Catalog

AC Motors

DRN63 – 315, DR2S56 – 225, DR2L71 – 225

Edition 03/2023

30590116/EN

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1 Introduction

1.1 What do we stand for?

For a reliable partnership!

Humanity and partnership, solutions and services, responsibility and quality, tradition and innovation: SEW-EURODRIVE, the owner-managed family business, has stood for all this and much more for more than 90 years.

As a market leader in drive and automation technology, we don't just power countless applications in virtually every industry. With over 20000 employees, we are also playing a key role in shaping the future of drive technology. For you. Ensuring you, your systems and machines are always at the cutting edge. Not just now, but in the future as well. We want you to succeed together with us.

1.2 Where can you find us?

We are always nearby!

Our 17 production plants and 88 Drive Technology Centers in 54 countries mean we are at your service on every continent and in every corner of the world, always working with you as an equal partner and ensuring everything runs smoothly.

What makes us truly stand out from other manufacturers? With our broad customer support and service network worldwide, you never have to wait long for spare parts, repairs or professional advice.

54	17	88	> 20000	Global service	Countless industries
Countries	Production plants	Drive Technology Centers	employees		

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1.3 What do we offer?

State-of-the-art drive technology and automation solutions from a single source!

Looking to modernize your processes or to construct a new system? We offer you one of the most extensive ranges of drive technology products, solutions, and services on the market. A single contact person for everything: that sounds good, doesn't it?

Gear units	Gearmotors	Motors	Industrial gear units	Decentralized drives/ mechatronics	Inverter technology	Servo drives
Industrial communication	Control technology	Software	Safety technology	Energy transfer/ power supply	Services	

From the very outset, our customers have been able to rely on our high quality, committed advice and support and fast delivery times. We offer a portfolio of modular solutions that are comprehensive and unique and meet every possible need.

- Perfect combination options and solutions for every application
- Energy efficiency up to IE5
- Quick and easy selection process and project planning
- Comprehensive portfolio – from drives and motors for continuous operation to high-precision servo drives
- Special designs in stainless steel, with explosion protection, or for electrified monorail systems
- Ideal solutions for every application
- Complete automation solutions for your machine or factory and many other areas

Independent of the project scope and the complexity of your requirements: We rise to the challenge, working with you to develop the perfect solution for you – including an all-round service package throughout your entire system life cycle on request.

Right now, predictive maintenance is one of the top service trends. Early diagnosis and end-to-end condition monitoring have been an essential part of our offering for many years. That's because one thing in particular matters to us – the satisfaction and trust of our customers. From planning and the operation phase all the way to modernization. Where necessary, we also take care of drives from other manufacturers.

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1.4 What are the goals we want to reach with you?

We want to take you to the top!

Nothing excites us more than the future of production. We are already using Industry 4.0 principles to transform our manufacturing operations. As far as we are concerned, Industry 4.0 ceased to be a distant vision long ago – it is already a successful reality thanks to our smart factory. As a result, we have become one of the world's pioneers in this field.

Yet we don't just focus on increasing our performance to ever greater levels. We also pass on to you the expertise, experience and technical solutions we have gathered in implementing Industry 4.0 in our production halls. Why not find out more?

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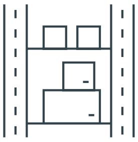
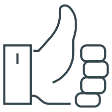
1.5 Why should you choose SEW-EURODRIVE?

Because these ten reasons speak for themselves:



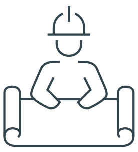
1. **You will be more flexible**

   However much the requirements for your processes and production systems increase, we're there for you every step of the way. With rapid conversions, short delivery times, enhanced capacity and faster format changeovers, we're at your side – from evaluating your needs and implementing an appropriate solution all the way to Life Cycle Services.



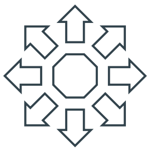
2. **You will be more satisfied**

   Our name stands for the best quality. But we do not rest on our laurels. Quite the contrary, in fact. To ensure we meet all standards – both ours and yours – we undergo annual testing, including certification processes. That's because only one thing matters to us – the satisfaction and trust of our customers.



3. **You will know more**

   We're happy to share with you the industry and application expertise we have gained over decades that extends far beyond drive technology areas. We work with you to plan and put into practice your tailored solutions in a process where you constantly evolve in tandem with us.



4. **You will be more sustainable**

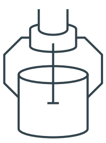
   We take responsibility for our employees, customers and business partners but also the environment in which we live and work. As a family business, we think in generations and always look beyond today and tomorrow. With us, you too can drive the future.

5. **You will be more successful**

   Like you, we cannot afford to stand still. We provide continuous training for our employees and customers. We constantly expand our horizons and enhance our products, solutions and services, and thus your processes. You can only continue to be successful in the future with optimized workflows.

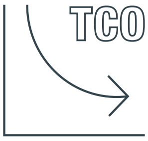
6. **You will be more energy efficient**

   We go out of our way to find new approaches and make our drives more efficient while always staying well ahead of international regulations. And, if you wish, we work with you to plan your systems and machines so that you can make the best possible use of energy recovery.



7. **You will be more innovative**

   What's the point of innovations if they remain out of your reach? We listen to you, which makes us fully aware of your future challenges, and we respond accordingly. With our approximately 800 researchers, we drive forward innovative technologies and help bring your processes up to date.

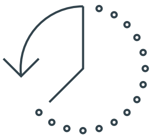


8. **You will save more money**

   With us, you can lower your overall operating costs. After all, it isn't just a matter of procurement expenses. Your TCO is significantly determined by the subsequent utilization and service life of your drive technology. We provide you with comprehensive advice on how to reduce your costs through sustainable operations.

9. **You will be close to us**

   Wherever in the world your system is running, our comprehensive service network and experts mean we're always ready to provide advice and practical assistance when you need it. All-in-one, on-site service that knows no bounds and significantly reduces or even eliminates downtimes.



10. **You will be faster**

    Throughout the world, our service staff ensure spare parts get to you fast, and faulty drives – including third-party products – are collected and repaired quickly. Software tools make engineering and startup easier for you. Services covering your entire system life cycle help make you faster and more efficient.

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1.6 Product names and trademarks

All product names included in this documentation are trademarks or registered trademarks of the respective titleholders.

1.7 Documentation

1.7.1 Contents of this publication

This catalog provides a detailed description of the following product groups offered by SEW-EURODRIVE:

- AC motors of the DRN.. series
- AC motors of the DR2.. series

1.7.2 Additional documentation

The following documents are available from SEW-EURODRIVE in addition to the present catalog:

- DR..56 – 315 AC motors
- Gearmotors DRN.. and DR2S..
- Asynchronous servo gearmotors
- Synchronous servomotors
- Synchronous servo gearmotors
- Geared torque motors
- Explosion-protected drives
- Explosion-protected AC motors
- "Project Planning for BE.. Brakes" manual – DR.., DRN.., DR2.., EDR.., EDRN.. AC Motors – Standard Brake/Safety Brake"

1.8 Recycling, reprocessing, reuse

SEW-EURODRIVE GmbH & Co KG strives to use as few new natural resources as possible in the production of its products. An important aspect of this is the circular economy with the recycling of materials as well as the inspection and/or reprocessing of returned components and their reuse in new products. SEW-EURODRIVE GmbH & Co KG only uses these processes if the resulting materials and components are of the same quality as new parts.

1.9 Copyright notice

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1.10 Decimal separator in numerical values

In this document, a period is used to indicate the decimal separator.

Example: 30.5 kg

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2 Product description

2.1 DRN../DR2.. AC Motors

Environmental protection and efficiently conserving valuable resources have gained importance in recent years. For this reason, numerous industrial nations have passed and will pass laws and regulations to stipulate binding minimum efficiency values. This especially applies to products with a considerable share in total energy consumption. The goal is to decrease the consumption of primary energy and simultaneously reduce CO_2 emissions.

The stricter legal requirements also affect AC asynchronous motors. We assume that the use of motors in accordance with the limit values of the international efficiency class IE3 will become mandatory in the largest target markets in the future.

There are no internationally consistent provisions for efficiency regulations with regard to affected products or approved exceptions in single countries or regions.

The highly dynamic nature and the varying international regulations require documentation that can be quickly updated. For this reason, SEW-EURODRIVE provides the latest information on "efficiency regulations" online via "www.sew-eurodrive.de/international-regulations" as well as via the Online Support under "Engineering & selection – Energy efficiency tools".

A broad range of approvals and certifications enables you to use DRN../DR2.. motors all over the world. In this context, the DRN../DR2.. global motors are particularly noteworthy as they can be used in almost any country in the world in the same design due to the wide voltage range and the numerous approvals. These characteristics reduce the effort regarding material management and storage and in this way save you a lot of money.

This catalog focuses on DRN../DR2.. stand-alone motors from SEW-EURODRIVE. Of course, you can also order all DRN../DR2.. motors as gearmotors from SEW-EURODRIVE. The gear unit can be connected directly to the motor or can be connected using an adapter. You can find more information in the SEW-EURODRIVE gearmotor catalogs.

This catalog describes how the motor can be ideally adapted to your requirements by choosing the required design or by enhancing it with various options.

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2.1.1 Product characteristics

DRN../DR2.. motors are AC asynchronous motors with an aluminum squirrel cage. They are designed for continuous duty (duty type S1). The single-speed DRN../DR2S.. motors are suitable for operation on the supply system as well as on the inverter (converter capable).

The series includes IE1 and IE3 AC motors in 50, 60 and 50/60 Hz in duty types S1, S3, and S9 that are available for the following power ratings, depending on the number of poles and size:

Series	Number of poles	Sizes	Power range
DR2S..	2	63MS – 80M	0.18 to 1.5 kW
	4	56M – 225M	0.09 to 45 kW
	6	63M – 80MK	0.09 to 0.75 kW
	4/2	63M – 80M	0.15/0.2 – 0.55/0.88 kW
	8/2	71M – 80M	0.44/0.2 – 0.22/0.9 kW
	8/2	71M – 80MS	0.1/0.18 – 0.22/0.4 kW
DRN..	2	63MS – 132S	0.18 to 7.5 kW
	4	63MS – 315H	0.12 to 225 kW
	6	63M – 160M	0.09 to 7.5 kW
	8	71MS – 180L	0.09 to 11 kW

DRN.. motors adhere to the limit values of energy efficiency class IE1 or NEMA Standard/Premium at 50 Hz and 60 Hz. The basic motor for determining the efficiency has degree of protection IP44. With regard to the size/power assignment, the series is based on IEC 60072 and/or EN 50347.

2.1.2 Brake

On request, SEW-EURODRIVE motors can be supplied with an electromechanical brake. It can be released mechanically if the design with manual brake release is selected accordingly. Up to 4 different brake sizes per power rating can be selected which allow the user a high degree of flexibility when choosing the right drive due to the possible braking torque configurations. On request, BE.. brakes from SEW-EURODRIVE can be ordered in a functionally safe version in accordance with ISO 13849.

For continuous monitoring of brake wear and brake function, SEW-EURODRIVE offers function and wear monitoring (/DUE option). It is a robust measuring system that is completely integrated into the drive. Thanks to the evaluation electronics used, it provides the user with real-time information about the condition of the brake.

For more information, refer to chapter "Brake" (→ 🗎 369).

2.1.3 Encoder

SEW-EURODRIVE offers compact mounting of incremental encoders and multi-turn absolute encoders without coupling in conjunction with the motors.

Various electrical and mechanical interfaces are available. Up to 8 different encoder mounting adapters are available for mounting customer-specific encoders. If space is limited, built-in encoders /EI.. allow for implementing compact drive solutions. They are entirely integrated into the motor and therefore do not add length to the motor. Both add-on encoders and the EI.. built-in encoder can be ordered in a functionally safe version in accordance with EN ISO 13849.

For further information, refer to chapter "Encoders" (→ 🗎 448).

2.1.4 Decentralized technology

AC motors from SEW-EURODRIVE with a rated power of up to 4 kW can be delivered with a MOVIMOT® MM..D inverter as an option. It is available in 2 variants: One variant is integrated into the terminal box and the other variant is mounted close to the motor and then connected to the motor. MOVIMOT® comes with numerous options as well as an extensive range of accessories. A functionally safe design for MOVIMOT® (according to EN ISO 13849) is also available.

Alternatively, AC motors from SEW-EURODRIVE in the power range between 0.09 and 3.0 kW can be delivered with the MOVI-SWITCH® motor starter with integrated switching and protection functions. The motor starter can either be mounted directly on the motor or close to the motor.

For further information, refer to chapter "AC motors with decentralized technology" (→ 🗎 484)

2.1.5 Digital motor integration with MOVILINK® DDI

For information on digital motor integration with MOVILINK® DDI, refer to chapter "Digital motor integration with MOVILINK® DDI" (→ 🗎 658).

2.2 Standards and regulations

SEW-EURODRIVE's AC motors comply with the IEC 60034/EN 60034 international series of product standards and also comply with other standards for special topics.

- **IEC 60034-1, EN 60034-1**

  Rotating electrical machines, rating and performance
- **IEC 60034-2-1, EN 60034-2-1**

  Rotating electrical machines, standard methods for determining losses and efficiency from tests
- **IEC 60034-5, EN 60034-5**

  Rotating electrical machines, degrees of protection provided by integral design of rotating electrical machines (IP code)
- **IEC 60034-7, EN 60034-7**

  Rotating electrical machines: Classification of types of construction, mounting arrangements and terminal box position (IM code)
- **IEC 60034-8, EN 60034-8**

  Rotating electrical machines: Terminal markings and direction of rotation
- **IEC 60034-9, EN 60034-9**

  Rotating electrical machines, noise limits
- **IEC 60034-11, EN 60034-11**

  Rotating electrical machines: Thermal protection
- **IEC 60034-12, EN 60034-12**

  Rotating electrical machines: Starting performance of single-speed three-phase cage induction motors
- **IEC 60034-14, EN 60034-14**

  Rotating electrical machines, mechanical vibrations
- **IEC 60034-18-41, EN 60034-18-41**

  Rotating electrical machines: Partial discharge free electrical insulation systems (Type I) used in rotating electrical machines fed from voltage converters - Qualification and quality control tests
- **IEC 60034-30-1, EN 60034-30-1**

  Rotating electrical machines, efficiency classes of line operated AC motors (IE code)
- **IEC 60072**

  Dimensions and output series for rotating electrical machines
- **EN 50347**

  General purpose three-phase induction motors having standard dimensions and outputs

In connection with terminal box:

- **EN 62444:2013**

  Cable glands for electrical installations (IEC 62444:2010, modified)

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In connection with functional safety:

- **EN ISO 13849-1**

  Safety of machines – Safety-related parts of control systems – Part 1: General design principles
- **EN ISO 12100**

  Safety of machines – Basic terminology, general design principles
- **EN 61800-5-2**

  Electrical power drive systems with adjustable speed – Part 5.2: Safety requirements – Functional safety

For international use, further standards are considered as well:

- **NEMA MG1**

  Motors and generators
- **UL 1004-1**

  Standard for rotating electrical machines – general requirements
- **CSA-C22.2 No. 100**

  Motors and generators
- **ABNT NBR 17094-1**

  Rotating electrical machines - inductance motors

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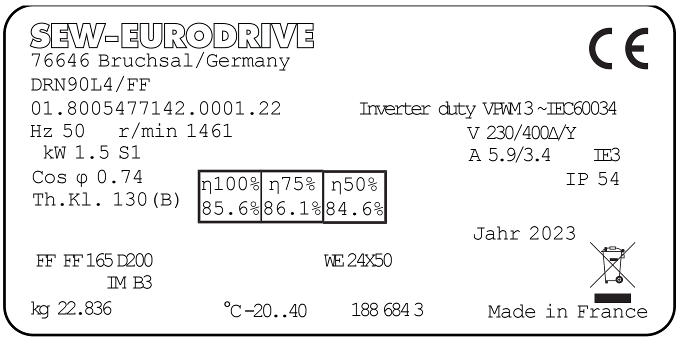
2.3 Rated data according to IEC 60034

Important data of an AC asynchronous motor:

- Size
- Number of poles
- Rated power
- Cyclic duration factor
- Rated speed
- Rated current
- Nominal voltage
- Rated frequency
- Power factor cosφ
- Degree of protection
- Thermal class
- Efficiency, energy efficiency class

This data is found on the nameplate of the motor, see the figure below. In accordance with IEC 60034-1, the nameplate data applies to a maximum ambient temperature of 40 °C and a maximum installation altitude of 1000 m above sea level.

Example of a nameplate with the specifications according to IEC and the additional identification for EU-Europe:



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2.4 Worldwide usability

The motors can be used in every country in the world.

Market access is contingent to approvals in many countries. Local laws, regulations and other market-specific requirements must be adhered to. SEW-EURODRIVE provides the latest information on efficiency regulations online via "https://www.sew-eurodrive.de/international-regulations/" as well as via the Online Support under "Engineering & selection – Energy efficiency tools" on the website "www.sew-eurodrive.com".

In many cases, an identification on the motor is required along with the certification. This identification is documented with one or several logos on the nameplate or additional labels on the motor.

2.4.1 Approvals and certifications for asynchronous motors

The requirements on the condition of asynchronous motors are different all around the world to guarantee safe and efficient operation. A distinction has to be made between statutory provisions (e.g. efficiency regulations) and voluntary measures (e.g. specific certifications for selected markets).

2.4.2 Approvals

Proof of compliance with normative and statutory requirements is required for evaluation of the conformity. In many countries, adherence to statutory minimum efficiency levels are mandatory.

In some regions, such as Europe, the conformity can be evaluated directly by the manufacturer. He assesses the suitability of the product and confirms the compliance with the specifications on his own responsibility. In some countries, this assessment has to be performed by an accredited conformity assessment body. The manufacturer has to request the approval from an independent third party.

Independent of the type of conformity assessment, SEW-EURODRIVE fulfills the approval requirements for asynchronous motors worldwide.

In most cases, the product approval or conformity has to be indicated on the product itself. The following chapters provide a selection of frequently used labels on the nameplates.

There are three general requirements for motors:

- Electrical and mechanical safety is largely regulated by the IEC 60034 series of standards.
- Efficiency, as defined in IEC 60034-30-1 and determined in IEC 60034-2-1.
- Explosion protection, the IEC 60079 series of standards applies.

The following table provides an overview of the most important additional national or market requirements for motors. Explosion protection is not taken into account here. For more information, refer to the "EDRN63 – EDRN315 ATEX and IECEx Explosion-Protected AC Motors" catalog. Following the table, the respective requirements are described in detail.

Country	Law/standard/regulation	Description	Identification on the nameplate
Australia/New Zealand	GEMS 2019	Registration of the motors/energy efficiency regulation	No further information

Country	Law/standard/regulation	Description	Identification on the nameplate
Brazil	Regulation Nº 4508	Product certification and factory certification	Advanced information on the nameplate
	Motor regulation Nº 1 ABNT 17094-1	Confirmation of efficiency	ENCE energy-saving label
China	CCC certification GB14711/CNCA-C04-01:2014	Small device specification Product certification and CCC factory certification	CCC marking
	GB 18613-2020 / CEL007-2021	Energy efficiency regulation Product registration	CEL efficiency label
Europe (EU)	2014/35/EU	Low Voltage Directive	CE marking
	2009/125/EC & (EU) 1781/2019 & (EU) 2021/341	Ecodesign guideline/energy efficiency regulation	
	2014/30/EU	EMC Directive Manufacturer's declarations of conformity	
Eurasian Economic Union Armenia, Belarus, Kazakhstan, Kyrgyz Republic, Russia	Technical Regulation TR CU 004/2011	Low Voltage Directive	EAC marking
	Technical Regulation TR CU 048/2019	Energy efficiency regulation Product certification and factory certification	
Great Britain	Electrical Equipment (Safety) Regulations 2016	Low Voltage Directive	UKCA marking
	The Ecodesign for Energy-Related Products Regulations 2021 & I.S. 2021 No. 745	Ecodesign guideline/energy efficiency regulation	
	Electromagnetic Compatibility Regulations 2016	EMC Directive Manufacturer's declarations of conformity	
India	IS12615	Energy efficiency regulation and additional requirements Product certification and factory certification	BIS marking
Japan	JIS 4034	Motor standard	Additional information on the nameplate
	JIS 4034-30	Efficiency	

Country	Law/standard/regulation	Description	Identification on the nameplate
Canada	CSA 22.2	Motor standard	CSA mark Additional information on the nameplate
	EER 2016	Energy efficiency regulation Product certification and factory certification	
Colombia	RETIQ	Efficiency	Advanced information on the nameplate URE label for the rational use of electrical energy
	RETIE	Electrical safety Product certification	
Morocco	N° 2573-14 (16.07.2015)	Low Voltage Directive	CMIM marking
	N° 2574-14 (16.07.2015)	EMC Directive Manufacturer's declarations of conformity	
Mexico	NOM-016-ENER-2016	Efficiency Product certification and factory certification	NOM mark Advanced information on the nameplate
Saudi Arabia	SASO-2893:2018	Efficiency Product certification	No further information
Switzerland	EnEV 730.02 (2020)	Energy efficiency regulation European directives adopted	CE marking
Singapore	Singapore’s Energy Conservation Act 2013	Energy efficiency regulation Product registration	No further information
South Korea	REELS 2017-61	Efficiency Product certification and factory certification	KEL efficiency label
Turkey	SGM:2021/16	Energy efficiency regulation European directives adopted	CE marking
Ukraine	CMU No.62-2013	Machinery Directive	UA.TR mark
	CMU No 1067-2015	Low Voltage Directive	
	CMU No 1077-2015	EMC Directive	
	CMU No 157-2019	Requirements for environmentally friendly design of electric motors	

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Country	Law/standard/regulation	Description	Identification on the nameplate
USA	EISA 2007/2014 DOE 10 CFR Part 431	Energy efficiency regulation	UR mark Additional information on the nameplate
	UL 1004-1	Proof of fire endurance based on recognized components Product specification and factory certification	
	NEMA MG1	Motor standard	

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Subsidies

There are various subsidies available in the different markets to promote the use of energy-efficient motors. For more information, contact SEW-EURODRIVE.

Europe, Switzerland, Turkey

General

By printing the CE marking on the nameplate, the manufacturer declares the conformity of the product with harmonized standards and applicable directives in the European Union (EU). Although the countries Switzerland and Turkey are not members of the EU, the EU specifications have been adopted for local laws. This means that the EU regulations are also applicable in these countries.

The declaration of conformity can be obtained from the manufacturer. It does not have to be included with the product upon delivery, i.e., when passing through customs.

Identification

CE

Directives

- Low Voltage Directive 2014/35/EU
- EMC Directive 2014/30/EU
- RoHS Directive 2011/65/EU
- Ecodesign Directive 2009/125/EC
- Machinery Directive 2006/42/EC

Motors whose CE conformity was declared in accordance with the Low Voltage Directive do not have to be declared in accordance with the Machinery Directive as well.

Efficiency requirements

Directive 2009/125/EC

The Ecodesign Directive 2009/125/EC establishes a framework to set mandatory ecological requirements for energy-using and energy-related products. It covers the following topics, among others:

- Regulation (EU) 2019/1781 and (EU) 2021/341 on AC asynchronous motors and frequency inverters
- Fans/ventilators in Regulation (EC) No. 327/2011
- Water pumps in Regulation (EC) No. 547/2012
- Wet rotor circulation pumps in Regulation (EC) No. 641/2009

Regulation (EU) 2019/1718 and (EU) 2021/341

The directives ((EU) 2019/1781 and (EU) 2021/341) define the placing of motors on the market within the European Community.

Motors with the following features are affected:

Induction motors without carbon brushes, commutators, slip rings or electrical rotor connections that are designed for operation with a sinusoidal voltage with a frequency of 50 Hz, 60 Hz, or 50/60 Hz and:

- 2, 4, 6, and 8-pole
- Power of 0.12 kW to 1000 kW
- Nominal voltage of more than 50 V and up to 1000 V
- Designed for continuous duty
- Line-capable motors

Valid from	Efficiency	Number of poles	Power range
July 01, 2021	IE2	2, 4, 6, 8	0.12 – < 0.75 kW
	IE3	2, 4, 6, 8	0.75 – 1000 kW
July 01, 2023	IE4	2, 4, 6	75 – 200 kW[1)].

1) Brakemotors and explosion-protected motors are excluded from the IE4 requirement

Exceptions

- Motors not on continuous duty
- Non-ventilated motors in accordance with IC Code 410 or TENV
- Motors, only for operation on frequency inverter
- Fully integrated motors
- Motors with integrated inverter
- Motors that are exclusively intended for operation under the following conditions:
  – Where ambient temperatures exceed 60 °C
  – Where ambient temperatures are less than -30 °C
  – Installation altitude of more than 4000 m above sea level

Motors for use in Europe, Switzerland, Turkey

Series	Number of poles	Sizes	Power range
DR2S..	4	56MR	0.09 kW
	6	63MQ	0.09 kW
DRN..	2	63MS – 132S	0.18 – 7.5 kW
	4	63MS – 315H	0.12 – 225 kW
	6	63M – 160M	0.09 – 7.5 kW
	8	71MS – 180L	0.09 – 11 kW

Switzerland

Switzerland adopts the energy-related Products Directive and its implementation regulations in Energy Ordinance EnEV 730.02 (2020).

This means that the EU rules must be directly applied in Switzerland.

Turkey

Turkey has published the valid rule (SGM:2021/16) for motors.

This is when the energy-related products directive and its implementation regulation ((EU) 2019/1781 and 2021/341) were adopted.

This means that the EU rules must be directly applied in Turkey.

Australia, New Zealand

General

Australia and New Zealand have harmonized the most important IEC standards for motors. This allows motors that meet the requirements of the IEC60034 series to be delivered and operated.

The minimum efficiency (MEPS – Minimum Efficiency Performance Standard) stipulated by law both in Australia and New Zealand took effect on April 1, 2006 in Australia and on June 1, 2006 in New Zealand.

In Australia, the revised legislation of the "Greenhouse and Energy Minimum Standards Act 2012" (GEMS Act) applies. The requirements for motors are described in the current "Greenhouse and Energy Minimum Standards (Three Phase Cage Induction Motors) Determination 2019".

In New Zealand, the "Energy Efficiency (Energy Using Products) Regulations 2002" apply. The requirements for motors are described in the current Australian "Greenhouse and Energy Minimum Standards (Three Phase Cage Induction Motors) Determination 2019".

Motors that are operated in Australia or New Zealand and are subject to the following efficiency requirements must be registered.

The DRN.. motors from SEW-EURODRIVE meet the legal requirements and have been registered by the authorization agency.

The overview of permitted motors can be found online by selecting "SEW-EURODRIVE" under the following link: "https://www.energyrating.gov.au/products/electric-motors".

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Identification

There is no special identification obligation. The identification according to IEC 60034-1 applies.

Efficiency requirements

The requirements apply to 2-, 4-, 6- and 8-pole motors from 0.73 kW to 185 kW with a nominal voltage of up to AC 1100 V. The requirements define the numerical values and measuring methods of the efficiency.

The minimum efficiency corresponds to the values of IE2 (High Efficiency) from IEC 60034-30-1. The Australian/New Zealand high efficiencies correspond to the IE3 (Premium Efficiency) values of the IEC standard.

Exceptions

The regulations exclude the following motors:

- Indivisible gearmotors. This means SPIROPLAN® W10/20/30 gearmotors (also WA.., WF.., WAF..) with motors up to 1.5 kW in the DR2S.. design can be provided in compliance with regulations.
- Motors with 2 or more fixed speeds: Pole-changing motors DRS.., DR2S.. are excluded.
- Motors in S2 short-time duty
- Motors only intended for operation on a frequency inverter:asynchronous servomotors DRL..
- DRK.. single-phase motors with running capacitor

Information

In Australia and New Zealand, the IE2 motors are considered the standard design. The advanced IE3 motors (premium efficiency) are "high-efficiency".

The voltage level 3 × 415 V, 50 Hz has already been adapted to 3 × 400 V, -6%/ +10%, 50 Hz throughout the most parts of these countries.

Motors with integrated MOVIMOT® frequency inverters are subject to the regulations regarding efficiency

Applicable motors

Series	Number of poles	Sizes	Power range
DR2S..	2	63MS – 71M	0.18 – 0.55 kW
	4	56M – 71M	0.09 – 0.55 kW
	6	63M – 80MK	0.09 – 0.55 kW
DRN..	2	63MS – 132S	0.18 – 7.5 kW
	4	63MS – 315H	0.12 – 225 kW
	6	63M – 160M	0.09 – 7.5 kW
	8	71MS – 180L	0.09 – 11 kW

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Brazil

General

Market access in Brazil requires two primary features for use or export:

- Motors that meet the requirements of the Brazilian standard for rotating electrical machines ABNT NBR 17091-1 are delivered and operated.
- The requirements for efficiency and the associated certification and labeling obligation with the ENCE label.

Motor certification is carried out by INMETRO. INMETRO (Instituto Nacional de Metrologia, Qualidade e Tecnologia) is the National Institute of Metrology, Quality and Technology of Brazil.

ENCE stands for the national energy conservation label (Etiqueta Nacional de Conservação de Energia).

Directives/standards/laws

With the passing of Law no.10.295 in 2001, the Brazilian government established the legal basis for Decree no. 4.508, no. 533 and no. 1.

Decree no. 4.508 requires the use of the ENCE label and describes the certification process.

Decree no. 1 is an addendum to Decree no. 4.508 and stipulates that, as of July 1, 2019, only motors with energy efficiency class IR3 Premium may be produced in Brazil or may be imported into Brazil.

The required efficiencies IR3 according to the Brazilian motor standard ABNT NBR 17094-1 largely correspond to the efficiencies according to IEC 60034-30 efficiency class IE3.

Deviations from the efficiencies according to IEC 60034-30 are regulated by motor standard ABNT NBR 17094-1 and motor regulation no. 1.

Identification

Brazil's motor standard ABNT NBR 17094-1 requires information on the nameplate in addition to the information required by motor standard IEC 60034-1:

- Starting current ratio I_a/I_n
- Bearing sizes on the A side and B side
- Directions of rotation upon delivery with backstop
- Wiring diagrams

The certification does not issue a certificate. This is only the permission to use the ENCE label and to assign a registration number to each motor series.

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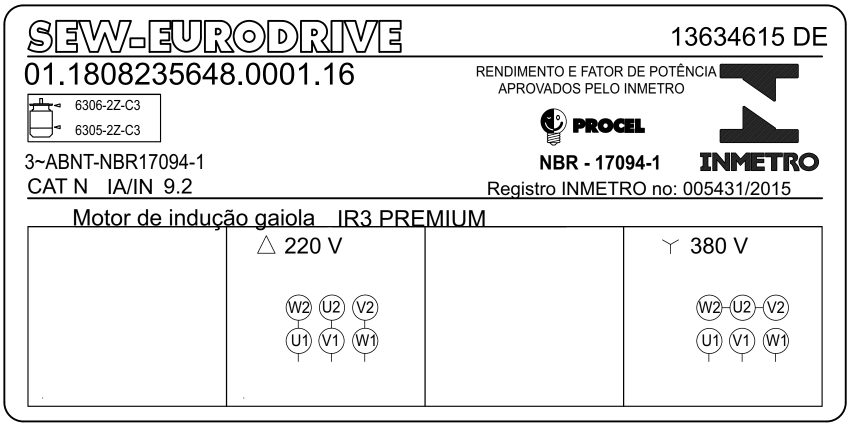
SEW-EURODRIVE may place this information on a second motor nameplate.



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Efficiency requirements

Motors with the following features are affected:

- AC induction motor with squirrel-cage rotor
- 2, 4, 6, and 8-pole
- Power of 0.12 kW to 370 kW
- Voltages of up to 600 V
- Frequencies 60 Hz and 50/60 Hz
- Operating modes S1
- Energy efficiency class IR3

Exceptions

- Gearmotors indivisibly mounted directly on the motor without motor flange
- Only intended for operation on a frequency inverter (asynchronous servomotors).
- Motors with integrated MOVIMOT® frequency inverter
- Motors that are not designed for continuous duty
- Explosion-protected motors with equipment protection level Gb, Gc, Db and Dc

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Applicable motors

The following table shows the DRN.. motors certified by INMETRO (NBR 17094-1) (IR3):

Series	Number of poles	Sizes	Power range
DR2S..	4	56M	0.09 kW
	6	63M	0.09 kW
DRN..	2	63MS – 132S	0.18 to 7.5 kW
	4	63MS – 315H	0.12 to 225 kW
	6	63M – 160M	0.09 to 7.5 kW
	8	71MS – 180L	0.09 to 11 kW

India

General

In January 2017, the Gazette of India made the requirements on the efficiency and quality of motors mandatory with regulation S.O. 178(E).

The requirements in terms of efficiency and starting behavior of asynchronous motors with squirrel-cage rotors is described in IS12615:2018. IS12615 is based on IEC 60034-30-1:2014.

As of January 1, 2018, all motors to which the following conditions apply must meet the requirements of at least energy efficiency class IE2.

The Indian standard IS12615 contains additional requirements regarding the motor. The most important of these relate to starting torque, starting current, speed at 100% load, current at 100% load, size-to-power relationship and greater permitted tolerance in terms of current and frequency.

Identification

According to the specifications of the BIS (Bureau of Indian Standards), the motors must be certified by a test laboratory approved by BIS. The manufacturing plants are audited and certified by BIS.

The motors must bear the BIS certification logo, the IS standard and the registration number of the manufacturing plant.

IS 12615

CM/L-6700064313

Efficiency requirements

Standard IS 12615:2018 relates to single-speed three-phase 50 Hz asynchronous motors with squirrel cage rotors with

- Nominal power from 0.12 kW to 1000 kW in size 56 and larger
- 2-, 4-, 6- and 8-pole
- Nominal voltage of 1000 V, with a nominal frequency of 50 Hz incl. 50/60 Hz
- Continuous duty with duty type S1, motors with duty type S2 and above (S3, S4, etc.) need an equivalent S1 identification and are therefore also affected.
- Line operation and inverter operation
- Ambient temperature range of -20 °C to +60 °C (previously up to +40 °C)
- Installation altitude up to 4000 m (previously up to 1000 m)
- Motors with and without service factor (SEW motors with design specification for India have no S.F.)
- Gearmotors or motors with deviating dimensions
- Efficiency classes IE2, IE3, and IE4
- The preferred type of cooling is self-cooled in accordance with IC411. Motors with forced air cooling in accordance with IC416 are also affected. The IC511 and 611 types of cooling listed in the standard are not relevant to SEW-EURODRIVE.

Exceptions

Motors with the following properties are not covered by IS12615 or are excluded and therefore do not require identification.

- Motors with power ratings of less than 0.12 kW
- W10, 20 and 30 SPIROPLAN® gearmotors because there is no LIA flange here
- Non-ventilated motors (DAS.., DR.. /UL, DR../OL)
- Synchronous motors (CM.. MOVIGEAR®, DRC..)
- DRL.. motors because the identification does not include 50 Hz
- DRM.. motors because they are 12-pole
- DRK.. motors because they are single-phase
- Pole-changing motors
- Explosion-protected motors

Information

The Indian standard IS12615 requires an extended routine test for each motor and only allows certified plants to mount motors.

Applicable motors

Series	Number of poles	Sizes	Power range
DRN..	2	63MS – 132S	0.18 to 7.5 kW
	4	63MS – 315H	0.12 to 200 kW
	6	63M – 160M	0.09 to 7.5 kW
	8	71MS – 80M	0.09 to 11 kW

The following are not available:

- Motors with operating modes other than S1 as the identification must be equivalent to S1, including efficiency and IE class
- Motors with forced cooling fan whereby the power rating of the forced cooling fan motor is greater than or equal to 0.12 kW

Japan

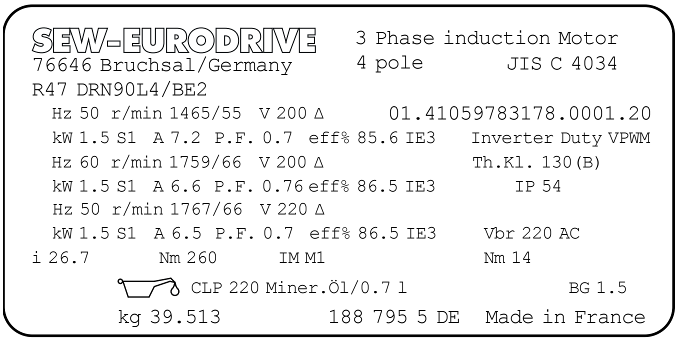
General

The Top Runner program has been the approach to standards on energy efficiency in Japan since 1998. Asynchronous motors were added to the Top Runner program on April 1, 2015.

At this point, all motors meeting these conditions will have to operate at the efficiency stated in the Top Runner program.

Identification

The information on the nameplate has been adjusted according to the Japanese regulations.



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Directives/standards/laws

Japan has harmonized international IEC 60034 to JIS C 4034. This allows motors that meet the requirements of the IEC 60034 series to be delivered and operated.

Efficiency requirements

The required efficiencies under Japanese standard JIS C 4034-30:2011 correspond to the efficiencies under IEC 60034-30-1: 2008 efficiency class IE3.

Motors with the following features are affected:

- 2-, 4- and 6-pole three-phase asynchronous motors from 0,75 kW to 375 kW
- Voltages below 1000 V
- Frequencies 50 Hz, 60 Hz and 50/60 Hz
- S1 or S3 duty types above 80%

Exceptions

- Not affected are motors for use in potentially explosive areas as well as motors only intended for operation on a frequency inverter (asynchronous servomotors).

Information

The design specification was extended for Japan to include Japanese energy efficiency regulations and the local power grids. DRN.. motors with Japanese design specification are always motors with 3 voltages and 2 frequencies. The following combinations are available:

- 200 V/50 Hz / 200 V/60 Hz / 220 V/60 Hz
- 400 V/50 Hz / 400 V/60 Hz / 440 V/60 Hz

The motors are always in a delta connection in the R13 wiring diagram. This also makes star-delta starting possible.

The energy efficiency class corresponds to IE3, although Japanese regulations have reduced the efficiency at 200 V/60 Hz and 400 V/60 Hz, so it is not directly comparable to the international IE3 efficiency requirements. Nevertheless, Japan still uses IE3. The nameplate has been modified to meet Japanese requirements.

Applicable motors

Motors with 3 voltages and 2 frequencies

Series	Number of poles	Size	Power range
DRN..	2	63MS – 132S	0.18 to 7.5 kW
	4	63MS – 280M	0.12 to 90 kW
	6	63M – 160M	0.09 to 7.5 kW

Motors with 50 or 60 Hz or 50/60 Hz

Series	Number of poles	Size	Power range
DR2S..	2	63MSR – 71MR	0.09 to 0.55 kW
	4	56MR – 71M	0.09 to 0.55 kW
	6	63MQ – 80MK	0.09 to 0.55 kW
DRN..	2	63MS – 132S	0.18 to 7.5 kW
	4	63MS – 315H	0.12 to 200 kW
	6	63M – 160M	0.09 to 7.5 kW
	8	71MS – 180L	0.09 to 11 kW

Canada

General

Market access in Canada requires two primary features for use or export. These are listed under directives/standards/laws.

Identification

Other additional markings include:

- Permitted temperature range
- Design letter

If a drive is not affected by the efficiency requirement, only one CSA logo is required. The logo shown here describes the CSA Energy Verified logo.

Directives/standards/laws

- CSA approval (CSA = Canadian Standard Association)
- EER 2016 (EER = Energy Efficiency Regulations)

Manufacturers of AC motors must obtain approval and certification from the CSA.

The designs of the motor series can be ordered certified with the CSA mark on the nameplate.

Efficiency requirements

Energy Efficiency Regulations (EER)

The Canadian legal requirements (EER = Energy Efficiency Regulations) for minimum efficiency from 1997 were modified and renewed in 2016. They were published in the Canada Gazette in April 2016. As of June 2016, the minimum efficiency level for AC motors was increased to premium level (IE3). This applies to the following motors:

Valid from	Efficiency	Number of poles	Power range
June 01, 2016	NEMA Premium/ IE3	2, 4	0.75 to 375 kW 1 – 500 hp
	NEMA Premium/ IE3	6	0.75 to 260 kW 1 – 350 hp
	NEMA Premium/ IE3	8	0.75 to 185 kW 1 – 250 hp

The motor can only pass through Canadian customs with the CSA or CSA Energy Verified mark on the nameplate. The CSA or CSA Energy Verified certificate is not included with the drive, since Canadian customs can view the certificate on the CSA website by entering the registration number MC170602. The MC number can be found on the nameplate next to the CSA mark. The overview of permitted motors can be found online by selecting "SEW-EURODRIVE" under the following link:

www.csagroup.org/services-industries/product-listing/

Exceptions

- Motors not on continuous duty
- Motors that are designed and marked for inverter operation (DRL..; DR2S.. in S9)
- Single-phase motors (DRK..)
- Motors operated at idle state (DRM..)

Information

CSA approval for motors is limited to a maximum ambient temperature of 40 °C. Use above +40 °C is only possible with the configured output reduction. However, in these instances the nameplate only shows the maximum temperature of 40 °C at full power.

Applicable motors

Series	Number of poles	Sizes	Power range
DR2S..	2	63MS – 71M	0.18 – 0.55 kW/0.25 – 0.75 hp
	4	56MR – 71M	0.09 – 0.55 kW/0.12 – 0.75 hp
	6	63MQ – 80MK	0.09 – 0.55 kW/0.12 – 0.75 hp
DRN..	2	63MS – 132S	0.18 – 7.5 kW/0.25 – 10 hp
	4	63MS – 315H	0.12 – 225 kW/0.16 – 300 hp
	6	63M – 160M	0.09 – 7.5 kW/0.12 – 10 hp
	8	71MSR – 180L	0.09 – 11 kW/0.12 – 15 hp

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Colombia

General

Market access in Colombia requires two primary features for use or export:

- RETIE (Reglamento Técnico de Instalaciones Eléctricas) - technical regulation for electrical installation.
- RETIQ (Reglamento Técnico de Etiquetado) - technical regulation for identification.

Directives/standards/laws

The RETIE (technical regulation for electrical installations) has been in force since 2004. The current edition of 2013 was introduced by resolution No. 90708 and supplemented by resolution 90795.

Requirements on motors are described in section 20.21 and comply with the IEC 60034-1.

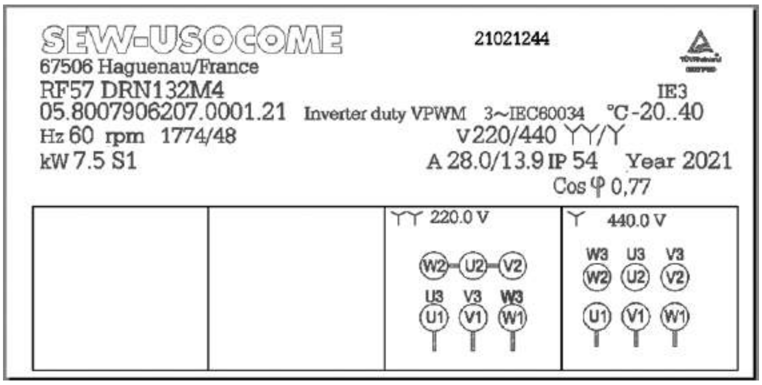
The introduction of decision No. 41012 of 2015, RETIQ (technical regulation for marking) also comes into force, which also makes the labeling of motors and other devices mandatory.

The requirements for the minimum efficiency class for motors have been tightened regularly since 2016. The last tightening took place in August 2021.

Identification

The marking according to the RETIE and the additional URE (label for the rational use of electrical energy / Etiqueta para el uso racional de energía eléctrica) apply.

According to RETIE, the wiring diagram of the motor is also mandatory; SEW-EURODRIVE may place the wiring diagram on a 2nd nameplate on the motor.



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Efficiency requirements

Motors with the following features are affected:

- AC motors
- 2, 4, 6, and 8-pole
- Voltages of up to 600 V
- Frequencies 60 Hz and 50/60 Hz
- Operating modes S1
- Power of 0.18 kW to 0.55 kW
  – Energy efficiency class IE2
- Power ratings of 0.75 to 375 kW
  – Energy efficiency class IE3

Exceptions

- Motors only intended for operation on a frequency inverter (asynchronous servomotors).
- Motors with integrated MOVIMOT® frequency inverter

Applicable motors

Series	Number of poles	Sizes	Power range
DR2S..	4	56M – 63MS	0.09 to 0.12 kW
	6	63M	0.09 to 0.12 kW
DRN..	2	63MS – 132S	0.18 to 7.5 kW
	4	63MS – 315H	0.12 to 225 kW
	6	63M – 160M	0.09 to 7.5 kW
	8	71MS – 180L	0.09 to 11 kW

Morocco

General

There are new technical regulations for electrical products in Morocco. The new requirement is a safety regulation which applies as a result of Moroccan law no. 24.09 coming into force. It includes the Low Voltage Directive No. 2573-14 (Basse Tension) &the EMC Directive No. 2574-14 (Compatibilité Electromagnétique). The Moroccan directives are along the lines of the European Low Voltage (LVD) and Electromagnetic Compatibility (EMC) directives.

The basis for Morocco's new economic orientation is the current economic plan "Morocco_2025", which is strongly focused by the Moroccan government. In addition, the introduction of the CMIM label and the legally required marking will further raise quality and safety standards. The most stringent requirements of the European standards and guidelines already existed for all previously imported CE-marked products. They did not apply in full for unmarked products.

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Identification

Directives/standards/laws

- Law no. 24.09 (art.7)
- Low Voltage Directive (Basse Tension N°2573-14)
- EMC Directive (Compatibilité Electromagnétique N°2574-14)

Efficiency requirements

No efficiency requirements are currently in force for Morocco.

Exceptions

- Explosion-protected motors

Applicable motors

Series	Number of poles	Sizes	Power range
DR2S..	2	63MSR – 80M	0.18 to 1.5 kW
	4	56MR – 225S	0.09 to 45 kW
	6	63MQ – 80M	0.09 to 0.75 kW
DRN..	2	63MS – 132S	0.18 to 7.5 kW
	4	63MS – 315H	0.12 to 225 kW
	6	63M – 160M	0.09 to 7.5 kW
	8	71MS – 180L	0.09 to 11 kW

Mexico

General

For delivery to Mexico as well as for local provision, AC motors must meet the requirements of the Mexican standard NOM-016-ENER-2016 (energy efficiency for induction, squirrel-cage, AC motors; limit values, test procedures and identification).

Directives/standards/laws

The Mexican government has issued the official Mexican standard NOM-016-ENER-2016 to increase efficiency in the energy sector.

The motors must be tested. Successfully tested motors will receive a certificate and can be marked accordingly with NOM. The certificates are issued following annually recurring type tests.

Identification

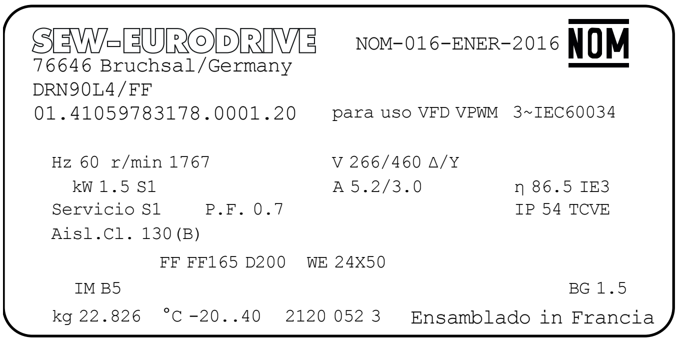
The nameplate must be written completely in Spanish and, in addition to IEC-60034-1, contain the following details:

- Designation of NOM-016-ENER-2016
- Designation of the degree of protection
  - TCVE – Totalmente cerrado con ventilación exterior

    Based on the English term TEFC – totally enclosed, fan-cooled
  - TCVF – Totalmente cerrado con ventilación forzada

    Based on the English term TEBC – totally enclosed, blower-cooled
- Official NOM logo

NOM



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Efficiency requirements

Motors with the following features are affected:

- AC, asynchronous, induction motors with squirrel-cage rotor
- 2, 4, 6, and 8-pole
- Voltages of up to 600 V
- Frequencies 60 Hz and 50/60 Hz
- Continuous duty
- Power ratings of 0,746 to 373 kW
- Energy efficiency class IE3

Exceptions

- Motors only intended for operation on a frequency inverter (asynchronous servo-motors).
- Motors with integrated MOVIMOT® frequency inverter

Motors that can be used

Series	Number of poles	Size	Power range
DR2S..	2	63MS – 71M	0.18 to 0.55 kW
	4	56M – 71M	0.09 to 0.55 kW
	6	63M – 80MK	0.09 to 0.55 kW
DRN..	2	63MS – 132S	0.18 to 7.5 kW
	4	63MS – 315H	0.12 to 225 kW
	6	63M – 160M	0.09 to 7.5 kW
	8	71MS – 180L	0.09 to 11 kW

Russia, Kazakhstan, Belarus, Armenia, Kyrgyzstan

General

The following must be observed to access the market in the Eurasian Economic Union, the customs union between Russia, Belarus, Kazakhstan, Armenia, and Kyrgyzstan:

Motors marketed in countries of the Eurasian Economic Union after March 15, 2015 must bear the EAC mark (Eurasian Conformity), similar to the European CE mark.

With the EAC mark, manufacturers and suppliers confirm that a product has undergone a conformity process and meets the specified technical requirements. Conformity is issued by an authorized certifying body.

The requirements for the conformity evaluation procedure are set forth in the technical regulations of the Customs Union (TR CU). These regulations refer to standards that must be applied for a manufacturer to meet the requirements.

In 2019, the new Technical Regulation 048/2019, which stipulates a minimum efficiency for motors, has been published.

Identification

EAC

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Directives/standards/laws

Technical regulation (TR) of the Eurasian Customs Union	Comparable with the European Directive	Affected products from SEW-EURODRIVE
Technical Regulation Customs Union TR CU 004/2011: Safety of low-voltage equipment	Low Voltage Directive 2014/35/EU	Motors, gearmotors
Technical Regulation Customs Union TR CU 020/2011: Electromagnetic compatibility of technical equipment (EMC)	EMC Directive 2014/30/EU	Motors, gearmotors, frequency inverters
Technical Regulation on Energy Efficiency Requirements for Energy-Consuming Devices – TR CU 048/2019	Requirements for environmentally friendly design of electric motors, Directive 2005/32/EC	Motors, gearmotors

Efficiency requirements

Technical regulation 048/2019 "Technical Regulation on Energy Efficiency Requirements for Energy Consuming Devices" is expected to come into effect on September 01, 2025 at the current time.

Induction motors without carbon brushes, commutators, slip rings or electrical rotor connections that are designed for operation with a sinusoidal voltage with a frequency of 50 Hz or 50/60 Hz.

- 2, 4, 6, and 6-pole
- Power of 0.75 kW to 375 kW
- Nominal voltage of more than 50 V and up to 1000 V
- Designed for continuous duty

Expected as of	Efficiency	Number of poles	Power range
September 01, 2025	IE2	2, 4, 6	0.75 to 375 kW
September 01, 2027	IE2	2, 4, 6	0.75 – < 7.5 kW
	IE3	2, 4, 6	7.5 to 375 kW
September 01, 2029	IE3	2, 4, 6	0.75 to 375 kW

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Exceptions

- Motors not on continuous duty
- Fully integrated motors
- IE2 line-operated motors with frequency inverter
- Motors that are exclusively intended for operation under the following conditions:
  – Where ambient temperatures exceed 60 °C
  – At ambient temperatures below -30 °C or 0 °C for water-cooled motors
  – Installation altitude of more than 4000 m above sea level

Motors that can be used

Series	Number of poles	Size	Power range
DR2S..	2	63MSR – 132M	0.18 to 9.2 kW
	4	56MR – 225S	0.09 to 45 kW
	6	63MQ – 160M	0.09 to 7.5 kW
DRN..	2	63MS – 132S	0.18 to 7.5 kW
	4	63MS – 315H	0.12 to 225 kW
	6	63M – 160M	0.09 to 7.5 kW
	8	71MS – 180L	0.09 to 11 kW

Saudi Arabia

General

In Saudi Arabia, local regulations include requirements for efficiency requirements, import regulations, and a low voltage directive.

The requirements for the motors are defined by the Saudi Standards, Metrology and Quality Organization (SASO), the technical government authority in Saudi Arabia.

When importing to Saudi Arabia, observe the following aspects (among other aspects):

- Energy guidelines for motors, known as Energy Efficiency Registration/Label (EER/EEL), which are described in standard SASO-2893:2018
- Low Voltage Directive GSO BD-142004-01

Identification

Attaching a logo or other marking according to SASO to the nameplate is not permitted. The EER/EEL is only confirmed in the order documentation with the motor-specific SASO license no.

Efficiency requirements

Single-speed, three-phase 60 Hz asynchronous motors with the following characteristics are affected by SASO-2893:2018 and therefore require EER/EEL:

- Nominal power of 0.75 kW to 375 kW
- Nominal voltage of 50 V to 1000 V,
- 2-, 4-, 6-, and 8-pole
- Continuous duty with duty type S1 (>S3/75%)
- Ambient temperature of -20 °C to +60 °C
- Installation altitude of up to 4000 m,
- 50 Hz and/or 60 Hz
- Motors that are designed for operation on the inverter

  Motors with integrated frequency inverters (compact drives) only come under this standard if the motor can be tested separately from the inverter. For this reason, motors starting at 0.75 kW with a MOVIMOT® included must comply with energy efficiency class IE3.

Exceptions

- Motors that are fully integrated into a product (e.g. a pump, fan, or compressor) and that cannot be tested independently of this product.
- Motors specially designed for operation in potentially explosive environments in accordance with IEC 60079-0.
- Motors with cooling by relative motion according to IC 418 or TEAO (Totally Enclosed Air Over)

Unaffected products

The following products are not affected and are therefore deliverable without restrictions:

- All motors with nominal motor power of < 0.75 kW
- DRM../DR2M.. (motors with special motor characteristics)
- DRL../DR2L.. (not marked with 60 Hz and power)
- DRU..J/DRU..J/MM (since they are synchronous motors)
- DRC.., CM.., CMP.., CM3C, etc. (since they are synchronous motors)
- MOVIGEAR® (since synchronous motors)
- Pole-changing motors
- Motors with operating mode ≤ S3/75%
- EDRN.. explosion-protected motors

Low Voltage Directive

The Low Voltage Directive BD-142004-01, published by the GCC Standardization Organization (GSO), currently only applies to motors/gearmotors beginning with customs tariff number 85015xxxxxxx.

In most cases, compliance with the requirements of the directive can be confirmed by a type test. Please contact us if necessary.

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Applicable motors

Series	Number of poles	Sizes	Power range
DRN..	2	63MS – 100LM 132S	0.18 – 3 kW 5.5 kW
	4	63MS – 250ME 315ME	0.12 – 55 kW 132 kW
	6	63M – 71M 132S	0.09 to 0.55 kW 3 kw

If a motor is not listed, please contact us.

Non-ventilated motors cannot be delivered. These require EEL/EER, but have not been registered:

- DRN.. /U or /OL as well as
- DAS..

Switzerland

Switzerland adopts the energy-related Products Directive and its implementation regulations in Energy Ordinance EnEV 730.02 (2020). For motors, this is valid from July 2021.

This means that the EU rules must be directly applied in Switzerland.

Singapore

General

As part of "Singapore's Energy Conservation Act 2013", the NEA – National Environment Agency of Singapore was introduce the minimum efficiency requirement for motors with effect from October 1, 2018. This was announced internationally in August 2017 in statement SGP38.

The DRN.. motors from SEW-EURODRIVE meet the legal requirements and have been registered by the authorization agency.

You can find an overview of the approved motors on the Internet by selecting the product "3-Phase Induction Motor" and the company name "SEW-EURODRIVE":

https://e-services.nea.gov.sg/els/Pages/Search/PublicSearchProduct.aspx?param=goods&type=p

Identification

There is no special identification obligation. The identification according to IEC 60034 applies.

Directives/standards/laws

- Singapore's Energy Conservation Act 2013

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Efficiency requirements

This regulation affects single-speed, 3-phase 50 Hz and 50/60 Hz asynchronous motors with squirrel-cage rotor that are dimensioned for continuous duty.

- 2-, 4-, and 6-pole
- Power: 0.75 kW – 375 kW
- Maximum nominal voltage of 1000 V
- Operating modes: S1, S3 > 80%, S6 and S9, acc. to IEC 60034-1:2017
- Line-powered motors and line-powered motors with frequency inverter

Exceptions

- Motors dimensioned and specified for operation where they are fully immersed in liquid;
- Motors that can only be operated in combination with an integrated drive unit:
  - With common components (without joints such as screws)
  - Where the motor is deactivated if separated from the drive unit (W10.., W20.., and W30 gear units, gear unit housing with integrated motor A-side bearing)
- Specially dimensioned motors that are exclusively specified for the following operating conditions:
  - Where ambient temperatures exceed 60 °C;
  - Maximum ambient temperature above 400 °C;
  - Where ambient temperatures are less than -30 °C or
  - At cooling liquid temperatures of below 0 °C or above 32 °C at the time it enters the product;
  - In atmospheres that can become explosive due to local or operational conditions (EX motors)
- Motors with an electromechanic brake unit that works on the motor shaft without coupling (DR2S.. with brake)
- Pole-changing (DR2S..)
- Motors with high slip (often at or near 100%) that are mainly designed for generating torque (DRM..)
- Motors that are intended for export to another country

Information

Motor manufacturers must register themselves and their motors at NEA.

SEW-EURODRIVE has registered the necessary DRN.. motors in Singapore.

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Motors that can be used

Series	Number of poles	Size	Power range
DR2S..	2	63MSR – 71MR	0.18 to 0.55 kW
	4	56MR – 71M	0.09 to 0.55 kW
	6	63MQ – 80MK	0.09 to 0.55 kW
DRN..	2	63MS – 132S	0.18 to 7.5 kW
	4	63MS – 315H	0.12 to 200 kW
	6	63M – 160M	0.09 to 7.5 kW
	8	71MS – 180L	0.09 to 11 kW

South Korea

General

South Korea has harmonized the most important IEC standards for motors. This allows motors that meet the requirements of the IEC 60034 series to be delivered and operated.

In South Korea, minimum efficiency requirements are laid down in article 15 of the "Designation of machinery and materials subject to efficiency management" and article 16 "Post management of machinery and materials subject to efficiency management" of the "Rational Energy Utilization Act".

The affected products are described in the "Regulation on Energy Efficiency Labeling and Standards" (REELS) of the Ministry of Economy "Ministry of Knowledge Economy" (MKE).

Motors that fall under the efficiency regulation and are operated in South Korea must be tested by Korean laboratories. After applying to the Korea Energy Management Corporation (KEMCO), they will be registered on a freely accessible page.

The DRN.. motors from SEW-EURODRIVE meet the legal requirements and have been registered by the authorization agency.

The overview of permitted motors can be found online by selecting "SEW-EURODRIVE" under the following link: "http://www.kemco.or.kr".

Efficiency requirements

In South Korea, AC motors must meet the requirements under REELS (Regulation of Energy Efficiency and Labeling Standard). These motors must adhere to energy efficiency class IE3. Korea has harmonized IEC 60034-30-1 and IEC 60034-2-1.

Single-speed three-phase asynchronous motors are affected:

- Nominal voltage of up to 600 V
- 2- and 8-pole 0.75 kW to 200 kW
- 4- and 6-pole 0.75 kW to 375 kW
- Ambient temperature up to 40 °C
- Line-powered motors and motors with frequency inverter

Exceptions

The regulations exclude the following motors:

- Motors with 2 or more fixed speeds: Pole-changing motors DRS.., DR2S.. are excluded.

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- Directly mounted gearmotors with no coupling between motor and gearmotors. This means SPIROPLAN® W10/20/30 gearmotors (also WA.., WF.., WAF..) with motors from 0.75 kW to 1.5 kW in the DR2S.. design can be provided in compliance with regulations.
- Motors in S2 short-time duty
- Motors only intended for operation on a frequency inverter (asynchronous servomotors DRL.., DR2L..)
- DRK.. single-phase motors with running capacitor
- Non-ventilated motors (TENV, TEAO)

Identification

The identification according to IEC 60034-1 and the additional Korea Energy Label (KEL) apply.

This label contains the following information:

- The KC logo (Korean Certification)
- Type designation
- Number of poles
- Nominal power
- Efficiency
- Conversion into CO_2 g/a
- Monetary equivalent in South Korean won

Motors that require KEL but are operated in or under "abnormal" conditions receive the NON-KEL label. This is the case if one of the following conditions is met:

- Operation at ambient temperatures below -15 °C
- Operation at ambient temperature exceeding 50 °C
- Operation at installation altitudes above 1000 m

Example: A DRN90L4 motor with T = -20 °C to +40 °C requires and receives KEL certification. However, the same motor with a temperate range of T = -20 to +60 °C receives the NON-KEL label.

Information

Motors with integrated MOVIMOT® frequency inverters are subject to the regulations regarding efficiency

In South Korea, there are voltage grids with 380 V/60 Hz and 440 V/60 Hz.

Applicable motors

Series	Number of poles	Sizes	Power range
DR2S..	2	63MS – 71M	0.18 to 0.55 kW
	4	56M – 71M	0.09 to 0.55 kW
	6	63M – 80MK	0.09 to 0.55 kW
DRN..	2	63MS – 132S	0.18 to 7.5 kW
	4	63MS – 315H	0.12 to 225 kW
	6	63M – 160M	0.09 to 7.5 kW
	8	71MS – 80M	0.09 to 0.25 kW

Turkey

Turkey has published the valid rule (SGM:2021/16) for motors.

This is when the energy-related products directive and its implementation regulation ((EU) 2019/1781 and 2021/341) were adopted.

This means that the EU rules must be directly applied in Turkey.

Ukraine

General

Motors marketed in the Ukraine must bear the Ukrainian conformity logo, similar to the European CE marking.

With the mark, manufacturers and suppliers confirm that a product has undergone a conformity process and meets the specified technical requirements. Conformity is issued by an authorized certifying body.

If necessary, the certificate can be requested from SEW-EURODRIVE.

Identification

UA.TR.
013

Directives/standards/laws

SEW-EURODRIVE products such as motors, gearmotors, and electronics are subject to the following Ukrainian technical regulations:

Ukrainian technical regulation (TR)	Comparable with the European Directive	Affected products from SEW-EURODRIVE
UA.TR Machines and equipment Safety according to the Resolution of CMU No. 62-2013	Machinery Directive 2006/42/EC	Motors, gearmotors, frequency inverters
UA.TR Low voltage equipment safety according to the Resolution of CMU No. 1067-2015	Low Voltage Directive 2014/35/EU	Motors, gearmotors
UA.TR Electromagnetic capability (EMC) according to the Resolution of CMU No. 1077-2015	EMC Directive 2014/30/EU	Motors, gearmotors, frequency inverters
UA.TR Equipment and protective systems used in potentially explosive environment according to the Resolution of CMU No. 1055-2016	ATEX Directive 2014/34/EU	All products for use in a potentially explosive environment
UA.TR Ecodesign requirements electric motors according to the Resolution of CMU No. 157-2019	Requirements for environmentally friendly design of electric motors, Directive 2005/32/EC	Motors, gearmotors

Efficiency requirements

Motors with the following features are affected:

- Asynchronous motors with squirrel-cage rotor
- 2-, 4-, and 6-pole
- Power of 0.75 kW to 375 kW
- Voltages of up to 1000 V
- Frequencies 50 Hz and 50/60 Hz
- Continuous duty
- Energy efficiency class IE3

Exceptions

- Motors subject to severe environmental influences
- Motors only intended for operation on a frequency inverter
- Brakemotors
- Integrated motors
- Explosion-protected motors
- IE2 line motors on the frequency inverter
- Motors that are not designed for continuous duty

Motors that can be used

Series	Number of poles	Size	Power range
DR2S..	2	63MS – 71M	0.18 to 0.55 kW
	4	56M – 71M	0.09 to 0.55 kW
	6	63M – 80MK	0.09 to 0.55 kW
DRN..	2	63MS – 132S	0.18 to 7.5 kW
	4	63MS – 315H	0.12 to 225 kW
	6	63M – 160M	0.09 to 7.5 kW
	8	71MS – 180L	0.09 to 11 kW

USA

General

Market access in the United States requires three primary features for use or export. These are listed under directives/standards/laws.

Identification

E189357

c UL us
LISTED

CC056A

Other additional markings include:

- Assembly plant code
- KVA letter
- Design letter
- Overload factor
- Type of ventilation

Directives/standards/laws

- UL (UR) certificate (UL = Underwriters Laboratories)
- EISA-2007 conformity + EISA 2014 (DOE amendment 10 CFR part 431) (EISA = Energy Independent and Security Act)
- Code of Federal Regulations, title 10, chapter II, sub-chapter D, part 431 B motors

Registering AC motors with UL (Underwriters Laboratories) offers advantages for US users due to lower fire insurance premiums.

The mark includes the registration number. UL approvals for SEW-EURODRIVE can be accessed under no. E189357. All DRN.. motors can be ordered with the appropriate mark on the nameplate.

SEW-EURODRIVE places the UL mark on these motors that are combined with MOVIMOT®.

Efficiency requirements

EISA compliance

The US legal requirements for minimum efficiency from 1992 were modified and renewed in 2007 and 2014. In a decision of the American authorities on May 29, 2014 taking effect on June 1, 2016, the requirements specified for the Premium NEMA energy efficiency class in the United States were extended to cover a larger power range and 8-pole motors, and numerous exceptions were eliminated. The requirements are specified in the Code of Federal Regulations of the Department of Energy (DoE).

Upon registration with the Department of Energy (DoE), the motors are marked with "ee" and the registration number, for SEW-EURODRIVE: CC056A.

Valid from	Efficiency	Number of poles	Power range
June 01, 2016	NEMA Premium	2, 4	0.75 – 373 kW/1 – 500 hp
	NEMA Premium	6	0.75 – 261 kW/1 – 350 hp
	NEMA Premium	8	0.75 – 186 kW/1 – 250 hp

Exceptions

- Motors not on continuous duty
- Motors that are designed and marked for inverter operation (DRL..; DR2S.. in S9)
- Single-phase motors (DRK..)
- Motors operated at idle state (DRM..)

Applicable motors

Series	Number of poles	Sizes	Power range
DR2S..	2	63MS – 71M	0.18 – 0.55 kW/0.25 – 0.75 hp
	4	56M – 71M	0.09 – 0.55 kW/0.12 – 0.75 hp
	6	63M – 80MK	0.09 – 0.55 kW0.12 – 0.75 hp
DRN..	2	63MS – 132S	0.18 – 7.5 kW/0.25 – 10 hp
	4	63MS – 315H	0.12 – 225 kW/0.16 – 300 hp
	6	63M – 160M	0.09 – 7.5 kW/0.12 – 10 hp

Not for use in the USA

One special feature is the requirement for identifying non-usability for the US market. Motors sold in the United States that cannot be used there because they do not comply with EISA 2007 must be labeled accordingly. SEW-EURODRIVE labels motors with the "NOT FOR USE IN THE USA" label.

United Kingdom (UK)

General

By printing the UKCA marking on the nameplate, the manufacturer declares the conformity of the product with harmonized standards and applicable directives in Great Britain (England, Scotland, Wales).

The Northern Ireland Protocol accords Northern Ireland special status with respect to the Withdrawal Agreement between the European Union and the United Kingdom, and products in and destined for Northern Ireland will continue to be sold with the CE marking while the Protocol is in force.

For this reason, the guidelines from the United Kingdom apply only to Great Britain.

The declaration of conformity can be obtained from the manufacturer. It does not have to be included with the product upon delivery, i.e., when passing through customs.

Identification

UK
CA

Regulations

- Electrical Equipment (Safety) Regulations 2016
- The Ecodesign for Energy-Related Products Regulations 2021
- Supply of Machinery (Safety) Regulations 2008

Motors whose UKCA conformity was declared in accordance with the Low Voltage Directive do not have to be declared in accordance with the Machinery Directive as well.

Efficiency requirements

UK Ecodesign Regulation (I.S. 2021 No. 745)

Motors with the following features are affected:

Induction motors without carbon brushes, commutators, slip rings or electrical rotor connections that are designed for operation with a sinusoidal voltage with a frequency of 50 Hz, 60 Hz, or 50/60 Hz.

- 2-, 4-, 6-, and 8-pole
- Power of 0.12 kW to 1000 kW
- Nominal voltage of more than 50 V and up to 1000 V
- Designed for continuous duty
- Line-capable motors

Valid from	Efficiency	Number of poles	Power range
July 01, 2021	IE2	2, 4, 6, 8	0.12 to 0.74 kW
	IE3	2, 4, 6, 8	0.75 to 1000 kW
July 01, 2023	IE4	2, 4, 6	75 to 200 kW

Exceptions

- Motors not on continuous duty
- Non-ventilated motors in accordance with IC Code 410 or TENV
- Motors, only for operation on frequency inverter
- Fully integrated motors
- Motors with integrated inverter
- Motors that are exclusively intended for operation under the following conditions:
  - Where ambient temperatures exceed 60 °C
  - Where ambient temperatures are less than -30 °C
  - Installation altitude of more than 4000 m above sea level

Motors that can be used

Series	Number of poles	Size	Power range
DR2S..	4	56MR	0.09 kW
	6	63MQ	0.09 kW
DRN..	2	63MS – 132S	0.18 to 7.5 kW
	4	63MS – 315H	0.12 to 225 kW
	6	63M – 160M	0.09 to 7.5 kW
	8	71MS – 180L	0.09 to 11 kW

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People’s Republic of China

General

Market access in the People's Republic of China requires two primary features for use or export:

- The rules of China Compulsory Certification (CCC) and
- The requirements for efficiency and the associated labeling obligation with the China Energy Label (CEL).

Directives/standards/laws

China Compulsory Certification (CCC)

The CNCA Implementation Rule CNCA-C04-01:2014 regulates which electric motors are subject to the CCC. The Implementation Rule also specifies which motor types are explicitly excluded from the CCC obligation and which product tests must be performed during certification.

The mandatory product tests are defined by the GB standards. The standards applicable to the certification of motors are GB 12350 and GB 14711. SEW motors are certified according to GB 14711, which defines the safety standards for small and medium-sized electrical devices.

GB stands for Gan Biao, a local standard.

CNCA-00C-008 "Self-declaration of the implementing rules for mandatory product certification" prescribes how the certification is performed.

Determining whether a motor requires CCC is based on the motor specification, including voltage, operating mode, design, etc.

In addition to the product, the manufacturer's plant is also audited and certified.

This affects motors with the following power ratings:

- 2-pole ≤ 2.2 kW
- 4-pole ≤ 1.1 kW
- 6-pole ≤ 0.75 kW
- 8-pole ≤ 0.55 kW

If one of the rated power values in pole-changing motors exceeds the limit values mentioned above, the entire motor is CCC-exempt. The motor only has to be labeled once all power ratings fall within the limit values. If the following conditions are met, the CCC logo must always be present on the motor if it is being imported into China:

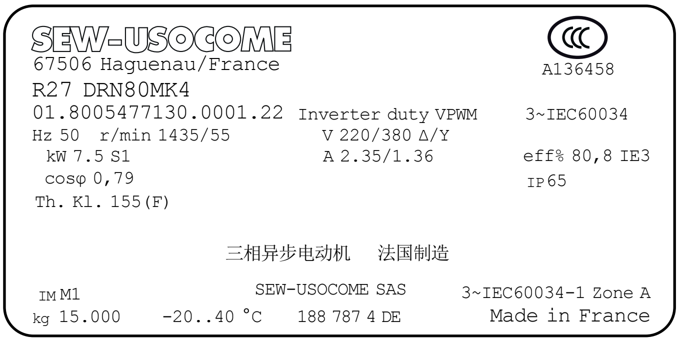
- The motor has one of the above number of poles and the specified power ratings.
- The motor is a stand-alone motor or a gearmotor.
- The motor is not built into a machine or system.

Identification

SEW-EURODRIVE has one plant in Europe and one in China that certifies and places the CCC logo on the motor nameplate.

The motor can only pass through Chinese customs with the CCC logo on the nameplate.

The nameplate shows the identification of a motor with CCC identification.



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A copy of the CCC certificate is included by SEW-EURODRIVE with the drive in order to facilitate passage through Chinese customs. This is a voluntary service by SEW-EURODRIVE and is not required by law.

Series	Number of poles	Sizes	Power range
DRN..	2	63MS – 90L	0.18 to 2.2 kW
	4	63MS – 90S	0.12 to 1.1 kW
	6	63M – 90S	0.09 to 0.75 kW
	8	71MS – 80M	0.09 – 0.25 kW

Efficiency requirements

Standard **GB 18613- 2020** "Minimum Allowable Values of Energy Efficiency and Values of Efficiency Grades for Motors" defines the minimum efficiency, the minimum permitted values of the efficiency and the test method for three-phase asynchronous motors, single-phase asynchronous motors and motors for air conditioning systems. The standard is binding from June 1, 2021.

GB 18613-2020 supersedes the 2012 version and GB 25958-2010 "Limited Value and Energy Efficiency Rating of Small Power Motors".

The implementation of the identification with the Chinese Energy Label (CEL) is regulated in the "Implementation rules for the energy efficiency labeling of electric motors CEL007-2021". CEL007-2021, which was only just published in May 2021, replaces CEL007-2016.

The validity of this implementation regulation describes only three-phase asynchronous motors in the power range from 0.75 kW to 375 kW.

The standard GB 18613:2020 defines a technical status. Regulation CEL007-2021 specifies the identification obligation and is more strictly formulated than the standard itself. However, in order to provide a standardized basis and platform, and to avoid difficulties with customs from the outset, SEW has decided to comply as far as possible with the more comprehensive standard.

Scope of GB 18613-2020

The standard affects three-phase asynchronous motors, single-phase asynchronous motors, and motors for air-conditioning systems. Three-phase asynchronous motors are affected in the following cases:

- 50 Hz, three-phase AC voltage, nominal voltage up to 1000 V, nominal power from 0.12 kW to 1000 kW, single-speed 2-, 4-, 6- and 8-pole, fan-cooled
- Design N
- Continuous duty
- Standard motors and motors with explosion protection

A new factor is the validity for single-phase asynchronous motors with ≤ 690 V/50 Hz AC voltage

- With starting capacitor (0.12 kW – 3.7 kW), with running capacitor (0.12 kW – 2.2 kW)
- with start-up and running capacitor (0.25 kW – 3.7 kW), and
- Motors with capacitor for fans in air conditioners (10 W – 1100 W) and brushless DC motors for fans in air conditioners (10 W – 1100 W)

As from **June 1, 2021, the affected motors must fulfill Level/Grade 3** (IE3).

The Chinese label with "Grade" is inverse to the internationally customary label in accordance with the IE class:

IEC	**GB 18613 – 2020**	GB 18613 – 2012	GB 18613 – 2006
IE1	Not permitted	Not permitted	Grade 3
IE2	Not permitted	Grade 3	Grade 2
IE3	**Grade 3**	Grade 2	Grade 1
IE4	Grade 2	Grade 1	–
1)	Grade 1		

1) Not defined in accordance with IEC 60034-30-1. In GB 18613-2020, the losses in Grade 1 have been reduced by approx. 20% compared to Grade 2 (IE4).

Motors with IE1 or IE2 may now be brought into circulation only if they are not affected.

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Identification

The design and the contents of the CEL label were redefined in the implementation regulation CEL 007-2021. By using the QR code, you can access an online website with additional information about the respective motor.

CEL
DRN80-160 / EDRN80-160

For logistical reasons, SEW-EURODRIVE has added the following information to the Grade label:

- Barcode
- Color ID field corresponding to the CEL color code
- Item number from SEW-EURODRIVE

The motor can only pass through Chinese customs with the CEL label on the product.

The CEL certificate is not included with the drive, since Chinese customs can view the certificate on the CQC website (Chinese approval authority) using the type and catalog designation or the QR code on the motor nameplate.

Since this database only contains Chinese characters, the link is not included here. SEW-EURODRIVE will give interested customers the link to the CQC database upon request.

No specific identification is shown on the nameplate.

Exceptions

The following motors are exempt from the requirements or have reduced requirements:

- Pole-changing motors with 2 nominal speeds
- Fully integrated motors that cannot be tested separately, e.g. pumps, fans, compressors and gearmotors: This means SPIROPLAN® W10/20/30 gearmotors (also WA.., WF.., WAF..) with motors up to 1.5 kW in the DR2S.. design can be provided in compliance with regulations.
- Motors not intended for continuous duty, e.g. DR2S.. motors in duty type S3 ≤ 75%
- Motors only intended for operation on a frequency inverter (asynchronous servomotors DRL.., DR2L..)
- Non-ventilated motors: Design /UL or /OL and DAS.. motors
- Motors with forced cooling fan

Information

The People's Republic of China has a line voltage of 220/380 V/50 Hz.

Applicable motors

Series	Number of poles	Sizes	Power range
DRN..	2	63MS – 123S	0.18 to 7.5 kW
	4	63MS – 315H	0.12 to 200 kW
	6	63MR – 160M	0.09 to 7.5 kW
	8	71MR – 180L	0.09 – 11 kW

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2.5 Global motors from SEW-EURODRIVE

A global motor has approvals and certifications for several markets and can be used almost anywhere due to its wide voltage range. For this reason, global motors from SEW-EURODRIVE are the ideal solution for supplying as many countries as possible with as little effort as possible.

The motor's part number in the system's parts list does not depend on the country of use which means that only one design is required for the application. When configuring the motor, make sure to observe the dependency of voltage and frequency for different speeds. The required approvals and certifications can be selected for the requested target countries. SEW-EURODRIVE is able to assemble global motors in many countries which ensures short delivery times.

Depending on the required operating voltages, the voltage range according to the table below can be covered with a motor:

		Voltage range at 50 Hz	**Voltage range at 60 Hz**
Design 1a	△	220 – 230 V	254 – 266 V
	⅄	380 – 400 V	440 – 460 V
Design 1a for motors ≤ 0.55 kW	△	220 – 240 V	254 – 277 V
	⅄	380 – 415 V	440 – 480 V
Design 1b	△	380 – 400 V	440 – 460 V
	⅄	660 – 690 V	–
Design 2 a	△	190 – 200 V	220 – 230 V
	⅄	330 – 346 V	380 – 400 V
Variant 2b	△	330 – 346 V	380 – 400 V
	⅄	575 – 600 V	660 – 690 V

Depending on the number of requested approvals and certificates, additional nameplates or small parts for attaching a label to the motor can be added due to the amount of required information.

The example shows global nameplates for a design that can be used in the following markets. Labels that are required additionally are not shown.

- Europe, Switzerland, Turkey
- Australia, New Zealand
- Brazil
- Canada
- Eurasian Economic Union
- South Africa
- South Korea
- Ukraine
- USA
- People's Republic of China

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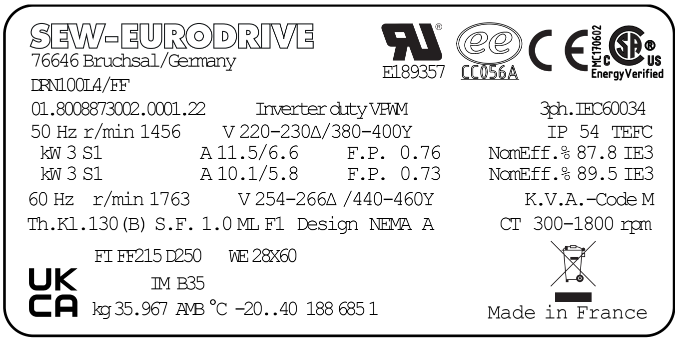
2.5.1 Example of a nameplate for the global motor

The DRN.. motor nameplate serves as an example of the nameplate of an entire global motor.



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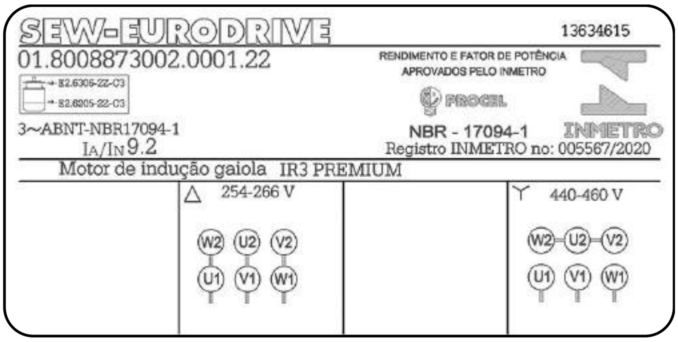

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INFORMATION

The line voltages in Brazil and South Korea can be different for the same frequency of 60 Hz. In addition to a nominal voltage of 3 × 220 V and 3 × 380 V, there are also supply systems with a nominal voltage of 3 × 440 V.

2.6 DR2L.. series asynchronous servomotors

In addition to the LSPM motors (DR..J), asynchronous servomotors are another link between the conventional AC asynchronous motors for supply system and inverter operation, and the highly dynamic synchronous servomotors with permanent magnets.

2.6.1 Product description of DR2L.. motors

DR2L.. series asynchronous servomotors are a drive package made up from the many options of the DR2.. modular motor system.

In its basic variant, the drive package always contains:

- An EI8R encoder with TTL interface and (1024 periods/revolution) for sizes 71 – 132S,
- An EK8S encoder with sin/cos interface (1024 periods/revolution) for sizes 132M – 225,
- Thermal motor protection in the form of a temperature sensor
- A dynamic package,
- A generous connection area and
- A winding optimized with respect to rotational speed.

Alternatives can be selected instead of the elements of the basic design, for example:

- Instead of the high-resolution built-in or add-on encoder: An absolute encoder or only an encoder mounting adapter
- Instead of thermal motor protection in the form of a temperature sensor: Temperature sensor in the winding
- Of the terminal box: The connection via plug connectors and
- Instead of entering encoder data manually: Electronic nameplate in the encoder to make startup easier

Depending on the application and the requirements of the application, you can select this option

- Brake or backstop
- A forced cooling fan,
- A Temperature detection (PT1000)
- A canopy
- And many more, see chapter "Designs, options, and accessories" (→ 🗎 66).

2.6.2 Characteristics of DR2L.. motors: Dynamics

AC motors in line operation usually have an overload capacity of 160% – 200% of the nominal torque during startup of the motors.

If the motor is operated on an inverter of the same power, the inverter usually provides 150% current - and thus roughly 150% torque - for 60 seconds during startup. If a larger inverter is selected, the inverter can deliver a higher current and, when used together with suitable motors, can also deliver greater torque. The mechanical current-carrying capacity of the motor, which is defined by the dynamics package, must be checked.

The mechanical design of the DR2L.. series asynchronous servomotors is of such a high quality that dynamic overload values can be reached which exceed the conventional values of an asynchronous motor operated on a supply system or inverter and almost match the values of a synchronous servomotor.

The motors are available with two dynamics packages. The motors differ in terms of the overload capacity of the nominal motor torque:

Package	Overload capacity in relation to the nominal torque
Dynamics package 1 (D1)	190 – 220%
Dynamics package 2 (D2)	300 – 350%

The nameplate of the motor specifies the data of the selected dynamics package.

2.6.3 Characteristics of DR2L.. motors: Rotational speeds

In order to optimally adapt motor speed to the required control limits of the applications, SEW-EURODRIVE offers the DR2L.. asynchronous servomotors with the following four rated speeds:

- 1200 min^{-1}
- 1700 min^{-1}
- 2100 min^{-1}
- 3000 min^{-1}

In inverter operation, the rated speed indicates the beginning of field weakening of the thermal characteristic curve.

The rotational speeds of the vertices of the maximum possible torques in the motor/inverter combination are lower than the rated speeds. The motor/inverter assignments can be found in the documentation of the inverter.

2.6.4 Characteristics of DR2L.. motors: Inverter combinations

The motors are optimally adapted for operation on MOVIDRIVE® application inverters.

Usually, the selection tables offer several inverter sizes. The application data and project planning result in the size of the inverter that fits perfectly.

The selection diagrams can be accessed via the following link:

http://go.sew-eurodrive.com/os/motorcharacteristics

2.6.5 Characteristics of DR2L.. motors: Startup

Encoders with an electronic nameplate make starting up motors on SEW-EURODRIVE inverters particularly convenient.

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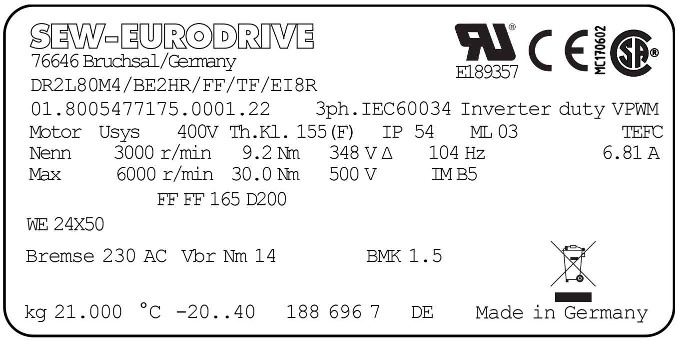
The nameplate of the following encoders contains all drive-related data that is uploaded from the encoder to the drive inverter at the beginning of startup:

- High-resolution built-in or add-on encoder
  - Built-in encoder EI8. or cone shaft encoder EK. on motors DR2L71MS4 to DR2L80M4

  The high-resolution built-in or add-on encoders are part of the basic configuration of DR2L.. motors.
- Absolute encoders
  - AK.. on motors DR2L71MS4 to DR2L80M4

  The absolute encoders can be used with DR2L.. motors instead of the high-resolution encoders.

2.6.6 Example nameplate



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2.7 Overview of materials used for the motors

The following table shows an overview of the materials used.

As standard, the motors are painted with machine paint "blue/gray"/RAL 7031. Other colors and special paint options are available on request.

Component	Material	Motor size			
		56 – 132S	132M – 180	200 – 225	250 – 315
Shaft	Steel	Plain steel, quenched and tempered steel			
Storage	Deep groove ball bearing	60.., 62.. and 63.. series			
	Cylindrical roller bearing	–			NU 3…
Laminated core rotor/stator	Sheet metal	Electrical steel			
Rotor cage	Aluminum	Aluminum die casting (EN-AC)			
Gaskets	Oil seals	NBR			
		FKM			
Drive-end end-shield/flange	Gray cast iron	Gray cast iron (EN-GJL)			
	Aluminum	EN-AC alloy (gearmotor sizes 63 – 90)	–		
Stator housing	Aluminum	EN-AC		–	
	Gray cast iron	–		EN-GJL	
Bed plate	Aluminum	EN-AC	–		
Single feet	Gray cast iron	–	EN-GJL		
B-side end-shield	Gray cast iron	EN-AC/(sizes 56 – 80) EN-GJL	EN-GJL		
Terminal boxes	Aluminum	EN-AC			–
	Gray cast iron	EN-GJL			
Insulation	Surfaces	PET/PA/PET composite			
Winding	Copper + paint	Cu-enameled wire			
Terminal board	Base	Polyester resin			
	Terminal stud	Nickel-plated steel/brass			
Plug connector	SEW-EURODRIVE	PA	–		
	Harting	PA			–
Fan	Plastic	PA/PPE			
	Aluminum	EN-AC			
	Gray cast iron	EN-GJL (sizes 63 – 132L)		–	
Fan guard	Steel	Zinc-plated sheet steel/bondal sheet			
	Plastic	Sizes 56 – 90: PC/PET	–		
Fan guard with encoder mount	Aluminum	EN-AC (only with encoder)			–

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3 Overview of types and type designation

3.1 Type designation of AC motors

The following table shows an example structure of a type designation:

DRN71MSR8/BE03HR/FI/TF	
DR	Product family
N	Labeling of the product line
71MS	Size
CW	Power label
8	Number of poles
/BE03	Brake
HR	Manual brake release
/FI	Output option
/TF	Thermal motor protection

3.1.1 Designation of the motors

Designation	
DR2S..	Standard motor (2nd generation) Single-speed motors meet energy efficiency class IE1.
DRN..	Motors that adhere to energy efficiency class IE3
DR2L..	Asynchronous servomotor (2nd generation)
DR2M..	Torque motor (2nd Generation)
56 – 315	Nominal sizes: 56, 63, 71, 80, 90, 100, 112, 132, 160, 180, 200, 225, 250, 280, 315
S, MK, MS, M, ME, LS, LM, L, H	Lengths
R, Q	Reduced power
P, I	Increased power
B	Non-standard power
2, 4, 6, 8, 4/2, 8/2, 8/4	Number of poles

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3.2 Designs, options, and accessories

3.2.1 Motor design

Code in the type designation	Description	Size
/FI	IEC foot-mounted motor	63MS – 315
/F.A, /F.B	Universal foot-mounted motor	71MS – 132S
/F.A, /F.B	(/F.A = motor feet enclosed in delivery, /F.B = motor feet mounted at the factory)	225 – 315
/FIA	Motor feet included loose	225 – 315
/FIB	Motor feet installed at the factory	225 – 315
/FF	IEC flange-mounted motor with through bores	63 – 315
/FE	IEC flange-mounted motor with through bores and IEC feet	63 – 315
/FT	IEC flange-mounted motor with threads	63 – 100
/FY	IEC flange-mounted motor with thread and IEC feet	63 – 100
/FC	C-face flange-mounted motor, dimensions in inches	63 – 160
/FG	Integral motor, as stand-alone motor	56 – 315
/FM	Integral motor with IEC feet	63 – 315
/FL	Flange-mounted motor (deviating from IEC)	63 – 315
/FK	Flange-mounted motor (deviating from IEC) with feet	63 – 280

3.2.2 Oil seals

Material

Code in the type designation	Description	Size
None	Oil seal made of NBR	56 – 315
None	FKM oil seal	56 – 315

Design

Code in the type designation	Description	Size
Without	Premium Sine Seal	63 – 280
Without	Premium Sine Seal conductive	63 – 280

3.2.3 Bearings

Code in the type designation	Description	Size
/NIB	Current-insulated rolling bearings (B-side, NDE)	200L – 315
/ERF	Reinforced bearings (A-side, DE) with roller bearing	250 – 315
/NS	Relubrication device	225 – 315

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3.2.4 Winding

Thermal class

Code in the type designation	Description	Size
None	Thermal class B	56 – 315
None	Thermal class F	56 – 315
None	Thermal class H	63 – 315

Insulation

Code in the type designation	Description	Size
/RI	Reinforced winding insulation	63 – 315
/RI2	Reinforced winding insulation with increased resistance against partial discharge	112 – 315

3.2.5 Condition monitoring

Thermal monitoring

Code in the type designation	Description	Size
/TF	Temperature sensor (PTC thermistor or PTC resistor)	56 – 315
/TH	Thermostat (bimetallic switch)	56 – 315
/PK	Pt1000 sensor	63 – 315
/PT	Pt100 sensor	63 – 315

Brake

Code in the type designation	Description	Size
/DUE	Diagnostic Unit Eddy Current = function/wear monitoring for BE1 to BE122 brake	80 – 315

Vibration

Code in the type designation	Description	Size
None	Preparation for accommodating SPM measuring nipples	112 – 315

3.2.6 Terminal box

Material

Code in the type designation	Description	Size
None	Aluminum terminal box	56 – 225

Code in the type designation	Description	Size
None	Terminal box made of gray cast iron	71 – 315

Connection

Code in the type designation	Description	Size
None	Gray cast iron terminal box with connection piece	132 – 315

3.2.7 Connection

Terminal board

Code in the type designation	Description	Size
None	Terminal board – 6 terminals	63 – 315
None	Terminal board – 12 terminals	71 – 280

Cage clamp terminals

Code in the type designation	Description	Size
/KCC	6-pole terminal strip with cage clamp contacts	71 – 132S
/KC1	C1 profile-compliant connection of the electrified monorail system drive (according to VDI guideline 3643)	71 – 132S
/KCW	6-pole series terminal	71 – 132S

Integrated plug connector

Code in the type designation	Description	Size
/IS	Integrated plug connector with terminal block in upper part of terminal box	63 – 132S
/ISU	Integrated plug connector without terminal block in upper part of terminal box	63 – 132S

Mounted plug connector

Code in the type designation	Description	Size
/ASE.	Mounted Han® 10ES plug connector on terminal box with single locking latch (crimp contacts on the motor side)	63 – 132M
/ASB.	Mounted Han® 10ES plug connector on terminal box with double locking latch (crimp contacts on the motor side)	63 – 132M
/ACE.	Mounted Han® 10E plug connector on terminal box with single locking latch (crimp contacts on the motor side)	63 – 132S
/ACB.	Mounted Han® 10E plug connector on terminal box with double locking latch (crimp contacts on the motor side)	63 – 132S
/AME.	Mounted Han Modular® 10B plug connector on terminal box with single locking latch (crimp contacts on the motor side)	63 – 132M
/ABE.	Mounted Han-Modular® 10B plug connector on terminal box with single locking latch (crimp contacts on the motor side)	71 – 225
/ADE.	Mounted Han Modular® 10B plug connector on terminal box with single locking latch (crimp contacts on the motor side)	71 – 225
/AKE.	Mounted Han Modular® 10B plug connector on terminal box with single locking latch (crimp contacts on the motor side)	132M – 225
/AMB.	Mounted Han-Modular® 10B plug connector on terminal box with double locking latch (crimp contacts on the motor side)	63 – 132M
/ABB.	Mounted Han-Modular® 10B plug connector on terminal box with double locking latch (crimp contacts on the motor side)	71 – 225
/ADB.	MountedHan-Modular® 10B plug connector on terminal box with double locking latch (crimp contacts on the motor side)	71 – 225
/AKB.	Mounted Han-Modular® 0B plug connector on terminal box with double locking latch (crimp contacts on the motor side)	132M – 225
/AND.	Harting Han® Q8/0, single locking latch	56 – 132M
/IV	Other industrial plug connectors according to customer specifications	56 – 225

3.2.8 Ventilation

Fan guard design

Code in the type designation	Description	Size
None	Noise-reducing fan guard made of plastic	56 – 90
None	Steel fan guard	63 – 315
/LN	Noise-reducing fan guard	100L – 132S

Type of ventilation

Code in the type designation	Description	Size
None	Fan-cooled	56 – 315

Code in the type designation	Description	Size
/V	Forced cooling fan	71 – 315
/U	Non-ventilated (without fan)	56 – 315
/OL	Non-ventilated (closed B-side)	63 – 280

Fan

Code in the type designation	Description	Size
None	Fan made of plastic	56 – 315
/AL	Aluminum fan	63 – 315
/Z	Additional inertia mass (flywheel fan)	63 – 132

3.2.9 Brake and backstop

Brake

Code in the type designation	Description	Size
/BE..[1]	Spring-loaded brake with specification of size	56 – 315

1) Optionally available as safety brake.

Brake options

Code in the type designation	Description	Size
HR	Manual brake release, re-engaging	56 – 280
HF	Manual brake release, lockable	63 – 315

Backstop

Code in the type designation	Description	Size
/RS	Backstop	63 – 315

3.2.10 Encoders

Built-in encoders

Code in the type designation	Description	Size
/EI7C[1]	Built-in incremental encoder with HTL interface, 24 periods	63 – 132S
/EI76	Built-in incremental encoder with HTL interface and 6/2/1 period(s)	71 – 132S
/EI72		71 – 132S
/EI71		71 – 132S
/EI8R	Built-in incremental encoder with TTL interface and 1024 periods (4096 increments)	71 – 132S
/EI8C	Built-in incremental encoder with HTL interface and 1024 periods (4096 increments)	71 – 132S
/EI8Z	Built-in incremental encoder with MOVILINK® DDI interface (12 bit incremental)	71 – 132S

1) Optionally available as safety encoder for sizes 71MS – 132S.

Add-on encoders

Code in the type designation	Description	Size
/EK8S[1]	Add-on encoder with sin/cos interface	71 – 315
/EV8S		71 – 280
/EK8R	Add-on encoder with TTL (RS422) interface	71 – 315
/EV8R		71 – 280
/EK8C	Add-on encoder with HTL interface	71 – 315
/EV8C		71 – 280
/EK8Z	Add-on incremental and single-turn encoder with MOVILINK® DDIinterface (18 bit incremental)	71 – 180
/AK8W[1]	Add-on absolute encoder with sin/cos and RS485 interface (multi-turn)	71 – 315
/AV8W		71 – 280
/AK8Y[1]	Add-on absolute encoder with sin/cos and SSI interface (multi-turn)	71 – 315
/AV8Y		71 – 280
/AK8H	Add-on absolute encoder with sin/cos and RS485 interface and HIPERFACE® protocol	71 – 315
/AV8H		71 – 280
/AK8Z	Add-on absolute encoder with MOVILINK® DDI interface (18 bit incremental, 16 bit multi-turn)	71 – 180

1) Optionally available as safety encoder.

Encoder mounting adapters

Code in the type designation	Description	Size
/EK8A	Mounting adapter for encoders from the SEW-EURODRIVE portfolio	71 – 315
/XV8A		71 – 280M
/XV.A	Mounting adapter for third-party encoders	80MS – 280M
/XH1.	Mounted third-party encoders	80MS – 132S
/XV..		80MS – 280M

3.2.11 Digital motor integration

Interfaces

Code in the type designation	Description	Size
/DI	MOVILINK® DDI	71 – 180

Mounted plug connectors

Code in the type designation	Description	Size
/KD1	M23 hybrid plug connector (cable cross section 1.5 mm² – 4 mm²)	71 – 160
/KD	Hybrid cable gland M25/M32 (cable cross section 1.5 mm² – 10 mm²)	71 – 132S[1)]
/KDB	M40 hybrid plug connector (cable cross section 6 mm² – 10 mm²)	90 – 180
/KDD	Power cable gland and M23 signal connector (MOVILINK® DDI)	71 – 132S[1)]

1) 132M – 180 in preparation.

Built-in encoder

Code in the type designation	Description	Size
/EI8Z	Built-in incremental encoder with MOVILINK® DDI interface (12 bit incremental)	71 – 132S

Add-on encoders

Code in the type designation	Description	Size
/EK8Z	Add-on incremental and single-turn encoder with MOVILINK® DDIinterface (18 bit incremental)	71 – 180
/AK8Z	Add-on absolute encoder with MOVILINK® interface (18 bit incremental, 16 bit multi-turn)	71 – 180

Brake rectifier

Code in the type designation	Description	Size
BG1Z[1]	Integrated brake control with MOVILINK® DDI interface and brake diagnostics as well as brake wear detection	71 – 180

1) Is coded using the DDI type code and is therefore not listed in the type designation of the motor.

3.2.12 Functional safety

Brake

Code in the type designation	Description	Size
/BE..	Spring-loaded brake with specification of size	63 – 315

Brake options

Code in the type designation	Description	Size
HR	Manual brake release, with automatic re-engaging	63 – 280

Built-in encoders

Code in the type designation	Description	Size
/EI7C	Built-in incremental encoder with HTL interface, 24 periods	71 – 132S

Add-on encoders

Code in the type designation	Description	Size
/AK8W	Add-on absolute encoder with sin/cos and RS485 interface (multi-turn)	71 – 315
/AK8Y	Add-on absolute encoder with sin/cos and SSI interface (multi-turn)	71 – 315
/EK8S	Add-on encoder with sin/cos interface	71 – 315

3.2.13 Decentralized technology

Code in the type designation	Description	Size
/MM03 – MM40	MOVIMOT®	71 – 112
/MO	MOVIMOT® options	71 – 112
/MI	Motor identification module for MOVIMOT®	63M – 112
/MSW	MOVI-SWITCH®	56 – 100
/D..	MOVIMOT® advanced	71M – 132M

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3.2.14 environmental influences

IP degree of protection

Code in the type designation	Description	Size
None	IP 54	56 – 315
None	IP 55	56 – 315
None	IP56	56 – 315
None	IP65	56 – 315
None	IP66	56 – 315

Winding protection

Code in the type designation	Description	Size
None	Encapsulated stator winding	63 – 132S
None	Moisture and acid protection	56 – 315
None	Tropicalized	63 – 315

Surface protection

Code in the type designation	Description	Size
None	Unpainted design	56 – 315
None	Base coat OSG	56 – 315
None	Surface protection OS1 to OS4	56 – 315

Corrosion protection

Code in the type designation	Description	Size
None	KS corrosion protection	56 – 315

Miscellaneous instructions

Code in the type designation	Description	Size
None	Anti-condensation heating	63 – 315
/DH	Condensation drain hole	63 – 315
/C	Canopy for the fan guard	63 – 315

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3.2.15 Other motor designs

Code in the type designation	Description	Size
/2W	Second shaft end at motor	63 – 315
None	Motor design according to recommendation VE01 of the VIK (Verband der Industriellen Energie- und Kraftwirtschaft e.V. – Association of Energy and Power Generation Industry)	63 – 315

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3.3 Serial number

The following table shows the structure of a serial number:

Example: 01. 12212343 01. 0001. 21	
01.	Sales organization
12212343	Order number (8 digits)
01.	Order item (2 digits)
0001	Running unit no./copy number (4 digits)
21	End digits of the year of manufacture (2 digits)

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3.4 Type designation of the MOVILINK® DDI interface

The type designation of the MOVILINK® DDI interface describes the characteristics of the MOVILINK® DDI communication unit integrated in the motor. It does not describe the equipment of the motor. This is defined by the motor type code.

DI0E00	
DI	DI = MOVILINK® DDI
0	0 = Motor-external brake control or MOVIMOT® flexible decentralized inverter 1 = BS1Z integrated brake control via MOVILINK® DDI 2 = BG1Z integrated brake control via MOVILINK® DDI
E	B = Temperature detection, no extended electronic nameplate, no encoder function C = Extended electronic nameplate and temperature detection of the motor, no encoder function E = Extended electronic nameplate, temperature detection of the motor, and encoder function F = Extended electronic nameplate and encoder function, no motor temperature detection
00	Reserved

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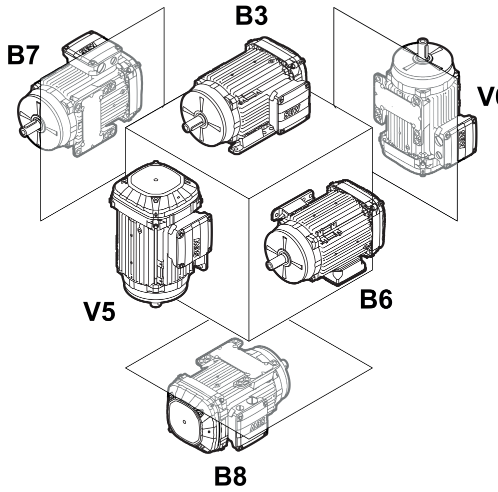
3.5 Mounting position designation of motors

3.5.1 Designs of AC motors according to IEC 60034-7

Motor design FI



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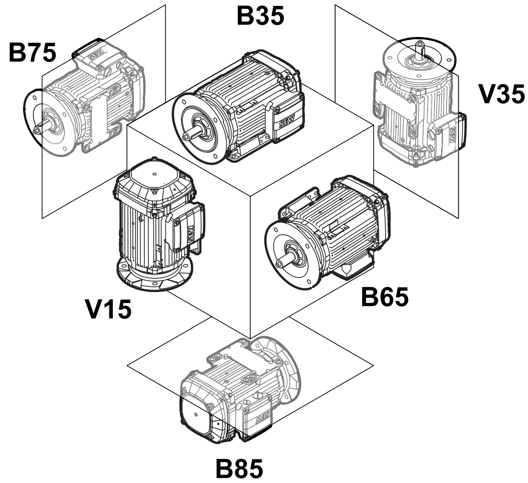
Motor design FE and FK



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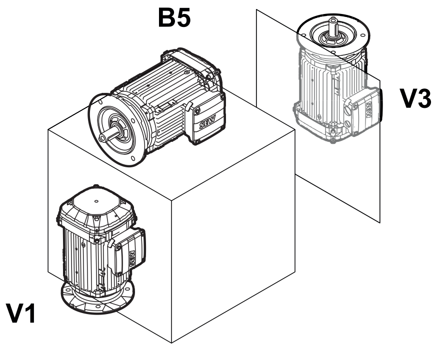
Motor design FF and FL



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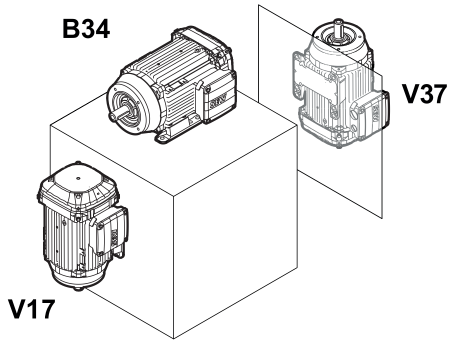
Motor design FY



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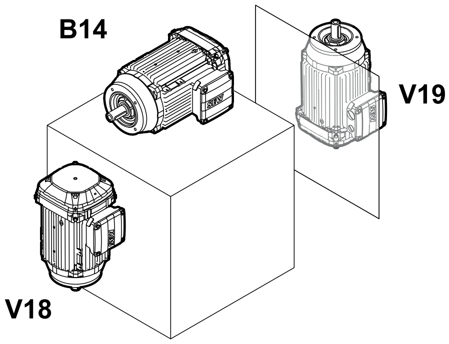
Motor design FT and FC



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3.5.2 Size/power assignment according to EN 50347/IEC60072-1

The new edition of IEC 60072-1:2022 edition 7 is based on EN 50347 and will replace it as EN 60072-1 in the long term.

In countries that accept the requirements of the IEC, AC motors with squirrel-cage rotor are usually classified according to the European standard EN 50347. This standard defines a unique size assignment depending on shaft height between 63 mm and 315 mm for motors with the following data:

- Rated power between 0.09 kW and 132 kW
- Number of poles 2, 4, 6, 8

Furthermore, EN 50347 defines standard dimensions for feet, flanges and shaft ends among others. The standard only applies to motors with a rated frequency of 50 Hz, as it is a European standard. In case of motors with a rated frequency of 60 Hz, deviations from the standard may occur in the size/power assignment.

DRN..

For 2- and 4-pole motors, the size/power assignment is always adhered to for 50 Hz and 60 Hz motors. For 6-pole variants, this also applies to a power rating of 50 Hz. For motors with 60 Hz and 50/60 Hz, the normatively prescribed dimensions are not adhered to with all sizes.

DR2..

Motors with feet are designed with shaft heights that are identical to the sizes and not in accordance with EN 50347. In the case of the flange-mounted design, the series is based on IEC 60072-1 and EN 50347.

INFORMATION

The standard EN 50347/IEC 60072-1 does not contain specifications on the geometrical length of a motor, which means that motors from different manufacturers but with the same designated size can have varying lengths. For a definite statement on the adherence of the normative specifications, the geometrical dimensions of foot or flange must be compared to the relevant rated power.

3.5.3 Position of motor terminal box and cable entry

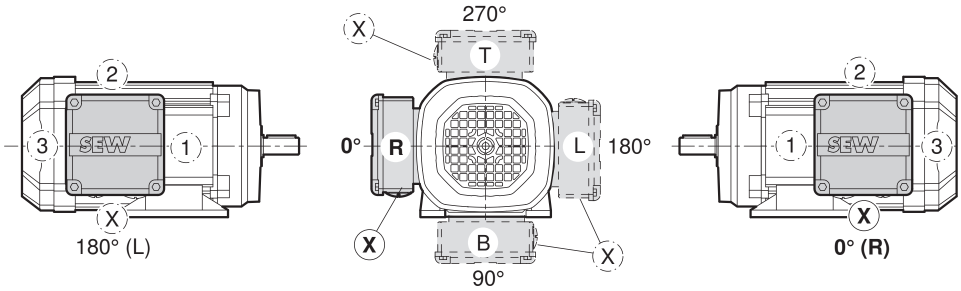
The standard IEC 60034 specifies the following designations for the motor terminal box positions:

- As viewed onto the output shaft = A-side.
- Designation as R (right), B (bottom), L (left) and T (top).

Deviating from this standard, in case of gearmotors the position of the motor terminal box is specified with 0°, 90°, 180° or 270° as viewed onto the fan guard = B-side.

The following figure shows both designations. Where the mounting position of the motor changes, R, B, L and T are rotated accordingly.

The cable entry position is specified with x, 1, 2, 3.



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INFORMATION

Without specific information regarding the terminal box, the design 0° with cable entry "X" (designation "normal" in quotation and order confirmation) is delivered.

For motor sizes 56 and 63, the terminal box is encapsulated on the stator. The cable entry is therefore fixed at position "X" and "2".

INFORMATION

The position of the terminal box is not given on the nameplate.

4 Technical data of the motors

4.1 Operating temperatures

The motors are designed for use in a temperature range between -20 °C and +40 °C in the standard version. According to IEC 60034-1, the standard temperature range is lower with -15 °C to +40 °C.

If the motors are operated outside of the standard temperature range, modifications may be necessary. Contact SEW-EURODRIVE in such a case.

4.2 Key to the data tables

The following table lists the short symbols used in the "Technical data" tables.

P_N	Rated power
M_N	Rated torque
n_N	Rated speed
I_N	Rated current
$\cos\varphi$	Power factor
$\eta_{50\%}$	Efficiency at 50% of the rated power
$\eta_{75\%}$	Efficiency at 75% of the rated power
$\eta_{100\%}$	Efficiency at 100% of the rated power
I_A/I_N	Starting current ratio
M_A/M_N	Starting torque ratio
M_H/M_N	Ramp-up torque ratio
M_K/M_N	Breakdown torque ratio
m_{Mot}	Mass of the motor
J_{Mot}	Mass moment of inertia of the motor
BE..	Brake used
Z_0 BG	Switching frequency for operation with BG brake controller
Z_0 BGE	Switching frequency for operation with BGE brake controller
M_B	Braking torque
m_{BMot}	Mass of the brakemotor
J_{BMot}	Mass moment of inertia of the brakemotor

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4.3 IE3 DRN.. motors, 400 V, 50 Hz, 2-pole, duty type S1

4.3.1 Information on motors

motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	$η_{50\%}$ %	$η_{75\%}$ %	$η_{100\%}$ %	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DRN 63MS 2	0.18	0.63	2725	0.465	0.78	62.7	66.2	65.9	4.2	2.6 2.6	2.6
DRN 63M 2	0.25	0.87	2755	0.57	0.81	69.2	70.9	69.7	4.9	2.7 2.6	2.7
DRN 71MS 2	0.25	0.84	2834	0.59	0.77	66.1	69.2	69.7	5.7	3.5 3.0	3.5
DRN 71MS 2	0.37	1.26	2810	0.87	0.78	70.7	73.8	73.8	5.4	3.1 2.7	3.1
DRN 71M 2	0.55	1.86	2825	1.24	0.81	75.7	78.0	77.8	5.9	3.2 3.0	3.2
DRN 80MS 2	0.75	2.5	2855	1.58	0.84	80.2	82.0	81.4	5.9	2.8 2.5	2.9
DRN 80M 2	1.1	3.65	2860	2.2	0.85	83.1	84.0	83.0	6.6	3.0 2.5	2.9
DRN 90S 2	1.5	4.95	2908	3.1	0.83	83.7	85.0	84.2	7.1	2.7 2.0	2.9
DRN 90L 2	2.2	7.2	2905	4.3	0.85	86.1	86.7	85.9	7.4	2.5 2.1	3.0
DRN 100LM 2	3	9.9	2894	5.8	0.85	88.9	88.7	87.2	7.7	3.3 2.6	3.5
DRN 112M 2	4	13	2948	7.5	0.86	88.1	88.7	88.1	9.8	3.3 2.7	3.9
DRN 132S 2	5.5	17.9	2935	9.4	0.92	90.3	90.2	89.2	10.0	3.0 2.1	3.7
DRN 132S 2	7.5	24.5	2936	14.1	0.85	90.6	90.8	90.1	9.6	3.3 2.4	3.4

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4.3.2 Further information on motors and brakemotors

Motor	P_N kW	M_N Nm	n_N min^{-1}	m_{Mot} kg	J_{mot} 10^{-4} kgm^2	BE..	Z_0 BG BGE h^{-1}	M_B Nm	m_{BMot} kg	J_{BMot} 10^{-4} kgm^2
DRN 63MS 2	0.18	0.63	2725	4.9	2.95	BE03	5000 6000	1.3	6.8	3.64
DRN 63M 2	0.25	0.87	2755	5.8	3.76	BE03	4500 6000	1.7	7.7	4.45
DRN 71MS 2	0.25	0.84	2834	6.8	2.93	BE03	3 600 6000	1.7	8.7	3.62
DRN 71MS 2	0.37	1.26	2810	6.8	2.93	BE03	3 600 6000	2.7	8.7	3.62
DRN 71M 2	0.55	1.86	2825	8	3.71	BE05	2600 5500	5	10	5.01
DRN 80MS 2	0.75	2.5	2855	11	18.5	BE05	1200 3400	5	15	20
DRN 80M 2	1.1	3.65	2860	14	24.1	BE1	1000 2600	7	18	25.6
DRN 90S 2	1.5	4.95	2908	20	53.1	BE1	600 1300	10	22	54.7
DRN 90L 2	2.2	7.2	2905	23	66.3	BE2	- 1000	14	27	71
DRN 100LM 2	3	9.9	2894	33	89.7	BE2	- 750	20	37	94.4
DRN 112M 2	4	13	2948	45	178	BE5	- 400	28	52	183
DRN 132S 2	5.5	17.9	2935	56	241	BE5	- 300	40	64	246
DRN 132S 2	7.5	24.5	2936	56	241	BE5	- 300	55	64	246

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4.4 IE3 DRN.. motors, 400 V, 50 Hz, 4-pole, duty type S1

4.4.1 Information on motors

motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	$\eta_{50\%}$ %	$\eta_{75\%}$ %	$\eta_{100\%}$ %	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DRN 63MS 4	0.12	0.83	1380	0.405	0.64	58.3	63.9	64.8	3.6	2.7 2.6	2.7
DRN 63M 4	0.18	1.25	1375	0.57	0.65	65.1	69.4	69.9	3.7	2.6 2.6	2.6
DRN 71MS 4	0.18	1.19	1440	0.64	0.54	61.1	67.1	69.9	4.9	3.6 3.2	3.6
DRN 71MS 4	0.25	1.7	1405	0.72	0.66	70.1	73.5	73.5	4.3	2.5 2.3	2.5
DRN 71M 4	0.37	2.5	1415	1.02	0.66	74.3	77.3	77.3	4.8	2.8 2.4	2.8
DRN 80MK 4	0.55	3.65	1435	1.29	0.75	78.6	81.0	80.8	6.1	2.7 2.1	3.1
DRN 80M 4	0.75	4.95	1440	1.75	0.74	80.7	82.9	82.9	6.7	3.1 2.7	3.4
DRN 90S 4	1.1	7.2	1455	2.55	0.73	83.5	85.0	84.5	6.9	2.7 2.1	3.3
DRN 90L 4	1.5	9.8	1461	3.4	0.74	84.6	86.1	85.6	7.5	2.7 2.2	3.3
DRN 100LS 4	2.2	14.5	1450	4.75	0.76	86.4	87.5	86.9	7.1	2.9 2.2	3.3
DRN 100L 4	3	19.7	1456	6.4	0.76	87.3	88.3	87.8	8.2	3.4 2.3	3.7
DRN 112M 4	4	26	1464	7.9	0.81	88.6	89.4	88.7	8.2	2.6 2.3	3.4
DRN 132S 4	5.5	36	1461	10.5	0.84	90.6	90.6	89.6	8.3	2.8 2.2	3.5
DRN 132M 4	7.5	49	1468	15.2	0.78	90.8	91.1	90.4	7.8	3.1 2.4	3.3
DRN 132L 4	9.2	60	1470	18.7	0.77	90.8	91.6	91.0	8.4	3.7 2.4	3.5
DRN 160M 4	11	71	1473	21	0.81	91.1	91.7	91.4	7.3	2.6 2.2	3.0
DRN 160L 4	15	97	1474	29	0.80	91.9	92.5	92.1	8.0	3.0 2.0	3.4
DRN 180M 4	18.5	120	1478	33.5	0.85	92.8	93.1	92.6	9.5	3.6 2.9	3.6
DRN 180L 4	22	142	1477	38.5	0.87	93.4	93.6	93.0	9.6	3.5 2.1	3.4
DRN 200L 4	30	194	1480	56	0.82	93.3	93.9	93.6	8.2	2.9 2.5	3.3
DRN 225S 4	37	240	1482	64	0.88	94.3	94.4	93.9	8.4	3.0 2.3	2.7
DRN 225M 4	45	290	1482	81	0.85	94.1	94.5	94.2	8.8	3.0 2.2	2.7
DRN 250M 4	55	355	1482	104	0.80	94.4	94.8	94.6	8.2	4.0 2.5	2.9
DRN 280S 4	75	485	1482	143	0.79	94.9	95.3	95.0	7.6	3.7 2.6	2.9
DRN 280M 4	90	580	1481	161	0.84	95.4	95.6	95.2	7.7	3.6 2.0	2.7
DRN 315S 4	110	710	1488	189	0.87	95.4	95.7	95.5	6.7	2.9 2.1	3.1
DRN 315M 4	132	850	1487	230	0.87	95.6	95.9	95.6	6.5	2.7 2.0	2.9
DRN 315L 4	160	1030	1486	275	0.87	95.9	96.1	95.9	6.5	2.7 2.0	2.8
DRN 315H 4	200	1280	1489	355	0.84	95.4	96.0	96.0	8.1	3.7 2.8	3.8

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4.4.2 Further information on motors and brakemotors

motor	P_N kW	M_N Nm	n_N min^{-1}	m_{Mot} kg	J_{Mot} 10^{-4} kgm^2	BE..	Z_0 BG BGE h^{-1}	M_B Nm	m_{BMot} kg	J_{BMot} 10^{-4} kgm^2
DRN 63MS 4	0.12	0.83	1380	4.9	2.95	BE03	10000 10000	1.7	6.8	3.64
DRN 63M 4	0.18	1.25	1375	5.8	3.76	BE03	10000 10000	2.7	7.7	4.45
DRN 71MS 4	0.18	1.19	1440	6.8	5.42	BE03	6200 9700	2.7	8.7	6.11
DRN 71MS 4	0.25	1.7	1405	6.8	5.42	BE03	6200 9700	3.4	8.7	6.11
DRN 71M 4	0.37	2.5	1415	8	7.14	BE05	5000 9000	5	10	8.44
DRN 80MK 4	0.55	3.65	1435	11	17.1	BE1	3500 8500	7	14	18.6
DRN 80M 4	0.75	4.95	1440	14	24.7	BE1	3200 8200	10	18	26.2
DRN 90S 4	1.1	7.2	1455	20	54	BE2	2300 6000	14	24	58.7
DRN 90L 4	1.5	9.8	1461	23	67.2	BE2	2200 5800	20	27	71.9
DRN 100LS 4	2.2	14.5	1450	27	81.4	BE5	- 6100	28	33	87.4
DRN 100L 4	3	19.7	1456	34	112	BE5	- 3700	40	40	118
DRN 112M 4	4	26	1464	45	178	BE5	- 2900	55	52	183
DRN 132S 4	5.5	36	1461	56	241	BE11	- 2100	80	71	251
DRN 132M 4	7.5	49	1468	74	381	BE11	- 1100	110	92	403
DRN 132L 4	9.2	60	1470	82	439	BE20	- 980	150	110	490
DRN 160M 4	11	71	1473	115	817	BE20	- 900	150	150	877
DRN 160L 4	15	97	1474	130	1040	BE20	- 800	200	165	1100
DRN 180M 4	18.5	120	1478	155	1630	BE30	- 510	300	195	1770
DRN 180L 4	22	142	1477	170	1950	BE30	- 470	300	210	2090
DRN 200L 4	30	194	1480	285	2660	BE32	- 500	400	340	2890
DRN 225S 4	37	240	1482	315	4350	BE32	- 230	500	370	4580
DRN 225M 4	45	290	1482	315	4350	BE32	- 200	600	370	4580
DRN 250M 4	55	355	1482	470	7360	BE62	- 180	800	560	7960
DRN 280S 4	75	485	1482	530	8940	BE62	- 150	1000	620	9530
DRN 280M 4	90	580	1481	640	12000	BE62	- 79	1200	730	12600
DRN 315S 4	110	710	1488	880	23400	BE122	- 53	1600	1020	24400
DRN 315M 4	132	850	1487	900	24800	BE122	- 46	2000	1040	25800
DRN 315L 4	160	1030	1486	1030	28600	BE122	- 34	2000	1160	29600
DRN 315H 4	200	1280	1489	1150	35200	BE122	- 23	2000	1280	36200

4.5 IE3 DRN.. motors, 400 V, 50 Hz, 6-pole, duty type S1

4.5.1 Information on motors

Motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	$\eta_{50\%}$ %	$\eta_{75\%}$ %	$\eta_{100\%}$ %	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DRN 63MR 6	0.09	0.93	920	0.36	0.58	44.3	51.6	55.0	2.9	2.7 2.6	2.8
DRN 63M 6	0.12	1.32	870	0.405	0.71	51.9	57.4	57.7	2.6	1.9 1.8	1.9
DRN 71MS 6	0.18	1.88	915	0.55	0.69	59.4	63.7	63.9	3.4	1.9 1.9	2.2
DRN 71M 6	0.25	2.6	915	0.76	0.68	63.5	68.2	68.6	3.4	2.0 1.9	2.3
DRN 80MK 6	0.37	3.8	935	1.05	0.68	70.8	73.8	73.5	4.1	2.1 2.1	2.4
DRN 90SR 6	0.55	5.4	966	1.52	0.65	73.5	76.7	77.2	5.2	2.3 2.2	2.8
DRN 90S 6	0.75	7.5	957	2	0.68	77.4	79.8	78.9	4.8	2.0 2.0	2.4
DRN 90L 6	1.1	11	957	2.95	0.67	78.8	81.2	81.0	5.0	2.4 2.3	2.8
DRN 100L 6	1.5	14.9	961	4.1	0.63	80.7	82.8	82.5	4.7	2.2 2.2	2.9
DRN 112M 6	2.2	21.5	973	5.5	0.66	83.6	85.0	84.3	6.5	2.4 1.9	3.2
DRN 132S 6	3	29.5	974	7.4	0.66	84.8	86.0	85.6	6.2	2.6 2.5	3.4
DRN 132S 6	4	39.5	968	9.7	0.68	86.4	87.5	86.8	5.5	2.5 2.5	3.2
DRN 132L 6	5.5	54	975	13.8	0.64	86.9	88.3	88.0	5.6	2.7 2.5	2.8
DRN 160M 6	7.5	73	979	15.8	0.74	88.4	89.4	89.1	8.2	2.7 1.6	4.0

4.5.2 Further information on motors and brakemotors

Motor	P_N kW	M_N Nm	n_N min^{-1}	m_{Mot} kg	J_{mot} 10^{-4} kgm^2	BE..	Z_0 BG BGE h^{-1}	M_B Nm	m_{BMot} kg	J_{BMot} 10^{-4} kgm^2
DRN 63MR 6	0.09	0.93	920	5.8	6.47	BE03	12000 12000	2.1	7.7	7.16
DRN 63M 6	0.12	1.32	870	5.8	6.47	BE03	12000 12000	2.7	7.7	7.16
DRN 71MS 6	0.18	1.88	915	6.8	8.29	BE05	7000 12000	5	9.2	9.59
DRN 71M 6	0.25	2.6	915	8	10.4	BE05	5200 12000	5	10	11.7
DRN 80MK 6	0.37	3.8	935	11	16.8	BE1	3000 9000	10	14	18.3
DRN 90SR 6	0.55	5.4	966	20	54	BE2	2400 5000	14	24	58.7
DRN 90S 6	0.75	7.5	957	20	54	BE2	2400 5000	20	24	58.7
DRN 90L 6	1.1	11	957	23	67.4	BE5	2200 4400	28	29	73.4
DRN 100L 6	1.5	14.9	961	34	112	BE5	- 3400	40	40	118
DRN 112M 6	2.2	21.5	973	45	178	BE5	- 2500	55	52	183
DRN 132S 6	3	29.5	974	56	245	BE11	- 2300	80	71	256
DRN 132S 6	4	39.5	968	56	245	BE11	- 2100	80	71	256
DRN 132L 6	5.5	54	975	82	439	BE11	- 1700	110	100	461
DRN 160M 6	7.5	73	979	115	1290	BE20	- 1200	150	150	1.350

4.6 IE3 DRN.. motors, 400 V, 50 Hz, 8-pole, duty type S1

4.6.1 Information on motors

Motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	$\eta_{50\%}$ %	$\eta_{75\%}$ %	$\eta_{100\%}$ %	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DRN 71MSR 8	0.09	1.24	695	0.435	0.53	39.0	46.7	50.7	2.4	2.3 2.3	2.6
DRN 71MS 8	0.12	1.72	665	0.47	0.64	46.2	52.4	53.5	2.3	1.6 1.6	1.8
DRN 80MK 8	0.18	2.45	705	0.76	0.54	49.4	56.1	58.7	3.0	1.8 1.8	2.4
DRN 80M 8	0.25	3.4	702	1.02	0.53	55.8	62.0	64.1	3.0	2.0 1.9	2.3
DRN 90S 8	0.37	4.95	716	1.38	0.55	61.9	67.5	69.3	3.6	1.8 1.7	2.4
DRN 90L 8	0.55	7.4	710	1.81	0.59	69.0	72.7	73.0	3.5	1.8 1.8	2.3
DRN 100LS 8	0.75	10.1	708	2.25	0.62	72.2	75.2	75.0	3.8	1.9 1.8	2.2
DRN 100L 8	1.1	14.8	710	3.45	0.59	73.5	77.2	77.7	4.1	2.2 2.1	2.7
DRN 112M 8	1.5	20	715	4.2	0.63	78.7	80.4	79.7	4.3	1.9 1.8	2.3
DRN 132S 8	2.2	29.5	715	6	0.64	81.6	82.9	81.9	4.5	2.0 1.8	2.4
DRN 132M 8	3	39.5	726	8.7	0.58	80.9	83.3	83.5	5.1	2.2 2.0	2.9
DRN 132L 8	4	53	722	11.1	0.61	83.6	85.1	84.8	4.7	2.1 1.9	2.6
DRN 160M 8	5.5	72	729	15	0.61	85.1	86.5	86.2	5.4	2.1 1.9	2.8
DRN 160L 8	7.5	98	729	19.6	0.63	86.8	87.7	87.3	5.8	2.1 1.9	2.9
DRN 180L 8	11	143	733	27.5	0.64	88.2	89.0	88.6	5.2	2.6 2.0	2.2

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4.6.2 Further information on motors and brakemotors

Motor	P_N kW	M_N Nm	n_N min^{-1}	m_{Mot} kg	J_{mot} 10^{-4} kgm^2	BE..	Z_0 BG BGE h^{-1}	M_B Nm	m_{BMot} kg	J_{BMot} 10^{-4} kgm^2
DRN 71MSR 8	0.09	1.24	695	6.8	8.29	BE03	6000 16000	2.7	8.7	8.98
DRN 71MS 8	0.12	1.72	665	6.8	8.29	BE03	6000 16000	3.4	8.7	8.98
DRN 80MK 8	0.18	2.45	705	11	16.8	BE05	5000 11500	5	14	18.3
DRN 80M 8	0.25	3.4	702	14	24.5	BE1	3700 10 500	7	18	26
DRN 90S 8	0.37	4.95	716	20	54	BE1	2800 6700	10	23	55.6
DRN 90L 8	0.55	7.4	710	23	67.6	BE2	2300 5700	20	27	72.3
DRN 100LS 8	0.75	10.1	708	27	80.8	BE2	2400 6400	20	32	85.5
DRN 100L 8	1.1	14.8	710	34	111	BE5	1800 5300	40	40	117
DRN 112M 8	1.5	20	715	45	182	BE5	- 3500	55	52	187
DRN 132S 8	2.2	29.5	715	56	245	BE11	- 2500	80	71	255
DRN 132M 8	3	39.5	726	74	564	BE11	- 2300	80	92	586
DRN 132L 8	4	53	722	82	678	BE11	- 2100	110	100	700
DRN 160M 8	5.5	72	729	115	1290	BE20	- 1300	150	150	1.350
DRN 160L 8	7.5	98	729	130	1640	BE20	- 1100	200	165	1700
DRN 180L 8	11	143	733	175	1960	BE30	- 1000	300	215	2100

4.7 IE3 DRN.. motors, 460 V, 60 Hz, 2-pole, duty type S1

4.7.1 Information on motors

Motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	$η_{50\%}$ %	$η_{75\%}$ %	$η_{100\%}$ %	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DRN 63MS 2	0.18	0.51	3370	0.41	0.74	60.9	65.1	66.0	5.3	3.3 3.1	3.3
DRN 63M 2	0.25	0.7	3395	0.5	0.79	67.0	69.8	70.0	6.2	3.4 3.1	3.4
DRN 71MS 2	0.37	1.03	3440	0.76	0.76	69.4	73.1	74.0	6.8	3.8 3.2	3.8
DRN 71M 2	0.55	1.52	3455	1.07	0.78	73.3	76.4	77.0	7.4	3.9 3.5	3.9
DRN 80MS 2	0.75	2.05	3476	1.39	0.82	79.7	84.8	82.5	7.4	3.2 2.9	3.4
DRN 80M 2	1.1	3	3485	1.94	0.83	82.3	84.1	84.0	8.2	3.7 3.0	3.6
DRN 90S 2	1.5	4.1	3505	2.65	0.81	83.7	85.6	85.5	8.3	3.3 2.7	3.5
DRN 90L 2	2.2	6	3525	3.7	0.85	84.7	86.4	86.5	9.8	3.1 2.1	3.5
DRN 100LM 2	3	8.1	3517	5.1	0.83	88.0	89.1	88.5	10.2	3.8 2.8	4.2
DRN 100L 2	3.7	10.1	3508	5.8	0.88	88.6	89.1	88.5	11.0	4.2 3.4	4.1
DRN 112M 2	4	10.8	3552	6.5	0.86	87.4	88.6	88.5	11.4	3.6 2.8	4.6
DRN 132S 2	5.5	14.8	3544	8.2	0.92	89.0	89.7	89.5	11.0	3.3 2.1	4.2
DRN 132S 2	7.5	20	3545	12.2	0.85	89.6	90.4	90.2	10.8	3.6 2.6	4.1

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4.7.2 Further information on motors and brakemotors

Motor	P_N	M_N	n_N	m_{Mot}	J_{Mot}	BE..	Z_0 BG BGE	M_B	m_{BMot}	J_{BMot}
	kW	Nm	min^{-1}	kg	10^{-4} kgm^2		h^{-1}	Nm	kg	10^{-4} kgm^2
DRN 63MS 2	0.18	0.51	3370	4.9	2.95	BE03	4000 4800	1.3	6.8	3.64
DRN 63M 2	0.25	0.7	3395	5.8	3.76	BE03	3600 4800	1.7	7.7	4.45
DRN 71MS 2	0.37	1.03	3440	6.8	2.93	BE03	2900 4800	2.1	8.7	3.62
DRN 71M 2	0.55	1.52	3455	8	3.71	BE03	2100 4400	3.4	9.9	4.4
DRN 80MS 2	0.75	2.05	3476	11	18.5	BE05	960 2720	5	15	20
DRN 80M 2	1.1	3	3485	14	24.1	BE1	800 2080	7	18	25.6
DRN 90S 2	1.5	4.1	3505	20	53.1	BE1	480 1040	10	22	54.7
DRN 90L 2	2.2	6	3525	23	66.3	BE2	- 800	14	27	71
DRN 100LM 2	3	8.1	3517	33	89.7	BE2	- 600	20	37	94.4
DRN 100L 2	3.7	10.1	3508	34	111	BE2	- 600	20	39	115
DRN 112M 2	4	10.8	3552	45	178	BE5	- 320	28	52	183
DRN 132S 2	5.5	14.8	3544	56	241	BE5	- 240	40	64	246
DRN 132S 2	7.5	20	3545	56	241	BE5	- 240	55	64	246

4.8 IE3 DRN.. motors, 460 V, 60 Hz, 4-pole, duty type S1

4.8.1 Information on motors

Motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	$η_{50\%}$ %	$η_{75\%}$ %	$η_{100\%}$ %	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DRN 63MS 4	0.12	0.67	1700	0.37	0.58	57.7	63.7	66.0	4.3	3.3 3.2	3.4
DRN 63M 4	0.18	1.01	1695	0.52	0.59	63.5	68.5	70.0	4.5	3.3 3.2	3.3
DRN 71MS 4	0.25	1.39	1720	0.65	0.62	69.2	73.1	74.0	5.1	3.0 2.6	3.0
DRN 71M 4	0.37	2.05	1730	0.92	0.62	74.3	77.7	78.5	5.7	3.4 2.8	3.4
DRN 80MK 4	0.55	3	1745	1.16	0.71	78.1	81.0	81.5	7.4	3.2 2.5	3.6
DRN 80M 4	0.75	4.1	1751	1.56	0.70	82.0	84.9	85.5	8.1	3.7 3.0	4.2
DRN 90S 4	1.1	6	1762	2.3	0.69	83.5	86.1	86.5	8.2	3.3 2.3	4.0
DRN 90L 4	1.5	8.1	1767	3	0.70	83.8	86.1	86.5	9.1	3.3 2.2	4.0
DRN 100LM 4	2.2	11.9	1762	4.2	0.73	88.1	89.5	89.5	9.1	3.4 2.4	4.2
DRN 100L 4	3	16.2	1763	5.8	0.73	87.6	89.3	89.5	9.2	3.9 2.6	4.4
DRN 100L 4	3.7	20	1758	7.2	0.72	87.8	89.4	89.5	9.1	4.1 2.0	4.4
DRN 112M 4	4	21.5	1769	7.1	0.79	88.5	89.6	89.5	9.8	3.1 2.4	4.2
DRN 132S 4	5.5	29.5	1768	9.2	0.82	90.9	91.8	91.7	9.8	3.5 2.8	4.3
DRN 132M 4	7.5	40.5	1774	13.3	0.77	91.1	91.9	91.7	8.5	3.7 2.6	3.7
DRN 132L 4	9.2	49.5	1775	16.5	0.76	91.0	91.9	91.7	8.4	4.3 2.8	4.1
DRN 160M 4	11	59	1776	18.5	0.80	91.2	92.3	92.4	7.0	2.6 2.4	3.3
DRN 160L 4	15	81	1777	25	0.80	92.3	93.3	93.0	9.0	3.4 2.1	3.8
DRN 180M 4	18.5	99	1781	29.5	0.84	92.7	93.6	93.6	9.5	4.1 3.4	4.0
DRN 180L 4	22	118	1781	34	0.86	93.2	93.8	93.6	9.8	4.2 2.7	3.9
DRN 200L 4	30	161	1783	48.5	0.82	93.0	94.0	94.1	8.5	3.5 2.5	3.3
DRN 225S 4	37	198	1785	56	0.88	94.2	94.7	94.5	9.2	3.4 2.6	3.0
DRN 225M 4	45	240	1785	70	0.85	94.5	95.1	95.0	8.9	3.4 2.0	2.5
DRN 250ME 4	55	295	1785	88	0.82	94.3	95.2	95.4	8.6	4.6 2.4	2.7
DRN 280S 4	75	400	1785	125	0.79	94.6	95.3	95.4	9.1	4.8 2.7	3.1
DRN 280M 4	90	480	1784	141	0.83	94.8	95.4	95.4	8.0	4.8 2.5	2.9
DRN 315S 4	110	590	1790	165	0.87	95.0	95.7	95.8	7.6	3.3 2.5	3.5
DRN 315ME 4	132	700	1791	200	0.86	95.4	96.0	96.2	8.3	3.8 3.1	4.3
DRN 315L 4	150	800	1788	225	0.87	95.5	96.1	96.2	7.8	3.4 2.7	3.8
DRN 315L 4	160	850	1788	235	0.88	95.6	96.2	96.2	7.4	3.2 2.6	3.6

Motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	$\eta_{50\%}$ %	$\eta_{75\%}$ %	$\eta_{100\%}$ %	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DRN 315H 4	185	990	1792	290	0.85	94.8	95.9	96.2	8.6	4.6 3.4	4.6
DRN 315H 4	200	1070	1791	310	0.85	95.0	96.0	96.2	8.1	4.2 3.1	4.3
DRN 315H 4	225	1200	1790	345	0.86	95.4	96.1	96.2	7.3	3.7 2.8	3.8

4.8.2 Further information on motors and brakemotors

Motor	P_N	M_N	n_N	m_{Mot}	J_{Mot}	BE..	Z_0 BG BGE	M_B	m_{BMot}	J_{BMot}
	kW	Nm	min^{-1}	kg	10^{-4} kgm²		h^{-1}	Nm	kg	10^{-4} kgm²
DRN 63MS 4	0.12	0.67	1700	4.9	2.95	BE03	8000 8000	1.3	6.8	3.64
DRN 63M 4	0.18	1.01	1695	5.8	3.76	BE03	8000 8000	2.1	7.7	4.45
DRN 71MS 4	0.25	1.39	1720	6.8	5.42	BE03	4950 7800	2.7	8.7	6.11
DRN 71M 4	0.37	2.05	1730	8	7.14	BE05	4000 7200	5	10	8.44
DRN 80MK 4	0.55	3	1745	11	17.1	BE1	2800 6800	7	14	18.6
DRN 80M 4	0.75	4.1	1751	14	24.7	BE1	2600 6600	10	18	26.2
DRN 90S 4	1.1	6	1762	20	54	BE2	1800 4800	14	24	58.7
DRN 90L 4	1.5	8.1	1767	23	67.2	BE2	1800 4700	20	27	71.9
DRN 100LM 4	2.2	11.9	1762	33	90.7	BE5	- 3700	28	38	96.7
DRN 100L 4	3	16.2	1763	34	112	BE5	- 2900	40	40	118
DRN 100L 4	3.7	20	1758	34	112	BE5	- 2900	40	40	118
DRN 112M 4	4	21.5	1769	45	178	BE5	- 2300	55	52	183
DRN 132S 4	5.5	29.5	1768	56	241	BE11	- 1700	80	71	251
DRN 132M 4	7.5	40.5	1774	74	381	BE11	- 900	110	92	403
DRN 132L 4	9.2	49.5	1775	82	439	BE11	- 780	110	100	461
DRN 160M 4	11	59	1776	115	817	BE20	- 720	150	150	877
DRN 160L 4	15	81	1777	130	1040	BE20	- 640	200	165	1100
DRN 180M 4	18.5	99	1781	155	1630	BE20	- 400	200	190	1690
DRN 180L 4	22	118	1781	170	1950	BE30	- 380	300	210	2090
DRN 200L 4	30	161	1783	285	2660	BE32	- 400	400	340	2890
DRN 225S 4	37	198	1785	315	4350	BE32	- 180	400	370	4580
DRN 225M 4	45	240	1785	315	4350	BE32	- 160	500	370	4580
DRN 250ME 4	55	295	1785	510	8940	BE60	- 120	600	600	9280
DRN 280S 4	75	400	1785	530	8940	BE62	- 120	1000	620	9530
DRN 280M 4	90	480	1784	640	12000	BE62	- 63	1000	730	12600
DRN 315S 4	110	590	1790	880	23400	BE122	- 42	1200	1020	24400
DRN 315ME 4	132	700	1791	1010	28300	BE122	- 33	1600	1140	29400
DRN 315L 4	150	800	1788	1030	28600	BE122	- 27	2000	1160	29600
DRN 315L 4	160	850	1788	1030	28600	BE122	- 27	2000	1160	29600

Motor	P_N kW	M_N Nm	n_N min^{-1}	m_{Mot} kg	J_{Mot} 10^{-4} kgm^2	BE..	Z_0 BG BGE h^{-1}	M_B Nm	m_{BMot} kg	J_{BMot} 10^{-4} kgm^2
DRN 315H 4	185	990	1792	1150	35200	BE122	- 18	2000	1280	36200
DRN 315H 4	200	1070	1791	1150	35200	BE122	- 18	2000	1280	36200
DRN 315H 4	225	1200	1790	1150	35200	BE122	- 18	2000	1280	36200

4.9 IE3 DRN.. motors, 460 V, 60 Hz, 6-pole, duty type S1

4.9.1 Information on motors

Motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	$\eta_{50\%}$ %	$\eta_{75\%}$ %	$\eta_{100\%}$ %	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DRN 63MR 6	0.09	0.76	1135	0.34	0.52	49.2	57.3	59.5	3.5	3.4 3.4	3.6
DRN 63M 6	0.12	1.04	1105	0.37	0.63	54.9	61.6	64.0	3.3	2.5 2.5	2.5
DRN 71MS 6	0.18	1.52	1130	0.5	0.63	61.7	66.6	68.0	3.9	2.3 2.1	2.6
DRN 71M 6	0.25	2.1	1135	0.69	0.62	64.8	70.3	72.0	4.2	2.5 2.3	2.8
DRN 80MK 6	0.37	3.05	1150	0.94	0.63	71.2	74.8	75.5	4.9	2.5 2.4	3.0
DRN 90SR 6	0.55	4.5	1172	1.38	0.60	76.6	80.5	81.5	6.0	2.7 2.4	3.4
DRN 90S 6	0.75	6.1	1165	1.8	0.63	79.1	82.6	82.5	5.6	2.4 2.3	3.0
DRN 112M 6	1.1	8.9	1183	2.55	0.61	84.6	86.9	87.5	7.0	2.3 1.8	3.5
DRN 112M 6	1.5	12.1	1181	3.35	0.63	86.1	88.2	88.5	7.1	2.3 1.9	3.5
DRN 132S 6	2.2	17.8	1179	4.9	0.63	87.2	89.2	89.5	6.7	2.7 2.4	3.9
DRN 132S 6	3	24.5	1178	6.7	0.63	87.6	89.4	89.5	6.9	2.7 2.5	3.7
DRN 132M 6	3.7	30	1182	8.8	0.59	86.8	89.0	89.5	6.7	3.4 2.8	3.3
DRN 132M 6	4	32.5	1181	9.2	0.61	87.4	89.2	89.5	6.4	3.2 2.6	3.1
DRN 160M 6	5.5	44.5	1185	10.4	0.72	88.4	90.4	91.0	8.6	2.9 1.3	4.4
DRN 160M 6	7.5	61	1182	14.2	0.73	89.2	90.8	91.0	8.0	2.9 1.3	4.2

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4.9.2 Further information on motors and brakemotors

Motor	P_N kW	M_N Nm	n_N min^{-1}	m_{Mot} kg	J_{Mot} 10^{-4} kgm^2	BE..	Z_0 BG BGE h^{-1}	M_B Nm	m_{BMot} kg	J_{BMot} 10^{-4} kgm^2
DRN 63MR 6	0.09	0.76	1135	5.8	6.47	BE03	9600 9600	1.7	7.7	7.16
DRN 63M 6	0.12	1.04	1105	5.8	6.47	BE03	9600 9600	2.1	7.7	7.16
DRN 71MS 6	0.18	1.52	1130	6.8	8.29	BE03	5600 9600	3.4	8.7	8.98
DRN 71M 6	0.25	2.1	1135	8	10.4	BE05	4150 9600	5	10	11.7
DRN 80MK 6	0.37	3.05	1150	11	17.1	BE1	2400 7200	7	14	18.6
DRN 90SR 6	0.55	4.5	1172	20	54	BE1	1920 4000	10	23	55.6
DRN 90S 6	0.75	6.1	1165	20	54	BE2	1920 4000	14	24	58.7
DRN 112M 6	1.1	8.9	1183	45	178	BE5	- 2080	20	52	183
DRN 112M 6	1.5	12.1	1181	45	178	BE5	- 2080	28	52	183
DRN 132S 6	2.2	17.8	1179	56	245	BE5	- 1840	40	64	250
DRN 132S 6	3	24.5	1178	56	245	BE5	- 1840	55	64	250
DRN 132M 6	3.7	30	1182	74	381	BE11	- 1440	80	92	403
DRN 132M 6	4	32.5	1181	74	381	BE11	- 1440	80	92	403
DRN 160M 6	5.5	44.5	1185	115	1290	BE20	- 960	110	150	1350
DRN 160M 6	7.5	61	1182	115	1290	BE20	- 960	150	150	1350

4.10 IE3 DRN.. motors, 460 V, 60 Hz, 8-pole, duty type S1

4.10.1 Information on motors

Motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	$\eta_{50\%}$ %	$\eta_{75\%}$ %	$\eta_{100\%}$ %	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DRN 71MSR 8	0.09	1	856	0.41	0.46	43.9	52.6	57.5	2.7	2.6 2.6	3.1
DRN 71MS 8	0.12	1.37	835	0.435	0.56	49.3	56.5	59.5	2.7	1.9 1.9	2.3
DRN 80MK 8	0.18	1.99	863	0.7	0.48	53.3	60.5	64.0	3.5	2.2 2.2	2.9
DRN 80M 8	0.25	2.75	861	0.95	0.48	58.2	65.0	68.0	3.5	2.3 2.2	2.9
DRN 90S 8	0.37	4.05	870	1.27	0.50	63.7	69.6	72.0	4.0	2.0 1.8	2.7
DRN 90L 8	0.55	6.1	868	1.65	0.54	68.5	72.8	74.0	4.0	1.9 1.9	2.6
DRN 100LS 8	0.75	8.3	866	2	0.57	71.2	74.7	75.5	4.4	2.1 1.9	2.6
DRN 100L 8	1.1	12.1	868	3.1	0.55	73.3	77.3	78.5	4.6	2.4 2.2	3.1
DRN 112M 8	1.5	16.4	872	3.75	0.59	81.4	83.8	84.0	5.0	2.1 1.8	2.6
DRN 132S 8	2.2	24	871	5.3	0.60	83.7	85.6	85.5	5.2	2.1 1.8	2.7
DRN 132M 8	3	32.5	880	7.8	0.55	83.0	85.8	86.5	5.6	2.4 2.0	3.2
DRN 132L 8	4	43.5	877	9.8	0.58	84.3	86.3	86.5	5.3	2.3 2.0	2.9
DRN 160M 8	5.5	59	883	13.3	0.58	84.4	86.3	86.5	5.9	2.1 2.0	3.3
DRN 160L 8	7.5	81	882	17.3	0.61	87.9	89.4	89.5	6.4	2.1 1.9	3.5
DRN 180L 8	11	119	885	24.5	0.62	88.3	89.5	89.5	5.9	2.9 2.3	2.5

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4.10.2 Further information on motors and brakemotors

Motor	P_N kW	M_N Nm	n_N min^{-1}	m_{Mot} kg	J_{Mot} 10^{-4} kgm^2	BE..	Z_0 BG BGE h^{-1}	M_B Nm	m_{BMot} kg	J_{BMot} 10^{-4} kgm^2
DRN 71MSR 8	0.09	1	856	6.8	8.29	BE03	4800 12800	2.1	8.7	8.98
DRN 71MS 8	0.12	1.37	835	6.8	8.29	BE03	4800 12800	2.7	8.7	8.98
DRN 80MK 8	0.18	1.99	863	11	17.1	BE05	4000 9200	5	14	18.6
DRN 80M 8	0.25	2.75	861	14	24.7	BE1	2950 8400	7	18	26.2
DRN 90S 8	0.37	4.05	870	20	54	BE1	2200 5300	10	23	55.6
DRN 90L 8	0.55	6.1	868	23	67.6	BE2	1900 4600	14	27	72.3
DRN 100LS 8	0.75	8.3	866	27	80.8	BE2	1900 5100	20	32	85.5
DRN 100L 8	1.1	12.1	868	34	111	BE5	1500 4200	28	40	117
DRN 112M 8	1.5	16.4	872	45	182	BE5	- 2800	40	52	187
DRN 132S 8	2.2	24	871	56	245	BE5	- 2000	55	64	250
DRN 132M 8	3	32.5	880	74	564	BE11	- 1800	80	92	586
DRN 132L 8	4	43.5	877	82	678	BE11	- 1700	110	100	700
DRN 160M 8	5.5	59	883	115	1290	BE20	- 1000	150	150	1350
DRN 160L 8	7.5	81	882	130	1640	BE20	- 900	200	165	1700
DRN 180L 8	11	119	885	175	1960	BE30	- 800	300	215	2100

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4.11 IE3 global DRN.. motors, 50/60 Hz, 2-pole, duty type S1

50 Hz (voltage range 380 – 400 V), 60 Hz (voltage range 440 – 460 V)

4.11.1 Information on motors

Motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	$\eta_{50\%}$ %	$\eta_{75\%}$ %	$\eta_{100\%}$ %	I_A/I_N	M_A/M_N	M_H/M_N	M_K/M_N
DRN 63MS 2	0.18 0.18	0.63 0.51	2725 3370	0.475 0.43	0.78 0.74	62.7 60.9	66.2 65.1	65.9 66.0	4.2 5.3	2.6 3.3	2.6 3.1	2.6 3.3
DRN 63M 2	0.25 0.25	0.87 0.7	2755 3395	0.58 0.52	0.81 0.79	69.2 67.0	70.9 69.8	69.7 70.0	4.9 6.2	2.7 3.4	2.6 3.1	2.7 3.4
DRN 71MS 2	0.25 0.25	0.84 0.69	2834 3460	0.6 0.54	0.77 0.74	66.1 64.4	69.3 68.5	69.7 70.0	5.7 6.7	3.5 5.1	3.0 3.5	3.5 4.2
DRN 71MS 2	0.37 0.37	1.26 1.03	2810 3440	0.89 0.79	0.78 0.76	70.7 69.4	73.8 73.1	73.8 74.0	5.4 6.8	3.1 3.8	2.7 3.2	3.1 3.8
DRN 71M 2	0.55 0.55	1.86 1.52	2825 3455	1.26 1.1	0.81 0.78	75.7 73.3	78.0 76.4	77.8 77.0	5.9 7.4	3.2 3.9	3.0 3.5	3.2 3.9
DRN 80MS 2	0.75 0.75	2.5 2.05	2855 3476	1.58 1.42	0.84 0.82	80.2 79.7	82.0 84.8	81.4 82.5	5.9 7.4	2.8 3.2	2.5 2.9	2.9 3.4
DRN 80M 2	1.1 1.1	3.65 3	2860 3485	2.25 1.94	0.85 0.83	83.1 82.3	84.1 84.1	83.0 84.0	6.6 8.2	3.0 3.7	2.5 3.0	2.9 3.6
DRN 90S 2	1.5 1.5	4.95 4.05	2908 3522	3.1 2.65	0.83 0.81	83.7 83.7	85.0 85.6	84.2 85.5	7.1 8.9	2.7 3.3	2.0 2.2	2.9 3.5
DRN 90L 2	2.2 2.2	7.2 6	2905 3525	4.35 3.75	0.85 0.85	86.1 84.7	86.7 86.4	85.9 86.5	7.4 9.8	2.5 3.1	2.1 2.1	3.0 3.5
DRN 100LM 2	3 3	9.9 8.1	2894 3517	6.1 5.2	0.85 0.83	88.9 88.0	88.7 89.1	87.2 88.5	7.7 10.2	3.3 3.8	2.6 2.8	3.5 4.2
DRN 112M 2	4 4	13 10.8	2948 3552	7.6 6.5	0.86 0.86	88.1 87.6	88.7 88.8	88.1 88.7	9.8 11.4	3.3 3.6	2.7 2.8	3.9 4.6
DRN 132S 2	5.5 5.5	17.9 14.8	2935 3544	9.9 8.5	0.92 0.92	90.3 89.0	90.2 89.7	89.2 89.5	10.0 11.0	3.0 3.3	2.1 2.1	3.7 4.2
DRN 132S 2	7.5 7.5	24.5 20	2936 3545	14.4 12.2	0.85 0.85	90.6 89.6	90.8 90.4	90.1 90.2	9.6 10.8	3.3 3.6	2.4 2.6	3.4 4.1

4.11.2 Further information on motors and brakemotors

Motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	$η_{50\%}$ %	$η_{75\%}$ %	$η_{100\%}$ %	I_A/I_N	M_A/M_N	M_H/M_N	M_K/M_N
DRN 63MS 2	0.18 0.18	0.63 0.51	2725 3370	0.475 0.43	0.78 0.74	62.7 60.9	66.2 65.1	65.9 66.0	4.2 5.3	2.6 3.3	2.6 3.1	2.6 3.3
DRN 63M 2	0.25 0.25	0.87 0.7	2755 3395	0.58 0.52	0.81 0.79	69.2 67.0	70.9 69.8	69.7 70.0	4.9 6.2	2.7 3.4	2.6 3.1	2.7 3.4
DRN 71MS 2	0.25 0.25	0.84 0.69	2834 3460	0.6 0.54	0.77 0.74	66.1 64.4	69.3 68.5	69.7 70.0	5.7 6.7	3.5 5.1	3.0 3.5	3.5 4.2
DRN 71MS 2	0.37 0.37	1.26 1.03	2810 3440	0.89 0.79	0.78 0.76	70.7 69.4	73.8 73.1	73.8 74.0	5.4 6.8	3.1 3.8	2.7 3.2	3.1 3.8
DRN 71M 2	0.55 0.55	1.86 1.52	2825 3455	1.26 1.1	0.81 0.78	75.7 73.3	78.0 76.4	77.8 77.0	5.9 7.4	3.2 3.9	3.0 3.5	3.2 3.9
DRN 80MS 2	0.75 0.75	2.5 2.05	2855 3476	1.58 1.42	0.84 0.82	80.2 79.7	82.0 84.8	81.4 82.5	5.9 7.4	2.8 3.2	2.5 2.9	2.9 3.4
DRN 80M 2	1.1 1.1	3.65 3	2860 3485	2.25 1.94	0.85 0.83	83.1 82.3	84.1 84.1	83.0 84.0	6.6 8.2	3.0 3.7	2.5 3.0	2.9 3.6
DRN 90S 2	1.5 1.5	4.95 4.05	2908 3522	3.1 2.65	0.83 0.81	83.7 83.7	85.0 85.6	84.2 85.5	7.1 8.9	2.7 3.3	2.0 2.2	2.9 3.5
DRN 90L 2	2.2 2.2	7.2 6	2905 3525	4.35 3.75	0.85 0.85	86.1 84.7	86.7 86.4	85.9 86.5	7.4 9.8	2.5 3.1	2.1 2.1	3.0 3.5
DRN 100LM 2	3 3	9.9 8.1	2894 3517	6.1 5.2	0.85 0.83	88.9 88.0	88.7 89.1	87.2 88.5	7.7 10.2	3.3 3.8	2.6 2.8	3.5 4.2
DRN 112M 2	4 4	13 10.8	2948 3552	7.6 6.5	0.86 0.86	88.1 87.6	88.7 88.8	88.1 88.7	9.8 11.4	3.3 3.6	2.7 2.8	3.9 4.6
DRN 132S 2	5.5 5.5	17.9 14.8	2935 3544	9.9 8.5	0.92 0.92	90.3 89.0	90.2 89.7	89.2 89.5	10.0 11.0	3.0 3.3	2.1 2.1	3.7 4.2
DRN 132S 2	7.5 7.5	24.5 20	2936 3545	14.4 12.2	0.85 0.85	90.6 89.6	90.8 90.4	90.1 90.2	9.6 10.8	3.3 3.6	2.0 2.4	3.4 4.6

4.12 IE3 global DRN.. motors, 50/60 Hz, 4-pole, duty type S1

50 Hz (voltage range 380 – 400 V), 60 Hz (voltage range 440 – 460 V)

4.12.1 Information on motors

Motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	$η_{50\%}$ %	$η_{75\%}$ %	$η_{100\%}$ %	I_A/I_N	M_A/M_N	M_H/M_N	M_K/M_N
DRN 63MS 4	0.12 0.12	0.83 0.67	1380 1700	0.41 0.38	0.64 0.58	58.3 57.7	63.9 63.7	64.8 66.0	3.6 4.3	2.7 3.3	2.6 3.2	2.7 3.4
DRN 63M 4	0.18 0.18	1.25 1.01	1375 1695	0.58 0.54	0.65 0.59	65.1 63.5	69.4 68.5	69.9 70.0	3.7 4.5	2.6 3.3	2.6 3.2	2.6 3.3
DRN 71MS 4	0.18 0.18	1.19 0.98	1440 1750	0.68 0.59	0.54 0.52	61.1 61.6	67.1 67.4	69.9 70.0	4.9 5.8	3.6 4.26	3.2 3.7	3.6 4.3
DRN 71MS 4	0.25 0.25	1.7 1.39	1405 1720	0.74 0.67	0.66 0.62	70.1 69.2	73.5 73.1	73.5 74.0	4.3 5.1	2.5 3.0	2.3 2.6	2.5 3.0
DRN 71M 4	0.37 0.37	2.5 2.05	1415 1730	1.05 0.95	0.66 0.62	74.3 74.3	77.3 77.7	77.3 78.5	4.8 5.7	2.8 3.4	2.4 2.8	2.8 3.4
DRN 80MK 4	0.55 0.55	3.65 3	1435 1745	1.32 1.2	0.75 0.71	78.6 78.1	81.0 81.0	80.8 81.5	6.1 7.4	2.7 3.2	2.1 2.5	3.1 3.6
DRN 80M 4	0.75 0.75	4.95 4.1	1440 1751	1.75 1.56	0.74 0.70	80.7 82.0	82.9 84.9	82.9 85.5	6.7 8.1	3.1 3.7	2.7 3.0	3.4 4.2
DRN 90S 4	1.1 1.1	7.2 6	1455 1762	2.6 2.3	0.73 0.69	83.5 83.5	85.0 85.8	84.5 86.5	6.9 8.2	2.7 3.3	2.1 2.3	3.3 4.0
DRN 90L 4	1.5 1.5	9.8 8.1	1461 1767	3.45 3	0.74 0.70	84.6 83.5	86.1 85.9	85.6 86.5	7.5 9.1	2.7 3.3	2.2 2.2	3.3 4.0
DRN 100LM 4	2.2 2.2	14.4 11.9	1456 1762	4.85 4.3	0.76 0.73	86.4 88.1	87.3 89.5	86.7 89.5	7.6 9.1	2.9 3.4	2.4 2.4	3.5 4.2
DRN 100L 4	3 3	19.7 16.2	1456 1763	6.6 5.8	0.76 0.73	87.3 87.6	88.3 89.3	87.8 89.5	8.2 9.2	3.4 3.9	2.7 3.2	3.7 4.4
DRN 112M 4	4 4	26 21.5	1464 1769	8.1 7.2	0.81 0.79	88.6 88.5	89.4 89.6	88.7 89.5	8.2 9.8	2.6 3.1	2.3 2.4	3.4 4.2
DRN 132S 4	5.5 5.5	36 29.5	1464 1768	11 9.5	0.84 0.82	90.1 90.9	90.4 91.8	89.6 91.7	9.0 9.8	3.0 3.5	2.4 2.8	3.7 4.3
DRN 132M 4	7.5 7.5	49 40.5	1468 1774	15.5 13.6	0.78 0.77	90.8 91.1	91.1 91.9	90.4 91.7	7.8 8.5	3.1 3.7	2.4 2.6	3.3 3.7
DRN 132L 4	9.2 9.2	60 49.5	1470 1775	19.1 16.8	0.77 0.76	90.8 91.0	91.6 91.9	91.0 91.7	8.4 8.4	3.7 4.3	2.4 2.8	3.7 4.1
DRN 160M 4	11 11	71 59	1473 1776	22 19.1	0.81 0.80	91.1 91.2	91.7 92.3	91.4 92.4	7.3 7.0	2.6 2.6	2.2 2.4	3.0 3.3
DRN 160L 4	15 15	97 81	1474 1777	30 25.5	0.80 0.80	91.9 92.3	92.5 93.3	92.1 93.0	8.0 9.0	3.0 3.4	2.0 2.1	3.4 3.8
DRN 180M 4	18.5 18.5	120 99	1478 1781	34.5 30	0.85 0.84	92.8 92.7	93.1 93.6	92.6 93.6	9.5 9.5	3.6 4.1	2.9 3.4	3.6 4.0
DRN 180L 4	22 22	142 118	1477 1781	40 35.5	0.87 0.86	93.4 93.2	93.6 93.8	93.0 93.6	9.6 9.8	3.5 4.2	2.1 2.7	3.4 3.9
DRN 200L 4	30 30	194 161	1480 1783	57 50	0.82 0.82	93.3 93.0	93.9 94.0	93.6 94.1	8.2 8.5	2.9 3.5	2.5 2.5	3.3 3.3
DRN 225S 4	37 37	240 198	1482 1785	67 58	0.88 0.88	94.3 94.2	94.4 94.7	93.9 94.5	8.4 9.2	3.0 3.4	2.3 1.8	2.7 2.4
DRN 225M 4	45 45	290 240	1482 1785	83 72	0.85 0.85	94.1 94.5	94.5 95.1	94.2 95.0	8.8 8.9	3.0 3.4	2.2 2.0	2.7 2.5
DRN 250ME 4	55 55	355 295	1483 1785	104 91	0.83 0.82	94.3 94.3	94.8 95.2	94.6 95.4	7.9 8.6	3.4 4.6	2.4 2.4	2.9 2.7
DRN 280S 4	75 75	485 400	1482 1785	145 126	0.79 0.79	94.9 94.6	95.3 95.3	95.0 95.4	7.6 9.1	3.7 4.8	2.6 2.7	2.9 3.1
DRN 280M 4	90 90	580 480	1481 1784	168 146	0.84 0.83	95.4 94.8	95.6 95.4	95.2 95.4	7.7 8.0	3.6 4.8	2.0 2.5	2.7 2.9
DRN 315S 4	110 110	710 590	1488 1790	198 165	0.87 0.87	95.4 95.0	95.7 95.0	95.5 95.8	6.7 7.6	2.9 3.3	2.1 2.5	3.1 3.5
DRN 315ME 4	132 132	850 700	1489 1791	240 205	0.86 0.86	95.3 95.4	95.7 95.4	95.6 96.2	7.8 8.3	3.3 3.8	2.4 3.1	3.4 4.3

Motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	$\eta_{50\%}$ %	$\eta_{75\%}$ %	$\eta_{100\%}$ %	I_A/I_N	M_A/M_N	M_H/M_N	M_K/M_N
DRN 315L 4	160 160	1030 850	1486 1788	290 240	0.87 0.88	95.9 95.7	96.1 95.7	95.9 96.2	6.5 7.4	2.7 3.2	2.0 2.6	2.8 3.6
DRN 315H 4	200 200	1280 1070	1489 1791	370 310	0.84 0.85	95.4 95.1	96.0 95.1	96.0 96.2	8.1 8.1	3.7 4.2	2.8 3.1	3.8 4.3

4.12.2 Further information on motors and brakemotors

Motor	P_N	M_N	n_N	m_{Mot}	J_{Mot}	BE..	Z_0 BG BGE	M_B	m_{BMot}	J_{BMot}
	kW	Nm	min^{-1}	kg	10^{-4} kgm^2		h^{-1}	Nm	kg	10^{-4} kgm^2
DRN 63MS 4	0.12 0.12	0.83 0.67	1380 1700	4.9	2.95	BE03	10000 10000	1.7	6.8	3.64
DRN 63M 4	0.18 0.18	1.25 1.01	1375 1695	5.8	3.76	BE03	10000 10000	2.7	7.7	4.45
DRN 71MS 4	0.18 0.18	1.19 0.98	1440 1750	6.8	5.42	BE03	6200 9700	2.7	8.7	6.11
DRN 71MS 4	0.25 0.25	1.7 1.39	1405 1720	6.8	5.42	BE03	6200 9700	3.4	8.7	6.11
DRN 71M 4	0.37 0.37	2.5 2.05	1415 1730	8	7.14	BE05	5000 9000	5	10	8.44
DRN 80MK 4	0.55 0.55	3.65 3	1435 1745	11	17.1	BE1	3500 8500	7	14	18.6
DRN 80M 4	0.75 0.75	4.95 4.1	1440 1751	14	24.7	BE1	3200 8200	10	18	26.2
DRN 90S 4	1.1 1.1	7.2 6	1455 1762	20	54	BE2	2300 6000	14	24	58.7
DRN 90L 4	1.5 1.5	9.8 8.1	1461 1767	23	67.2	BE2	2200 5800	20	27	71.9
DRN 100LM 4	2.2 2.2	14.4 11.9	1456 1762	33	90.7	BE5	- 4700	28	38	96.7
DRN 100L 4	3 3	19.7 16.2	1456 1763	34	112	BE5	- 3700	40	40	118
DRN 112M 4	4 4	26 21.5	1464 1769	45	178	BE5	- 2900	55	52	183
DRN 132S 4	5.5 5.5	36 29.5	1464 1768	56	241	BE11	- 2100	80	71	251
DRN 132M 4	7.5 7.5	49 40.5	1468 1774	74	381	BE11	- 1100	110	92	403
DRN 132L 4	9.2 9.2	60 49.5	1470 1775	82	439	BE20	- 980	150	110	490
DRN 160M 4	11 11	71 59	1473 1776	115	817	BE20	- 900	150	150	877
DRN 160L 4	15 15	97 81	1474 1777	130	1040	BE20	- 800	200	165	1100
DRN 180M 4	18.5 18.5	120 99	1478 1781	155	1630	BE30	- 510	300	195	1770
DRN 180L 4	22 22	142 118	1477 1781	170	1950	BE30	- 470	300	210	2090
DRN 200L 4	30 30	194 161	1480 1783	285	2660	BE32	- 500	400	340	2890
DRN 225S 4	37 37	240 198	1482 1785	315	4350	BE32	- 230	500	370	4580
DRN 225M 4	45 45	290 240	1482 1785	315	4350	BE32	- 200	600	370	4580
DRN 250ME 4	55 55	355 295	1483 1785	510	8940	BE62	- 150	800	600	9530
DRN 280S 4	75 75	485 400	1482 1785	530	8940	BE62	- 150	1000	620	9530
DRN 280M 4	90 90	580 480	1481 1784	640	12000	BE62	- 79	1200	730	12600
DRN 315S 4	110 110	710 590	1488 1790	880	23400	BE122	- 53	1600	1020	24400
DRN 315ME 4	132 132	850 700	1489 1791	1010	28300	BE122	- 41	2000	1140	29400
DRN 315L 4	160 160	1030 850	1486 1788	1030	28600	BE122	- 34	2000	1160	29600
DRN 315H 4	200 200	1280 1070	1489 1791	1150	35200	BE122	- 23	2000	1280	36200

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4.13 IE3 global DRN.. motors, 50/60 Hz, 6-pole, duty type S1

50 Hz (voltage range 380 – 400 V), 60 Hz (voltage range 440 – 460 V)

4.13.1 Information on motors

Motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	$\eta_{50\%}$ %	$\eta_{75\%}$ %	$\eta_{100\%}$ %	I_A/I_N	M_A/M_N	M_H/M_N	M_K/M_N
DRN 63MR 6	0.09 0.09	0.93 0.76	920 1135	0.38 0.355	0.58 0.52	44.3 49.2	51.7 57.3	55.0 61.5	2.9 3.5	2.7 3.4	2.6 3.4	2.8 3.6
DRN 63M 6	0.12 0.12	1.32 1.04	870 1105	0.405 0.38	0.71 0.63	51.9 54.9	57.5 61.6	57.7 64.0	2.6 3.3	1.9 2.4	1.8 2.5	1.9 2.5
DRN 71MS 6	0.18 0.18	1.88 1.52	915 1130	0.55 0.52	0.69 0.63	59.4 61.7	63.7 66.6	63.9 68.0	3.4 3.9	1.9 2.3	1.9 2.1	2.2 2.6
DRN 71M 6	0.25 0.25	2.6 2.1	915 1135	0.77 0.72	0.68 0.62	63.5 64.8	68.2 70.3	68.6 72.0	3.4 4.2	2.0 2.5	1.9 1.9	2.3 2.8
DRN 80MK 6	0.37 0.37	3.8 3.05	935 1150	1.07 0.97	0.68 0.63	70.8 71.2	73.8 74.8	73.5 75.5	4.1 4.9	2.1 2.5	2.1 2.4	2.4 3.0
DRN 90SR 6	0.55 0.55	5.4 4.5	966 1172	1.54 1.41	0.65 0.60	73.5 76.6	76.7 80.5	77.2 81.7	5.2 6.0	2.3 2.7	2.2 2.4	2.8 3.4
DRN 90S 6	0.75 0.75	7.5 6.1	957 1165	2.05 1.82	0.68 0.63	77.4 79.1	79.8 82.6	78.9 82.5	4.8 5.6	2.0 2.4	2.0 2.3	2.4 3.0
DRN 112M 6	1.1 1.1	10.7 8.9	981 1183	2.85 2.55	0.64 0.61	83.9 84.6	85.9 86.9	86.0 87.5	6.6 7.0	2.1 2.3	1.8 1.8	3.0 3.5
DRN 112M 6	1.5 1.5	14.7 12.1	977 1181	3.75 3.35	0.66 0.63	83.9 86.1	85.6 88.2	85.5 88.5	6.4 7.1	2.1 2.3	1.9 1.9	3.0 3.5
DRN 132S 6	2.2 2.2	21.5 17.8	976 1179	5.5 4.9	0.66 0.63	83.3 87.2	84.6 89.2	84.3 89.5	6.1 6.7	2.6 2.7	2.4 2.4	3.4 3.9
DRN 132S 6	3 3	29.5 24.5	974 1178	7.4 6.7	0.66 0.63	84.8 87.6	86.0 89.4	85.6 89.5	6.2 7.0	2.6 2.7	2.5 2.5	3.4 3.7
DRN 132M 6	4 4	39 32.5	977 1181	10.2 9.2	0.64 0.61	85.4 87.4	86.9 89.2	86.8 89.5	5.6 6.4	2.7 3.2	2.4 2.6	2.8 3.1
DRN 160M 6	5.5 5.5	53 44.5	982 1185	12.1 10.4	0.74 0.72	86.7 88.4	88.0 90.4	88.0 91.0	8.6 8.6	2.8 2.9	1.6 1.3	4.3 4.4
DRN 160M 6	7.5 7.5	73 61	979 1182	16.1 14.5	0.74 0.73	88.4 89.2	89.4 90.8	89.1 91.0	8.2 8.0	2.7 2.9	1.6 1.3	4.0 4.2

4.13.2 Further information on motors and brakemotors

Motor	P_N	M_N	n_N	m_{Mot}	J_{Mot}	BE..	Z_0 BG BGE	M_B	m_{BMot}	J_{BMot}
	kW	Nm	min^{-1}	kg	10^{-4} kgm^2		h^{-1}	Nm	kg	10^{-4} kgm^2
DRN 63MR 6	0.09 0.09	0.93 0.76	920 1135	5.8	6.47	BE03	12000 12000	2.1	7.7	7.16
DRN 63M 6	0.12 0.12	1.32 1.04	870 1105	5.8	6.47	BE03	12000 12000	2.7	7.7	7.16
DRN 71MS 6	0.18 0.18	1.88 1.52	915 1130	6.8	8.29	BE05	7000 12000	5	9.2	9.59
DRN 71M 6	0.25 0.25	2.6 2.1	915 1135	8	10.4	BE05	5200 12000	5	10	11.7
DRN 80MK 6	0.37 0.37	3.8 3.05	935 1150	11	17.1	BE1	3000 9000	10	14	18.6
DRN 90SR 6	0.55 0.55	5.4 4.5	966 1172	20	54	BE2	2400 5000	14	24	58.7
DRN 90S 6	0.75 0.75	7.5 6.1	957 1165	20	54	BE2	2400 5000	20	24	58.7
DRN 112M 6	1.1 1.1	10.7 8.9	981 1183	45	178	BE5	- 2600	28	52	183
DRN 112M 6	1.5 1.5	14.7 12.1	977 1181	45	178	BE5	- 2600	40	52	183
DRN 132S 6	2.2 2.2	21.5 17.8	976 1179	56	245	BE5	- 2300	55	64	250
DRN 132S 6	3 3	29.5 24.5	974 1178	56	245	BE11	- 2300	80	71	256
DRN 132M 6	4 4	39 32.5	977 1181	74	381	BE11	- 1800	80	92	403
DRN 160M 6	5.5 5.5	53 44.5	982 1185	115	1290	BE20	- 1200	110	150	1350
DRN 160M 6	7.5 7.5	73 61	979 1182	115	1290	BE20	- 1200	150	150	1350

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4.14 IE3 global DRN.. motors, 50/60 Hz, 8-pole, duty type S1

50 Hz (voltage range 380 – 400 V), 60 Hz (voltage range 440 – 460 V)

4.14.1 Information on motors

Motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	$η_{50\%}$ %	$η_{75\%}$ %	$η_{100\%}$ %	I_A/I_N	M_A/M_N	M_H/M_N	M_K/M_N
DRN 71MSR 8	0.09 0.09	1.24 1	695 856	0.47 0.445	0.53 0.46	39.0 43.9	46.7 52.6	50.7 57.5	2.4 2.7	2.3 2.6	2.3 2.6	2.6 3.1
DRN 71MS 8	0.12 0.12	1.72 1.37	665 835	0.485 0.455	0.64 0.56	46.2 49.3	52.4 56.5	53.5 59.5	2.3 2.7	1.6 1.9	1.6 1.9	1.8 2.3
DRN 80MK 8	0.18 0.18	2.45 1.99	705 863	0.78 0.74	0.54 0.48	49.4 53.3	56.1 60.5	58.7 64.0	3.0 3.5	1.8 2.2	1.8 2.2	2.4 2.9
DRN 80M 8	0.25 0.25	3.4 2.75	702 861	1.04 0.98	0.53 0.48	55.8 58.2	62.0 65.0	64.1 68.0	3.1 3.5	2.0 2.3	1.9 2.2	2.3 2.9
DRN 90S 8	0.37 0.37	4.95 4.05	716 870	1.46 1.37	0.55 0.50	61.9 63.7	67.5 69.6	69.3 72.0	3.6 4.0	1.8 2.0	1.7 1.8	2.4 2.7
DRN 90L 8	0.55 0.55	7.4 6.1	710 868	1.87 1.88	0.59 0.54	69.0 68.5	72.7 72.8	73.0 74.0	3.5 4.0	1.8 1.9	1.8 1.9	2.3 2.6
DRN 100LS 8	0.75 0.75	10.1 8.3	708 866	2.25 2.15	0.62 0.57	72.2 71.2	75.2 74.7	75.0 75.5	3.8 4.4	1.9 2.1	1.8 1.9	2.2 2.6
DRN 100L 8	1.1 1.1	14.8 12.1	710 868	3.5 3.2	0.59 0.55	73.5 73.3	77.2 77.3	77.7 78.5	4.1 4.6	2.2 2.4	2.1 2.2	2.7 3.1
DRN 112M 8	1.5 1.5	20 16.4	715 872	4.2 4	0.63 0.59	78.7 81.4	80.4 83.8	79.7 84.0	4.3 5.0	1.9 2.1	1.8 1.8	2.3 2.6
DRN 132S 8	2.2 2.2	29.5 24	715 871	6.1 5.4	0.64 0.60	81.6 83.7	82.9 85.6	81.9 85.5	4.5 5.2	2.0 2.1	1.8 1.8	2.4 2.7
DRN 132M 8	3 3	39.5 32.5	726 880	8.9 8	0.58 0.55	80.9 83.0	83.3 85.8	83.5 86.5	5.1 5.6	2.2 2.4	2.0 2.0	2.9 3.2
DRN 132L 8	4 4	53 43.5	722 877	11.2 10.1	0.61 0.58	83.6 84.3	85.1 86.3	84.8 86.5	4.7 5.3	2.1 2.3	1.9 2.0	2.6 2.9
DRN 160M 8	5.5 5.5	72 59	729 883	15.2 13.4	0.61 0.58	85.1 84.4	86.5 86.3	86.2 86.5	5.4 5.9	2.1 2.1	1.9 2.0	2.8 3.3
DRN 160L 8	7.5 7.5	98 81	729 882	19.8 17.3	0.63 0.61	86.8 87.9	87.7 89.4	87.3 89.5	5.8 6.4	2.1 2.1	1.9 1.9	2.9 3.5
DRN 180L 8	11 11	143 119	733 885	28 25	0.64 0.62	88.2 88.3	89.0 89.5	88.6 89.5	5.2 5.9	2.6 2.9	2.0 2.3	2.2 2.5

4.14.2 Further information on motors and brakemotors

Motor	P_N kW	M_N Nm	n_N min^{-1}	m_{Mot} kg	J_{Mot} 10^{-4} kgm^2	BE..	Z_0 BG BGE h^{-1}	M_B Nm	m_{BMot} kg	J_{BMot} 10^{-4} kgm^2
DRN 71MSR 8	0.09 0.09	1.24 1	695 856	6.8	8.29	BE03	6000 16000	2.7	8.7	8.98
DRN 71MS 8	0.12 0.12	1.72 1.37	665 835	6.8	8.29	BE03	6000 16000	3.4	8.7	8.98
DRN 80MK 8	0.18 0.18	2.45 1.99	705 863	11	17.1	BE05	5000 11500	5	14	18.6
DRN 80M 8	0.25 0.25	3.4 2.75	702 861	14	24.7	BE1	3700 10500	7	18	26.2
DRN 90S 8	0.37 0.37	4.95 4.05	716 870	20	54	BE1	2800 6700	10	23	55.6
DRN 90L 8	0.55 0.55	7.4 6.1	710 868	23	67.6	BE2	2300 5700	20	27	72.3
DRN 100LS 8	0.75 0.75	10.1 8.3	708 866	27	80.8	BE2	2400 6400	20	32	85.5
DRN 100L 8	1.1 1.1	14.8 12.1	710 868	34	111	BE5	1800 5300	40	40	117
DRN 112M 8	1.5 1.5	20 16.4	715 872	45	182	BE5	- 3500	55	52	187
DRN 132S 8	2.2 2.2	29.5 24	715 871	56	245	BE11	- 2500	80	71	255
DRN 132M 8	3 3	39.5 32.5	726 880	74	564	BE11	- 2300	80	92	586
DRN 132L 8	4 4	53 43.5	722 877	82	678	BE11	- 2100	110	100	700
DRN 160M 8	5.5 5.5	72 59	729 883	115	1290	BE20	- 1300	150	150	1350
DRN 160L 8	7.5 7.5	98 81	729 882	130	1640	BE20	- 1100	200	165	1700
DRN 180L 8	11 11	143 119	733 885	175	1960	BE30	- 1000	300	215	2100

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4.15 IE1 DR2S.. motors, 400 V, 50 Hz, 2-pole, duty type S1

4.15.1 Information on motors

Motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	$\eta_{50\%}$ %	$\eta_{75\%}$ %	$\eta_{100\%}$ %	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DR2S 63MSR 2	0.18	0.63	2725	0.465	0.78	57.8	61.0	60.7	4.2	2.6 2.6	2.6
DR2S 63MS 2	0.25	0.91	2610	0.67	0.80	62.1	64.7	62.3	3.3	2.1 2.1	2.1
DR2S 63M 2	0.37	1.33	2655	0.94	0.79	64.6	67.0	65.1	4.0	2.4 2.3	2.4
DR2S 71MR 2	0.55	1.86	2825	1.24	0.81	72.4	74.6	74.4	5.9	3.2 3.0	3.2
DR2S 71M 2	0.75	2.6	2760	1.78	0.80	71.3	73.7	72.9	4.6	2.8 2.7	2.8
DR2S 80MS 2	1.1	3.75	2800	2.45	0.84	74.2	76.4	75.0	4.6	2.3 2.0	2.4
DR2S 80M 2	1.5	5.1	2820	3.3	0.84	77.2	78.5	77.2	5.1	2.6 2.3	2.6
DR2S 90S 2	2.2	7.3	2875	4.75	0.82	79.3	80.9	79.7	5.4	2.2 1.7	2.4
DR2S 90L 2	3	10	2875	6.3	0.84	82.4	83.1	81.5	5.7	2.2 1.9	2.3
DR2S 100LM 2	4	13.4	2850	8.1	0.85	85.5	85.0	83.1	6.0	2.9 2.5	2.7
DR2S 112M 2	5.5	18	2921	10.5	0.86	85.1	85.5	84.7	7.3	2.6 2.2	3.2
DR2S 132SR 2	7.5	24.5	2902	13.2	0.92	88.4	87.6	86.0	8.1	3.0 2.6	2.9
DR2S 132S 2	9.2	30.5	2900	17.3	0.87	88.0	87.5	86.0	7.9	3.1 2.7	3.0

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4.15.2 Further information on motors and brakemotors

Motor	P_N kW	M_N Nm	n_N min^{-1}	m_{Mot} kg	J_{Mot} 10^{-4} kgm^2	BE..	Z_0 BG BGE h^{-1}	M_B Nm	m_{BMot} kg	J_{BMot} 10^{-4} kgm^2
DR2S 63MSR 2	0.18	0.63	2725	4.9	2.95	BE03	5000 6000	1.3	6.8	3.64
DR2S 63MS 2	0.25	0.91	2610	4.9	2.95	BE03	5000 6000	2.1	6.8	3.64
DR2S 63M 2	0.37	1.33	2655	5.8	3.76	BE03	4500 6000	2.7	7.7	4.45
DR2S 71MR 2	0.55	1.86	2825	8	3.71	BE05	2600 5500	5	10	5.01
DR2S 71M 2	0.75	2.6	2760	8	3.83	BE05	2600 5500	5	10	5.13
DR2S 80MS 2	1.1	3.75	2800	11	18.9	BE1	1200 3400	10	15	20.4
DR2S 80M 2	1.5	5.1	2820	14	24.5	BE1	1000 2600	10	18	26
DR2S 90S 2	2.2	7.3	2875	20	54	BE2	600 1300	14	24	58.7
DR2S 90L 2	3	10	2875	23	67.2	BE2	– 1000	20	27	71.9
DR2S 100LM 2	4	13.4	2850	33	89.7	BE5	– 750	28	38	95.7
DR2S 112M 2	5.5	18	2921	45	178	BE5	– 400	40	52	183
DR2S 132SR 2	7.5	24.5	2902	56	241	BE5	– 300	55	64	246
DR2S 132S 2	9.2	30.5	2900	56	241	BE11	– 300	80	71	251

4.16 IE1 DR2S.. motors, 400 V, 50 Hz, 4-pole, duty type S1

4.16.1 Information on motors

Motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	$η_{50\%}$ %	$η_{75\%}$ %	$η_{100\%}$ %	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DR2S 56MR 4	0.09	0.62	1380	0.35	0.61	43.9	51.4	54.8	3.0	2.8 2.8	2.9
DR2S 56M 4	0.12	0.89	1290	0.39	0.74	48.8	53.8	53.3	2.7	2.0 2.0	2.0
DR2S 63MSR 4	0.12	0.83	1380	0.405	0.64	55.6	61.0	61.9	3.6	2.7 2.6	2.7
DR2S 63MS 4	0.18	1.29	1330	0.59	0.71	52.1	57.1	57.0	2.9	2.0 2.0	2.1
DR2S 63M 4	0.25	1.79	1330	0.78	0.70	59.0	62.5	61.5	3.4	2.3 2.3	2.3
DR2S 71MS 4	0.37	2.6	1350	1.05	0.73	66.0	68.0	66.0	3.6	2.0 1.8	2.0
DR2S 71M 4	0.55	3.85	1360	1.52	0.72	69.6	71.7	70.0	4.1	2.4 2.2	2.4
DR2S 80MK 4	0.75	5.1	1410	1.81	0.76	73.6	75.9	75.3	5.2	2.4 2.0	2.6
DR2S 80M 4	1.1	7.4	1415	2.45	0.80	79.5	80.3	78.9	5.5	2.5 2.1	2.7
DR2S 90S 4	1.5	9.9	1453	3.55	0.73	78.4	80.6	80.4	6.2	2.3 1.8	2.8
DR2S 90L 4	2.2	14.6	1440	5.1	0.76	80.3	81.9	81.1	5.9	2.3 1.8	2.6
DR2S 100LS 4	3	20	1435	6.7	0.76	82.2	83.0	81.8	6.4	2.6 2.2	3.1
DR2S 100L 4	4	26.5	1445	8.9	0.75	84.4	85.1	84.2	7.4	3.1 2.2	3.7
DR2S 112M 4	5.5	36	1453	11.4	0.79	86.6	86.8	85.7	7.4	2.4 2.0	3.3
DR2S 132S 4	7.5	49.5	1453	15.8	0.77	87.8	88.0	87.0	7.1	2.8 2.7	3.5
DR2S 132M 4	9.2	60	1466	19.8	0.74	87.8	88.4	87.9	7.5	3.3 2.5	3.5
DR2S 132L 4	11	72	1466	23	0.78	88.5	89.2	88.7	7.7	3.4 2.3	3.4
DR2S 160M 4	15	98	1466	30	0.80	89.4	89.8	89.2	6.9	2.6 2.1	3.0
DR2S 160L 4	18.5	120	1470	37.5	0.78	89.6	90.2	89.8	7.5	2.9 2.4	3.3
DR2S 180M 4	22	142	1477	40.5	0.85	89.9	90.3	89.9	9.1	3.4 2.5	3.3
DR2S 180L 4	30	194	1473	55	0.86	91.4	91.4	90.7	8.7	3.4 2.3	3.2
DR2S 200L 4	37	240	1478	72	0.79	90.8	91.4	91.2	7.4	2.8 2.4	3.1
DR2S 225S 4	45	290	1482	81	0.85	91.6	92.0	91.7	9.1	3.0 2.2	2.7

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4.16.2 Further information on motors and brakemotors

Motor	P_N	M_N	n_N	m_{Mot}	J_{Mot}	BE..	Z_0 BG BGE	M_B	m_{BMot}	J_{BMot}
	kW	Nm	min^{-1}	kg	10^{-4} kgm²		h^{-1}	Nm	kg	10^{-4} kgm²
DR2S 56MR 4	0.09	0.62	1380	3.1	1.31	BE02	10000 10000	1.2	3.9	1.41
DR2S 56M 4	0.12	0.89	1290	3.1	1.31	BE02	10000 10000	1.2	3.9	1.41
DR2S 63MSR 4	0.12	0.83	1380	4.9	2.95	BE03	10000 10000	1.7	6.8	3.64
DR2S 63MS 4	0.18	1.29	1330	4.9	2.95	BE03	10000 10000	2.7	6.8	3.64
DR2S 63M 4	0.25	1.79	1330	5.8	3.76	BE03	10000 10000	3.4	7.7	4.45
DR2S 71MS 4	0.37	2.6	1350	6.8	5.42	BE05	6200 9700	5	9.2	6.72
DR2S 71M 4	0.55	3.85	1360	8	7.14	BE1	5000 9000	10	11	8.44
DR2S 80MK 4	0.75	5.1	1410	11	17.1	BE1	3500 8500	10	14	18.6
DR2S 80M 4	1.1	7.4	1415	14	24.7	BE2	3200 8200	20	18	29.2
DR2S 90S 4	1.5	9.9	1453	20	54	BE2	2300 6000	20	24	58.7
DR2S 90L 4	2.2	14.6	1440	23	67.2	BE5	2200 5800	28	29	73.2
DR2S 100LS 4	3	20	1435	27	81.5	BE5	- 6100	40	33	87.5
DR2S 100L 4	4	26.5	1445	34	112	BE5	- 3700	55	40	118
DR2S 112M 4	5.5	36	1453	45	182	BE11	- 2900	80	59	193
DR2S 132S 4	7.5	49.5	1453	56	245	BE11	- 2100	110	71	256
DR2S 132M 4	9.2	60	1466	74	385	BE20	- 1100	150	100	436
DR2S 132L 4	11	72	1466	82	443	BE20	- 980	150	110	494
DR2S 160M 4	15	98	1466	115	829	BE20	- 900	200	150	889
DR2S 160L 4	18.5	120	1470	135	1050	BE30	- 800	300	175	1190
DR2S 180M 4	22	142	1477	155	1650	BE30	- 510	300	195	1780
DR2S 180L 4	30	194	1473	175	1960	BE32	- 470	400	220	2190
DR2S 200L 4	37	240	1478	285	2670	BE32	- 500	500	340	2900
DR2S 225S 4	45	290	1482	315	4350	BE32	- 200	600	370	4580

4.17 IE1 DR2S.. motors, 400 V, 50 Hz, 6-pole, duty type S1

4.17.1 Information on motors

Motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	$\eta_{50\%}$ %	$\eta_{75\%}$ %	$\eta_{100\%}$ %	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DR2S 63MQ 6	0.09	0.93	920	0.36	0.58	37.5	43.7	46.5	2.9	2.7 2.6	2.8
DR2S 63MR 6	0.12	1.32	870	0.405	0.71	48.7	53.9	54.1	2.6	1.9 1.8	1.9
DR2S 63M 6	0.18	2	855	0.66	0.71	41.5	48.0	49.1	2.5	1.9 1.9	1.9
DR2S 71MS 6	0.25	2.65	895	0.78	0.71	60.2	65.1	64.9	3.0	1.7 1.7	2.0
DR2S 71M 6	0.37	4	885	1.18	0.69	55.1	60.1	60.0	2.9	1.9 1.9	2.0
DR2S 80MK 6	0.55	5.8	910	1.58	0.72	64.5	67.2	65.9	3.5	1.8 1.8	2.1
DR2S 80M 6	0.75	7.8	915	2.15	0.72	68.4	71.4	70.1	3.5	1.9 1.9	2.1
DR2S 90S 6	1.1	11	955	3.1	0.67	69.3	72.7	72.9	4.5	2.1 2.0	2.6
DR2S 90L 6	1.5	15	955	4.2	0.67	71.9	75.1	75.2	5.0	2.4 2.2	2.7
DR2S 100L 6	2.2	22	955	6.1	0.64	78.0	79.8	79.3	4.9	2.5 2.3	2.9
DR2S 112M 6	3	30	960	7.5	0.68	82.2	83.1	82.1	5.5	2.2 2.0	2.8
DR2S 132S 6	4	40	960	10.1	0.67	81.7	82.3	81.4	5.4	2.4 2.3	2.6
DR2S 132M 6	5.5	54	965	13.5	0.68	85.7	86.0	84.8	4.6	2.2 1.8	2.1

4.17.2 Further information on motors and brakemotors

Motor	P_N	M_N	n_N	m_{Mot}	J_{Mot}	BE..	Z_0 BG BGE	M_B	m_{BMot}	J_{BMot}
	kW	Nm	min^{-1}	kg	10^{-4} kgm^2		h^{-1}	Nm	kg	10^{-4} kgm^2
DR2S 63MQ 6	0.09	0.93	920	5.8	6.47	BE03	12000 12000	2.1	7.7	7.16
DR2S 63MR 6	0.12	1.32	870	5.8	6.47	BE03	12000 12000	2.7	7.7	7.16
DR2S 63M 6	0.18	2	855	5.8	6.57	BE03	12000 12000	3.4	7.7	7.26
DR2S 71MS 6	0.25	2.65	895	6.8	8.29	BE1	7000 12000	7	9.4	9.59
DR2S 71M 6	0.37	4	885	8	10.4	BE1	5200 12000	10	11	11.7
DR2S 80MK 6	0.55	5.8	910	11	16.8	BE2	3000 9000	14	15	21.3
DR2S 80M 6	0.75	7.8	915	14	24.5	BE2	2700 8000	20	18	29
DR2S 90S 6	1.1	11	955	20	54	BE5	2400 5000	28	26	60
DR2S 90L 6	1.5	15	955	23	67.4	BE5	2200 4400	40	29	73.4
DR2S 100L 6	2.2	22	955	34	112	BE5	- 3400	55	40	118
DR2S 112M 6	3	30	960	45	178	BE11	- 2500	80	59	188
DR2S 132S 6	4	40	960	56	245	BE11	- 2100	80	71	256
DR2S 132M 6	5.5	54	965	74	381	BE11	- 1800	110	92	403

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4.18 IE1 DR2S.. motors, 400 V, 50 Hz, 4/2-pole, duty type S1

4.18.1 Information on motors

DR2S.. motor type	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	I_A/I_N	M_A/M_N	M_H/M_N	M_K/M_N
DR2S 63MR 4/2	0.15 0.2	1.02 0.69	1400 2785	0.56 0.475	0.64 0.81	3.0 4.5	1.9 2.1	1.8 2.0	2.3 2.4
DR2S 63M 4/2	0.2 0.28	1.39 0.98	1375 2715	0.74 0.69	0.67 0.83	2.8 3.7	1.6 1.8	1.5 1.7	2.1 2.0
DR2S 71MS 4/2	0.25 0.37	1.71 1.32	1400 2680	0.82 0.93	0.66 0.83	3.6 3.7	1.8 1.7	1.7 1.6	2.2 2.0
DR2S 71M 4/2	0.4 0.63	2.7 2.2	1405 2705	1.28 1.54	0.67 0.84	3.7 3.6	1.7 1.6	1.6 1.2	2.1 1.8
DR2S 80M 4/2	0.55 0.88	3.6 2.9	1452 2880	1.39 1.81	0.72 0.86	6.3 6.6	2.8 2.3	2.4 2.1	3.5 2.8

4.18.2 Further information on motors and brakemotors

Motor type DR2	P_N kW	M_N Nm	n_N min^{-1}	m kg	J_{Mot} 10^{-4} kgm^2	BE..	Z_0 BG BGE 1/h	M_B Nm	m_B kg	J_{Mot_BE} 10^{-4} kgm^2
DR2S 63MR 4/2	0.15 0.2	1.02 0.69	1400 2785	5.8	3.76	BE03	8300 8300	2.1	7.7	4.45
DR2S 63M 4/2	0.2 0.28	1.39 0.98	1375 2715	5.8	3.76	BE03	9300 9300	2.7	7.7	4.45
DR2S 71MS 4/2	0.25 0.37	1.71 1.32	1400 2680	6.8	5.42	BE03	4900 7600	3.4	8.7	6.11
DR2S 71M 4/2	0.4 0.63	2.7 2.2	1405 2705	8	7.14	BE1	2900 5300	7	11	8.44
DR2S 80M 4/2	0.55 0.88	3.6 2.9	1452 2880	14	24.7	BE1	1000 2000	7	18	26.2

4.19 IE1 DR2S.. motors, 400 V, 50 Hz, 8/2-pole, duty type S1

4.19.1 Information on motors

DR2S.. motor type	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	I_A/I_N	M_A/M_N	M_H/M_N	M_K/M_N
DR2S 71MS 8/2	0.044 0.2	0.59 0.66	710 2880	0.415 0.71	0.53 0.66	1.8 3.7	1.7 2.2	1.8 2.0	2.5 2.7
DR2S 71M 8/2	0.08 0.37	1.1 1.23	695 2870	0.61 1.06	0.56 0.71	1.9 4.4	1.7 2.0	1.7 1.4	2.2 2.4
DR2S 80MS 8/2	0.15 0.6	2.1 2.1	675 2720	0.9 1.39	0.61 0.86	1.7 4.0	1.7 2.0	1.7 1.8	1.8 1.9
DR2S 80M 8/2	0.22 0.9	3.15 3.15	665 2745	1.16 2.2	0.61 0.84	1.9 4.0	1.7 2.3	1.7 2.1	1.8 2.2

4.19.2 Further information on motors and brakemotors

Motor type DR2S	P_N kW	M_N Nm	n_N min^{-1}	m kg	J_{Mot} 10^{-4} kgm^2	BE..	Z_0 BG BGE 1/h	M_B Nm	m_B kg	J_{Mot_BE} 10^{-4} kgm^2
DR2S 71MS 8/2	0.044 0.2	0.59 0.66	710 2880	6.8	5.42	BE03	15000 20000	1.3	8.7	6.11
DR2S 71M 8/2	0.08 0.37	1.1 1.23	695 2870	8	7.14	BE03	14000 18000	2.7	9.9	7.83
DR2S 80MS 8/2	0.15 0.6	2.1 2.1	675 2720	11	19.1	BE05	6900 12000	5	15	20.6
DR2S 80M 8/2	0.22 0.9	3.15 3.15	665 2745	14	24.7	BE1	7300 12000	7	18	26.2

4.20 IE1 DR2S.. motors, 400 V, 50 Hz, 8/4-pole, duty type S1

4.20.1 Information on motors

DR2S.. motor type	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	I_A/I_N	M_A/M_N	M_H/M_N	M_K/M_N
DR2S 71MS 8/4	0.1 0.18	1.39 1.22	685 1405	0.47 0.51	0.63 0.79	2.3 3.3	1.5 1.4	1.6 1.4	2.0 1.9
DR2S 71M 8/4	0.16 0.3	2.2 2.05	690 1405	0.8 0.9	0.60 0.76	2.2 3.2	1.8 1.4	1.8 1.4	2.2 1.9
DR2S 80MS 8/4	0.22 0.4	2.95 2.65	710 1450	1.18 1.03	0.52 0.74	2.6 5.1	1.9 1.9	1.9 1.6	2.5 2.4

4.20.2 Further information on motors and brakemotors

Motor type DR2S	P_N kW	M_N Nm	n_N min^{-1}	m kg	J_{Mot} 10^{-4} kgm^2	BE..	Z_0 BG BGE 1/h	M_B Nm	m_B kg	J_{Mot_BE} 10^{-4} kgm^2
DR2S 71MS 8/4	0.1 0.18	1.39 1.22	685 1405	6.8	8.29	BE03	7200 12000	2.7	8.7	8.98
DR2S 71M 8/4	0.16 0.3	2.2 2.05	690 1405	8	10.4	BE05	7500 10000	5	10	11.7
DR2S 80MS 8/4	0.22 0.4	2.95 2.65	710 1450	11	19.1	BE1	5800 7600	7	15	20.6

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4.21 IE1 DR2S.. motors, 460 V, 60 Hz, 2-pole, duty type S1

4.21.1 Information on motors

Motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	$\eta_{50\%}$ %	$\eta_{75\%}$ %	$\eta_{100\%}$ %	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DR2S 63MSR 2	0.18	0.51	3370	0.41	0.74	59.0	63.1	64.0	5.3	3.3 3.1	3.3
DR2S 63MS 2	0.25	0.72	3310	0.57	0.74	64.5	68.1	68.0	4.3	2.7 2.6	2.7
DR2S 63M 2	0.37	1.06	3340	0.82	0.74	68.2	71.9	72.0	5.2	3.0 2.8	3.0
DR2S 71MR 2	0.55	1.52	3455	1.07	0.78	68.5	71.4	72.0	7.4	3.9 3.5	3.9
DR2S 71M 2	0.75	2.1	3410	1.53	0.77	70.4	73.6	74.0	6.0	3.4 3.1	3.4
DR2S 80MS 2	1.1	3.05	3445	2.15	0.81	75.5	78.5	78.5	6.0	2.9 2.4	2.9
DR2S 80M 2	1.5	4.15	3460	2.8	0.81	79.4	81.6	81.5	6.8	3.3 2.7	3.3

4.21.2 Further information on motors and brakemotors

Motor	P_N kW	M_N Nm	n_N min^{-1}	m_{Mot} kg	J_{Mot} 10^{-4} kgm^2	BE..	Z_0 BG BGE h^{-1}	M_B Nm	m_{BMot} kg	J_{BMot} 10^{-4} kgm^2
DR2S 63MSR 2	0.18	0.51	3370	4.9	2.95	BE03	4000 4800	1.3	6.8	3.64
DR2S 63MS 2	0.25	0.72	3310	4.9	2.95	BE03	4000 4800	1.7	6.8	3.64
DR2S 63M 2	0.37	1.06	3340	5.8	3.76	BE03	3600 4800	2.1	7.7	4.45
DR2S 71MR 2	0.55	1.52	3455	8	3.71	BE03	2100 4400	3.4	9.9	4.4
DR2S 71M 2	0.75	2.1	3410	8	3.83	BE05	2100 4400	5	10	5.13
DR2S 80MS 2	1.1	3.05	3445	11	19.1	BE1	960 2720	7	15	20.6
DR2S 80M 2	1.5	4.15	3460	14	24.7	BE1	800 2080	10	18	26.2

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4.22 IE1 DR2S.. motors, 460 V, 60 Hz, 4-pole, duty type S1

4.22.1 Information on motors

Motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	$η_{50\%}$ %	$η_{75\%}$ %	$η_{100\%}$ %	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DR2S 56MR 4	0.09	0.51	1700	0.33	0.55	45.4	53.3	57.5	3.6	3.6 3.5	3.6
DR2S 56M 4	0.12	0.69	1650	0.35	0.66	53.3	59.9	62.0	3.4	2.6 2.6	2.7
DR2S 63MSR 4	0.12	0.67	1700	0.37	0.58	56.0	61.8	64.0	4.3	3.3 3.2	3.4
DR2S 63MS 4	0.18	1.03	1675	0.54	0.62	58.3	64.2	66.0	3.7	2.6 2.6	2.8
DR2S 63M 4	0.25	1.43	1675	0.7	0.62	62.8	67.2	68.0	4.2	3.0 2.9	3.0
DR2S 71MS 4	0.37	2.1	1685	0.92	0.67	67.5	70.2	70.0	4.4	2.4 2.2	2.5
DR2S 71M 4	0.55	3.1	1695	1.33	0.66	71.5	74.2	74.0	5.0	2.8 2.5	2.8
DR2S 80MK 4	0.75	4.15	1730	1.6	0.72	75.7	78.3	78.5	6.5	2.9 2.3	3.3
DR2S 80M 4	1.1	6.1	1730	2.15	0.76	80.3	81.9	81.5	6.9	3.1 2.6	3.4
DR2S 180M 4	22	118	1780	35.5	0.84	90.4	91.1	91.0	11.0	4.1 1.9	3.4
DR2S 180L 4	30	161	1776	48	0.85	91.6	92.0	91.7	9.7	4.0 2.4	3.5
DR2S 200L 4	37	198	1781	62	0.79	91.5	92.4	92.4	8.2	3.2 2.0	3.0
DR2S 225S 4	45	240	1785	70	0.85	92.5	93.1	93.0	10.4	3.6 2.2	2.7

4.22.2 Further information on motors and brakemotors

Motor	P_N	M_N	n_N	m_{Mot}	J_{Mot}	BE..	Z_0 BG BGE	M_B	m_{BMot}	J_{BMot}
	kW	Nm	min^{-1}	kg	10^{-4} kgm^2		h^{-1}	Nm	kg	10^{-4} kgm^2
DR2S 56MR 4	0.09	0.51	1700	3.1	1.31	BE02	8000 8000	1.2	3.9	1.41
DR2S 56M 4	0.12	0.69	1650	3.1	1.31	BE02	8000 8000	1.2	3.9	1.41
DR2S 63MSR 4	0.12	0.67	1700	4.9	2.95	BE03	8000 8000	1.3	6.8	3.64
DR2S 63MS 4	0.18	1.03	1675	4.9	2.95	BE03	8000 8000	2.1	6.8	3.64
DR2S 63M 4	0.25	1.43	1675	5.8	3.76	BE03	8000 8000	3.4	7.7	4.45
DR2S 71MS 4	0.37	2.1	1685	6.8	5.42	BE05	4950 7800	5	9.2	6.72
DR2S 71M 4	0.55	3.1	1695	8	7.14	BE1	4000 7200	7	11	8.44
DR2S 80MK 4	0.75	4.15	1730	11	17.1	BE1	2800 6800	10	14	18.6
DR2S 80M 4	1.1	6.1	1730	14	24.7	BE2	2600 6600	14	18	29.2
DR2S 180M 4	22	118	1780	155	1650	BE30	- 400	300	195	1780
DR2S 180L 4	30	161	1776	175	1960	BE32	- 380	400	220	2190
DR2S 200L 4	37	198	1781	285	2670	BE32	- 400	400	340	2900
DR2S 225S 4	45	240	1785	315	4350	BE32	- 160	500	370	4580

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4.23 IE1 DR2S.. motors, 460 V, 60 Hz, 6-pole, duty type S1

4.23.1 Information on motors

Motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	$\eta_{50\%}$ %	$\eta_{75\%}$ %	$\eta_{100\%}$ %	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DR2S 63MQ 6	0.09	0.76	1135	0.34	0.52	46.0	53.6	57.5	3.5	3.4 3.4	3.6
DR2S 63MR 6	0.12	1.04	1105	0.37	0.63	51.1	57.3	59.5	3.3	2.4 2.5	2.5
DR2S 63M 6	0.18	1.57	1095	0.62	0.60	44.4	51.9	55.0	3.1	2.5 2.4	2.6
DR2S 71MS 6	0.25	2.15	1120	0.7	0.63	61.2	66.6	68.0	3.6	2.1 2.0	2.5
DR2S 71M 6	0.37	3.15	1115	1.06	0.62	58.9	64.5	66.0	3.6	2.4 2.3	2.5
DR2S 80MK 6	0.55	4.65	1135	1.37	0.65	68.2	71.7	72.0	4.3	2.2 2.2	2.6
DR2S 80M 6	0.75	6.3	1130	1.78	0.69	73.6	76.2	75.5	4.3	2.1 1.9	2.3

4.23.2 Further information on motors and brakemotors

Motor	P_N kW	M_N Nm	n_N min^{-1}	m_{Mot} kg	J_{Mot} 10^{-4} kgm^2	BE..	Z_0 BG BGE h^{-1}	M_B Nm	m_{BMot} kg	J_{BMot} 10^{-4} kgm^2
DR2S 63MQ 6	0.09	0.76	1135	5.8	6.47	BE03	9600 9600	1.7	7.7	7.16
DR2S 63MR 6	0.12	1.04	1105	5.8	6.47	BE03	9600 9600	2.1	7.7	7.16
DR2S 63M 6	0.18	1.57	1095	5.8	6.57	BE03	9600 9600	3.4	7.7	7.26
DR2S 71MS 6	0.25	2.15	1120	6.8	8.29	BE05	5600 9600	5	9.2	9.59
DR2S 71M 6	0.37	3.15	1115	8	10.4	BE1	4150 9600	7	11	11.7
DR2S 80MK 6	0.55	4.65	1135	11	17.1	BE1	2400 7200	10	14	18.6
DR2S 80M 6	0.75	6.3	1130	14	24.7	BE2	2150 6400	14	18	29.2

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4.24 IE1 DR2S.. motors, 460 V, 60 Hz, 4/2-pole, duty type S1

4.24.1 Information on motors

DR2S.. motor type	P_N kW	M_N Nm	n_N 1/min	I_N A	cosφ	I_A/I_N	M_A/M_N	M_H/M_N	M_K/M_N
DR2S 63MR 4/2	0.15 0.2	0.84 0.56	1710 3405	0.485 0.4	0.60 0.81	3.6 5.5	2.2 2.4	1.9 2.2	2.6 2.7
DR2S 63M 4/2	0.2 0.28	1.12 0.8	1700 3355	0.64 0.57	0.62 0.82	3.4 4.7	2.0 2.1	1.7 2.0	2.5 2.3
DR2S 71MS 4/2	0.25 0.37	1.39 1.05	1715 3350	0.72 0.77	0.62 0.81	4.2 4.6	2.1 2.1	1.7 1.7	2.6 2.2
DR2S 71M 4/2	0.4 0.63	2.2 1.79	1720 3370	1.12 1.27	0.62 0.82	4.2 4.6	2.1 1.9	1.7 1.1	2.5 1.9
DR2S 80M 4/2	0.55 0.88	3 2.4	1749 3470	1.16 1.53	0.73 0.89	6.6 6.8	2.8 2.4	2.4 2.0	3.6 2.7

4.24.2 Further information on motors and brakemotors

DR2S.. motor type	P_N kW	M_N Nm	n_N 1/min	m kg	J_{Mot} 10^{-4} kgm²	BE..	Z_0 BG BGE 1/h	M_B Nm	m_B kg	J_{Mot_BE} 10^{-4} kgm²
DR2S 63MR 4/2	0.15 0.2	0.84 0.56	1710 3405	5.8	3.76	BE03	6600 6600	1.7	7.7	4.45
DR2S 63M 4/2	0.2 0.28	1.12 0.8	1700 3355	5.8	3.76	BE03	7400 7400	2.7	7.7	4.45
DR2S 71MS 4/2	0.25 0.37	1.39 1.05	1715 3350	6.8	5.42	BE03	3900 6100	2.7	8.7	6.11
DR2S 71M 4/2	0.4 0.63	2.2 1.79	1720 3370	8	7.14	BE05	2300 4200	5	10	8.44
DR2S 80M 4/2	0.55 0.88	3 2.4	1749 3470	14	24.7	BE1	800 1600	7	18	26.2

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4.25 IE1 DR2S.. motors, 460 V, 60 Hz, 8/2-pole, duty type S1

4.25.1 Information on motors

DR2S.. motor type	P_N kW	M_N Nm	n_N 1/min	I_N A	cosφ	I_A/I_N	M_A/M_N	M_H/M_N	M_K/M_N
DR2S 71MS 8/2	0.044 0.2	0.485 0.55	865 3495	0.375 0.59	0.45 0.65	2.0 4.5	1.9 2.6	1.9 2.1	2.6 3.2
DR2S 71M 8/2	0.08 0.37	0.89 1.01	855 3486	0.55 0.86	0.48 0.73	2.2 5.3	2.0 2.2	1.9 1.3	2.4 2.6
DR2S 80MS 8/2	0.15 0.6	1.71 1.72	840 3340	0.81 1.14	0.52 0.87	2.1 4.8	2.1 2.5	1.9 2.0	2.2 2.2
DR2S 80M 8/2	0.22 0.9	2.6 2.6	815 3325	0.95 1.75	0.57 0.87	2.2 4.7	1.9 2.5	1.8 2.0	1.9 2.2

4.25.2 Further information on motors and brakemotors

DR2S.. motor type	P_N kW	M_N Nm	n_N 1/min	m kg	J_{Mot} 10^{-4} kgm²	BE..	Z_0 BG BGE 1/h	M_B Nm	m_B kg	J_{Mot_BE} 10^{-4} kgm²
DR2S 71MS 8/2	0.044 0.2	0.485 0.55	865 3495	6.8	5.42	BE03	12000 16000	1.3	8.7	6.11
DR2S 71M 8/2	0.08 0.37	0.89 1.01	855 3486	8	7.14	BE03	11200 14400	2.1	9.9	7.83
DR2S 80MS 8/2	0.15 0.6	1.71 1.72	840 3340	11	19.1	BE05	5500 9600	3.5	15	20.6
DR2S 80M 8/2	0.22 0.9	2.6 2.6	815 3325	14	24.7	BE05	5800 9600	5	18	26.2

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4.26 IE1 DR2S.. motors, 460 V, 60 Hz, 8/4-pole, duty type S1

4.26.1 Information on motors

DR2S.. motor type	P_N kW	M_N Nm	n_N 1/min	I_N A	cosφ	I_A/I_N	M_A/M_N	M_H/M_N	M_K/M_N
DR2S 71MS 8/4	0.1 0.18	1.12 1	850 1725	0.45 0.46	0.54 0.71	2.5 4.1	1.9 1.7	1.9 1.7	2.5 2.3
DR2S 71M 8/4	0.16 0.3	1.82 1.68	840 1705	0.63 0.69	0.57 0.78	2.6 3.9	1.8 1.5	1.8 1.5	2.2 2.0
DR2S 80MS 8/4	0.22 0.4	2.45 2.2	865 1756	1.06 0.91	0.47 0.71	3.0 6.1	2.2 2.2	1.9 1.7	2.9 2.8

4.26.2 Further information on motors and brakemotors

DR2S.. motor type	P_N kW	M_N Nm	n_N 1/min	m kg	J_{Mot} 10^{-4} kgm²	BE..	Z_0 BG BGE 1/h	M_B Nm	m_B kg	J_{Mot_BE} 10^{-4} kgm²
DR2S 71MS 8/4	0.1 0.18	1.12 1	850 1725	6.8	8.29	BE03	5800 9600	2.7	8.7	8.98
DR2S 71M 8/4	0.16 0.3	1.82 1.68	840 1705	8	10.4	BE05	6000 8000	3.5	10	11.7
DR2S 80MS 8/4	0.22 0.4	2.45 2.2	865 1756	11	19.1	BE05	4600 6100	5	15	20.6

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4.27 IE1 DR2S.. motors, 400 V, 50 Hz, 2-pole, duty type S3/40

4.27.1 Information on motors

Motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DR2S 63MS 2	0.3	1.11	2580	0.9	0.74	3.0	2.2 2.1	2.2
DR2S 63M 2	0.46	1.68	2615	1.27	0.78	3.5	2.4 2.2	2.3
DR2S 71M 2	0.95	3.3	2730	2.55	0.74	4.0	2.7 2.6	2.7
DR2S 80MS 2	1.4	4.8	2785	3.5	0.78	4.1	2.2 2.0	2.3
DR2S 80M 2	1.8	6.1	2825	4.35	0.76	4.7	2.7 2.4	2.7

4.27.2 Further information on motors and brakemotors

Motor	P_N kW	M_N Nm	n_N min^{-1}	m_{Mot} kg	J_{Mot} 10^{-4} kgm^2	BE..	Z_0 BG BGE h^{-1}	M_B Nm	m_{BMot} kg	J_{BMot} 10^{-4} kgm^2
DR2S 63MS 2	0.3	1.11	2580	4.9	2.95	BE03	5000 6000	2.7	6.8	3.64
DR2S 63M 2	0.46	1.68	2615	5.8	3.76	BE03	4500 6000	3.4	7.7	4.45
DR2S 71M 2	0.95	3.3	2730	8	3.83	BE1	2600 5500	7	11	5.13
DR2S 80MS 2	1.4	4.8	2785	11	19.1	BE1	1200 3400	10	15	20.6
DR2S 80M 2	1.8	6.1	2825	14	24.7	BE2	1000 2600	14	18	29.2

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4.28 IE1 DR2S.. motors, 400 V, 50 Hz, 4-pole, duty type S3/40

4.28.1 Information on motors

Motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DR2S 63MS 4	0.22	1.59	1325	0.73	0.70	2.8	1.9 2.0	2.1
DR2S 63M 4	0.32	2.3	1315	1.01	0.69	3.1	2.2 2.2	2.2
DR2S 71MS 4	0.48	3.45	1335	1.44	0.71	3.3	1.9 1.7	1.9
DR2S 71M 4	0.7	4.95	1345	2.1	0.69	3.7	2.3 2.1	2.3
DR2S 80MK 4	0.94	6.5	1385	2.2	0.82	4.7	2.0 1.7	2.2
DR2S 80M 4	1.4	9.6	1395	3.1	0.83	4.9	2.2 1.8	2.3
DR2S 90S 4	1.9	12.6	1440	5.1	0.68	5.4	2.2 1.7	2.7
DR2S 90L 4	2.6	17.3	1435	5.9	0.78	5.4	1.8 1.7	2.5
DR2S 100LS 4	3.7	25	1425	8.3	0.77	6.1	2.4 2.1	2.9
DR2S 100L 4	4.8	32	1435	10.1	0.80	7.2	2.9 2.1	3.4
DR2S 112M 4	6.6	43.5	1445	14.7	0.76	6.4	2.2 1.9	3.0
DR2S 132S 4	9.2	61	1445	18.4	0.82	7.9	2.6 1.8	3.4
DR2S 132M 4	11.2	73	1461	26.5	0.69	6.6	3.2 2.4	3.3
DR2S 132L 4	14	92	1459	31.5	0.72	6.6	3.2 2.2	3.2
DR2S 160M 4	19	125	1457	38.5	0.78	5.9	2.3 1.9	2.6
DR2S 160L 4	23	150	1465	49.5	0.74	6.6	2.7 2.3	3.0
DR2S 180M 4	27	175	1472	52	0.80	8.0	3.2 2.3	3.1
DR2S 180L 4	37	240	1469	71	0.82	8.0	3.3 2.2	3.0
DR2S 200L 4	45	295	1469	85	0.83	6.3	2.3 1.9	2.6
DR2S 225S 4	55	355	1479	98	0.86	7.4	2.7 2.4	2.8

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4.28.2 Further information on motors and brakemotors

Motor	P_N	M_N	n_N	m_{Mot}	J_{Mot}	BE..	Z_0 BG BGE	M_B	m_{BMot}	J_{BMot}
	kW	Nm	min^{-1}	kg	10^{-4} kgm^2		h^{-1}	Nm	kg	10^{-4} kgm^2
DR2S 63MS 4	0.22	1.59	1325	4.9	2.95	BE03	10000 10000	3.4	6.8	3.64
DR2S 63M 4	0.32	2.3	1315	5.8	3.76	BE03	10000 10000	3.4	7.7	4.45
DR2S 71MS 4	0.48	3.45	1335	6.8	5.42	BE1	6200 9700	7	9.4	6.72
DR2S 71M 4	0.7	4.95	1345	8	7.14	BE1	5000 9000	10	11	8.44
DR2S 80MK 4	0.94	6.5	1385	11	17.1	BE2	3500 8500	14	15	21.6
DR2S 80M 4	1.4	9.6	1395	14	24.7	BE2	3200 8200	20	18	29.2
DR2S 90S 4	1.9	12.6	1440	20	54	BE5	2300 6000	28	26	60
DR2S 90L 4	2.6	17.3	1435	23	67.2	BE5	2200 5800	40	29	73.2
DR2S 100LS 4	3.7	25	1425	27	81.5	BE5	- 6100	55	33	87.5
DR2S 100L 4	4.8	32	1435	34	112	BE5	- 3700	55	40	118
DR2S 112M 4	6.6	43.5	1445	45	182	BE11	- 2900	110	59	193
DR2S 132S 4	9.2	61	1445	56	245	BE11	- 2100	110	71	256
DR2S 132M 4	11.2	73	1461	74	385	BE20	- 1100	150	100	436
DR2S 132L 4	14	92	1459	82	443	BE20	- 980	200	110	494
DR2S 160M 4	19	125	1457	115	829	BE30	- 900	300	155	964
DR2S 160L 4	23	150	1465	135	1050	BE30	- 800	300	175	1190
DR2S 180M 4	27	175	1472	155	1650	BE32	- 510	400	200	1880
DR2S 180L 4	37	240	1469	175	1960	BE32	- 470	500	220	2190
DR2S 200L 4	45	295	1469	285	2670	BE32	- 500	600	340	2900
DR2S 225S 4	55	355	1479	315	4350	BE62	- 200	800	395	4940

4.29 IE1 DR2S.. motors, 400 V, 50 Hz, 6-pole, duty type S3/40

4.29.1 Information on motors

Motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DR2S 63M 6	0.22	2.5	840	0.73	0.76	2.5	1.7 1.6	1.7
DR2S 71MS 6	0.33	3.6	880	1.02	0.73	3.0	1.6 1.6	1.9
DR2S 71M 6	0.44	4.7	890	1.47	0.67	2.8	1.9 1.9	2.0
DR2S 80MK 6	0.66	7	905	1.93	0.71	3.4	1.8 1.8	2.1
DR2S 80M 6	0.95	10.1	900	2.7	0.73	3.2	1.8 1.7	2.0

4.29.2 Further information on motors and brakemotors

Motor	P_N kW	M_N Nm	n_N min^{-1}	m_{Mot} kg	J_{Mot} 10^{-4} kgm^2	BE..	Z_0 BG BGE h^{-1}	M_B Nm	m_{BMot} kg	J_{BMot} 10^{-4} kgm^2
DR2S 63M 6	0.22	2.5	840	5.8	6.57	BE03	12000 12000	3.4	7.7	7.26
DR2S 71MS 6	0.33	3.6	880	6.8	8.29	BE1	7000 12000	7	9.4	9.59
DR2S 71M 6	0.44	4.7	890	8	10.4	BE1	5200 12000	10	11	11.7
DR2S 80MK 6	0.66	7	905	11	17.1	BE2	3000 9000	14	15	21.6
DR2S 80M 6	0.95	10.1	900	14	24.7	BE2	2700 8000	20	18	29.2

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4.30 IE1 DR2S.. motors, 460 V, 60 Hz, 2-pole, duty type S3/40

4.30.1 Information on motors

Motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DR2S 63MS 2	0.37	1.11	3190	0.87	0.77	3.5	2.2 2.1	2.2
DR2S 63M 2	0.55	1.63	3230	1.18	0.80	4.4	2.4 2.3	2.4
DR2S 71M 2	1.1	3.15	3345	2.35	0.76	5.0	2.9 2.7	2.9
DR2S 80MS 2	1.6	4.5	3380	3.05	0.83	5.7	2.7 2.2	2.7
DR2S 80M 2	2.1	5.8	3430	3.95	0.81	5.9	2.8 2.3	2.8
DR2S 90S 2	2.9	7.9	3487	5.9	0.76	6.6	2.7 2.0	2.9
DR2S 90L 2	4	11	3475	7.3	0.83	6.3	2.2 1.9	2.3
DR2S 100LM 2	5.2	14.4	3450	8.8	0.86	6.6	2.8 2.5	2.7
DR2S 112M 2	7.8	21.5	3501	12.8	0.88	7.5	2.2 1.8	3.0
DR2S 132S 2	12.2	33.5	3500	19.5	0.88	8.3	3.1 2.6	3.1

4.30.2 Further information on motors and brakemotors

Motor	P_N kW	M_N Nm	n_N min^{-1}	m_{Mot} kg	J_{Mot} 10^{-4} kgm^2	BE..	Z_0 BG BGE h^{-1}	M_B Nm	m_{BMot} kg	J_{BMot} 10^{-4} kgm^2
DR2S 63MS 2	0.37	1.11	3190	4.9	2.95	BE03	4000 4800	2.7	6.8	3.64
DR2S 63M 2	0.55	1.63	3230	5.8	3.76	BE03	3600 4800	3.4	7.7	4.45
DR2S 71M 2	1.1	3.15	3345	8	3.83	BE1	2100 4400	7	11	5.13
DR2S 80MS 2	1.6	4.5	3380	11	18.9	BE1	960 2720	10	15	20.4
DR2S 80M 2	2.1	5.8	3430	14	24.5	BE2	800 2080	14	18	29
DR2S 90S 2	2.9	7.9	3487	20	54	BE2	480 1040	20	24	58.7
DR2S 90L 2	4	11	3475	23	67.2	BE5	- 800	28	29	73.2
DR2S 100LM 2	5.2	14.4	3450	33	89.7	BE5	- 600	28	38	95.7
DR2S 112M 2	7.8	21.5	3501	45	178	BE5	- 320	55	52	183
DR2S 132S 2	12.2	33.5	3500	56	241	BE11	- 240	80	71	251

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4.31 IE1 DR2S.. motors, 460 V, 60 Hz, 4-pole, duty type S3/40

4.31.1 Information on motors

Motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DR2S 63MS 4	0.27	1.6	1615	0.74	0.69	3.3	2.1 2.1	2.2
DR2S 63M 4	0.37	2.2	1615	0.95	0.71	3.8	2.4 2.3	2.4
DR2S 71MS 4	0.56	3.25	1635	1.35	0.73	3.8	2.0 1.9	2.1
DR2S 71M 4	0.83	4.8	1650	1.95	0.71	4.2	2.4 2.1	2.4
DR2S 80MK 4	1.1	6.2	1685	2.15	0.82	5.4	2.2 1.7	2.5
DR2S 80M 4	1.7	9.6	1685	3.15	0.84	5.7	2.4 2.0	2.6
DR2S 90S 4	2.3	12.6	1740	4.85	0.72	6.0	2.1 1.6	2.7
DR2S 90L 4	3	16.5	1740	5.6	0.79	6.4	2.2 1.8	2.6
DR2S 100LS 4	4	22	1735	7.5	0.78	7.0	2.6 2.2	3.2
DR2S 100L 4	5.3	29	1741	9.4	0.80	8.1	3.1 2.1	3.6
DR2S 112M 4	7.3	40	1750	13.3	0.79	7.4	2.4 1.8	3.1
DR2S 132S 4	10	55	1749	16.8	0.84	8.5	2.7 1.8	4.5
DR2S 132M 4	12.2	66	1764	24	0.72	7.8	3.5 2.3	3.3
DR2S 132L 4	15.2	82	1763	28	0.75	7.1	3.3 2.3	3.3
DR2S 160M 4	21	114	1760	35.5	0.81	6.4	2.4 1.9	2.8
DR2S 160L 4	26	141	1766	45.5	0.78	7.3	2.6 1.9	2.9
DR2S 180M 4	30	162	1773	48.5	0.83	9.1	3.5 1.7	2.9
DR2S 180L 4	39	210	1773	63	0.83	8.8	3.7 2.2	3.2
DR2S 200L 4	48	260	1772	77	0.84	6.7	2.5 1.7	2.3
DR2S 225S 4	60	320	1781	92	0.87	8.1	2.9 2.3	2.8

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4.31.2 Further information on motors and brakemotors

Motor	P_N kW	M_N Nm	n_N min^{-1}	m_{Mot} kg	J_{Mot} 10^{-4} kgm^2	BE..	Z_0 BG BGE h^{-1}	M_B Nm	m_{BMot} kg	J_{BMot} 10^{-4} kgm^2
DR2S 63MS 4	0.27	1.6	1615	4.9	2.95	BE03	8000 8000	3.4	6.8	3.64
DR2S 63M 4	0.37	2.2	1615	5.8	3.76	BE03	8000 8000	3.4	7.7	4.45
DR2S 71MS 4	0.56	3.25	1635	6.8	5.42	BE1	4950 7800	7	9.4	6.72
DR2S 71M 4	0.83	4.8	1650	8	7.14	BE1	4000 7200	10	11	8.44
DR2S 80MK 4	1.1	6.2	1685	11	17.1	BE2	2800 6800	14	15	21.6
DR2S 80M 4	1.7	9.6	1685	14	24.7	BE2	2600 6600	20	18	29.2
DR2S 90S 4	2.3	12.6	1740	20	54	BE5	1800 4800	28	26	60
DR2S 90L 4	3	16.5	1740	23	67.2	BE5	1800 4700	40	29	73.2
DR2S 100LS 4	4	22	1735	27	81.5	BE5	- 4000	55	33	87.5
DR2S 100L 4	5.3	29	1741	34	112	BE5	- 2900	55	40	118
DR2S 112M 4	7.3	40	1750	45	182	BE11	- 2300	80	59	193
DR2S 132S 4	10	55	1749	56	245	BE11	- 1700	110	71	256
DR2S 132M 4	12.2	66	1764	74	385	BE20	- 900	150	100	436
DR2S 132L 4	15.2	82	1763	82	443	BE20	- 780	200	110	494
DR2S 160M 4	21	114	1760	115	829	BE30	- 720	300	155	964
DR2S 160L 4	26	141	1766	135	1050	BE30	- 640	300	175	1190
DR2S 180M 4	30	162	1773	155	1650	BE32	- 400	400	200	1880
DR2S 180L 4	39	210	1773	175	1960	BE32	- 380	500	220	2190
DR2S 200L 4	48	260	1772	285	2670	BE32	- 400	600	340	2900
DR2S 225S 4	60	320	1781	315	4350	BE62	- 160	800	395	4940

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4.32 IE1 DR2S.. motors, 460 V, 60 Hz, 6-pole, duty type S3/40

4.32.1 Information on motors

Motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DR2S 63M 6	0.26	2.4	1045	0.72	0.73	2.8	1.7 1.6	1.7
DR2S 71MS 6	0.41	3.65	1070	1.02	0.74	3.3	1.5 1.5	1.7
DR2S 71M 6	0.53	4.65	1090	1.45	0.67	3.2	1.8 1.8	2.0
DR2S 80MK 6	0.77	6.6	1115	1.9	0.68	4.0	1.9 1.9	2.2
DR2S 80M 6	1.1	9.5	1110	2.6	0.71	3.9	1.8 1.7	2.0
DR2S 90S 6	1.5	12.4	1155	3.6	0.67	5.3	2.4 2.0	2.8
DR2S 90L 6	2	16.6	1150	4.55	0.68	5.6	2.3 2.1	2.6
DR2S 100L 6	3.2	27	1135	6.9	0.70	4.4	2.4 2.3	2.9
DR2S 112M 6	4.2	34.5	1160	8.4	0.73	5.3	1.9 1.7	2.8
DR2S 132S 6	6	50	1150	11.8	0.74	5.2	2.0 1.8	2.3
DR2S 132M 6	7.5	62	1164	15.5	0.69	5.3	2.5 1.9	2.2

4.32.2 Further information on motors and brakemotors

Motor	P_N kW	M_N Nm	n_N min^{-1}	m_{Mot} kg	J_{Mot} 10^{-4} kgm^2	BE..	Z_0 BG BGE h^{-1}	M_B Nm	m_{BMot} kg	J_{BMot} 10^{-4} kgm^2
DR2S 63M 6	0.26	2.4	1045	5.8	6.57	BE03	9600 9600	3.4	7.7	7.26
DR2S 71MS 6	0.41	3.65	1070	6.8	8.29	BE1	5600 9600	7	9.4	9.59
DR2S 71M 6	0.53	4.65	1090	8	10.4	BE1	4150 9600	10	11	11.7
DR2S 80MK 6	0.77	6.6	1115	11	16.8	BE2	2400 7200	14	15	21.3
DR2S 80M 6	1.1	9.5	1110	14	24.5	BE2	2150 6400	20	18	29
DR2S 90S 6	1.5	12.4	1155	20	54	BE5	1920 4000	28	26	60
DR2S 90L 6	2	16.6	1150	23	67.4	BE5	1760 3520	40	29	73.4
DR2S 100L 6	3.2	27	1135	34	112	BE5	- 2700	55	40	118
DR2S 112M 6	4.2	34.5	1160	45	178	BE11	- 2080	80	59	188
DR2S 132S 6	6	50	1150	56	245	BE11	- 1840	110	71	256
DR2S 132M 6	7.5	62	1164	74	381	BE20	- 1440	150	100	432

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4.33 IE1 DR2S.. motors, 400 V, 50 Hz, 2-pole, duty type S3/25

4.33.1 Information on motors

Motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DR2S 63MS 2	0.35	1.37	2435	1.02	0.80	2.6	1.8 1.7	1.8
DR2S 63M 2	0.52	1.97	2520	1.41	0.82	3.2	2.1 1.9	2.0
DR2S 71M 2	1	3.5	2710	2.6	0.76	3.9	2.6 2.5	2.6
DR2S 80MS 2	1.5	5.2	2760	3.7	0.80	3.9	2.1 1.8	2.2
DR2S 80M 2	2	6.8	2795	4.65	0.80	4.4	2.4 2.1	2.4

4.33.2 Further information on motors and brakemotors

Motor	P_N kW	M_N Nm	n_N min^{-1}	m_{Mot} kg	J_{Mot} 10^{-4} kgm^2	BE..	Z_0 BG BGE h^{-1}	M_B Nm	m_{BMot} kg	J_{BMot} 10^{-4} kgm^2
DR2S 63MS 2	0.35	1.37	2435	4.9	2.95	BE03	5000 6000	2.7	6.8	3.64
DR2S 63M 2	0.52	1.97	2520	5.8	3.76	BE03	4500 6000	3.4	7.7	4.45
DR2S 71M 2	1	3.5	2710	8	3.83	BE1	2600 5500	7	11	5.13
DR2S 80MS 2	1.5	5.2	2760	11	19.1	BE1	1200 3400	10	15	20.6
DR2S 80M 2	2	6.8	2795	14	24.7	BE2	1000 2600	14	18	29.2

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4.34 IE1 DR2S.. motors, 400 V, 50 Hz, 4-pole, duty type S3/25

4.34.1 Information on motors

Motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DR2S 63MS 4	0.25	1.87	1275	0.81	0.75	2.6	1.6 1.7	1.7
DR2S 63M 4	0.35	2.6	1285	1.07	0.73	2.9	2.0 1.9	2.0
DR2S 71MS 4	0.55	4.1	1285	1.58	0.76	3.0	1.6 1.5	1.6
DR2S 71M 4	0.8	5.9	1305	2.25	0.75	3.4	1.9 1.8	2.0
DR2S 80MK 4	1.1	7.6	1380	2.7	0.79	4.3	1.9 1.6	2.1
DR2S 80M 4	1.5	10.2	1400	3.4	0.81	5.1	2.3 1.9	2.4
DR2S 90S 4	2.2	14.6	1435	5.1	0.77	5.4	1.9 1.5	2.3
DR2S 90L 4	3	20	1430	6.9	0.77	5.2	2.0 1.6	2.3
DR2S 100LS 4	4	26.5	1430	9.2	0.76	5.9	2.4 2.1	2.9
DR2S 100L 4	5.5	37	1425	11.2	0.83	6.5	2.5 1.8	3.0
DR2S 112M 4	7.5	50	1435	15.8	0.81	5.9	1.9 1.7	2.7
DR2S 132S 4	10.5	70	1435	20.5	0.86	7.1	2.3 1.6	3.0
DR2S 132M 4	12.5	82	1458	27.5	0.75	6.4	2.8 2.2	3.0
DR2S 132L 4	16	105	1456	35	0.75	6.5	3.0 2.1	3.1
DR2S 160M 4	22	144	1456	45.5	0.78	5.6	2.2 1.8	2.6
DR2S 160L 4	26	170	1461	52	0.80	6.3	2.4 2.0	2.7
DR2S 180M 4	31	200	1467	59	0.83	7.2	2.8 2.0	2.7
DR2S 180L 4	43	280	1463	81	0.84	7.0	2.8 1.9	2.6
DR2S 200L 4	51	330	1471	98	0.81	6.8	2.5 2.1	2.8
DR2S 225S 4	63	410	1476	113	0.86	6.4	2.4 2.1	2.4

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4.34.2 Further information on motors and brakemotors

Motor	P_N	M_N	n_N	m_{Mot}	J_{Mot}	BE..	Z_0 BG BGE	M_B	m_{BMot}	J_{BMot}
	kW	Nm	min^{-1}	kg	10^{-4} kgm²		h^{-1}	Nm	kg	10^{-4} kgm²
DR2S 63MS 4	0.25	1.87	1275	4.9	2.95	BE03	10000 10000	3.4	6.8	3.64
DR2S 63M 4	0.35	2.6	1285	5.8	3.76	BE03	10000 10000	3.4	7.7	4.45
DR2S 71MS 4	0.55	4.1	1285	6.8	5.42	BE1	6200 9700	10	9.4	6.72
DR2S 71M 4	0.8	5.9	1305	8	7.14	BE1	5000 9000	10	11	8.44
DR2S 80MK 4	1.1	7.6	1380	11	17.1	BE2	3500 8500	20	15	21.6
DR2S 80M 4	1.5	10.2	1400	14	24.7	BE2	3200 8200	20	18	29.2
DR2S 90S 4	2.2	14.6	1435	20	54	BE5	2300 6000	28	26	60
DR2S 90L 4	3	20	1430	23	67.2	BE5	2200 5800	40	29	73.2
DR2S 100LS 4	4	26.5	1430	27	81.5	BE5	- 6100	55	33	87.5
DR2S 100L 4	5.5	37	1425	34	112	BE5	- 3700	55	40	118
DR2S 112M 4	7.5	50	1435	45	182	BE11	- 2900	110	59	193
DR2S 132S 4	10.5	70	1435	56	245	BE11	- 2100	110	71	256
DR2S 132M 4	12.5	82	1458	74	385	BE20	- 1100	200	100	436
DR2S 132L 4	16	105	1456	82	443	BE20	- 980	200	110	494
DR2S 160M 4	22	144	1456	115	829	BE30	- 900	300	155	964
DR2S 160L 4	26	170	1461	135	1050	BE32	- 800	400	180	1280
DR2S 180M 4	31	200	1467	155	1650	BE32	- 510	500	200	1880
DR2S 180L 4	43	280	1463	175	1960	BE32	- 470	600	220	2190
DR2S 200L 4	51	330	1471	285	2670	BE62	- 500	800	365	3260
DR2S 225S 4	63	410	1476	315	4350	BE62	- 200	1000	395	4940

4.35 IE1 DR2S.. motors, 400 V, 50 Hz, 6-pole, duty type S3/25

4.35.1 Information on motors

motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DR2S 63M 6	0.25	2.85	835	0.82	0.76	2.4	1.6 1.6	1.6
DR2S 71MS 6	0.37	4.05	875	1.21	0.71	2.6	1.5 1.5	1.8
DR2S 71M 6	0.52	5.7	875	1.75	0.69	2.6	1.8 1.8	1.9
DR2S 80MK 6	0.75	8.1	885	2.15	0.75	3.1	1.6 1.6	1.8
DR2S 80M 6	1.1	11.7	895	3.15	0.74	3.0	1.6 1.6	1.9

4.35.2 Further information on motors and brakemotors

motor	P_N kW	M_N Nm	n_N min^{-1}	m_{Mot} kg	J_{Mot} 10^{-4} kgm^2	BE..	Z_0 BG BGE h^{-1}	M_B Nm	m_{BMot} kg	J_{BMot} 10^{-4} kgm^2
DR2S 63M 6	0.25	2.85	835	5.8	6.57	BE03	12000 12000	3.4	7.7	7.26
DR2S 71MS 6	0.37	4.05	875	6.8	8.29	BE1	7000 12000	10	9.4	9.59
DR2S 71M 6	0.52	5.7	875	8	10.4	BE1	5200 12000	10	11	11.7
DR2S 80MK 6	0.75	8.1	885	11	17.1	BE2	3000 9000	20	15	21.6
DR2S 80M 6	1.1	11.7	895	14	24.7	BE2	2700 8000	20	18	29.2

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4.36 IE1 DR2S.. motors, 460 V, 60 Hz, 2-pole, duty type S3/25

4.36.1 Information on motors

motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DR2S 63MS 2	0.39	1.18	3165	0.9	0.79	3.4	2.1 2.0	2.1
DR2S 63M 2	0.59	1.76	3200	1.25	0.82	4.2	2.2 2.1	2.2
DR2S 71M 2	1.2	3.45	3320	2.5	0.79	4.7	2.6 2.4	2.6
DR2S 80MS 2	1.7	4.85	3355	3.25	0.84	5.4	2.5 2.1	2.5
DR2S 80M 2	2.2	6.1	3420	4.05	0.83	5.7	2.7 2.2	2.7
DR2S 90S 2	3.1	8.5	3481	6.2	0.78	6.2	2.5 1.9	2.8
DR2S 90L 2	4.2	11.6	3465	7.7	0.84	6.0	2.1 1.8	2.2
DR2S 100LM 2	5.5	15.2	3460	9.6	0.84	6.7	2.9 2.6	2.8
DR2S 112M 2	8.4	23	3506	14	0.86	7.6	2.4 1.9	3.2
DR2S 132S 2	13	35.5	3495	20.5	0.89	7.8	2.9 2.4	2.9

4.36.2 Further information on motors and brakemotors

Motor	P_N kW	M_N Nm	n_N min^{-1}	m_{Mot} kg	J_{Mot} 10^{-4} kgm^2	BE..	Z_0 BG BGE h^{-1}	M_B Nm	m_{BMot} kg	J_{BMot} 10^{-4} kgm^2
DR2S 63MS 2	0.39	1.18	3165	4.9	2.95	BE03	4000 4800	2.7	6.8	3.64
DR2S 63M 2	0.59	1.76	3200	5.8	3.76	BE03	3600 4800	3.4	7.7	4.45
DR2S 71M 2	1.2	3.45	3320	8	3.83	BE1	2100 4400	7	11	5.13
DR2S 80MS 2	1.7	4.85	3355	11	18.9	BE1	960 2720	10	15	20.4
DR2S 80M 2	2.2	6.1	3420	14	24.5	BE2	800 2080	14	18	29
DR2S 90S 2	3.1	8.5	3481	20	54	BE2	480 1040	20	24	58.7
DR2S 90L 2	4.2	11.6	3465	23	67.2	BE5	- 800	28	29	73.2
DR2S 100LM 2	5.5	15.2	3460	33	89.7	BE5	- 600	40	38	95.7
DR2S 112M 2	8.4	23	3506	45	178	BE5	- 320	55	52	183
DR2S 132S 2	13	35.5	3495	56	241	BE11	- 240	80	71	251

4.37 IE1 DR2S.. motors, 460 V, 60 Hz, 4-pole, duty type S3/25

4.37.1 Information on motors

motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DR2S 63MS 4	0.29	1.74	1595	0.77	0.72	3.1	1.9 1.9	2.0
DR2S 63M 4	0.39	2.3	1605	0.98	0.72	3.6	2.3 2.2	2.3
DR2S 71MS 4	0.59	3.45	1625	1.4	0.74	3.6	1.9 1.8	2.0
DR2S 71M 4	0.88	5.1	1635	2.05	0.73	4.1	2.2 2.0	2.2
DR2S 80MK 4	1.2	6.8	1690	2.45	0.79	5.4	2.2 1.8	2.5
DR2S 80M 4	1.8	10.1	1695	3.35	0.82	6.1	2.6 2.1	2.8
DR2S 90S 4	2.4	13.2	1742	4.7	0.76	6.2	2.1 1.6	2.6
DR2S 90L 4	3.2	17.6	1741	6.2	0.77	6.7	2.4 1.9	2.8
DR2S 100LS 4	4.2	23	1735	8.3	0.74	6.8	2.7 2.2	3.3
DR2S 100L 4	5.8	32	1735	10	0.82	7.5	2.8 1.9	3.3
DR2S 112M 4	7.9	43	1746	14	0.82	7.0	2.2 1.6	2.8
DR2S 132S 4	11	60	1745	18	0.86	7.9	2.5 1.6	4.1
DR2S 132M 4	13	70	1763	24.5	0.73	7.5	3.2 2.2	3.1
DR2S 132L 4	16.7	91	1762	31.5	0.74	7.0	3.4 2.3	3.3
DR2S 160M 4	23	125	1763	38.5	0.81	6.7	2.4 2.0	2.9
DR2S 160L 4	28	152	1760	47.5	0.80	7.0	2.4 1.8	2.7
DR2S 180M 4	33	178	1771	53	0.84	8.4	3.1 1.5	2.6
DR2S 180L 4	44	240	1769	70	0.85	7.9	3.3 1.9	2.9
DR2S 200L 4	53	285	1775	88	0.80	7.0	2.7 1.8	2.5
DR2S 225S 4	66	355	1778	100	0.87	7.3	2.6 2.1	2.5

4.37.2 Further information on motors and brakemotors

Motor	P_N	M_N	n_N	m_{Mot}	J_{Mot}	BE..	Z_0 BG BGE	M_B	m_{BMot}	J_{BMot}
	kW	Nm	min^{-1}	kg	10^{-4} kgm^2		h^{-1}	Nm	kg	10^{-4} kgm^2
DR2S 63MS 4	0.29	1.74	1595	4.9	2.95	BE03	8000 8000	3.4	6.8	3.64
DR2S 63M 4	0.39	2.3	1605	5.8	3.76	BE03	8000 8000	3.4	7.7	4.45
DR2S 71MS 4	0.59	3.45	1625	6.8	5.42	BE1	4950 7800	7	9.4	6.72
DR2S 71M 4	0.88	5.1	1635	8	7.14	BE1	4000 7200	10	11	8.44
DR2S 80MK 4	1.2	6.8	1690	11	17.1	BE2	2800 6800	14	15	21.6
DR2S 80M 4	1.8	10.1	1695	14	24.1	BE2	2600 6600	20	18	28.6
DR2S 90S 4	2.4	13.2	1742	20	54	BE5	1800 4800	28	26	60
DR2S 90L 4	3.2	17.6	1741	23	67.2	BE5	1800 4700	40	29	73.2
DR2S 100LS 4	4.2	23	1735	27	81.5	BE5	- 4000	55	33	87.5
DR2S 100L 4	5.8	32	1735	34	112	BE5	- 2900	55	40	118
DR2S 112M 4	7.9	43	1746	45	182	BE11	- 2300	110	59	193
DR2S 132S 4	11	60	1745	56	245	BE11	- 1700	110	71	256
DR2S 132M 4	13	70	1763	74	385	BE20	- 900	150	100	436
DR2S 132L 4	16.7	91	1762	82	443	BE20	- 780	200	110	494
DR2S 160M 4	23	125	1763	115	829	BE30	- 720	300	155	964
DR2S 160L 4	28	152	1760	135	1050	BE32	- 640	400	180	1280
DR2S 180M 4	33	178	1771	155	1650	BE32	- 400	400	200	1880
DR2S 180L 4	44	240	1769	175	1960	BE32	- 380	500	220	2190
DR2S 200L 4	53	285	1775	285	2670	BE32	- 400	600	340	2900
DR2S 225S 4	66	355	1778	315	4350	BE62	- 160	800	395	4940

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4.38 IE1 DR2S.. motors, 460 V, 60 Hz, 6-pole, duty type S3/25

4.38.1 Information on motors

motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DR2S 63M 6	0.29	2.65	1045	0.79	0.73	2.8	1.7 1.6	1.7
DR2S 71MS 6	0.44	3.9	1075	1.18	0.71	3.2	1.6 1.6	1.8
DR2S 71M 6	0.56	4.95	1085	1.48	0.70	3.2	1.7 1.7	1.9
DR2S 80MK 6	0.82	7.1	1110	1.98	0.71	3.9	1.8 1.8	2.0
DR2S 80M 6	1.2	10.3	1110	2.95	0.70	3.8	1.9 1.8	2.0
DR2S 90S 6	1.7	14.1	1150	3.85	0.70	4.9	2.1 1.8	2.4
DR2S 90L 6	2.3	19.1	1150	5.3	0.68	5.4	2.2 2.0	2.5
DR2S 100L 6	3.5	29.5	1135	7.6	0.71	4.2	2.4 2.3	2.8
DR2S 112M 6	4.5	37	1160	8.8	0.74	5.1	1.8 1.6	2.6
DR2S 132S 6	6.3	52	1160	12.8	0.71	5.7	2.4 2.2	2.8
DR2S 132M 6	8	66	1162	16.3	0.70	5.0	2.3 1.8	2.1

4.38.2 Further information on motors and brakemotors

Motor	P_N kW	M_N Nm	n_N min^{-1}	m_{Mot} kg	J_{Mot} 10^{-4} kgm^2	BE..	Z_0 BG BGE h^{-1}	M_B Nm	m_{BMot} kg	J_{BMot} 10^{-4} kgm^2
DR2S 63M 6	0.29	2.65	1045	5.8	6.57	BE03	9600 9600	3.4	7.7	7.26
DR2S 71MS 6	0.44	3.9	1075	6.8	8.29	BE1	5600 9600	10	9.4	9.59
DR2S 71M 6	0.56	4.95	1085	8	10.4	BE1	- -	10	11	11.7
DR2S 80MK 6	0.82	7.1	1110	11	16.8	BE2	2400 7200	14	15	21.3
DR2S 80M 6	1.2	10.3	1110	14	24.5	BE2	2150 6400	20	18	29
DR2S 90S 6	1.7	14.1	1150	20	54	BE5	1920 4000	28	26	60
DR2S 90L 6	2.3	19.1	1150	23	67.4	BE5	1760 3520	40	29	73.4
DR2S 100L 6	3.5	29.5	1135	34	112	BE5	- 2700	55	40	118
DR2S 112M 6	4.5	37	1160	45	178	BE11	- 2500	80	59	188
DR2S 132S 6	6.3	52	1160	56	245	BE11	- 1840	110	71	256
DR2S 132M 6	8	66	1162	74	381	BE20	- 1440	150	100	432

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4.39 IE1 DR2S.. motors, 400 V, 50 Hz, 2-pole, duty type S3/15

4.39.1 Information on motors

motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DR2S 63MS 2	0.4	1.65	2315	1.24	0.81	2.3	1.6 1.5	1.6
DR2S 63M 2	0.63	2.55	2365	1.84	0.86	2.7	1.8 1.6	1.7
DR2S 71M 2	1.3	4.8	2580	3.45	0.80	3.2	2.0 1.9	2.0
DR2S 80MS 2	1.7	6	2700	4.1	0.84	3.5	1.8 1.6	1.9
DR2S 80M 2	2.2	7.5	2800	5.2	0.79	4.4	2.4 2.1	2.4

4.39.2 Further information on motors and brakemotors

motor	P_N kW	M_N Nm	n_N min^{-1}	m_{Mot} kg	J_{Mot} 10^{-4} kgm^2	BE..	Z_0 BG BGE h^{-1}	M_B Nm	m_{BMot} kg	J_{BMot} 10^{-4} kgm^2
DR2S 63MS 2	0.4	1.65	2315	4.9	2.95	BE03	5000 6000	3.4	6.8	3.64
DR2S 63M 2	0.63	2.55	2365	5.8	3.76	BE03	4500 6000	3.4	7.7	4.45
DR2S 71M 2	1.3	4.8	2580	8	3.83	BE1	2600 5500	10	11	5.13
DR2S 80MS 2	1.7	6	2700	11	19.1	BE2	1200 3400	14	16	23.6
DR2S 80M 2	2.2	7.5	2800	14	24.7	BE2	1000 2600	20	18	29.2

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4.40 IE1 DR2S.. motors, 400 V, 50 Hz, 4-pole, duty type S3/15

4.40.1 Information on motors

motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DR2S 63MS 4	0.3	2.35	1220	0.98	0.78	2.3	1.5 1.5	1.6
DR2S 63M 4	0.4	3.05	1255	1.21	0.75	2.7	1.8 1.8	1.8
DR2S 71MS 4	0.63	4.7	1285	1.96	0.73	2.9	1.7 1.6	1.7
DR2S 71M 4	0.95	7.3	1240	2.9	0.76	2.9	1.7 1.5	1.7
DR2S 80MK 4	1.3	9.1	1365	3.2	0.80	3.9	1.8 1.5	2.0
DR2S 80M 4	1.8	12.4	1390	3.9	0.83	4.4	1.9 1.6	2.0
DR2S 90S 4	2.5	16.6	1435	6	0.75	5.0	1.8 1.4	2.3
DR2S 90L 4	3.5	23.5	1425	8.2	0.78	4.7	1.9 1.5	2.1
DR2S 100LS 4	4.8	32.5	1415	11.2	0.76	5.2	2.2 1.9	2.6
DR2S 100L 4	6.6	44	1430	15	0.76	6.1	2.6 1.9	3.1
DR2S 112M 4	8.7	58	1440	19.6	0.76	5.9	2.1 1.8	2.9
DR2S 132S 4	12	80	1440	24.5	0.81	6.8	2.3 1.6	3.0
DR2S 132M 4	15	99	1451	33	0.75	5.7	2.6 2.0	2.7
DR2S 132L 4	18.5	122	1450	41	0.77	6.2	2.9 2.0	3.0
DR2S 160M 4	25	164	1454	53	0.75	5.4	2.2 1.8	2.5
DR2S 160L 4	33	215	1455	68	0.78	5.6	2.2 1.8	2.4
DR2S 180M 4	37	240	1465	75	0.78	6.5	2.7 2.0	2.6
DR2S 180L 4	50	325	1463	103	0.77	6.6	2.9 2.0	2.7
DR2S 200L 4	60	390	1466	113	0.83	5.8	2.1 1.8	2.3
DR2S 225S 4	75	485	1476	141	0.82	6.2	2.4 2.2	2.5

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4.40.2 Further information on motors and brakemotors

motor	P_N kW	M_N Nm	n_N min^{-1}	m_{Mot} kg	J_{Mot} 10^{-4} kgm^2	BE..	Z_0 BG BGE h^{-1}	M_B Nm	m_{BMot} kg	J_{BMot} 10^{-4} kgm^2
DR2S 63MS 4	0.3	2.35	1220	4.9	2.95	BE03	10000 10000	3.4	6.8	3.64
DR2S 63M 4	0.4	3.05	1255	5.8	3.76	BE03	10000 10000	3.4	7.7	4.45
DR2S 71MS 4	0.63	4.7	1285	6.8	5.42	BE1	6200 9700	10	9.4	6.72
DR2S 71M 4	0.95	7.3	1240	8	7.14	BE1	5000 9000	10	11	8.44
DR2S 80MK 4	1.3	9.1	1365	11	17.1	BE2	3500 8500	20	15	21.6
DR2S 80M 4	1.8	12.4	1390	14	24.7	BE2	3200 8200	20	18	29.2
DR2S 90S 4	2.5	16.6	1435	20	54	BE5	2300 6000	40	26	60
DR2S 90L 4	3.5	23.5	1425	23	67.2	BE5	2200 5800	55	29	73.2
DR2S 100LS 4	4.8	32.5	1415	27	81.5	BE5	- 6100	55	33	87.5
DR2S 100L 4	6.6	44	1430	34	112	BE5	- 3700	55	40	118
DR2S 112M 4	8.7	58	1440	45	182	BE11	- 2900	110	59	193
DR2S 132S 4	12	80	1440	56	245	BE11	- 2100	110	71	256
DR2S 132M 4	15	99	1451	74	385	BE20	- 1100	200	100	436
DR2S 132L 4	18.5	122	1450	82	443	BE20	- 980	200	110	494
DR2S 160M 4	25	164	1454	115	829	BE32	- 900	400	160	1060
DR2S 160L 4	33	215	1455	135	1050	BE32	- 800	500	180	1280
DR2S 180M 4	37	240	1465	155	1650	BE32	- 510	500	200	1880
DR2S 180L 4	50	325	1463	175	1960	BE32	- 470	600	220	2190
DR2S 200L 4	60	390	1466	285	2670	BE62	- 500	800	365	3260
DR2S 225S 4	75	485	1476	315	4350	BE62	- 200	1000	395	4940

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4.41 IE1 DR2S.. motors, 400 V, 50 Hz, 6-pole, duty type S3/15

4.41.1 Information on motors

motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DR2S 63M 6	0.28	3.25	820	0.97	0.78	2.4	1.6 1.5	1.6
DR2S 71MS 6	0.42	4.65	860	1.44	0.71	2.4	1.4 1.5	1.7
DR2S 71M 6	0.6	6.8	840	1.9	0.76	2.4	1.5 1.5	1.6
DR2S 80MK 6	0.88	9.7	870	2.5	0.77	2.9	1.5 1.5	1.7
DR2S 80M 6	1.3	14	885	4.05	0.73	2.7	1.5 1.5	1.8

4.41.2 Further information on motors and brakemotors

motor	P_N kW	M_N Nm	n_N min^{-1}	m_{Mot} kg	J_{Mot} 10^{-4} kgm^2	BE..	Z_0 BG BGE h^{-1}	M_B Nm	m_{BMot} kg	J_{BMot} 10^{-4} kgm^2
DR2S 63M 6	0.28	3.25	820	5.8	6.57	BE03	12000 12000	3.4	7.7	7.26
DR2S 71MS 6	0.42	4.65	860	6.8	8.29	BE1	7000 12000	10	9.4	9.59
DR2S 71M 6	0.6	6.8	840	8	10.4	BE1	5200 12000	10	11	11.7
DR2S 80MK 6	0.88	9.7	870	11	17.1	BE2	3000 9000	20	15	21.6
DR2S 80M 6	1.3	14	885	14	24.7	BE2	2700 8000	20	18	29.2

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4.42 IE1 DR2S.. motors, 460 V, 60 Hz, 2-pole, duty type S3/15

4.42.1 Information on motors

motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DR2S 63MS 2	0.4	1.19	3205	0.91	0.74	3.4	2.2 2.1	2.2
DR2S 63M 2	0.63	1.88	3200	1.45	0.78	3.8	2.5 2.1	2.3
DR2S 71M 2	1.3	3.75	3310	2.8	0.76	4.3	2.6 2.3	2.6
DR2S 80MS 2	1.9	5.4	3370	3.9	0.78	5.4	2.6 2.2	2.6
DR2S 80M 2	2.4	6.7	3425	4.65	0.79	5.6	2.8 2.3	2.8
DR2S 90S 2	3.3	9	3488	7.6	0.69	5.8	2.7 2.0	3.0
DR2S 90L 2	4.5	12.3	3484	9.1	0.76	5.9	2.3 2.0	2.4
DR2S 100LM 2	6.2	17.2	3440	10.8	0.86	6.0	2.6 2.3	2.4
DR2S 112M 2	9.2	25	3511	16	0.82	7.6	2.5 2.0	3.3
DR2S 132S 2	15	41	3498	25.5	0.84	7.5	3.0 2.5	3.0

4.42.2 Further information on motors and brakemotors

Motor	P_N kW	M_N Nm	n_N min^{-1}	m_{Mot} kg	J_{Mot} 10^{-4} kgm^2	BE..	Z_0 BG BGE h^{-1}	M_B Nm	m_{BMot} kg	J_{BMot} 10^{-4} kgm^2
DR2S 63MS 2	0.4	1.19	3205	4.9	2.95	BE03	4000 4800	2.7	6.8	3.64
DR2S 63M 2	0.63	1.88	3200	5.8	3.76	BE03	3600 4800	3.4	7.7	4.45
DR2S 71M 2	1.3	3.75	3310	8	3.83	BE1	2100 4400	10	11	5.13
DR2S 80MS 2	1.9	5.4	3370	11	18.9	BE2	960 2720	14	15	23.4
DR2S 80M 2	2.4	6.7	3425	14	24.5	BE2	800 2080	14	18	29
DR2S 90S 2	3.3	9	3488	20	54	BE2	480 1040	20	24	58.7
DR2S 90L 2	4.5	12.3	3484	23	67.2	BE5	- 800	28	29	73.2
DR2S 100LM 2	6.2	17.2	3440	33	89.7	BE5	- 600	40	38	95.7
DR2S 112M 2	9.2	25	3511	45	178	BE5	- 320	55	52	183
DR2S 132S 2	15	41	3498	56	241	BE11	- 240	110	71	251

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4.43 IE1 DR2S.. motors, 460 V, 60 Hz, 4-pole, duty type S3/15

4.43.1 Information on motors

motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DR2S 63MS 4	0.3	1.76	1625	0.84	0.68	3.1	2.1 2.1	2.2
DR2S 63M 4	0.4	2.35	1630	1.05	0.67	3.6	2.4 2.3	2.4
DR2S 71MS 4	0.63	3.7	1625	1.55	0.71	3.5	1.9 1.7	2.0
DR2S 71M 4	0.95	5.6	1620	2.35	0.71	3.9	2.1 1.9	2.1
DR2S 80MK 4	1.3	7.3	1695	2.75	0.75	5.0	2.2 1.7	2.5
DR2S 80M 4	1.8	10.1	1705	3.45	0.79	5.5	2.4 2.0	2.5
DR2S 90S 4	2.5	13.7	1748	5.3	0.71	6.1	2.2 1.7	2.8
DR2S 90L 4	3.5	19.2	1741	7	0.74	6.3	2.3 1.9	2.7
DR2S 100LS 4	4.8	26.5	1730	9.5	0.74	6.4	2.6 2.1	3.2
DR2S 100L 4	6.6	36	1744	12.8	0.74	7.3	3.1 2.1	3.6
DR2S 112M 4	8.7	47.5	1747	17	0.73	7.1	2.5 1.9	3.2
DR2S 132S 4	12	65	1750	21.5	0.79	7.7	2.7 1.8	4.4
DR2S 132M 4	15	81	1759	29	0.73	6.9	3.1 2.0	2.9
DR2S 132L 4	18.5	100	1761	36.5	0.71	6.7	3.4 2.3	3.3
DR2S 160M 4	25	135	1765	44	0.78	6.6	2.5 2.0	3.0
DR2S 160L 4	33	179	1759	60	0.75	6.5	2.4 1.7	2.6
DR2S 180M 4	37	200	1771	64	0.79	8.1	3.3 1.6	2.7
DR2S 180L 4	50	270	1771	87	0.78	7.6	3.5 2.0	3.1
DR2S 200L 4	60	325	1772	99	0.81	6.3	2.4 1.6	2.2
DR2S 225S 4	75	400	1780	120	0.83	7.5	2.8 2.2	2.7

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4.43.2 Further information on motors and brakemotors

Motor	P_N	M_N	n_N	m_{Mot}	J_{Mot}	BE..	Z_0 BG BGE	M_B	m_{BMot}	J_{BMot}
	kW	Nm	min^{-1}	kg	10^{-4} kgm²		h^{-1}	Nm	kg	10^{-4} kgm²
DR2S 63MS 4	0.3	1.76	1625	4.9	2.95	BE03	8000 8000	3.4	6.8	3.64
DR2S 63M 4	0.4	2.35	1630	5.8	3.76	BE03	- -	3.4	7.7	4.45
DR2S 71MS 4	0.63	3.7	1625	6.8	5.42	BE1	4950 7800	10	9.4	6.72
DR2S 71M 4	0.95	5.6	1620	8	7.14	BE1	4000 7200	10	11	8.44
DR2S 80MK 4	1.3	7.3	1695	11	17.1	BE2	2800 6800	14	15	21.6
DR2S 80M 4	1.8	10.1	1705	14	24.7	BE2	2600 6600	20	18	29.2
DR2S 90S 4	2.5	13.7	1748	20	54	BE5	1800 4800	28	26	60
DR2S 90L 4	3.5	19.2	1741	23	67.2	BE5	1800 4700	40	29	73.2
DR2S 100LS 4	4.8	26.5	1730	27	81.5	BE5	- 4000	55	33	87.5
DR2S 100L 4	6.6	36	1744	34	112	BE5	- 2900	55	40	118
DR2S 112M 4	8.7	47.5	1747	45	182	BE11	- 2300	110	59	193
DR2S 132S 4	12	65	1750	56	245	BE11	- 1700	110	71	256
DR2S 132M 4	15	81	1759	74	385	BE20	- 900	200	100	436
DR2S 132L 4	18.5	100	1761	82	443	BE20	- 780	200	110	494
DR2S 160M 4	25	135	1765	115	829	BE30	- 720	300	155	964
DR2S 160L 4	33	179	1759	135	1050	BE32	- 640	400	180	1280
DR2S 180M 4	37	200	1771	155	1650	BE32	- 400	400	200	1880
DR2S 180L 4	50	270	1771	175	1960	BE32	- 380	600	220	2190
DR2S 200L 4	60	325	1772	285	2670	BE62	- 400	800	365	3260
DR2S 225S 4	75	400	1780	315	4350	BE62	- 160	1000	395	4940

4.44 IE1 DR2S.. motors, 460 V, 60 Hz, 6-pole, duty type S3/15

4.44.1 Information on motors

motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DR2S 63M 6	0.31	2.8	1050	0.91	0.72	2.8	1.7 1.6	1.7
DR2S 71MS 6	0.47	4.25	1060	1.23	0.74	3.1	1.4 1.4	1.7
DR2S 71M 6	0.6	5.3	1080	1.68	0.67	3.0	1.9 1.8	2.0
DR2S 80MK 6	0.88	7.6	1110	2.15	0.69	3.8	1.8 1.8	2.2
DR2S 80M 6	1.3	11.1	1115	3.7	0.63	3.4	2.0 1.8	2.2
DR2S 90S 6	1.8	14.9	1150	4.35	0.67	4.9	2.2 1.9	2.6
DR2S 90L 6	2.5	21	1150	6.1	0.65	5.2	2.2 2.1	2.5
DR2S 100L 6	3.7	31	1145	8.3	0.67	4.2	2.7 2.6	3.2
DR2S 112M 6	4.8	39.5	1160	9.7	0.72	5.0	1.8 1.6	2.7
DR2S 132M 6	8.8	72	1168	18.3	0.68	5.6	2.7 2.1	2.4

4.44.2 Further information on motors and brakemotors

Motor	P_N kW	M_N Nm	n_N min^{-1}	m_{Mot} kg	J_{Mot} 10^{-4} kgm^2	BE..	Z_0 BG BGE h^{-1}	M_B Nm	m_{BMot} kg	J_{BMot} 10^{-4} kgm^2
DR2S 63M 6	0.31	2.8	1050	5.8	6.57	BE03	12000 12000	3.4	7.7	7.26
DR2S 71MS 6	0.47	4.25	1060	6.8	8.29	BE1	5600 9600	10	9.4	9.59
DR2S 71M 6	0.6	5.3	1080	8	10.4	BE1	4150 9600	10	11	11.7
DR2S 80MK 6	0.88	7.6	1110	11	16.8	BE2	2400 7200	20	15	21.3
DR2S 80M 6	1.3	11.1	1115	14	24.5	BE2	2150 6400	20	18	29
DR2S 90S 6	1.8	14.9	1150	20	54	BE5	1920 4000	40	26	60
DR2S 90L 6	2.5	21	1150	23	67.4	BE5	1760 3520	40	29	73.4
DR2S 100L 6	3.7	31	1145	34	112	BE5	- 2700	55	40	118
DR2S 112M 6	4.8	39.5	1160	45	178	BE11	- 2500	80	59	188
DR2S 132M 6	8.8	72	1168	74	381	BE20	- 1440	150	100	432

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4.45 IE1 DR2S.. motors, 400 V, 53 Hz, 4-pole duty type S9

4.45.1 Information on motors

motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	M_K/M_N
DR2S 56M 4	0.13	0.95	1305	0.405	0.80	1.7
DR2S 63MS 4	0.2	1.45	1320	0.63	0.78	1.7
DR2S 63M 4	0.28	2.05	1320	0.85	0.78	1.8
DR2S 71MS 4	0.4	2.8	1355	1.13	0.79	1.7
DR2S 71M 4	0.6	4.1	1395	1.61	0.77	2.0
DR2S 80MK 4	0.8	5.2	1475	1.81	0.82	2.3
DR2S 80M 4	1.2	7.8	1475	2.6	0.84	2.3
DR2S 90S 4	1.7	10.5	1542	4.15	0.71	2.9
DR2S 90L 4	2.3	14.4	1530	5	0.79	2.5
DR2S 100LS 4	3.2	20	1525	6.8	0.79	3.1
DR2S 100L 4	4.4	27.5	1530	8.9	0.81	3.5
DR2S 112M 4	6	37	1540	12.1	0.82	3.2
DR2S 132S 4	8	49.5	1544	15.5	0.85	3.7
DR2S 132M 4	10	61	1555	21.5	0.74	3.5
DR2S 132L 4	12	74	1555	25.5	0.75	3.5
DR2S 160M 4	17	105	1552	33	0.82	2.8
DR2S 160L 4	21	129	1558	41.5	0.79	3.1
DR2S 180M 4	24	147	1564	44.5	0.84	3.3
DR2S 180L 4	33	200	1560	60	0.85	3.2
DR2S 200L 4	38	230	1563	70	0.84	2.9
DR2S 225S 4	53	325	1565	93	0.87	2.7

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4.45.2 Further information on motors and brakemotors

motor	P_N kW	M_N Nm	n_N min^{-1}	m_{Mot} kg	J_{Mot} 10^{-4} kgm^2	BE..	Z_0 BG BGE h^{-1}	M_B Nm	m_{BMot} kg	J_{BMot} 10^{-4} kgm^2
DR2S 56M 4	0.13	0.95	1305	3.1	1.31	BE02	10000 10000	1.2	3.9	1.41
DR2S 63MS 4	0.2	1.45	1320	4.9	2.95	BE03	10000 10000	3.4	6.8	3.64
DR2S 63M 4	0.28	2.05	1320	5.8	3.76	BE03	10000 10000	3.4	7.7	4.45
DR2S 71MS 4	0.4	2.8	1355	6.8	5.42	BE1	6200 9700	7	9.4	6.72
DR2S 71M 4	0.6	4.1	1395	8	7.14	BE1	5000 9000	10	11	8.44
DR2S 80MK 4	0.8	5.2	1475	11	17.1	BE1	3500 8500	10	14	18.6
DR2S 80M 4	1.2	7.8	1475	14	24.7	BE2	3200 8200	20	18	29.2
DR2S 90S 4	1.7	10.5	1542	20	54	BE5	2300 6000	28	26	60
DR2S 90L 4	2.3	14.4	1530	23	67.2	BE5	2200 5800	28	29	73.2
DR2S 100LS 4	3.2	20	1525	27	81.5	BE5	- 6000	40	33	87.5
DR2S 100L 4	4.4	27.5	1530	34	112	BE5	- 3700	55	40	118
DR2S 112M 4	6	37	1540	45	182	BE11	- 2900	80	59	193
DR2S 132S 4	8	49.5	1544	56	245	BE11	- 2100	110	71	256
DR2S 132M 4	10	61	1555	74	385	BE20	- 1100	150	100	436
DR2S 132L 4	12	74	1555	82	443	BE20	- 980	150	110	494
DR2S 160M 4	17	105	1552	115	829	BE30	- 900	300	155	964
DR2S 160L 4	21	129	1558	135	1050	BE30	- 800	300	175	1190
DR2S 180M 4	24	147	1564	155	1650	BE30	- 510	300	195	1780
DR2S 180L 4	33	200	1560	175	1960	BE32	- 470	500	220	2190
DR2S 200L 4	38	230	1563	285	2670	BE32	- 500	500	340	2900
DR2S 225S 4	53	325	1565	315	4390	BE62	- 200	800	395	4980

4.46 IE1 DR2S.. motors, 50/60 Hz, 2-pole

4.46.1 Information on motors

Motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	$\eta_{50\%}$ %	$\eta_{75\%}$ %	$\eta_{100\%}$ %	I_A/I_N	M_A/M_N	M_H/M_N	M_K/M_N
DR2S 63MSR 2	0.18 0.18	0.63 0.51	2725 3370	0.485 0.43	0.78 0.74	57.8 64.6	61.0 69.0	60.7 70.0	4.2 5.3	2.6 3.3	2.6 3.1	2.6 3.3
DR2S 63MS 2	0.25 0.25	0.91 0.72	2610 3310	0.68 0.61	0.80 0.74	62.1 64.5	64.7 68.1	62.3 68.0	3.3 4.3	2.1 2.7	2.1 2.6	2.1 2.7
DR2S 63M 2	0.37 0.37	1.33 1.06	2655 3340	0.98 0.87	0.79 0.74	64.6 68.2	67.0 71.9	65.1 72.0	4.0 5.2	2.4 3.0	2.3 2.8	2.4 3.0
DR2S 71MR 2	0.55 0.55	1.86 1.52	2825 3455	1.26 1.1	0.81 0.78	72.4 68.5	74.6 71.4	74.4 72.0	5.9 7.4	3.2 3.9	3.0 3.5	3.2 3.9
DR2S 71M 2	0.75 0.75	2.6 2.1	2760 3410	1.84 1.62	0.80 0.77	71.3 70.4	73.7 73.6	72.9 74.0	4.6 6.0	2.8 3.4	2.7 3.1	2.8 3.4
DR2S 80MS 2	1.1 1.1	3.75 3.05	2800 3445	2.55 2.25	0.84 0.81	74.2 75.5	76.4 78.5	75.0 78.5	4.6 6.0	2.3 2.9	2.0 2.4	2.4 2.9
DR2S 80M 2	1.5 1.5	5.1 4.15	2820 3460	3.35 2.95	0.84 0.81	77.2 79.4	78.5 81.6	77.2 81.5	5.1 6.8	2.6 3.3	2.3 2.7	2.6 3.3
DR2S 90S 2	2.2 2.2	7.3 6	2875 3502	5 4.35	0.82 0.80	79.3 79.3	80.9 81.5	79.7 81.5	5.4 6.7	2.2 2.6	1.7 1.9	2.4 2.8
DR2S 90L 2	3 3	10 8.2	2875 3500	6.4 5.6	0.84 0.80	82.5 82.1	83.1 83.5	81.5 83.0	5.7 7.4	2.2 2.7	1.9 2.3	2.3 2.9
DR2S 100LM 2	4 4	13.4 11	2850 3475	8.3 7	0.85 0.84	85.5 86.5	85.0 86.8	83.1 85.6	6.0 7.9	2.9 3.5	2.5 2.7	2.7 3.4
DR2S 112M 2	5.5 5.5	18 14.9	2921 3518	10.6 9.2	0.86 0.86	86.5 87.0	86.9 88.0	86.1 87.7	7.3 9.7	2.6 2.9	2.2 2.3	3.2 3.9
DR2S 132SR 2	7.5 7.5	24.5 20.5	2902 3523	13.6 11.8	0.92 0.91	89.3 89.8	88.5 90.0	86.9 89.2	8.1 9.8	3.0 3.4	2.6 2.9	2.9 3.5
DR2S 132S 2	9.2 9.2	30.5 25	2900 3516	17.4 14.3	0.87 0.87	89.0 89.3	88.5 89.4	87.0 88.5	7.9 9.4	3.1 3.5	2.7 2.9	3.0 3.5

4.46.2 Further information on motors and brakemotors

Motor	P_N kW	M_N Nm	n_N min^{-1}	m_{Mot} kg	J_{Mot} 10^{-4} kgm^2	BE..	Z_0 BG BGE h^{-1}	M_B Nm	m_{BMot} kg	J_{BMot} 10^{-4} kgm^2
DR2S 63MSR 2	0.18 0.18	0.63 0.51	2725 3370	4.9	2.95	BE03	5000 6000	1.3	6.8	3.64
DR2S 63MS 2	0.25 0.25	0.91 0.72	2610 3310	4.9	2.95	BE03	5000 6000	2.1	6.8	3.64
DR2S 63M 2	0.37 0.37	1.33 1.06	2655 3340	5.8	3.76	BE03	4500 6000	2.7	7.7	4.45
DR2S 71MR 2	0.55 0.55	1.86 1.52	2825 3455	8	3.71	BE05	2600 5500	5	10	5.01
DR2S 71M 2	0.75 0.75	2.6 2.1	2760 3410	8	3.83	BE05	2600 5500	5	10	5.13
DR2S 80MS 2	1.1 1.1	3.75 3.05	2800 3445	11	18.9	BE1	1200 3400	10	15	20.4
DR2S 80M 2	1.5 1.5	5.1 4.15	2820 3460	14	24.5	BE1	1000 2600	10	18	26
DR2S 90S 2	2.2 2.2	7.3 6	2875 3502	20	54	BE2	600 1300	14	24	58.7
DR2S 90L 2	3 3	10 8.2	2875 3500	23	67.2	BE2	- 1000	20	27	71.9
DR2S 100LM 2	4 4	13.4 11	2850 3475	33	89.7	BE5	- 750	28	38	95.7
DR2S 112M 2	5.5 5.5	18 14.9	2921 3518	45	178	BE5	- 400	40	52	183
DR2S 132SR 2	7.5 7.5	24.5 20.5	2902 3523	56	241	BE5	- 300	55	64	246

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Motor	P_N kW	M_N Nm	n_N min^{-1}	m_{Mot} kg	J_{Mot} 10^{-4} kgm^2	BE..	Z_0 BG BGE h^{-1}	M_B Nm	m_{BMot} kg	J_{BMot} 10^{-4} kgm^2
DR2S 132S 2	9.2 9.2	30.5 25	2900 3516	56	241	BE11	- 300	80	71	251

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4.47 IE1 DR2S.. motors, 50/60 Hz, 4-pole

4.47.1 Information on motors

Motor	P_N kW	M_N Nm	n_N min^{-1}	I_N A	cosφ	$\eta_{50\%}$ %	$\eta_{75\%}$ %	$\eta_{100\%}$ %	I_A/I_N	M_A/M_N	M_H/M_N	M_K/M_N
DR2S 56MR 4	0.09 0.09	0.62 0.51	1380 1700	0.38 0.36	0.61 0.55	43.9 45.4	51.4 53.3	54.8 57.5	3.0 3.6	2.8 3.6	2.8 3.5	2.9 3.6
DR2S 63MSR 4	0.12 0.12	0.83 0.67	1380 1700	0.41 0.38	0.64 0.58	55.6 56.0	61.0 61.8	61.9 64.0	3.6 4.3	2.7 3.3	2.6 3.2	2.7 3.4
DR2S 63MS 4	0.18 0.18	1.29 1.03	1330 1675	0.61 0.56	0.71 0.62	52.1 58.3	57.1 64.2	57.0 66.0	2.9 3.7	2.0 2.6	2.0 2.6	2.1 2.8
DR2S 63M 4	0.25 0.25	1.79 1.43	1330 1675	0.79 0.72	0.70 0.62	59.0 62.8	62.5 67.2	61.5 68.0	3.4 4.2	2.3 3.0	2.3 2.9	2.3 3.0
DR2S 71MS 4	0.37 0.37	2.6 2.1	1350 1685	1.06 0.97	0.73 0.67	66.0 67.5	68.0 70.2	66.0 70.0	3.6 4.4	2.0 2.4	1.8 2.2	2.0 2.5
DR2S 71M 4	0.55 0.55	3.85 3.1	1360 1695	1.58 1.39	0.72 0.66	69.6 71.5	71.7 74.2	70.0 74.0	4.1 5.0	2.4 2.8	2.2 2.5	2.4 2.8
DR2S 80MK 4	0.75 0.75	5.1 4.15	1410 1730	1.88 1.67	0.76 0.72	73.6 75.7	75.9 78.3	75.3 78.5	5.2 6.1	2.4 2.9	2.0 2.3	2.6 3.3
DR2S 80M 4	1.1 1.1	7.4 6.1	1415 1730	2.5 2.2	0.80 0.76	79.5 80.3	80.3 81.9	78.9 81.5	5.5 6.9	2.5 3.1	2.1 2.6	2.7 3.4
DR2S 90S 4	1.5 1.5	9.9 8.1	1453 1761	3.65 3.25	0.73 0.70	78.4 79.6	80.6 82.1	80.4 82.5	6.2 7.6	2.3 2.7	1.8 2.1	2.8 3.4
DR2S 90L 4	2.2 2.2	14.6 12	1440 1755	5.2 4.6	0.76 0.72	80.3 82.3	81.9 84.0	81.1 84.0	5.9 7.5	2.3 2.8	1.8 2.2	2.6 3.3
DR2S 100LS 4	3 3	20 16.4	1435 1746	6.9 6	0.76 0.73	82.2 84.7	83.0 85.9	81.8 85.5	6.4 7.5	2.6 3.0	2.2 2.5	3.1 3.7
DR2S 100L 4	4 4	26.5 22	1445 1754	9.1 8	0.75 0.73	84.4 86.5	85.1 87.7	84.2 87.5	7.4 8.7	3.1 3.6	2.2 2.5	3.7 4.3
DR2S 112M 4	5.5 5.5	36 30	1453 1760	11.8 10.1	0.79 0.78	86.6 88.3	86.8 89.0	85.7 88.5	7.4 8.9	2.4 2.8	2.0 2.1	3.3 3.6
DR2S 132S 4	7.5 7.5	49.5 40.5	1453 1763	16 14.4	0.77 0.74	87.8 88.1	88.0 88.9	87.0 88.5	7.1 8.8	2.8 3.2	2.7 2.8	3.5 3.9
DR2S 132M 4	9.2 9.2	60 49.5	1466 1772	20.5 17.5	0.74 0.74	87.8 88.8	88.4 89.7	87.9 89.5	7.5 9.0	3.3 3.8	2.5 2.5	3.5 3.6
DR2S 132L 4	11 11	72 59	1466 1770	23.5 20	0.78 0.77	88.5 89.2	89.2 90.3	88.7 90.2	7.7 8.7	3.4 3.8	2.3 2.7	3.4 3.8
DR2S 160M 4	15 15	98 81	1466 1771	30 26	0.80 0.79	89.4 89.4	89.8 90.3	89.2 90.2	6.9 7.8	2.6 2.9	2.1 2.4	3.0 3.5
DR2S 160L 4	18.5 18.5	120 100	1470 1774	39 33	0.78 0.78	89.6 89.9	90.2 90.9	89.8 91.0	7.5 8.7	2.9 3.1	2.4 2.3	3.3 3.5
DR2S 180M 4	22 22	142 118	1477 1780	42 36	0.85 0.84	89.9 90.4	90.3 91.1	89.9 91.0	9.0 11.0	3.4 4.1	2.5 1.9	3.3 3.4
DR2S 180L 4	30 30	194 161	1473 1776	56 49.5	0.86 0.85	91.4 91.6	91.4 92.0	90.7 91.7	8.7 9.7	3.4 4.0	2.3 2.4	3.2 3.5
DR2S 200L 4	37 37	240 198	1478 1781	73 63	0.79 0.79	90.8 91.5	91.4 92.4	91.2 92.4	7.4 8.2	2.8 3.2	2.4 2.0	3.1 3.0
DR2S 225S 4	45 45	290 240	1482 1785	83 72	0.85 0.85	91.6 92.5	92.0 93.1	91.7 93.0	9.1 8.9	3.0 4.0	2.2 2.2	2.7 2.7

4.47.2 Further information on motors and brakemotors

Motor	P_N kW	M_N Nm	n_N min^{-1}	m_{Mot} kg	J_{Mot} 10^{-4} kgm^2	BE..	Z_0 BG BGE h^{-1}	M_B Nm	m_{BMot} kg	J_{BMot} 10^{-4} kgm^2
DR2S 56MR 4	0.09 0.09	0.62 0.51	1380 1700	3.1	1.31	BE02	10000 10000	1.2	3.9	1.41
DR2S 63MSR4	0.12 0.12	0.83 0.67	1380 1700	4.9	2.95	BE03	10000 10000	1.7	6.8	3.64
DR2S 63MS 4	0.18 0.18	1.29 1.03	1330 1675	4.9	2.95	BE03	10000 10000	2.7	6.8	3.64

Motor	P_N kW	M_N Nm	n_N min^{-1}	m_{Mot} kg	J_{Mot} 10^{-4} kgm^2	BE..	Z_0 BG BGE h^{-1}	M_B Nm	m_{BMot} kg	J_{BMot} 10^{-4} kgm^2
DR2S 63M 4	0.25 0.25	1.79 1.43	1330 1675	5.8	3.76	BE03	10000 10000	3.4	7.7	4.45
DR2S 71MS 4	0.37 0.37	2.6 2.1	1350 1685	6.8	5.42	BE05	6200 9700	5	9.2	6.72
DR2S 71M 4	0.55 0.55	3.85 3.1	1360 1695	8	7.14	BE1	5000 9000	10	11	8.44
DR2S 80MK 4	0.75 0.75	5.1 4.15	1410 1730	11	16.8	BE1	3500 8500	10	14	18.3
DR2S 80M 4	1.1 1.1	7.4 6.1	1415 1730	14	24.5	BE2	3200 8200	20	18	29
DR2S 90S 4	1.5 1.5	9.9 8.1	1453 1761	20	54	BE2	2300 6000	20	24	58.7
DR2S 90L 4	2.2 2.2	14.6 12	1440 1755	23	67.2	BE5	2200 5800	28	29	73.2
DR2S 100LS 4	3 3	20 16.4	1435 1746	27	81.5	BE5	- 6100	40	33	87.5
DR2S 100L 4	4 4	26.5 22	1445 1754	34	112	BE5	- 3700	55	40	118
DR2S 112M 4	5.5 5.5	36 30	1453 1760	45	182	BE11	- 2900	80	59	193
DR2S 132S 4	7.5 7.5	49.5 40.5	1453 1763	56	245	BE11	- 2100	110	71	256
DR2S 132M 4	9.2 9.2	60 49.5	1466 1772	74	385	BE20	- 1100	150	100	436
DR2S 132L 4	11 11	72 59	1466 1770	82	443	BE20	- 980	150	110	494
DR2S 160M 4	15 15	98 81	1466 1771	115	829	BE20	- 900	200	150	889
DR2S 160L 4	18.5 18.5	120 100	1470 1774	135	1050	BE30	- 800	300	175	1190
DR2S 180M 4	22 22	142 118	1477 1780	155	1650	BE30	- 510	300	195	1780
DR2S 180L 4	30 30	194 161	1473 1776	175	1960	BE32	- 470	400	220	2190
DR2S 200L 4	37 37	240 198	1478 1781	285	2670	BE32	- 500	500	340	2900
DR2S 225S 4	45 45	290 240	1482 1785	315	4350	BE32	- 200	600	370	4580

4.48 Key to the data tables of DR2L.. asynchronous servomotors

The following table lists the short symbols used in the "Technical data" tables.

n_N	Rated speed
M_N	Rated torque
I_N	Rated current
J_{Mot}	Mass moment of inertia of the motor
M_{pk} D1	Maximum limit torque (dynamics package 1)
M_{pk} D2	Maximum limit torque (dynamics package 2)
m	Mass of the motor
BE..	Brake used
m_B	Mass of the brake motor
J_{MOT_BE}	Mass moment of inertia of the brakemotor
M_B D1	Braking torque (dynamics package 1)
M_B D2	Braking torque (dynamics package 2)

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4.49 DR2L.. motors, 400 V, 50 Hz, 4-pole

4.49.1 Information on motors

n_N	Motor type	M_N	I_N	M_{pk}	M_{pk}	m	J_{Mot}
				D1	D2		
		Nm	A	Nm	Nm	kg	10^{-4} kgm²
1200	DR2L71MS4	2.5	1.12	5	8.5	6.8	5.42
	DR2L71M4	3.8	1.71	7	14	8	7.14
	DR280MK4	6	2.3	14	25	10.7	17.1
	DR2L80M4	8	3.15	14	30	14.1	24.7
	DR2L180M4	165	45.6	350	520	157	1650
	DR2L180L4	185	50.6	420	600	172	1960
	DR2L200L4	225	64.8	600	800	285	2660
	DR2L225S4	300	87,8	700	1100	315	4390
1700	DR2L71MS4	2.7	1.64	5	8.5	6.8	5.42
	DR2L71M4	4.2	2.32	7	14	8	7.14
	DR280MK4	6.2	3.14	14	25	10.7	17.1
	DR2L80M4	9.6	4.32	14	30	14.1	24.7
	DR2L180M4	165	63.2	350	520	157	1650
	DR2L180L4	180	67.5	420	600	172	1960
	DR2L200L4	220	93	600	800	285	2660
	DR2L225S4	290	113.6	700	1100	315	4390
2100	DR2L71MS4	2.7	1.9	5	8.5	6.8	5.42
	DR2L71M4	4	2.66	7	14	8	7.14
	DR280MK4	6.5	3.77	14	25	10.7	17.1
	DR2L80M4	9.6	5.25	14	30	14.1	24.7
	DR2L180M4	160	77.5	350	520	157	1650
	DR2L180L4	175	84.1	420	600	172	1960
	DR2L200L4	210	107.3	600	800	285	2660
	DR2L225S4	265	137.9	700	1100	315	4390
3000	DR2L71MS4	2.6	2.46	5	8.5	6.8	5.42
	DR2L71M4	3.8	3.49	7	14	8	7.14
	DR2L80MK4	6.3	4.89	14	25	10.7	17.1
	DR2L80M4	9.2	6.81	14	30	14.1	24.7
	DR2L180M4	130	90.5	350	520	157	1650
	DR2L180L4	145	98.2	420	600	172	1960
	DR2L200L4	165	130,8	600	800	285	2660
	DR2L225S4	220	156.8	700	1100	315	4390

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4.49.2 Further information on motors and brakemotors

n_N	Motor type	M_N	I_N	BE..	M_B	M_B	m_B	J_{Mot_BE}
					D1	D2		
		Nm	A		Nm	Nm	kg[1)]	10^{-4} kgm^2
1200	DR2L71MS4	2.5	1.12	BE05	5	5	9.2	6.72
	DR2L71M4	3.8	1.71	BE1	7	10	10.6	8.44
	DR2L80MK4	6	2.3	BE2	14	20	14.9	21.6
	DR2L80M4	8	3.15	BE2	14	20	18.3	29.2
	DR2L180M4	165	45.6	BE32	330	500	200	1880
	DR2L180L4	185	50.6	BE32	400	600	215	2190
	DR2L200L4	225	64.8	BE32	600	600	340	2890
	DR2L225S4	300	87.8	BE32	600	600	370	4620
1700	DR2L71MS4	2.7	1.64	BE05	5	5	9.2	6.72
	DR2L71M4	4.2	2.32	BE1	7	10	10.6	8.44
	DR2L80MK4	6.2	3.14	BE2	14	20	14.9	21.6
	DR2L80M4	9.6	4.32	BE2	14	20	18.3	29.2
	DR2L180M4	165	63.2	BE32	330	500	200	1880
	DR2L180L4	180	67.5	BE32	400	600	215	2190
	DR2L200L4	220	93	BE32	600	600	340	2890
	DR2L225S4	290	113.6	BE32	600	600	370	4620
2100	DR2L71MS4	2.7	1.9	BE05	5	5	9.2	6.72
	DR2L71M4	4	2.66	BE1	7	10	10.6	8.44
	DR2L80MK4	6.5	3.77	BE2	14	20	14.9	21.6
	DR2L80M4	9.6	5.25	BE2	14	20	18.3	29.2
	DR2L180M4	160	77.5	BE32	330	500	200	1880
	DR2L180L4	175	84.1	BE32	400	600	215	2190
	DR2L200L4	210	107.3	BE32	600	600	340	2890
	DR2L225S4	265	137.9	BE32	600	600	370	4620
3000	DR2L71MS4	2.6	2.46	BE05	5	5	9.2	6.72
	DR2L71M4	3.8	3.49	BE1	7	10	10.6	8.44
	DR2L80MK4	6.3	4.89	BE2	14	20	14.9	21.6
	DR2L80M4	9.2	6.81	BE2	14	20	18.3	29.2
	DR2L180M4	130	90,5	BE32	330	500	200	1880
	DR2L180L4	145	98.2	BE32	400	600	215	2190
	DR2L200L4	165	130.8	BE32	600	600	340	2890
	DR2L225S4	220	156.8	BE32	600	600	370	4620

1) Applies to foot-mounted motors with brake (DR2L...BE../FI..)

5 Drive selection

Observe the explanations and notes in this chapter when selecting the drive.

5.1 Notes on electromagnetic compatibility – EMC

5.1.1 EMC Directive 2014/30/EU

AC motors are designed for use as components for installation in machinery and systems. The manufacturer of the machine or system is responsible for complying with the EMC Directive 2014/30/EU.

5.1.2 EMC measures

The motor can be equipped with grounding terminals, depending on size and design.

- External grounding terminals **LF** (low frequency grounding)
- External grounding terminals **HF** (high frequency grounding)

Metallic cable glands and shielded cables increase the electromagnetic compatibility.

5.1.3 Line operation

AC (brake) motors by SEW-EURODRIVE adhere to the EMC requirements of IEC 60034-1 when used in accordance with their designated use in continuous duty. Interference suppression measures are not required.

5.1.4 Switching operation

Switching operation of the motor requires suitable measures for interference suppression from the switching device.

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5.1.5 Safe switching of motor and brakes

Note the information in the following sections for switching of inductances.

Switching of motor windings

Switching of motor windings can create voltage peaks. Voltage peaks can damage windings and contacts. To avoid this, install the incoming cables with varistors.

Switching of brake coils

Varistors must be used in order to avoid harmful overvoltages caused by switching operations in the DC circuit of disk brakes.

All brake control systems from SEW-EURODRIVE are equipped with varistors as standard.

Observe the dimensioning specifications for switch contacts, voltage supply cables, and fusing in chapter "Dimensioning the periphery" (→ 🗎 410).

Suppressor circuit on the switching devices

According to standard IEC 60204 (Electrical Equipment of Machines), motor windings must be equipped with interference suppression to protect the numerical or programmable logic controllers. Because problems are primarily caused by line switching operations, we recommend installing suppressor circuits on the switching devices.

5.2 Drive selection – non-controlled motor

5.2.1 Flow diagram

The following flow diagram shows the project planning procedure for a non-controlled motor without gear unit that is operated on the grid.

For the flow diagram for configuring gearmotors, refer to the gearmotor catalogs.

Required information about the machine to be driven
• Technical data • Required duty type • Travel cycle and switching frequency • Other specifications (such as minimum or maximum acceleration, run-up time, etc.) • Ambient conditions • Country of use, voltage and frequency • Required approvals and certifications • Installation situation, available space

↓

Calculate the relevant application data
• Travel diagram (acceleration, maximum speed, deceleration, pauses) • Motor speeds on 50 Hz or 60 Hz supply system • Static and dynamic torques • Static and dynamic overhung loads • Static and dynamic power requirements

↓

Motor selection
• Specify motor voltage and motor frequency • Identify the efficiency class demanded in the country of use, and required approvals and certifications • Static and maximum torque • Consider derating due to installation altitude or ambient temperature • Permitted overhung load • Permitted switching frequency • Maximum speed • Minimum speed • Number of poles • Operating mode • Select the mounting position • Motor options (brake, ventilation, plug connectors, degree of protection, painting, etc.)

↓

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Optional: Brake selection
• Determine brake size and braking torque • Brake control • Braking work • Number of braking operations per hour • Braking distance • Braking time

↓

Ensure that all requirements have been met.

Also refer to chapter "Nominal data of a 50 Hz motor when operated on a 60 Hz supply system" (→ 🗎 197).

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5.3 Drive selection – controlled motor

5.3.1 Inverter operation

Suitability for inverter operation

AC motors by SEW-EURODRIVE can be operated with inverters.

If the motors are operated at the frequency inverter at more than 1800 min^{-1}, SEW-EURODRIVE recommends using shaft seals made of FKM (fluorocarbon rubber) on the A and B sides of the motor.

Installation note

For operating AC motors with an inverter, refer to the installation and EMC instructions provided by the inverter manufacturer.

Brakemotor operation with inverter

Install the brake cables of brakemotors separately from the other power cables, maintaining a distance of at least 200 mm. Joint installation is only permitted if either the brake cable or the power cable is shielded.

Connecting an encoder to the inverter

Observe the following instructions when connecting an encoder:

- Only use a shielded cable with twisted pair conductors.
- Connect the shield to the PE potential on both ends over a large surface area.
- Route signal cables separately from power cables or brake cables (minimum distance 200 mm).

Connection of a PTC thermistor /TF to the inverter

Install the connecting lead of the positive temperature coefficient (PTC) thermistor /TF separately from power cables, maintaining a distance of at least 200 mm between the lines. Laying together is only permitted if either the cable of the PTC thermistor /TF or the power cable is shielded.

INFORMATION

Motor protection device at ambient temperatures < 0 °C

If motors are used in the CFC and VFC control mode at ambient temperatures < 0 °C, a Pt1000 temperature sensor must be used in order to achieve the optimum torque of the motor.

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5.3.2 Flow diagram

The following flow diagram shows how to determine a controlled drive. The drive consists of a motor that is powered by an inverter.

For the flow diagram on project planning for a gearmotor, refer to the gearmotor catalogs.

Required information about the machine to be driven
• Technical data
• Travel cycle
• Speed setting range
• Positioning accuracy
• Ambient conditions
• Country of use, voltage and frequency
• Required approvals and certifications
• Installation situation

↓

Calculate the relevant application data
• Travel diagram (acceleration, maximum speed, deceleration, pauses)
• Motor speeds
• Static and dynamic torques
• Static and dynamic overhung loads
• Static and dynamic power requirements
• Regenerative power and cyclic duration factor
• Thermal rms torque
• Thermal rms power

↓

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Motor selection

- Specify motor voltage and motor frequency
- Identify the efficiency class required in the country of use, required approvals and certifications
- Static and maximum torque
- Consider derating due to installation altitude or ambient temperature
- Observe the thermal torque curves taking into account the mean speed and the effective torque
- Observe the dynamic torque curves taking into account the dynamic torques
- Permitted overhung load
- Maximum speed
- Minimum speed
- Number of poles
- Operating mode
- Select the mounting position
- Select encoder based on requirements
- Motor options (brake, ventilation, plug connectors, thermal motor protection, degree of protection, painting, oil seal, etc.)

↓

Optional: Brake selection

- Determine brake size and braking torque
- Brake control
- Braking work
- Number of braking operations per hour
- Braking distance
- Braking time

↓

Inverter selection

- Motor/inverter assignment
- Continuous current and peak current
- Selection of additional inverter options according to functional requirements

↓

Select the braking resistor

- Based on the calculated regenerative power
- Based on the cyclic duration factor and peak braking power

↓

Inverter options

- EMC measures
- Operation/communication
- Additional functions
- Functional safety technology, if required

↓

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Ensure that all requirements have been met.

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5.3.3 Product range of inverters by SEW-EURODRIVE

The extensive product range of SEW-EURODRIVE inverters is available for designing electronically controlled drives.

A distinction is made for inverters between decentralized installation (mounting close to the motor with a high degree of protection) and installation in the control cabinet.

The inverters of the MOVI-C® modular automation system are ideal.

The benefits for you: MOVI-C® is the complete, modular automation system from SEW-EURODRIVE. This end-to-end solution from a single manufacturer covers all your needs – planning, commissioning, operation and diagnostics software, electronic control and monitoring devices, mechanical drives and gearmotors.

You receive all the necessary automation components from a single source. And of course all components can be fully integrated into all automation concepts, fieldbus topologies and network standards. This means you have complete freedom when it comes to the communication topology.

MOVI-C® offers you all the advantages in communication:

PROFINET/PROFIsafe, EtherNet/IP™/CIP Safety™, Modbus TCP, EtherCAT®/Safety over EtherCAT®, POWERLINK, PROFIBUS®, OPC UA, and more.

MOVI-C® decentralized installation

MOVIMOT® flexible

MOVIMOT® flexible enables the decentralized inverter to be installed close to the motor in your system. With MOVIMOT® flexible, it's up to you whether you opt for a synchronous or asynchronous motor. MOVIMOT® flexible is available in two versions. Unlike the MMF1., the MMF3. version can be fitted with additional options. These options include a load disconnector (with or without integrated line protection), an M12 engineering interface or with and preparation for mounting an operator panel. A key switch with feedback contact can also be integrated. The current configuration level of the decentralized inverter is intended for motors in the range 2 – 5.5 A / 0.55 – 3 kW. Additional performance classes are in the pipeline.

MOVI-C® control cabinet installation

MOVITRAC® advanced

The MOVITRAC® advanced standard inverter with IP20 degree of protection for motors in the range 2 – 588 A / 0.55 – 315 kW is intended for torque control, speed control and position control of asynchronous motors and synchronous motors. MOVITRAC® advanced is flexible thanks to its integrated communication interface for connection to all standard control systems. You can also configure functional safety with MOVITRAC® advanced – from the integrated STO safety function to higher-quality safety functions and safe communication. MOVITRAC® advanced is ideal for conveying and motion applications, such as conveyor belts, hoists, and palletizers, making it a truly compact all-rounder.

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MOVIDRIVE® technology

The application inverter MOVIDRIVE® system with IP20 degree of protection for motors in the range 2 – 588 A / 0.55 – 315 kW is intended for torque control, speed control and position control of asynchronous motors and synchronous motors. MOVIDRIVE® system is connected to the higher-level PLC via pluggable communication interfaces. The ready-to-use software modules MOVIKIT® Drive allow for quick and easy application startup. MOVIDRIVE® system is the optimal inverter when the focus lies on high functionality, flexible communications links, large power ranges, long motor cables, and high availability.

MOVIDRIVE® system

The application inverter MOVIDRIVE® system with IP20 degree of protection for motors in the range 2 – 588 A / 0.55 – 315 kW is intended for torque control, speed control and position control of asynchronous motors and synchronous motors. In combination with MOVI-C® CONTROLLER, MOVIDRIVE® system performs tasks with high demands on dynamics, functional safety, and kinematics. MOVIDRIVE® system is the optimal inverter when the focus lies on high functionality, large power ranges, long motor cables, and high availability.

MOVIDRIVE® modular

The application inverter MOVIDRIVE® modular with degree of protection IP20 consists of a 10 – 110 kW power supply module and 2 – 180 A / 0.55 – 90 kW axis modules in series. In this modular design, the focus lies on compact units and energy exchange between the drives via the DC link connection. MOVIDRIVE® modular meets the most demanding requirements on dynamics, energy management, functional safety, and kinematics. In combination with the MOVI-C® CONTROLLER, all applications ranging from materials handling technology to machine automation with predefined, parameterizable function units, to free programming in IEC 61131, can be implemented quickly and flexibly in a cost-efficient manner.

Other devices

MOVI4R-U®

The decentralized inverter MOVI4R-U® in degree of protection IP54 and a power range of 0.25 to 4.0 kW is designed for open-loop speed control of asynchronous motors without encoder. Installation and startup procedure are optimized for simple applications.

MOVIFIT® compact

The decentralized inverter MOVIFIT® compact in degree of protection IP55 and power range 0.37 – 1.5 kW is designed for open-loop speed control of asynchronous motors without encoder. The inverter does not require space in the central control cabinet as it is installed close to the motor. Installation and startup procedure are optimized for simple intralogistics applications.

MOVIFIT® FC

The decentralized inverter MOVIFIT®-FC in degree of protection IP65 and a power range of 0.25 – 4 kW is designed for speed control of asynchronous motors without encoder. The inverter does not require space in the central control cabinet as it is installed close to the motor. The robust housing technology of MOVIFIT® is available in various hygienic surface designs that reliably protect the inverter, even in demanding environments such as in the beverage industry where the devices are subject to humidity and cleaning agents.

MOVIPRO®

The decentralized application controller MOVIPRO® with an IP54 degree of protection and a power range of 2.2 – 15 kW is designed for torque control, speed control and positioning control of asynchronous motors and synchronous motors. MOVIPRO® is not only an inverter but also includes the following functions: Controller, inverter, energy management, brake management, communication, functional safety, and connection technology. With these functions, MOVIPRO® combines all functions of decentralized system installations without control cabinet, and thus ensures that systems are flexible, modular, and standardized.

MOVITRAC® LTE-B

The simple inverter MOVITRAC® LTE-B in degree of protection IP20 and a power range of 0.37 – 11 kW, and in degree of protection IP66 and a power range of 0.37 – 7.5 kW is designed for open-loop speed control of asynchronous motors without encoder. The inverter is defined by a compact design and especially easy handling in conveyor systems, pumps, and fans. The design variant with a high degree of protection can be mounted outside of the control cabinet and includes the required equipment such as EMC measures.

MOVITRAC® LTP-B

The MOVITRAC® LTP-B standard inverter with IP20 degree of protection for 0.37 – 11 kW, IP66 for 0.37 – 7.5 kW and IP55 for 11 – 160 kW is intended for encoderless speed control of asynchronous motors and synchronous motors. The design variants with a high degree of protection can be mounted outside of the control cabinet and includes the required equipment such as EMC measures or the safety function STO. MOVITRAC® LTP-B is characterized by convenient startup in conveyor systems, hoists, pumps and fans.

MOVITRAC® B

The standard inverter MOVITRAC® B in degree of protection IP10/IP20 and a power range of 0.25 – 75 kW is designed for speed control of asynchronous motors without encoder. The universal inverter is suitable for versatile applications in conveying and materials handling technology as it combines the vector control mode VFC, the integrated safety function STO, extensive accessories and a modular structure.

MOVIDRIVE® B

The application inverter MOVIDRIVE® B in degree of protection IP10/IP20 and a power range of 0.55 – 315 kW is designed for torque control, speed control, and positioning control of asynchronous motors and synchronous motors. The high basic functionality, the wide range of options and the comprehensive range of accessories make

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MOVIDRIVE® B a universal application inverter for all applications. In combination with control technology of SEW-EURODRIVE, it is the ideal device, both technically and economically, for demanding tasks in conveying, handling technology, processing technology, and kinematics applications.

MOVIAXIS®

The MOVIAXIS® multi-axis servo inverter stands for motion control at the highest level. An axis system with MOVIAXIS® always consists of a power supply module and a variable number of axis modules. These also include optional modules such as master module, motion control or 24 V switched-mode power supply, which integrate perfectly within the servo solution both mechanically and electronically. And MOVIAXIS® of course supports all common encoder systems on the motor and the track. MOVIAXIS® multi-axis servo inverter – solutions for the future: Highest control quality with compact design in the power range of 10 kW nominal supply and up to 187 kW peak power.

Product characteristics of inverters

The most important product features for the various inverter series are listed below. You can choose the inverter series matching your application based on these product characteristics.

Decentralized installation

MOVI4R-U®, MOVIFIT® compact, MOVIFIT® FC, MOVIPRO®,

Product characteristics	MOVI4R-U®	MOVIFIT® compact	MOVIFIT® FC	MOVIPRO®
Voltage range	1 × AC 200 – 240 V (0.25 – 0.55 kW)	3 × AC 380 – 500 V	3 × AC 380 to 500 V	3 × AC 380 to 500 V
	3 × AC 200 – 240 V (0.25 – 0.55 kW)	–	–	–
	3 × AC 380 – 480 V (0.25 – 4 kW)	–	–	–
Power range	0.25 to 4 kW	0.25 to 4 kW	0.25 to 4 kW	2.2 to 22 kW
Overload capacity	150% I_N for 60 seconds			
	100% I_N continuously in operation without overload			
4Q-capable	No	No	Yes, with integrated brake chopper as standard	
Control mode	U/f	U/f	U/f	U/f
		LVFC voltage-controlled vector control	VFC voltage-controlled vector control	
	–	–	–	CFC/servo current-controlled vector control
Encoder input	No	No	No	Option
Torque control	No	No	No	Yes
Speed control	Yes	Yes	Yes	Yes
Positioning control	No	No	No	Yes
Serial interfaces	No	No	System bus (SBus) and RS485	–
Fieldbus interfaces	No	AS-Interface SBus[1)]	PROFIBUS, PROFINET IO, PROFINET POF, DeviceNet™, EtherNet/IP™, Modbus TCP	
Maximum output frequency	599 Hz	599 Hz	599 Hz	599 Hz
STO – Safe Torque Off	No	No	Yes	Yes
Approvals and certifications	CE, UL, cUL, RCM, EAC	CE, UL[1)], cUL[1)], RCM, EAC	CE, UL, cUL, RCM, EAC	

1) In preparation for MOVIFIT® compact

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Control cabinet installation

MOVITRAC® LTE-B, MOVITRAC® LTP-B, MOVITRAC® B

Product characteristics	MOVITRAC® LTE-B	MOVITRAC® LTP-B	MOVITRAC® B
Voltage range	1 × AC 110 – 120 V (0.37 – 1.1 kW)	1 × AC 200 – 240 V (0.75 – 2.2 kW)	1 × AC 200 – 240 V (0.25 – 2.2 kW)
	1 × AC 200 – 240 V (0.75 – 4.0 kW)	3 × AC 200 – 240 V (0.75 – 75 kW)	3 × AC 200 – 240 V (0.25 – 30 kW)
	3 × AC 200 – 240 V (0.37 – 4.0 kW)	3 × AC 380 – 480 V (0.75 – 160 kW)	3 × AC 380 – 500 V (0.25 – 75 kW)
	3 × AC 380 – 480 V (0.75 – 11 kW)	3 × AC 500 – 600 V (0.75 – 110 kW)	–
Power range	0.37 to 11 kW (IP20)	0.75 to 15 kW (IP20)	0.25 to 75 kW
	0.37 – 7.5 kW (IP66)	0.75 – 160 kW (IP55)	
Overload capacity	150% I_N for 60 seconds	150% I_N for 60 seconds	150% I_N for 60 seconds
	175% I_N for 2 seconds	175% I_N for 2 seconds	125% I_N continuously in operation without overload
4Q-capable	Size 1 without brake chopper, sizes 2 and 3 as standard	Yes, with integrated brake chopper as standard	
Control mode	U/f	U/f	U/f
	VFC voltage-controlled vector control	VFC voltage-controlled vector control	VFC voltage-controlled vector control
Encoder input	No	No	No
Torque control	No	Yes	No
Speed control	Yes	Yes	Yes
Positioning control	No	No	No
Serial interfaces	System bus (SBus) and RS485		
Fieldbus interfaces	Optionally via gateway PROFIBUS, EtherCAT®, PROFINET, DeviceNet™, EtherNet/IP™	Optionally via gateway PROFIBUS, EtherCAT®, PROFINET, DeviceNet™, EtherNet/IP™	Optionally via gateway PROFIBUS, CANopen, DeviceNet™, PROFINET IO, EtherNet/IP™, EtherCAT®
Maximum output frequency	500 Hz	500 Hz	599 Hz
STO – Safe Torque Off	No	Yes	Yes (3-phase devices)
Approvals and certifications	CE, UL, cUL, RCM, EAC		

MOVIDRIVE® B, MOVIDRIVE® system, MOVIDRIVE® modular

Product characteristics	MOVIDRIVE® B	MOVIDRIVE® system	MOVIDRIVE® modular
Voltage range	3 × AC 200 – 240 V (1.5 – 30 kW)	3 × AC 200 – 240 V (7 –108 A)	–
	3 × AC 380 – 500 V (0.55 – 315 kW)	3 × AC 380 – 500 V (2 – 588 A)	3 × AC 380 – 500 V
Performance/current range	0.55 to 250 kW	–	10 – 110 kW (power supply modules)
			2 – 180 A (axis modules)
Overload capacity	150% I_N for 60 seconds	200% I_N for 3 seconds	250% I_N for 1 second
	125% I_N continuously in operation without overload	125% I_N continuously in operation without overload	100% I_N continuously in operation without overload
4Q-capable	Yes, with integrated brake chopper as standard		
Control mode	U/f	U/f	U/f
	VFC voltage-controlled vector control	VFC^{PLUS} voltage-controlled vector control	VFC^{PLUS} voltage-controlled vector control
	CFC current-controlled vector control	CFC current-controlled vector control	CFC current-controlled vector control
	–	ELSM® for synchronous motors without encoders	ELSM® for synchronous motors without encoders
Encoder input	Option	Yes	Yes
Torque control	Yes	Yes	Yes
Speed control	Yes	Yes	Yes
Positioning control	Yes	Yes	Yes
Serial interfaces	System bus (SBus) and RS485	EtherCAT®/SBus^{PLUS}	
Fieldbus interfaces	Optionally PROFIBUS DP, CANopen, DeviceNet™, PROFINET IO, EtherNet/IP™, EtherCAT®	PROFIBUS, PROFINET, PROFISAFE, EtherNet/IP™, Modbus TCP/IP	
Maximum output frequency	599 Hz	599 Hz	599 Hz
STO – Safe Torque Off	Yes	Yes	Yes
Approvals and certifications	CE, UL, cUL, RCM, EAC		

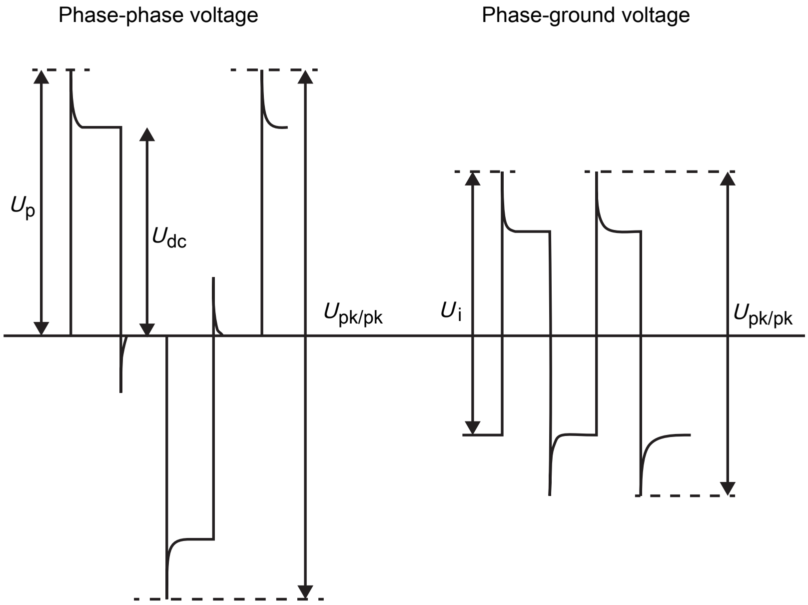
5.3.4 Insulation system for inverter operation

When asynchronous motors are operated on an inverter, the winding is subject to higher loads than would be the case in line operation without an inverter.

An inverter pulses the DC voltage of the DC link (U_z) to the supply cables to the motor. This pulsing takes place in the kHz range, which means several thousand ON and OFF switchings per second – at SEW-EURODRIVE usually with 4, 8, or 16 kHz.

The standard winding can resist voltage peaks up to:

- Phase-phase voltages $U_{PP\_pk/pk}$= 2360 V
- Phase-ground voltages $U_{PE\_pk/pk}$ = 1680 V



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As a result, using SEW-EURODRIVE AC motors with the standard winding on an inverter is permitted up to 500 V.

If a motor is operated with an inverter under the following conditions, the double voltage pulse can exceed the maximum permitted value of the standard winding of $U_{PP\_pk/pk}$ = 2360 V:

- The inverter supplies the motor with a voltage of 600 V or higher.
- The DC link voltage is increased to DC 742.5 V.

Additional measures are required to protect the motor winding. The options reinforced winding insulation /RI (chapter "Reinforced winding insulation" (→ 🗎 571)) and reinforced winding insulation with increased resistance against partial discharge /RI2, see chapter "Reinforced winding insulation with increased resistance against partial discharge" (→ 🗎 571) are available.

Motors from SEW-EURODRIVE comply with the requirements of NEMA MG1 part 31 for the partial discharge-free voltage ("PD free voltage"). For the evaluation, MG1 refers to the standard IEC 60034-18-41. The required stress category C exceeds the NEMA requirement "PD free".

5.3.5 AC motors on third-party inverters

In the case of inverter-supplied motors, observe the wiring instructions issued by the inverter manufacturer. It is essential that you observe the operating instructions for the inverter.

Operating the motors on third-party inverters is permitted if the pulse voltages of the respective winding insulation at the motor terminals are not exceeded.

INFORMATION

Compliance with the limit values must be checked and taken into account as follows:

- The supply voltage level at the third-party inverter
- The threshold of the brake chopper voltage
- The operating mode of the motor (motor mode/generator mode)

→ If the permitted pulse voltage is exceeded, you must install limiting measures, such as filters, chokes or special motor cables. Consult the manufacturer of the inverter.

5.3.6 IVIC Class for Motors

The standard IEC 60034-18-41:2014 defines the stress categories for motors with the following characteristics:

- Nominal voltages over 300 V
- With electrical insulation system that is free of partial discharge
- Operation at a frequency inverter with intermediate voltage circuit

The stress categories, or impulse voltage insulation classes (IVIC), are divided into classes A to D.

Technical details

The table shows the normative limit values for the most important nominal voltages for the motors.

IVIC class		Nominal voltage		
		400 V	500 V	575 V
B (medium)	Phase-to-earth $U_{pk/pk}$	1240 V	1550 V	1783 V
	Phase-to-phase $U_{pk/pk}$	1800 V	2250 V	2588 V
C (high)	Phase-to-earth $U_{pk/pk}$	1680 V	2100 V	2415 V
	Phase-to-phase $U_{pk/pk}$	2360 V	2950 V	3393 V

The rise time of the voltage is defined as follows: Ta > 0.3 ±0.2 µs.

Information about drive selection

The 2-, 4-, and 6-pole DRN../DR2S.. motors are optimally adapted for operation with all SEW-EURODRIVE frequency inverters.

Motors with standard insulating systems for nominal voltages > 300 V

For operation on frequency inverters with intermediate voltage circuit and with line voltages up to and including 400 V (including tolerances), the motors fulfill the specifications of IEC 60034-18-41:2014 in impulse voltage insulation class C (high). For line voltages up to and including 500 V (including tolerances), they fulfill impulse voltage insulation class B (medium).

Motors with /RI reinforced winding insulation for nominal voltages > 300 V

For operation on voltage source converters with line voltages up to and including 500 V (including tolerances), the motors fulfill the specifications of IEC 60034-18-41:2014 in impulse voltage insulation class C (high). For line voltages up to and including 600 V (including tolerances), they fulfill impulse voltage insulation class B (medium).

SEW-EURODRIVE motors with /RI reinforced winding insulation surpass the normative specifications and achieve the limit values for phase-to-earth $U_{pk/pk}$ of 2200 V and phase-to-phase $U_{pk/pk}$ of 3000 V.

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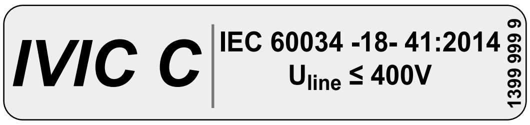
Order information

Upon request, the permissible IVIC class can be displayed on the motor in the form of an additional label.

The permissible IVIC class is then also specified for SEW-EURODRIVE motors in the order confirmation.

The following illustration depicts an example of a motor label with standard insulation system:



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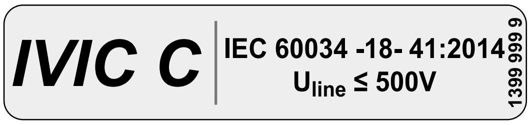
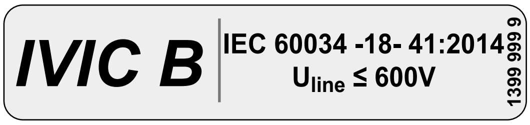
The following illustration depicts an example of a motor label with the option reinforced winding insulation /RI, depending on the nominal voltage:



20562391947



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5.3.7 Limit characteristic curves of DRN.. and DR2S.. motors in inverter operation

If the motors are operated on an inverter, the thermally permitted torque must be observed when determining the drive.

The thermally permitted torque depends on the following factors:

- Motor size
- Motor series (DRN.. or DR2S..)
- Operating mode
- Type of cooling: Self-cooling or forced cooling fan
- Base frequency:
  - f_{base} = 50 Hz (230/400 V ⅄)
  - f_{base} = 87 Hz (230/400 V △)
  - f_{base} = 60 Hz (266/460 V ⅄ / 230/460 V ⅄)
  - f_{base} = 104 Hz (266/460 V △)
  - f_{base} = 120 Hz (230/460 V ⅄⅄)
  - f_{base} = 53 Hz (400 V ⅄)
  - f_{base} = 92 Hz (400 V △)

The effective operating point resulting from the travel cycle must lie below the thermal limit curve. It comprises the effective torque and the mean speed.

The maximum permitted mechanical limit torque for gearmotors amounts to 200% of the nominal motor torque. This applies for all motor characteristics shown in this chapter.

Motor-specific thermal limit characteristic curves are included in the SEW-Workbench project planning tool or in the online characteristic curve generator in Online Support at www.seweurodrive.com.

The following conditions apply to the shown limit curves:

- Motor design in thermal class 155 (F)
- Motor in duty type S1 (DRN..) or S9 (DR2S..)
- Nominal motor voltage corresponding to the nominal line voltage (e.g. 230 V△/400 V⅄ or corresponding voltage range on the 400 V grid)
- Rated motor frequency corresponding to the rated line frequency (e.g. 50 Hz)
- Motors with TF thermal protection or equivalent temperature detection
- 4-pole motors (for the operation of motors with a different number of poles on the frequency inverter, contact SEW-EURODRIVE)
- Startup on the inverter with appropriate inverter settings (nominal motor current is used as a reference for the inverter setting and does not exceed the nominal current of the motor in the constant torque range)
- Motor current is reduced at low speeds, provided that the torque is reduced
- Operation on the inverter in a VFC operating mode (for operation on inverters in a CFC operating mode, contact SEW-EURODRIVE)
- Maximum ambient temperature of +40 °C

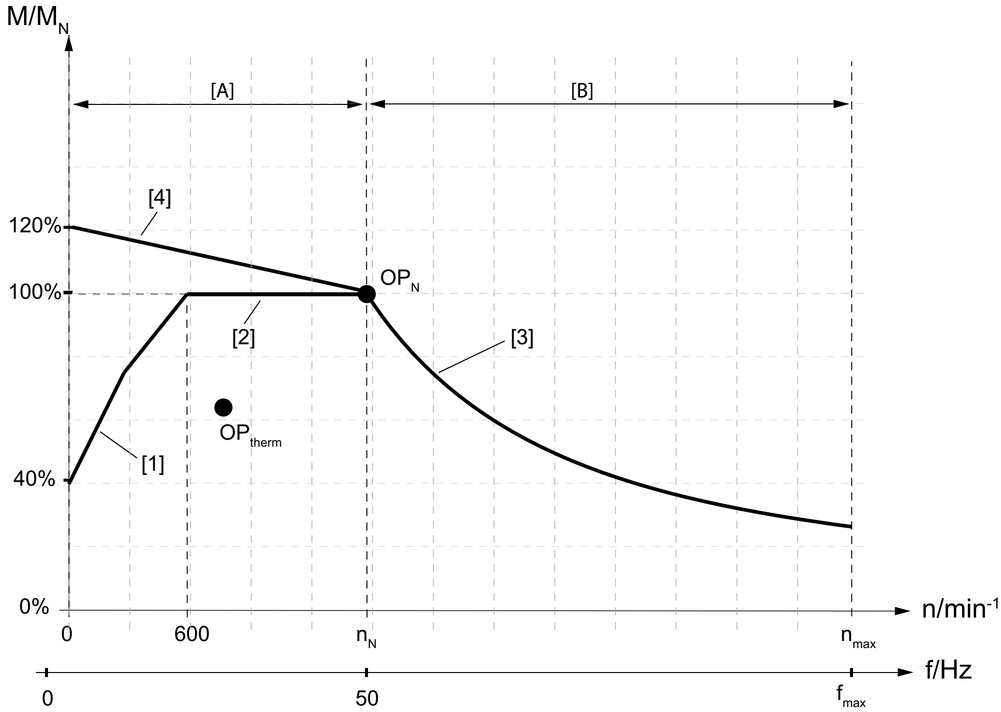
INFORMATION

Observe the maximum limit speeds in chapter "Limit speeds" as well as the project planning notes for motors and mounted options.

The characteristic curve in the field weakening range is limited by the dynamic limit in the case of individual motors. For this reason, the thermal limit characteristic curve does not represent the physical limit of the drive system in part.

Thermal limit characteristic

The following figure explains in more detail individual areas of a universal thermal limit characteristic curve.



24635011467

M/M_N	Ratio of motor torque to rated motor torque
[A]	Basic setting range
[B]	Field weakening range
[1]	Reduced torque due to reduced cooling
[2]	Constant torque
[3]	Constant power
[4]	Increased torque due to external cooling
OP_{therm}	Thermal operating point (example shown here)
OP_N	Rated operating point
n_N	Rated speed
n_{max}	Maximum speed
f_{max}	Maximum frequency (here: rotating field frequency)

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Delta connection of the motor – 87 Hz characteristic curve

In order to provide a voltage reserve between the line voltage and rated motor voltage, a motor is selected whose nominal voltage in a star connection corresponds to the line voltage. This motor is connected in delta, which makes the line voltage √3 times higher than the motor rated voltage in a delta connection.

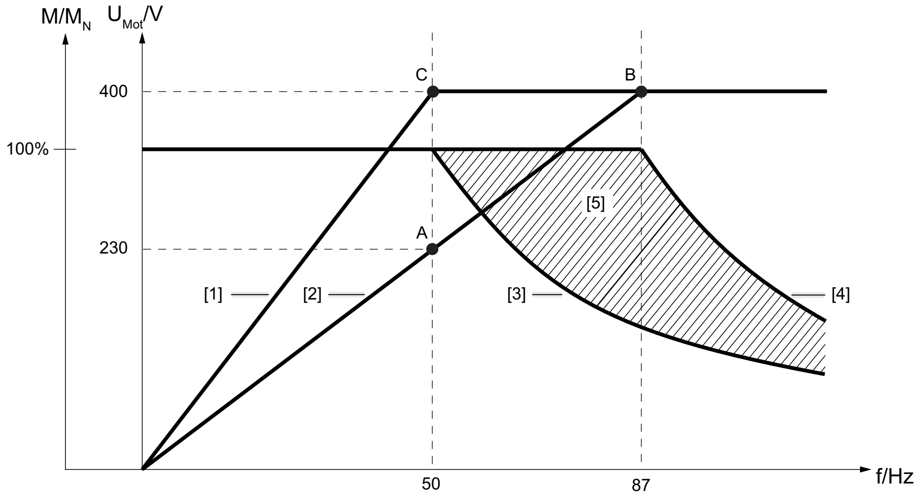
Example: Motor according to nameplate with nominal voltage of 230 V△/400 V ⅄

The motor is connected in delta and connected to a frequency inverter. The line voltage at the input of the frequency inverter is 400 V. Due to the delta connection, the rated point of the electrical values is 230 V/50 Hz or 400 V/87 Hz.

V/f characteristic and power gain

In the following diagram, the circuit-dependent V/f characteristics are compared with the corresponding transition and rated points in star and delta connections. The transition points do not necessarily represent the rated points.

The gain in mechanical power is shown by the motor torque curves in the shaded area in the following figure.



9007225149297547

M/M_N	Ratio of motor torque to rated motor torque
U_{Mot}	Motor voltage
[A]	Nominal voltage at 230 V/50 Hz in a delta connection
[B]	Transition point at 400 V/87 Hz in a delta connection
[C]	Transition point (= rated point) at 400 V/50 Hz in a star connection
[1]	V/f characteristic in a star connection
[2]	V/f characteristic in a delta connection
[3]	Curve of the motor torque as a function of the frequency in relation to [1]
[4]	Curve of the motor torque as a function of the frequency in relation to [2]
[5]	Gain in mechanical power

For motors rated for a frequency of 50 Hz, the base frequencies apply for star/delta connection:

- f_{base} = 50 Hz (connection in star)
- f_{base}= 87 Hz (connection in delta)

For motors rated for a frequency of 60 Hz, the base frequencies apply for star/delta connection:

- f_{base} = 60 Hz (connection in star)
- f_{base}= 104 Hz (connection in delta)

For motors rated for a frequency of 60 Hz, the base frequencies apply for star/double star connection:

- f_{base} = 60 Hz (connection in star)
- f_{base} = 120 Hz (double star connection)

Motivation and possible applications

The motivation for drive configuration for 87 Hz operation is:

- Expanding the speed setting range with constant motor torque, enabling higher application speeds.
- Using a smaller motor size in conjunction with a higher gear unit ratio reduces:
  - The initial costs of the motor
  - The installation space required for the motor
  - The mass of the motor

Please consider:

87 Hz operation should take place in a voltage-controlled control mode. Current-controlled control modes are also possible with limited gains in the speed setting range.

When the field weakening range is used, it is necessary to observe the breakdown torque (proportional to $1/f_2$), which decreases quadratically as the frequency increases and further restricts the available motor torque. For 87 Hz operation, the inverter is selected based on the required motor current in a delta connection, which is $\sqrt{3}$ times higher than in a star connection. On the gear unit side, a higher input speed causes larger churning losses, which can increase the gear unit temperature. Observe these points during further project configuration.

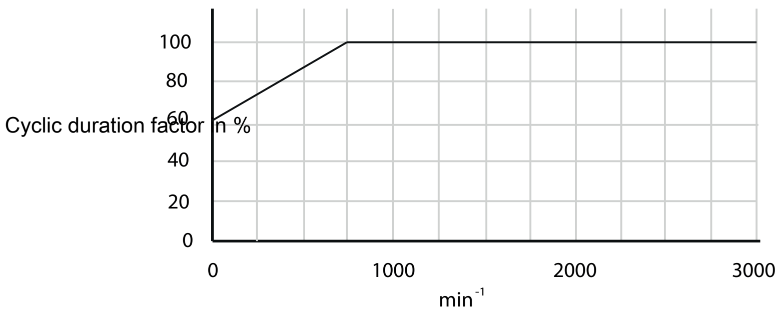
Brakemotors

Due to the increased motor operating temperature and reduced ventilation at variable rotational speed in inverter operation, brakemotors are not allowed to be operated continuously at low rotational speed below 750 min^{-1}.

The thermally permitted torques in the lower speed range apply for DRN.. brakemotors under the following conditions:

- Operation of the brake with a maximum tolerance of the brake voltage of ±5%
- Operation of the brake only with a brake rectifier in the control cabinet

The following diagram shows the permitted cyclic duration factor in periodic intermittent duty S3 (IEC 60034-1) for DRN.. brakemotors. The maximum time interval (100%) corresponds to one hour. To ensure sufficient cooling of the brake at low speed, operate the drive again at high speed after 60% of the cyclic duration factor at the latest or switch off the brake.



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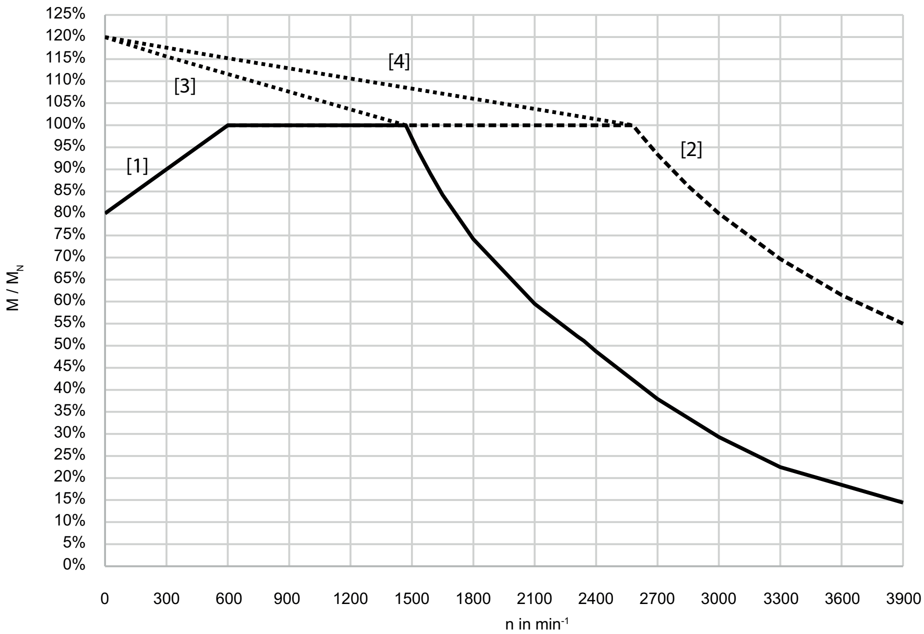
DRN.. motor, 4-pole (self-cooling and forced air cooling), f_{base} = 50 Hz (400 V⅄, 50 Hz) and 87 Hz (230 V△, 50 Hz)

The following diagrams show the thermal limit characteristics of the DRN.. motors at a base frequency f_{base} of 50 Hz in ⅄ connection and at a base frequency f_{base} of 87 Hz in △ connection. A distinction is made between motors with self-cooling and forced air cooling (option forced cooling fan /V).

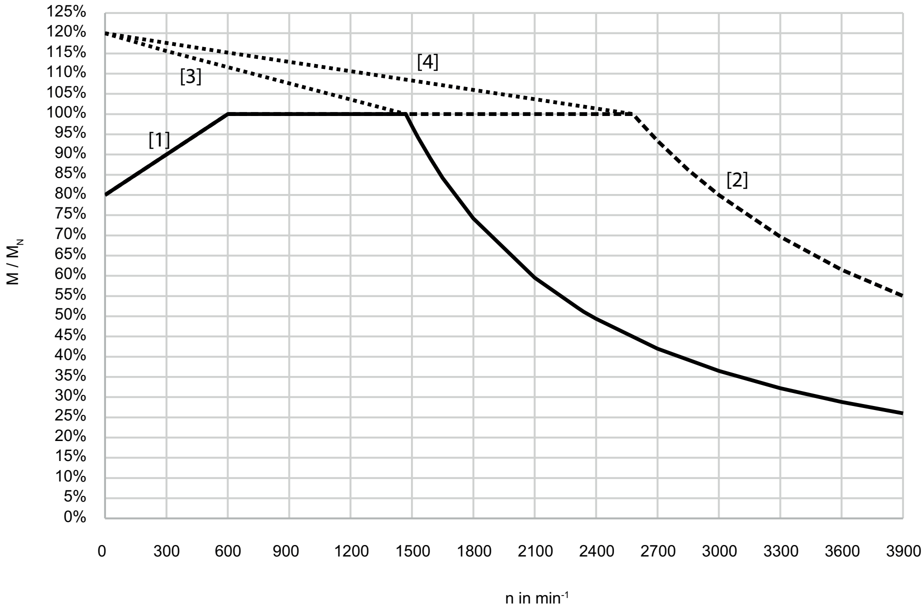
DRN63MS4 – 80MK4



36885783691

[1] Duty type S1 with self-cooling DRN63MS4 – 80MK4 (star connection)
[2] Duty type S1 with self-cooling DRN63MS4 – 80MK4 (delta connection)
[3] Duty type S1 with forced air cooling DRN63MS4 – 80MK4 (star connection)
[4] Duty type S1 with forced air cooling DRN63MS4 – 80MK4 (delta connection)

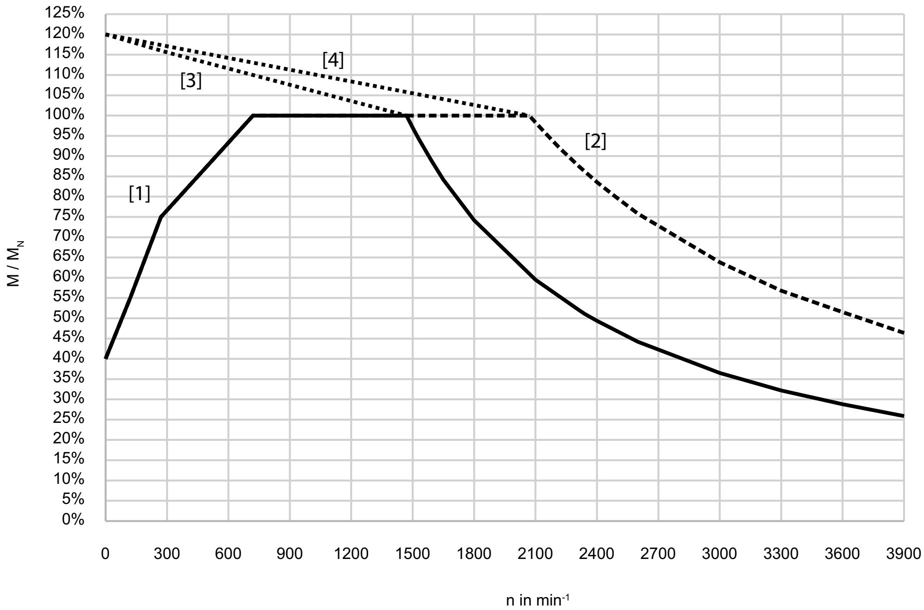
DRN80M4 – 250M4



36885786123

[1] Duty type S1 with self-cooling DRN80M4 – 250M4 (star connection)
[2] Duty type S1 with self-cooling DRN80M4 – 250M4 (delta connection)
[3] Duty type S1 with forced air cooling DRN80M4 – 250M4 (star connection)
[4] Duty type S1 with forced air cooling DRN80M4 – 250M4 (delta connection)

DRN280S4 – 280M4



36885778827

[1] Duty type S1 with self-cooling DRN280S4 – 280M4 (star connection)
[2] Duty type S1 with self-cooling DRN280S4 – 280M4 (delta connection)
[3] Duty type S1 with forced air cooling DRN280S4 – 280M4 (star connection)
[4] Duty type S1 with forced air cooling DRN280S4 – 280M4 (delta connection)

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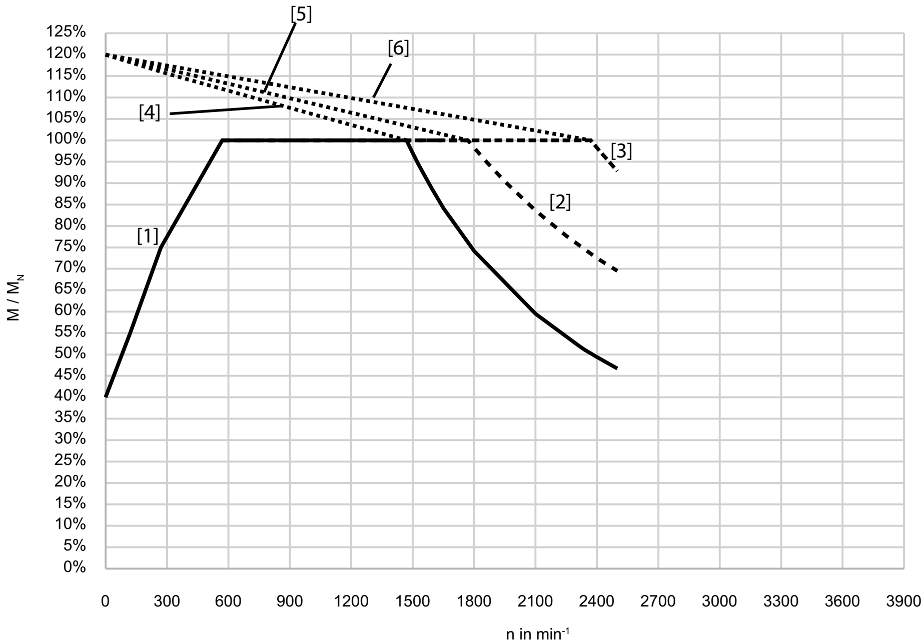
DRN315S4 - 315H4



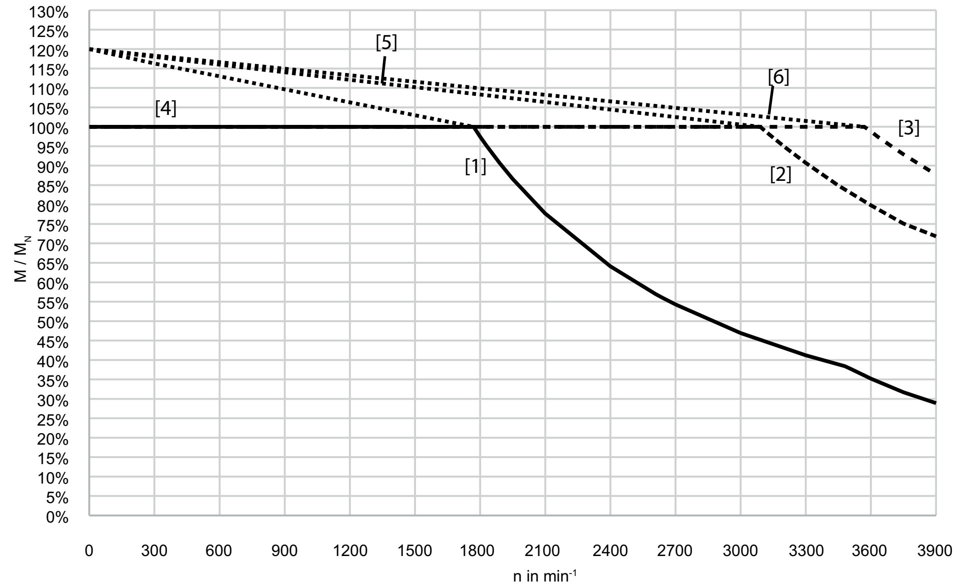
36885781259

[1] Duty type S1 with self-cooling DRN315S4 – 315H4 (star connection)
[2] Duty type S1 with self-cooling DRN315M4 – 315H4 (delta connection)
[3] Duty type S1 with self-cooling DRN315S4 (delta connection)
[4] Duty type S1 with forced air cooling DRN315S4 – 315H4 (star connection)
[5] Duty type S1 with forced air cooling DRN315M4 – 315H4 (delta connection)
[6] Duty type S1 with forced air cooling DRN315S4 (delta connection)

DRN.. motor, 4-pole (self-cooling and forced air cooling), f_{base} = 60 Hz (460 V⅄, 60 Hz), 104 Hz (266 V△, 60 Hz) and 120 Hz (230 V⅄⅄, 60 Hz)

The following diagrams show the thermal limit characteristic curves of DRN.. motors with a base frequency f_{base} of 60 Hz in ⅄ connection with a base frequency f_{base} of 104 Hz in △ connection and with a base frequency f_{base} of 120 Hz in ⅄⅄ connection. A distinction is made between motors with self-cooling and forced air cooling (option forced cooling fan /V).

DRN63MS4 – 80MK4



37037870347

[1] Duty type S1 with self-cooling DRN63MS4 – 80MK4 (star connection)
[2] Duty type S1 with self-cooling DRN63MS4 – 80MK4 (delta connection)
[3] Duty type S1 with self-cooling DRN63MS4 – 80MK4 (double star connection)
[4] Duty type S1 with forced air cooling DRN63MS4 – 80MK4 (star connection)
[5] Duty type S1 with forced air cooling DRN63MS4 – 80MK4 (delta connection)
[6] Duty type S1 with forced air cooling DRN63MS4 – 80MK4 (double star connection)

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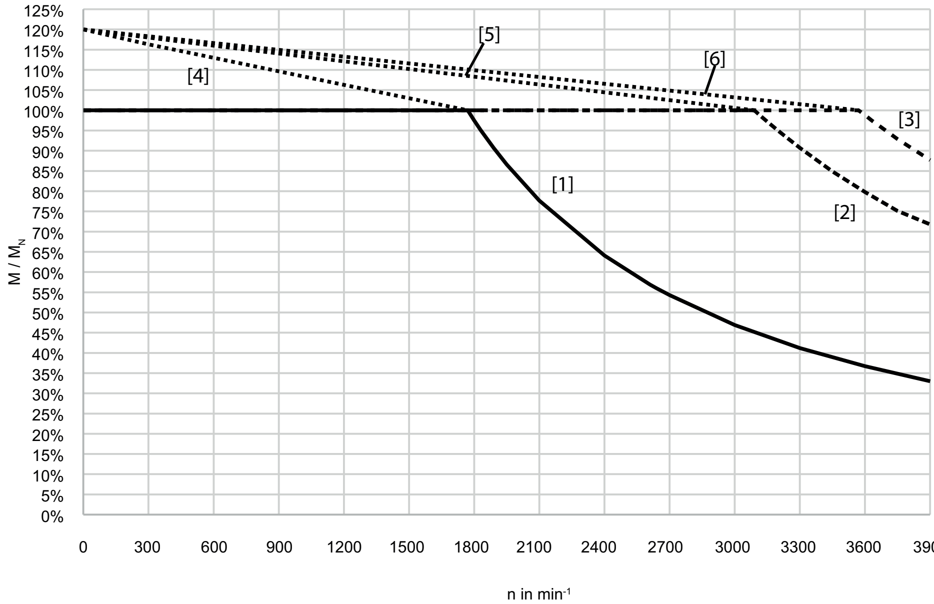
DRN80M4 – 180L4



37037872779

[1] Duty type S1 with self-cooling DRN80M4 – 180L4 (star connection)
[2] Duty type S1 with self-cooling DRN80M4 – 180L4 (delta connection)
[3] Duty type S1 with self-cooling DRN80M4 – 180L4 (double star connection)
[4] Duty type S1 with forced air cooling DRN80M4 – 180L4 (star connection)
[5] Duty type S1 with forced air cooling DRN80M4 – 180L4 (delta connection)
[6] Duty type S1 with forced air cooling DRN80M4 – 180L4 (double star connection)

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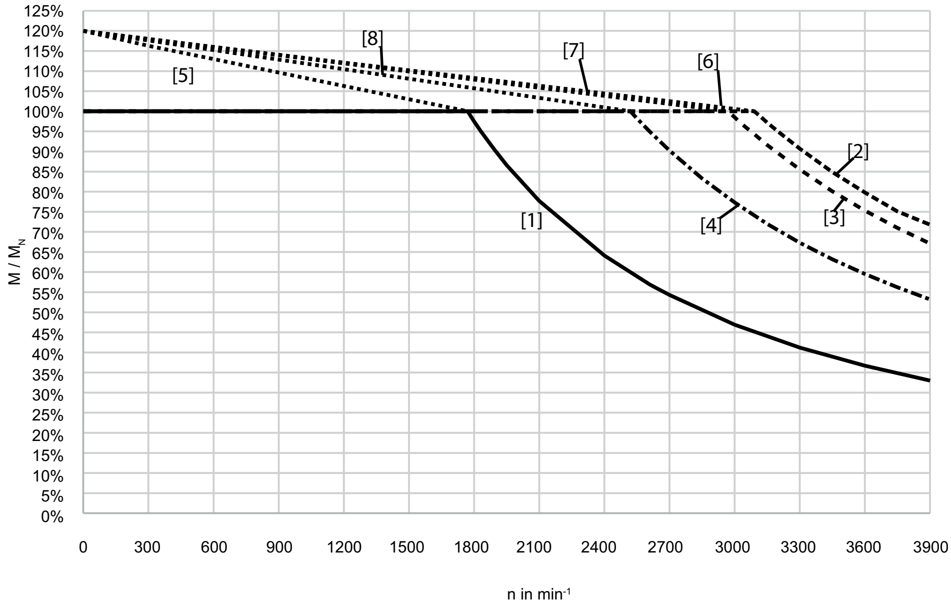
DRN200L4 – 250M4



37037865483

[1] Duty type S1 with self-cooling DRN200L4 – 250M4 (star connection)
[2] Duty type S1 with self-cooling DRN200L4 – 250M4 (delta connection)
[3] Duty type S1 with self-cooling DRN200L4 – 225S4 (double star connection)
[4] Duty type S1 with self-cooling DRN225M4 – 250M4 (double star connection)
[5] Duty type S1 with forced air cooling DRN200L4 – 250M4 (star connection)
[6] Duty type S1 with forced air cooling DRN200L4 – 250M4 (delta connection)
[7] Duty type S1 with forced air cooling DRN200L4 – 225S4 (double star connection)
[8] Duty type S1 with forced air cooling DRN225M4 – 250M4 (double star connection)

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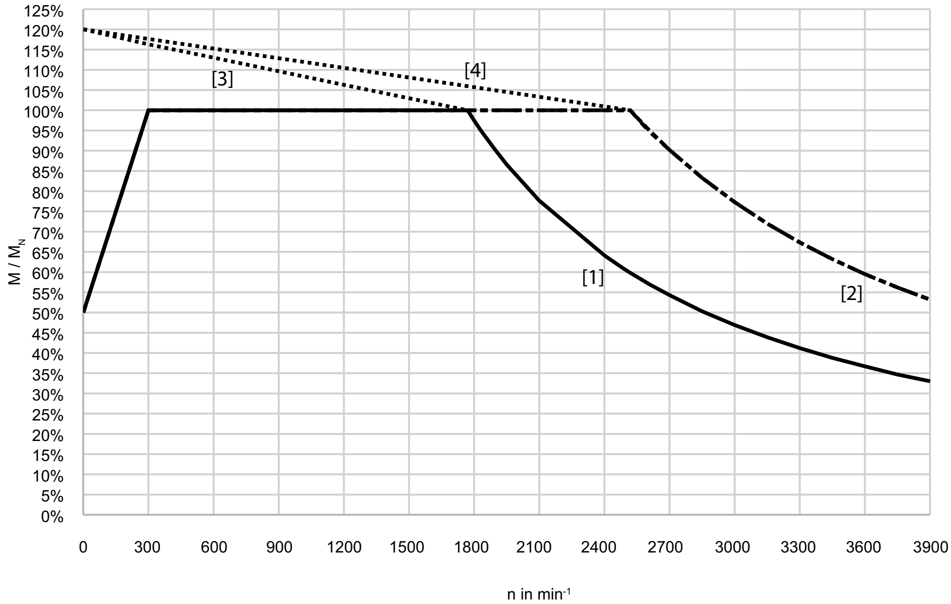
DRN280S4 – 315H4



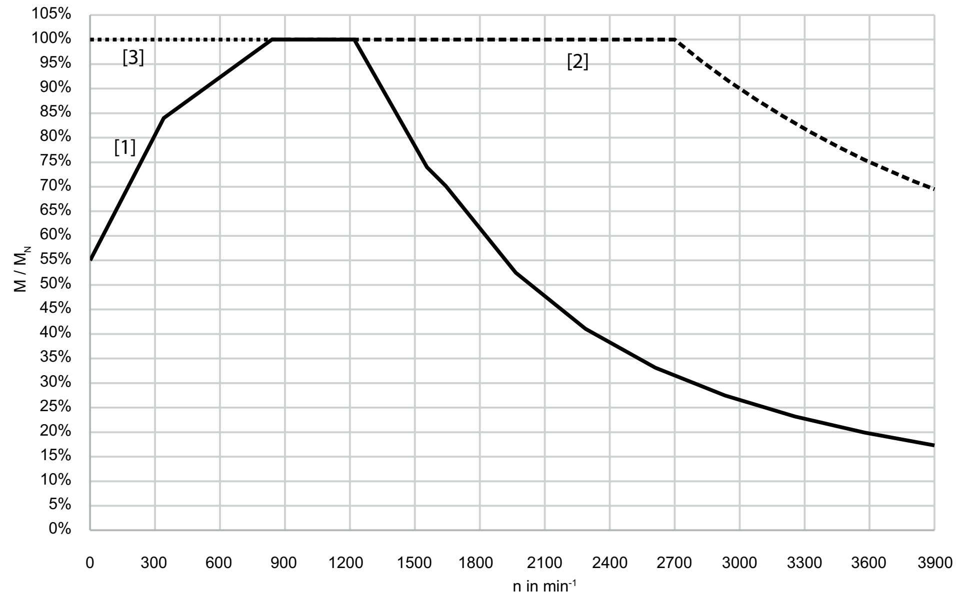
37037867915

[1] Duty type S1 with self-cooling DRN280S – 315H4 (star connection)
[2] Duty type S1 with self-cooling DRN280S – 315H4 (delta connection) and DRN280S4 – 280M4 (double star connection)
[3] Duty type S1 with forced air cooling DRN280S – 315H4 (star connection)
[4] Duty type S1 with forced air cooling DRN280S – 315H4 (delta connection) and DRN280S4 – 280M4 (double star connection)

DR2S.. motor, 4-pole (self-cooling and forced cooling), f_{base} = 53 (400 V⅄, 53 Hz) and 92 Hz (230 V△, 53 Hz)

The following diagrams show the thermal limit characteristics of the DR2S.. motors at a base frequency f_{base} of 53 Hz in ⅄ connection and at a base frequency f_{base} of 92 Hz in △ connection. A distinction is made between motors with self-cooling and forced air cooling (option forced cooling fan /V).

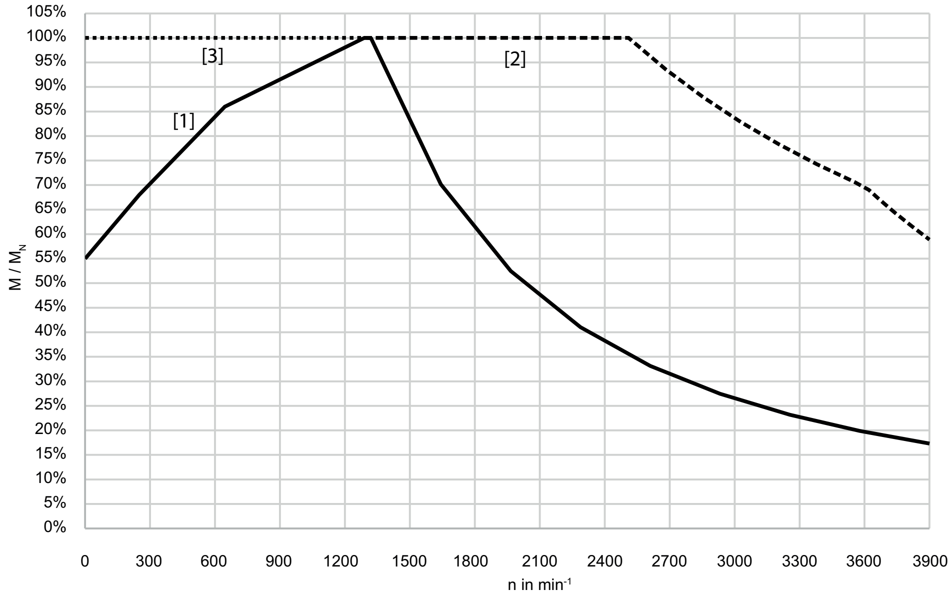
DR2S56M4



36885766667

[1] Duty type S9 with self-cooling DR2S56M4 (star connection)
[2] Duty type S9 with self-cooling DR2S56M4 (delta connection)
[3] Duty type S9 with forced air cooling DR2S56M4 (star or delta connection)

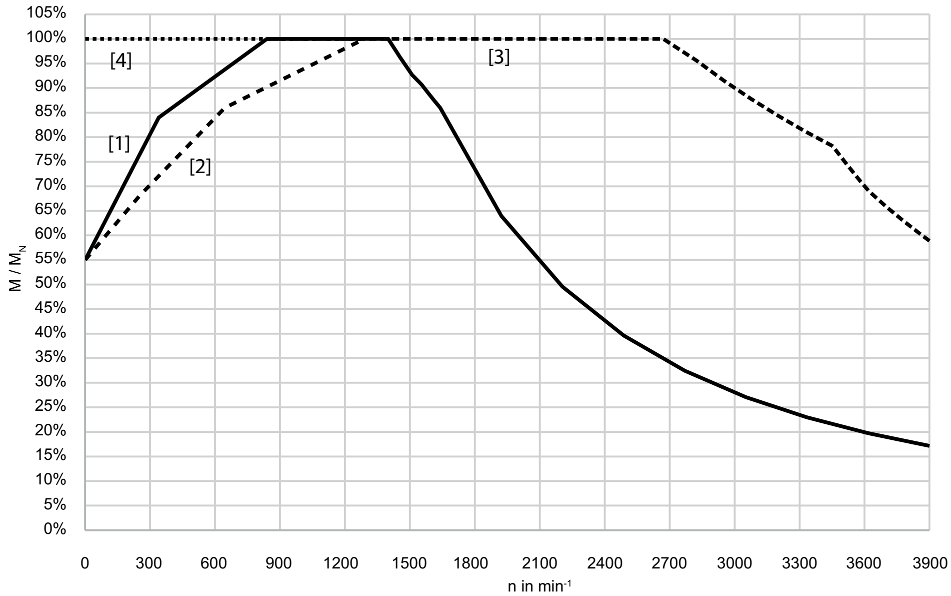
DR2S63MS4 – 63M4



36885769099

[1] Duty type S9 with self-cooling DR2S63MS4 – 63M4 (star connection)
[2] Duty type S9 with self-cooling DR2S63MS4 – 63M4 (delta connection)
[3] Duty type S9 with forced air cooling DR2S63MS4 – 63M4 (star or delta connection)

DR2S71MS4 – 71M4



36885771531

[1] Duty type S9 with self-cooling DR2S71MS4 (star connection)
[2] Duty type S9 with self-cooling DR2S71M4 (star connection)
[3] Duty type S9 with self-cooling DR2S71MS4 – 71M4 (delta connection)
[4] Duty type S9 with forced air cooling DR2S71MS4 – 71M4 (star or delta connection)

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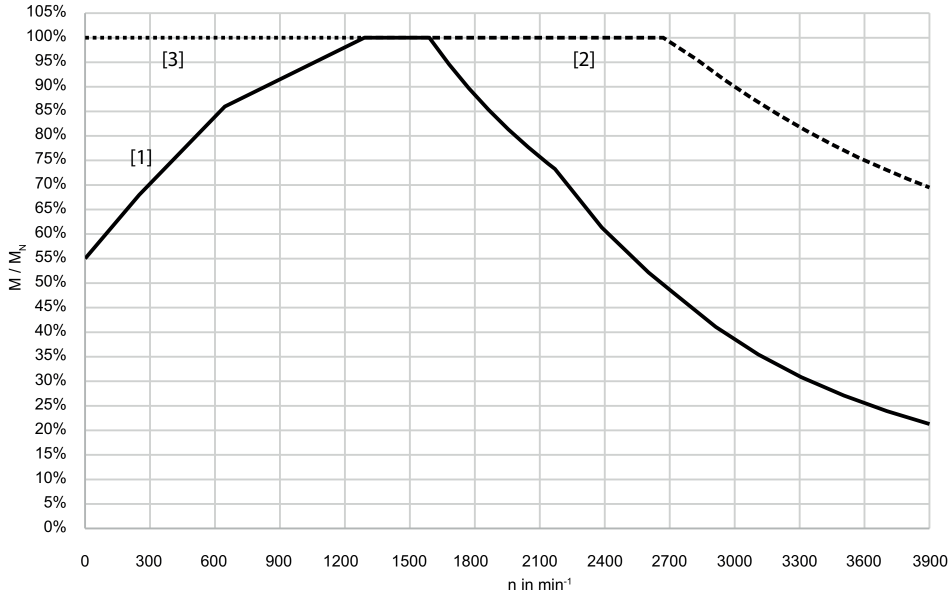
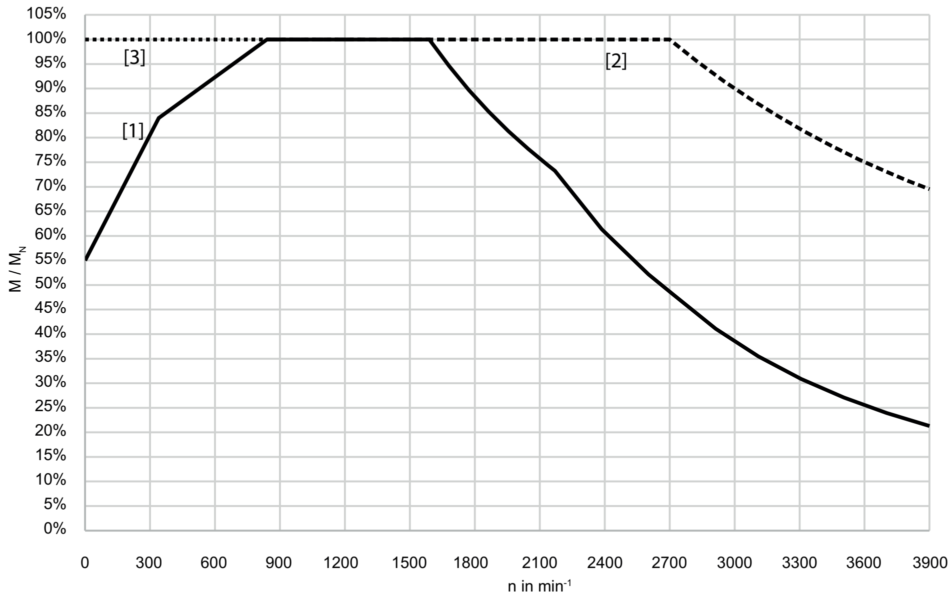
DR2S90L4 – 132S4, DR2S180L4



36885776395

[1] Duty type S9 with self-cooling DR2S90L4 – 132S4, DR2S180L4 (star connection)
[2] Duty type S9 with self-cooling DR2S90L4 – 132S4, DR2S180L4 (delta connection)
[3] Duty type S9 with forced air cooling DR2S90L4 – 132S4, DR2S180L4 (star and delta connection)

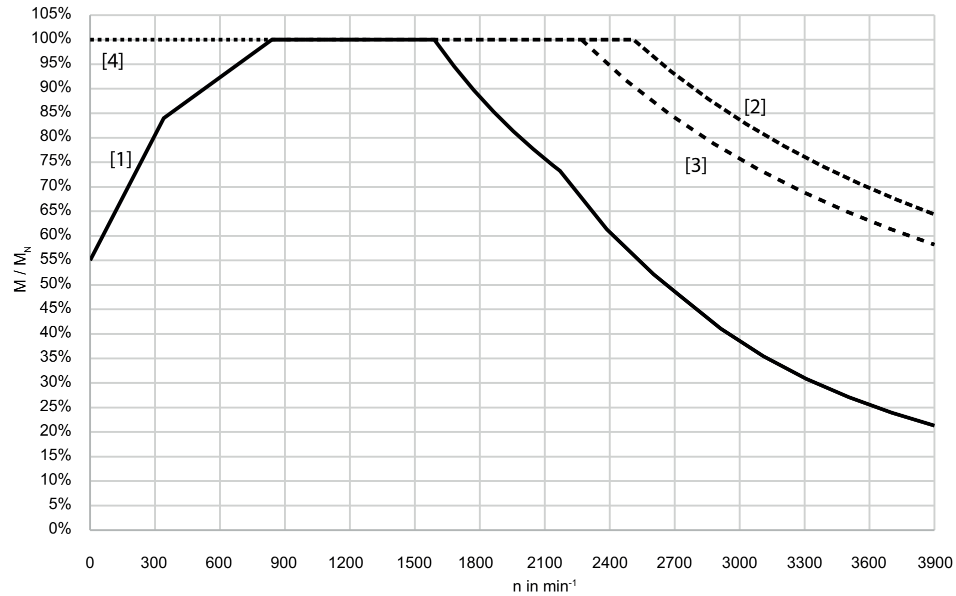
DR2S80MK4 – 90S4, DR2S132M4 – 180M4



36885773963

[1] Duty type S9 with self-cooling DR2S80MK4 – 90S4, DR2S132M4 – 180M4 (star connection)
[2] Duty type S9 with self-cooling DR2S80MK4 – 90S4, DR2S132M4 – 180M4 (delta connection)
[3] Duty type S9 with forced air cooling DR2S80MK4 – 90S4, DR2S132M4 – 180M4 (star and delta connection)

DR2S200L4 – 225S4



36885764235

[1] Duty type S9 with self-cooling DR2S200L4 – 225S4 (star connection)
[2] Duty type S9 with self-cooling DR2S225S4 (delta connection)
[3] Duty type S9 with self-cooling DR2S200L4 (delta connection)
[4] Duty type S9 with forced air cooling DR2S200L4 – 225S4 (star or delta connection)

5.4 Project planning of the drive – DR2L.. motors

Tapping the full potential of an asynchronous servomotor requires the selection of an appropriate drive.

The schematic procedure is depicted in chapter "Drive selection – controlled motor" (→ 🗎 162).

The thermal and dynamic limit characteristic curve is selected under consideration of the dynamics package, speed class, and frequency inverter.

5.4.1 Dynamics package D1 or D2

During the drive selection, you must decide which dynamics package is required and will be implemented.

Preliminary regulations are then made, especially for the size of the inverter.

The higher inertia levels of the DR2L.. motor when compared to synchronous servomotors – roughly a factor of 10 or more – are of great benefit when controlling loads with high inherent inertia, even when taking gear unit reduction ratios into account.

For further information, refer to chapter "DR2L.. series asynchronous servomotors" (→ 🗎 61).

The technical data for the DR2L.. motors and the limit values of the D1 or D2 dynamics packages are provided in chapter "DR2L.. motors, 400 V, 50 Hz, 4-pole" (→ 🗎 156).

5.4.2 Speed classes

Available speed classes:

- 1200 min^{-1}
- 1700 min^{-1}
- 2100 min^{-1}
- 3000 min^{-1}

Various setting ranges can be implemented using the 4 available speed classes. Different gear unit ratios can be selected.

The technical data of the DR2L motors in the different speed classes can be found in chapter "DR2L.. motors, 400 V, 50 Hz, 4-pole" (→ 🗎 156).

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5.4.3 Sine encoder

The following incremental encoders are included in the standard drive package for DR2L.. motors:

- Built-in encoder EI8R
- EK8S add-on cone encoder

This sine encoder has a resolution of 1024 sine cycles.

The interpolation of the sin/cos signals in the inverter greatly increases the available speed information, resulting in a usable speed setting range of 1:5000 and highly accurate operation at speeds below 1 min^{-1}.

Startup is simplified by the electronic nameplate included in the encoder.

For further information, refer to chapter "Encoders" (→ 🗎 448).

5.4.4 Multi-turn absolute encoder

Instead of the incremental encoder, a multi-turn absolute encoder can be installed at the same location.

- AK8W, AK8Y or AK8H add-on cone encoders

Startup is simplified by the electronic nameplate included in the encoder.

For further information, refer to chapter "Encoders" (→ 🗎 448).

5.4.5 Forced cooling fan

The use of a /V forced cooling fan prevents the reduction in permissible load torque at speeds below 900 min^{-1}.

In fact, the relationship is reversed, meaning that the permitted torque at speed "0" is approx. 10 – 15% higher than the nominal torque when a forced cooling fan is used.

For further information, refer to chapter "Forced cooling fan" (→ 🗎 601).

5.4.6 Inverter configuration

SEW-Workbench is the central planning and configuration tool for products by SEW-EURODRIVE. It can process any required configurations, from entering the application to gear unit, motor and inverter calculations.

Optimization of the various axis cycles including accessory selection and error check of the entire drive system design are further features.

This means SEW-Workbench allows for dimensioning drive solutions from the entire product range from SEW-EURODRIVE.

The straightforward operation saves a great deal of time and minimizes complexity.

The key features of the SEW-Workbench are:

- Application selection
- Gear unit and motor calculation
- Price-optimized configuration
- Comparison of different solutions
- Inverter calculation
- Multi-axis optimization
- Parameterization of cable and accessories selection
- Dimensioning error check
- Parts list generation
- The electronic catalog with all products

The configuration software SEW-Workbench is available for download from the official SEW-EURODRIVE website.

To use SEW-Workbench, all you need to do is to register via the Online Support once you have downloaded and installed the software.

An Internet update service ensures that the products and functions are always up-to-date.

In addition, the application offers motor/inverter characteristics in the Online Support on the SEW-EURODRIVE homepage for motor characteristics of the peak motor torque above the speed. If you select an inverter in addition, the specific motor characteristics will be created on this inverter.

URL: http://go.sew-eurodrive.com/os/motorcharacteristics

Observe the connection option in the terminal box during dimensioning and selection of the cable cross section. The cross sections for cable entry and connection to the terminal board must be considered.

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5.5 Electrical properties

5.5.1 Motor properties for operation on a 60 Hz or 50/60 Hz supply system

The motors are also available for operation at a line frequency of 60 Hz.

In such cases, the length (and thus the geometric dimensions) a the same rated power may vary between the 50 Hz and the 60 Hz or 50/60 Hz design. Especially adhere to this when selecting global motors, see chapter "Technical data of the motors" (→ 🗎 81).

5.5.2 Frequencies and voltages

Frequencies

The AC motors from SEW-EURODRIVE are delivered suitable for line frequency operation of 50 Hz or 60 Hz, depending on the configuration. The nameplates of the relevant motors list data referring to the configuration, see chapter "Rated data according to IEC 60034" (→ 🗎 19).

The global motor design is an exception to that. The global motor is designed both for operation on a 50 Hz and on a 60 Hz supply system. The nameplates of global motors list information for operation on a 50 Hz supply system, as well as information for operation on a 60 Hz supply system.

Unless specified otherwise, the technical specifications in this catalog refer to motors operated at a line frequency of 50 Hz.

Voltages

Depending on the configuration, AC motors from SEW-EURODRIVE are designed for operation at a fixed voltage (e.g. 230 V △/400 V ⅄) or for operation in a voltage range (e.g. 220 V – 230 V △/380 V – 400 V ⅄), see chapter "Global motors from SEW-EURODRIVE" (→ 🗎 59).

The following combinations of rated frequency and rated voltage are possible:

- 50 Hz fixed voltage
- 60 Hz fixed voltage
- 50 Hz voltage range
- 50/60 Hz voltage range

The tolerances A and B as specified in standard IEC 60034 apply to rated frequencies as well as to nominal voltages, see chapter "Tolerances according to IEC 60034-1" (→ 🗎 198).

The AC motors from SEW-EURODRIVE are available in a variety of nominal voltages. Should you require a nominal voltage deviating from the local standard, contact SEW-EURODRIVE.

5.5.3 Standard nominal voltages at 50 Hz or 50/60 Hz, depending on the motor size

As standard, motors in the variants 50 Hz or 50/60 Hz are operated in the wiring diagram R13, i.e. in star or delta connection.

The nominal voltage assigned to the motors by SEW-EURODRIVE as standard varies depending on the motor size and motor power.

The following table lists the nominal voltages for motors designed for operation at a 50 Hz or 50/60 Hz supply system depending on the rated power.

motor	Power	Fixed voltage 50 Hz	Voltage range 50 Hz	Voltage range 50/60 Hz
	kW	V	V	V
DRN63 – DRN80MK	0.12 – 0.55	230△/400⅄	220 – 230△/380 – 400⅄	220 – 230△/380 – 400⅄, 50 Hz
				254 – 266△/440 – 460⅄, 60 Hz
DRN80MS – DRN132S	0.75 – 5.5		220 – 230△/380 – 400⅄	220 – 230△/380 – 400⅄, 50 Hz
				254 – 266△/440 – 460⅄, 60 Hz
DRN132M – DRN315	7.5 – 200	400/690⅄	380 – 400△/660 – 690⅄	380 – 400△/660 – 690⅄, 50 Hz
				440 – 469△60 Hz
DR2S56	0.09 – 0.12	400⅄		380 – 415⅄/440 – 480⅄
DR2S63 – 132S	0.12 – 7.5	230△/400⅄	220 – 240△/380 – 415⅄	220 – 240△/380 – 415⅄, 50 Hz
				254 – 277△/440 – 480⅄, 60 Hz
DR2S132M – 225	9.2 – 45	400△/690⅄	380 – 415△/660 – 715⅄	380 – 415△/660 – 715⅄, 50 Hz
				440 – 480△, 60 Hz

Due to the tolerances A and B as specified in standard IEC 60034, motors and brakes for AC 230/400 V and motors for AC 400/690 V can also be operated at AC 220/380 V or AC 380/660 V supply systems.

5.5.4 Nominal data of a 50 Hz motor when operated on a 60 Hz supply system

Observe the following table when motors designed for 50 Hz supply system are operated on 60 Hz supply systems:

Nominal voltage at 50 Hz	Connection	Motor voltage at 60 Hz	Deviating data			
			Speed	Power	Rated torque	Starting torque ratio
AC 230 △/400 V ⅄	△	230	+20%	0%	-17%	-17%
AC 230 △/400 V ⅄	⅄	460	+20%	+20%	0%	0%
AC 400 △/690 V ⅄	△					

If you want to operate motors designed for 50 Hz supply systems on a 60 Hz supply system, consult SEW-EURODRIVE. In some countries and regions regulations apply regarding efficiency values that must be adhered for 60 Hz operation.

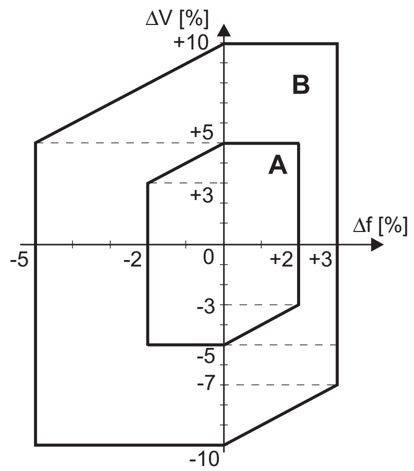
5.6 Tolerances according to IEC 60034-1

In accordance with IEC 60034-1, the following tolerances are permitted for electric motors with rated voltage (also applies to the rated voltage range):

Voltage and frequency	Tolerance A and tolerance B
Efficiency η $P_N \leq 150$ kW $P_N > 150$ kW	-0.15 × (1-η) -0.1 × (1-η)
Power factor cosφ	$-\frac{1 - \cos\varphi}{6}$
Slip $P_N < 1$ kW $P_N \geq 1$ kW	± 30% ± 20%
Starting current	+ 20%
Tightening torque	-15% to +25%
Breakdown torque	-10%
Pull-up torque	- 15%
Mass moment of inertia	± 10%

5.6.1 Tolerance A, tolerance B

Tolerances A and B describe the permitted range within which the frequency and voltage are allowed to deviate from their respective rated points. The origin marked "0" in the following figure identifies the respective ratings for frequency as well as voltage.



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In the tolerance range A, the motor must be able to deliver the rated torque in continuous duty (S1). The other characteristic values and heating may deviate slightly from the rated voltage and rated frequency.

In the tolerance range B, the motor must be able to deliver the rated torque but not in continuous duty. The increase in temperature and deviations from the rated data are higher than in tolerance range A. Avoid frequent operation of the motor at the outer limits of tolerance range B.

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5.6.2 Undervoltage

It is not possible to achieve the rated value such as power, torque and speed in the event of undervoltage, e.g. due to weak supply systems or an insufficiently large motor cable. This is particularly true for motor startup where the starting current amounts to a multiple of the rated current.

5.6.3 Overvoltage

Overvoltage results in a higher torque development, but also in more intense heating of the motor winding.

Overvoltages exceeding the tolerances permitted in the standards may cause damage at the motor winding.

5.7 Thermal classes according to IEC 60034-1

The motor standards of the IEC 60034-1 series describe the designs and identification of thermal classes. This defines the limit overtemperatures for the winding subject to the rated torque at a maximum ambient temperature of +40 °C. A thermal reserve of 10 – 15 Kelvin for eventual voltage tolerances is also provided.

SEW-EURODRIVE indicated the thermal class of the motor with the numerical value as required in the standards and with a letter.

As standard, asynchronous motors from SEW-EURODRIVE are designed in thermal class 130 (B). Higher thermal classes (155 (F) and 180 (H)) are available upon request.

Thermal classification/ thermal class	Maximum winding temperature
130 (B)	130 °C
155 (F)	155 °C
180 (H)	180 °C

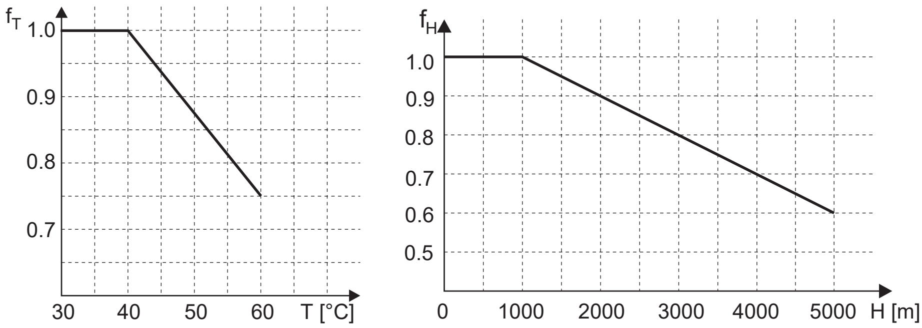
5.7.1 Power reduction

The rated power P_N of a motor depends on the ambient temperature and the altitude. The rated power stated on the nameplate applies for an ambient temperature of 40 °C and a maximum installation altitude of 1000 m above sea level. The power must be reduced according to the following formula in the case of higher ambient temperatures or altitudes:

$$P_{Nred} = P_N \times f_T \times f_H$$

The following diagrams show the power reduction depending on the ambient temperature and installation altitude with approximately constant heating of the motors.

The factors f_T and f_H apply for the motors:



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T Ambient temperature
H Installation altitude above sea level

Please contact SEW-EURODRIVE for ambient temperatures over 60 °C or installation altitudes above 5000 m.

5.7.2 Starting frequency

At the supply system, a motor is rated according to its thermal capacity utilization in continuous duty (S1 = continuous duty = 100% cyclic duration factor).

Definition

The switching frequency indicates the number of times the motor can accelerate the mass moment of inertia of its rotor and the mass moment of inertia of the external load up to the static load speed without thermal overloading.

The power demand calculated from the load torque of the application must not exceed the rated power of the motor. This mechanical power must be output continuously by the motor within the permitted thermal limits without overheating.

High switching frequency

In practice, drives can be loaded in such a way that the motor can often be switched on and off at low load torque relative to the motor's rated torque, such as for a travel drive. In this case, it is not the power demand of the drive train that is the decisive factor in determining the size of the motor, but rather the number of times the motor has to start up per time interval.

In comparison to motor operation at the rating point, a higher current flows at the start-up of an asynchronous motor. This starting current is specified in the starting current ratio. The motor heats up more during startup due to the higher current than in permanent operation at the rating point. This means each startup leads to disproportionate heating of the motor.

If the resulting heat generation is higher than the heat that is dissipated by the cooling system, the windings can overheat excessively. This must be taken into account when configuring the overall drive and is determined by means of the permitted switching frequency. The thermal load capacity of the motor can additionally be increased by selecting a suitable thermal class or by using forced air cooling.

No-load starting frequency Z_0

For line-powered drives, the thermal limit limits the permitted switching frequency of the motors. The basis for calculating the permitted switching frequency is known as the no-load starting frequency Z_0 of the motors with the switch-ons per hour as the unit.

SEW-EURODRIVE specifies the permitted switching frequency of a load-free motor as the no-load starting frequency Z_0 at 50 % cyclic duration factor. This value indicates the number of times per hour that the motor can accelerate the mass moment of inertia of its rotor up to the rated speed without external load at 50% cyclic duration factor within its thermal configuration.

The calculation of the permitted switching frequency is based on the no-load starting frequency, taking several influence factors into account. The following factors influence the value of the no-load starting frequency:

- K_J: The factor K_J is determined according to the mass moments of inertia to be accelerated of the application and the motor options in relation to the inertia of the motor. The higher the additional mass moment of inertia to be accelerated, the smaller the value K_J.
- K_M: Depending on the external load during run-up, i.e. the higher the static load torque, the smaller the factor K_M.
- K_P: Depending on the static power and the relative cyclic duration factor cdf, i.e. the static capacity utilization and the percentage of the cyclic duration factor influence the factor K_P.

Permitted switching frequency of motors

If a load with increased mass moment of inertia has to be accelerated or an increased load torque has to be overcome, the motor's run-up time increases. As a higher current flows during this run-up time, the motor is thermally more loaded and the permitted switching frequency decreases.

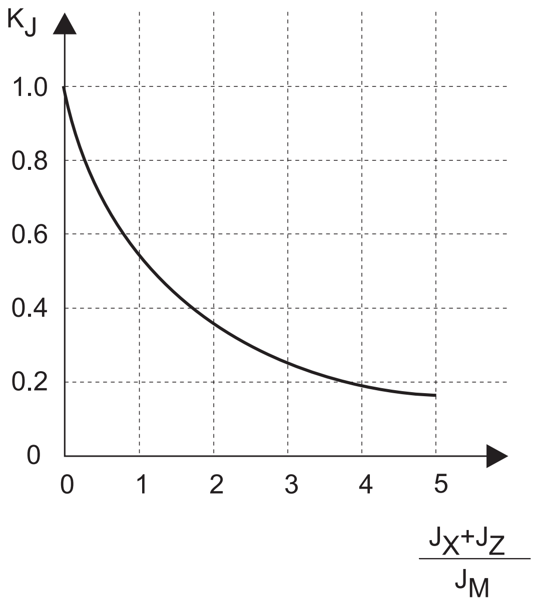
The permitted starting frequency Z of a motor in cycles/hour can be calculated using the following formula:

$\mathbf{Z = Z_0 \times K_J \times K_M \times K_P}$

The factors K_J, K_M and K_P influence the value of the no-load starting frequency in such a way that the actual permitted switching frequency Z on the basis of the conditions of the application is determined.

You can determine the factors K_J, K_M and K_P using the following diagrams according to different parameters.

Factor K_J depending on the additional mass moment of inertia



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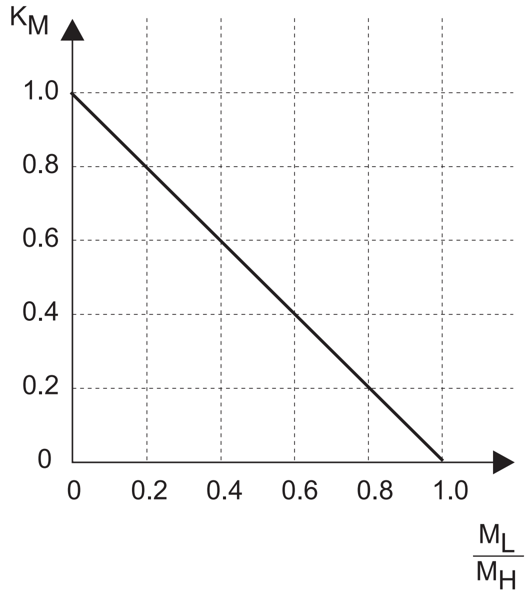
Factor K_M depending on the external load during run-up



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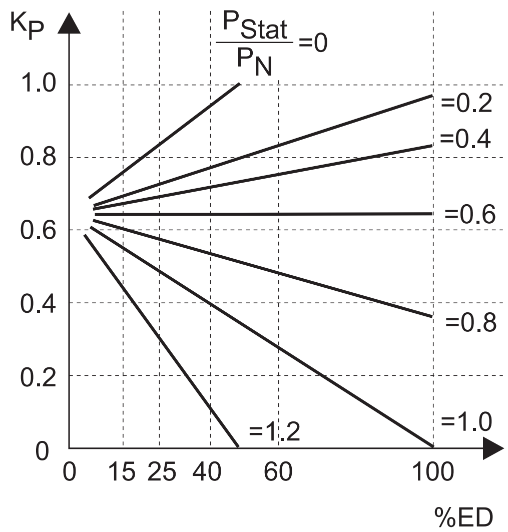
Factor K_P depending on the static power and the relative cyclic duration factor CDF



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Key

J_X	Total of all external mass moments of inertia in relation to the motor axis	M_H	Acceleration torque of the motor
J_Z	Mass moment of inertia flywheel fan	P_{stat}	Power demand after run-up (static power)
J_M	Motor mass moment of inertia	P_N	Rated motor power
M_L	External load during run-up	% ED	Relative cyclic duration factor

Example: Calculating the permitted switching frequency

Brakemotor: DRN80M4 with BE1 brake as line-powered drive

No-load starting frequency Z_0 with BGE brake rectifier = 8200 h^{-1}

1. $(J_X + J_Z) / J_M = 3.5 \rightarrow K_J = 0.2$
2. $M_L / M_H = 0.6 \rightarrow K_M = 0.4$
3. $P_{stat} / P_N = 0.6$ and 60% cdf $\rightarrow K_P = 0.65$

$Z = Z_0 \times K_J \times K_M \times K_P = 8200\ h^{-1} \times 0.2 \times 0.4 \times 0.65 = 426\ h^{-1}$

The cycle duration is 8.45 s.

The switch-on time amounts to 5.07 s.

In addition, it must be checked if the brake is permitted for the required operating conditions. Observe the information in the manual "Project Planning for BE.. Brakes – DR.., DRN.., DR2.., EDR.., EDRN.. AC Motors – Standard Brake/Safety Brake".

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5.8 Thermal monitoring

In accordance with the standard IEC 60034-11, two fundamental states are taken into account when monitoring a motor against thermal overload:

- Thermal overload with gradual temperature change
- Thermal overload with rapid temperature change

5.8.1 Thermal overload with gradual temperature change

If the motor is subject to thermal overload with a gradual temperature rise, the thermal protection system must limit the winding temperature from critical rising.

Possible causes for heating:

- Failure of the cooling system, e.g. due to residue in the cooling channels or at the cooling fins on the motor housing.
- Reduced flow of cooling air, e.g. due to completely or partially covered fan grille.
- Renewed drawing in of already heated cooling air.
- Excessive rise in the ambient temperature or the coolant temperature.
- Rising mechanical overload.
- Voltage drop, overvoltage or asymmetry in the motor supply over an extended period.
- A cyclic duration factor deviating from the initial specifications at a motor dimensioned for intermittent duty.
- Deviations from the rated frequency.

5.8.2 Thermal overload with rapid temperature change

If the motor is subject to thermal overload with a rapid temperature rise, then the thermal protection system must limit the winding temperature from rising further.

Possible causes for rapid heating:

- Rotor blockage
- Phase failure
- Start-up under special, non-designated conditions, e.g. with excess mass moment of inertia, insufficient voltage, or extremely high load torque
- Rapid load increase
- Repeated start-up over short time intervals

5.8.3 Selecting the correct motor protection device

Selecting the correct motor protection device significantly influences the operational safety of the motor. There are 2 kinds of protection devices: current-controlled and motor temperature-dependent.

Current-controlled protection devices are usually installed in the control cabinet.

Examples of current-controlled protection devices:

- Fuses
- Motor circuit breaker

Temperature-dependent protection devices are usually installed directly in the motor winding.

PTC thermistors, bimetallic switches, or temperature sensors respond when the maximum permitted winding temperature is reached. The advantage is that temperatures are detected where they actually occur and where they reach the highest values.

SEW-EURODRIVE provides 4 fundamental types of thermal motor protection for the motors:

- PTC thermistor /TF, chapter "PTC thermistor /TF (PTC)" (→ 🗎 573)
- Bimetallic temperature switch /TH, chapter "Temperature switch /TH" (→ 🗎 575)
- Temperature sensor /PT, chapter "Temperature sensor /PT" (→ 🗎 577)
- Temperature sensor /PK, chapter "Temperature sensor /PK" (→ 🗎 578)

INFORMATION

Motor protection device at ambient temperatures < 0 °C

If motors are used in the CFC and VFC control mode at ambient temperatures < 0 °C, a Pt1000 temperature sensor must be used in order to achieve the optimum torque of the motor.

Fuses

Fuses do not protect the motor from overload, but are used to protect supply cables. They are exclusively used as short-circuit protection and may detect a rotor blockage, as this condition is similar to a short-circuit on the terminals.

Motor circuit breakers

Motor circuit breakers offer adequate protection against overload in operation with low switching frequencies and brief start-ups. The motor circuit breaker is set to the rated motor current. In combination with DRN.. motors, ensure that the motor circuit breakers used are suitable for IE3 motors.

Motor circuit breakers are not adequate as the sole means of protection given switching operation with a high switching frequency (> 60 per h) and for high inertia starting. In these cases, we recommend using PTC thermistors in addition, see chapter "PTC thermistor /TF (PTC)" (→ 🗎 573).

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PTC thermistors

Three PTC thermistors (PTC, characteristic curve according to DIN 44082) are integrated into the winding overhang of the motor and connected in series. The terminals are in the terminal box.

Evaluation takes place at a respective input of the inverter or at a trip switch in the control cabinet.

Motor protection with PTC thermistor /TF (see chapter "PTC thermistor /TF (PTC)" (→ 🗎 573)) provides comprehensive protection against thermal overload. Motors protected in this way can be used for heavy starting, switching and braking operation and in case of unstable supply systems. A motor circuit breaker is usually installed as well.

SEW-EURODRIVE recommends using motors equipped with PTC thermistor for inverter operation.

Bimetallic switches

In contrast to the PTC thermistors, bimetallic switches do not require specific evaluation electronics. They can be directly included into the monitoring circuit of the motor.

Three bimetallic switches are integrated into the winding overhang of the motor and connected in series, see chapter "Temperature switch /TH" (→ 🗎 575). The terminals are located in the terminal box.

To achieve maximum motor protection, the trigger temperature is slightly lower than the limit value of the thermal class selected for the motor.

Temperature sensor

A temperature sensor is integrated into the winding of the motor. The winding temperature of the motor can be constantly determined with an evaluation unit by means of the characteristic curve of the sensor.

The sensor has a nearly linear characteristic curve and a high level of accuracy.

The sensors do not bear any relation to the selected thermal class of the motor and can be integrated into the winding in addition to a PTC thermistor or a bimetallic switch.

For detailed information, refer to chapters "Temperature sensor /PT" (→ 🗎 577) and "Temperature sensor /PK" (→ 🗎 578).

MOVIMOT® protection devices

Motors driven by MOVIMOT® contain integrated protection devices to prevent thermal damage. No other devices are required for motor protection.

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5.8.4 Comparison of the safety mechanisms

The following table shows the suitability of the various protection devices and temperature sensors for different causes of tripping.

Cause of the increased thermal load	Current-dependent protection device		Temperature-dependent protection device			
	Fuse	Motor circuit breaker	PTC thermistor /TF	Bimetallic switch /TH	Temperature sensor /PT[1]	Temperature sensor /PK[1]
Overcurrents up to 200% I_N	–	x	x	x	x	x
Heavy starting	–	•	x	•	•	•
Direct switching of the direction of rotation	–	•	x	•	–	–
Switching operation up to Z = 30 1/h	–	•	x	x	–	–
Blocking	•	•	•	•	•	•
Phase failure	–	•	x	x	–	–
Voltage deviation (> tolerance B)	–	x	x	x	x	x
Frequency deviation (> tolerance B)	–	x	x	x	x	x
Insufficient motor cooling	–	–	x	x	x	x

1) With adapted evaluation unit.

x Comprehensive protection
• Limited protection
– No protection

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5.9 Output designs

Asynchronous motors from SEW-EURODRIVE are available in different flange and foot-mounted designs. This chapter provides a list of the available designs.

In the standard version, the output shaft is designed as IEC shaft end with full key or half key.

AC motors from SEW-EURODRIVE are equipped with a pinion shaft end for direct mounting to gear units.

5.9.1 /FI – IEC foot-mounted motor

The /FI foot-mounted motor is a motor design with a drive-end endshield (closed flange), shaft end, and feet according to the IEC 60072-1/EN 50347 standard (comparable to IEC basic mounting position IM B3). The dimension of the feet and the shaft end are shown on the nameplate. This ensures a reference to the geometrical dimensions specified in the IEC 60072-1/EN 50347 standard.

5.9.2 /F.A, /F.B – Universal foot-mounted motor

These designs describe the SEW-EURODRIVE motor in the universal foot version. This means that variable mounting of the feet to the stator is possible, thus allowing a foot-mounted motor with individual terminal box positions (0°, 180°, 270°) to be implemented, e.g. /FIA or /FYB. The option /F.A means that the motor feet are enclosed in the delivery, option /F.B means that the motor feet are mounted at the factory.

5.9.3 /FF – IEC flange-mounted motor with through bores

Flanges of design /FF have through bores according to IEC 60072-1/EN 50347 (comparable to IEC basic mounting position IM B5). Both the flange diameter and the diameter at which the bores are arranged as well as the shaft end comply with the specifications of the standard.

5.9.4 /FT – IEC flange-mounted motor with threads

Flanges of design /FT have threaded holes according to IEC 60072-1/EN 50347 (comparable to IEC basic mounting position IM B14). Both the flange diameter and the diameter at which the threads are arranged as well as the shaft end comply with the specifications of the standard.

5.9.5 /FL – Flange-mounted motor (deviating from IEC)

The flange design /FL has through bores or tapped holes according to the standard (comparable to IEC basic mounting position IM B14 or IM B5) according to IEC 60072-1/EN 50347. One or several geometrical designs deviate from the standard. This may include: Other connection dimensions as defined in the size-to-power relationship, deviating flange heights or deviating alignment of the connection bore pattern.

5.9.6 /FE – IEC flange-mounted motor with through bores and IEC feet

Combination of /FI and /FF (comparable with IEC basic mounting position IM B35).

5.9.7 /FY – IEC flange-mounted motor with threaded holes and IEC feet

Combination of /FI and /FT (comparable with IEC basic mounting position IM B34).

5.9.8 /FK – Flange-mounted motor (deviating from IEC) with IEC feet

Combination of /FI and /FL.

5.9.9 /FC – C-face flange-mounted motor; dimensions in inches according to NEMA MG1

Shaft end and flanges in /FC design are designed according to NEMA MG 1 (comparable to IEC basic mounting position IM B14) and the dimensions are based on the Anglo-American system of measurement (inches).

5.9.10 /FG – Integral motor as stand-alone motor

Flanges in /FG design are intended for connecting motors and gear units from SEW-EURODRIVE. The designation /FG is only part of the type designation if the motors are delivered without gear unit.

5.9.11 /FM – Integral motor as stand-alone motor with IEC feet

Combination of /FI and /FG (not comparable with an existing IEC basic mounting position).

5.9.12 Overview

The table below gives an overview of the possible flange and feet designs.

Option	IEC flange With through bore	IEC flange With tapped hole	Non-IEC flange	C-Face flange	IEC foot	Gear unit flange
/FI						
/FF						
/FE						
/FT						
/FY						
/FC						
/FG						
/FM						
/FL						
/FK						

5.10 Input side shaft end

In the standard design, the input side shaft end (A-side) of an AC motor from SEW-EURODRIVE is designed with keyway according to IEC 60072-1/EN 50347 and full key according to DIN 6885. On request, the shaft ends can also be delivered as smooth shaft ends and without a key and keyway.

A special form of input side shaft end for direct mounting to gear units from SEW-EURODRIVE is the pinion shaft end that represents the input element for the gear unit.

Rotors are balanced with a half key as standard, see chapter "Vibration class and increased vibration stress" (→ 🗎 232) class.

Contact SEW-EURODRIVE if you need the motors to be delivered with rotors with full-key balancing (deviating from the standard). Rotors balanced in this manner are labeled with a "V" on the front shaft end face in line with the standard regulations.

5.10.1 Standard shaft ends

DRN.. motors

The following table lists the standard shaft ends for DRN.. motors. Deviating geometries of the shaft ends are available on request.

Size	Shaft end
63	11 × 23
71	14 × 30
80	19 × 40
90	24 × 50
100	28 × 60
112	28 × 60
132	38 × 80
160	42 × 110
180	48 × 110
200	55 × 110
225	60 × 140
250	65 × 140
280	75 × 140
315	80 × 170

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DR2S.. motors

The following table lists the standard shaft ends for DR2S.. motors. Deviating geometries of the shaft ends are available on request.

Size	Shaft end
63MS	11 × 23
63M	14 × 30
71MS	14 × 30
71M	19 × 40
80MK	19 × 40
80M	24 × 50
90S	24 × 50
90L	28 × 60
100LS	28 × 60
100L	28 × 60
112M	38 × 80
132S	38 × 80
132M	38 × 80
132L	42 × 110
160M	42 × 110
160L	48 × 110
180M	48 × 110
180L	55 × 110
200L	60 × 140
225S	60 × 140

5.10.2 Center of gravity of motors

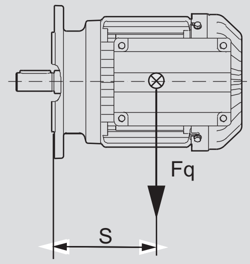
The center of gravity of a motor is a theoretical variable. This theoretical value is determined under the assumption that the entire mass of the motor is concentrated in one point and acts on this point with the weight F_q. The mass of the motor can be found in the chapter "Technical data of the motors" (→ 🗎 81).

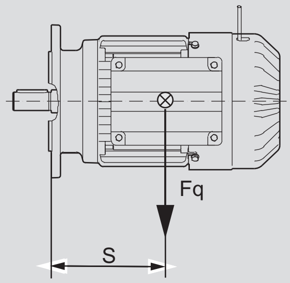
The center of gravity is relative to the flange position and stated with regard to the standard IEC flange (B5). For brakemotors, it additionally considers the characteristics of the BE.. brake assigned in the standard.

Also consider the center of gravity for the combination of motors that are mounted to a gear unit with an adapter.

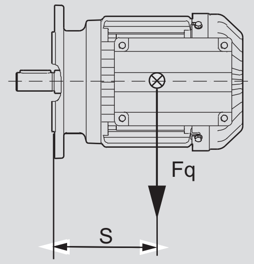
Changed designs or additional options influence the center of gravity. Consult SEW-EURODRIVE in case of deviating motor designs or changed options.

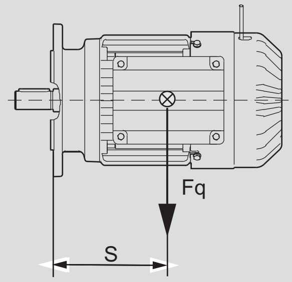
DRN.. motors





Motor	Center of gravity S	Brakemotor	Brake	Center of gravity S
	mm			mm
DRN63MS	71[1)]	DRN63MS	BE03	98[1)]
DRN63M	78[1)]	DRN63M	BE03	104[1)]
DRN71MS	73[1)]	DRN71MS	BE03	94[1)]
DRN71M	84[1)]	DRN71M	BE05	111[1)]
DRN80MK	90[1)]	DRN80MK	BE1	121[1)]
DRN80MS	98[1)]	DRN80MS	BE05	128[1)]
DRN80M	115[1)]	DRN80M	BE1	144[1)]
DRN90S	119[1)]	DRN90S	BE2	147[1)]
DRN90L	133[1)]	DRN90L	BE2	161[1)]
DRN100LS	127	DRN100LS	BE5	156
DRN100L	152	DRN100L	BE5	180
DRN100LM	148	DRN100LM	BE2	171
DRN112M	161	DRN112M	BE5	188
DRN132S	180	DRN132S	BE11	226
DRN132M	187	DRN132M	BE11	234
DRN132L	199	DRN132L	BE20	261
DRN160M	218	DRN160M	BE20	283
DRN160L	233	DRN160L	BE20	289
DRN180M	232	DRN180M	BE30	298
DRN180L	244	DRN180L	BE30	303
DRN200L	294	DRN200L	BE32	348
DRN225S	262	DRN225S	BE32	312
DRN225M	262	DRN225M	BE32	312
DRN250M	325	DRN250M	BE62	388
DRN280S	337	DRN280S	BE62	393
DRN280M	377	DRN280M	BE62	431
DRN315S	408	DRN315S	BE122	475
DRN315M	414	DRN315M	BE122	478
DRN315L	464	DRN315L	BE122	535

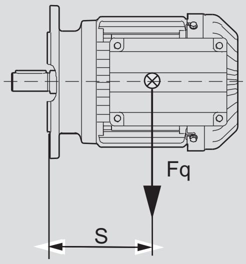


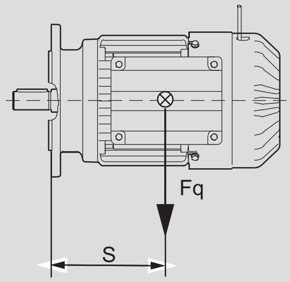


Motor	Center of gravity S	Brakemotor	Brake	Center of gravity S
	mm			mm
DRN315H	488	DRN315H	BE122	550

1) Plastic fan guard

DR2S.. motors





motor	Center of gravity S	Brakemotor	Brake	Center of gravity S
	mm			mm
DR2S63MS	71[1]	DR2S63MS	BE03	98[1]
DR2S63M	75[1]	DR2S63M	BE03	101[1]
DR2S71MS	73[1]	DR2S71MS	BE05	101[1]
DR2S71M	75[1]	DR2S71M	BE1	102[1]
DR2S80MK	90[1]	DR2S80MK	BE1	120[1]
DR2S80MS	99[1]	DR2S80MS	BE1	130[1]
DR2S80M	115[1]	DR2S80M	BE2	147[1]
DR2S90S	119[1]	DR2S90S	BE2	146[1]
DR2S90L	123[1]	DR2S90L	BE5	156[1]
DR2S100LS	128	DR2S100LS	BE5	156
DR2S100L	152	DR2S100L	BE5	179
DR2S112M	152	DR2S112M	BE11	201
DR2S132S	180	DR2S132S	BE11	226
DR2S132M	188	DR2S132M	BE20	251
DR2S132L	191	DR2S132L	BE20	253
DR2S160M	218	DR2S160M	BE20	283
DR2S160L	234	DR2S160L	BE30	289
DR2S180M	233	DR2S180M	BE30	298
DR2S180L	241	DR2S180L	BE32	308
DR2S200L	291	DR2S200L	BE32	345
DR2S225L	263	DR2S225L	BE32	312

1) Plastic fan guard

5.10.3 Special shaft ends

SEW-EURODRIVE can also deliver shaft ends of the solo foot-mounted motors and/or solo flange-mounted motors that differ from the series design. Contact SEW-EURODRIVE, if required.

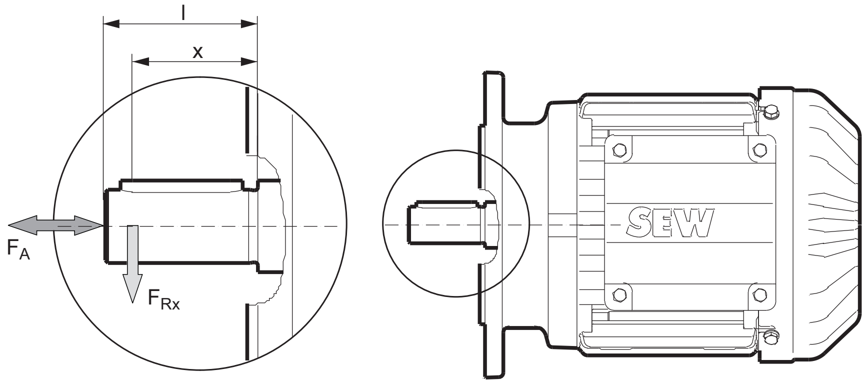
The permitted overhung and axial loads and the dimensions of the special shaft end are documented separately. For the standard IEC shaft ends and bearings, refer to chapter "Overhung and axial loads for motor shaft ends" (→ 🗎 216).

5.10.4 Overhung and axial loads for motor shaft ends

Refer to the following diagrams for the permitted overhung load F_{Rx} for AC motors/ brakemotors. To read the permitted overhung load from the diagram, you must know the distance x of the force application of the overhung load F_R from the shaft collar.

All overhung load diagrams are designed for a bearing service life of 20000 hours. A detailed bearing service life calculation is available on request.

The following figure shows the point of force application of the overhung load F_{Rx} at point X.



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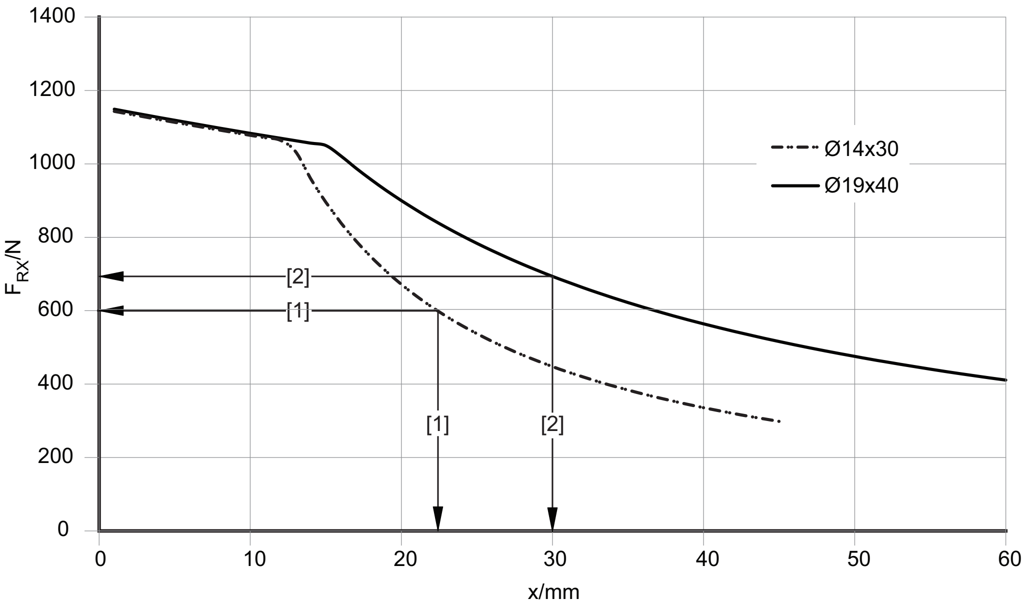
l	= Length of the shaft end
x	= Distance of the force application point from the shaft collar
F_{Rx}	= Overhung load at the point of application of force
F_A	= Axial load

The following diagram shows an example of how you can read the overhung load from the diagram:



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[1] Motor with shaft diameter 14 mm, force application x at 22 mm, permitted overhung load F_{Rx} = 600 N

[2] Motor with shaft diameter 19 mm, force application x at 30 mm, permitted overhung load F_{Rx} = 700 N

During determining the overhung load, the transmission element factors f_Z must be considered. The transmission element factor depends on the used transmission element, such as gears, chains, V-belts, flat belts or toothed belts. When belt pulleys are used, the initial belt tension must be considered as well. The overhung loads F_R calculated with the transmission element factor must not exceed the permitted overhung load of the motor.

Transmission element	Transmission element factor f_Z	Remarks
Direct drive	1.0	–
Gear wheels	1.0	≥ 17 teeth
Gear wheels	1.15	< 17 teeth
Sprockets	1.0	≥ 20 teeth
Sprockets	1.25	< 20 teeth
Narrow V-belt	1.75	Influence of pretension force
Flat belt	2.50	Influence of pretension force
Toothed belt	1.50	Influence of pretension force
Gear rack	1.15	< 17 teeth (pinion)

The following equation is used to calculate the overhung load with the transmission element factor f_Z:

$F_R = f_z \times F_{Rx}$

Permitted axial load

The maximum permitted axial load F_A is determined by multiplying the maximum permitted overhung load F_{RX} with the factor 0.2.

$F_A = 0.2 \times F_{Rx}$

Permitted overhung load of DR2L.. motors

The determined F_{Rx} value for the 4-pole DR.. motors of the same size is multiplied by a factor of 0.8 in order to define the permitted overhung load F_{RxDRL} for the 4-pole DR2L.. motors.

$F_{RxDRL} = 0.8 \times F_{Rx}$

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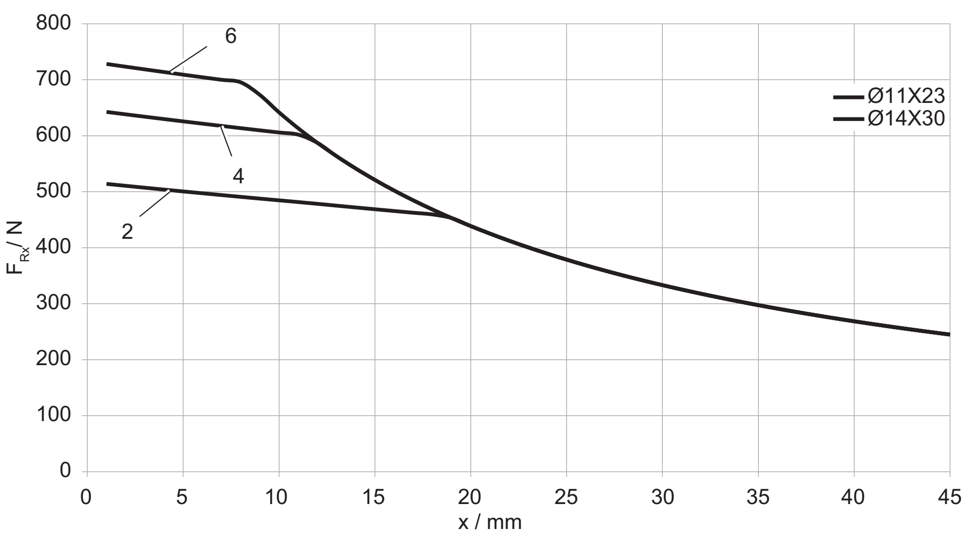
Overhung load diagrams

Key

2, 4, 6	Number of poles
Ø 19 x 40	Shaft end

For overhung load diagrams of the second shaft end, refer to chapter "Output" (→ 🗎 557).

Overhung load diagram DR..63



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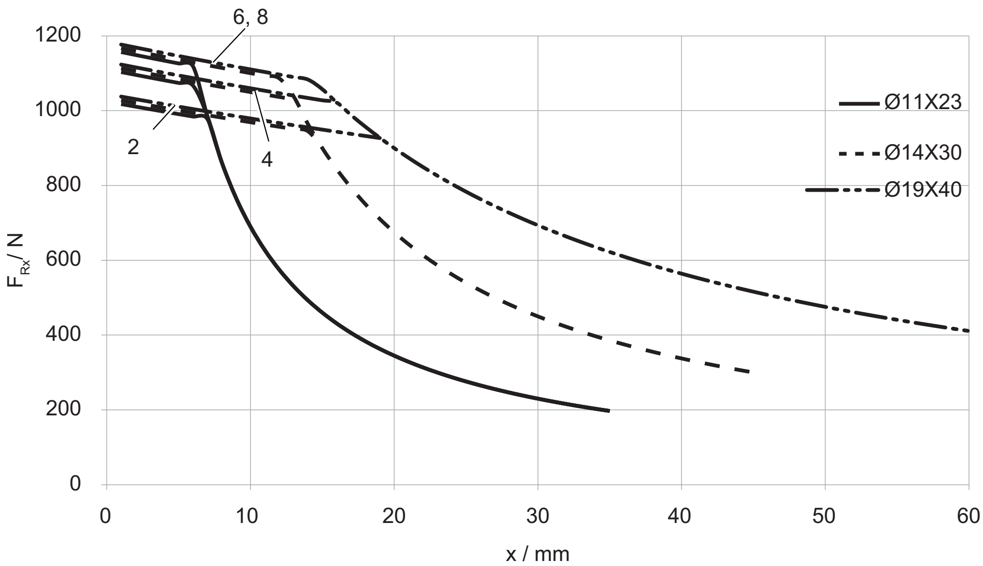
Overhung load diagram DR..71



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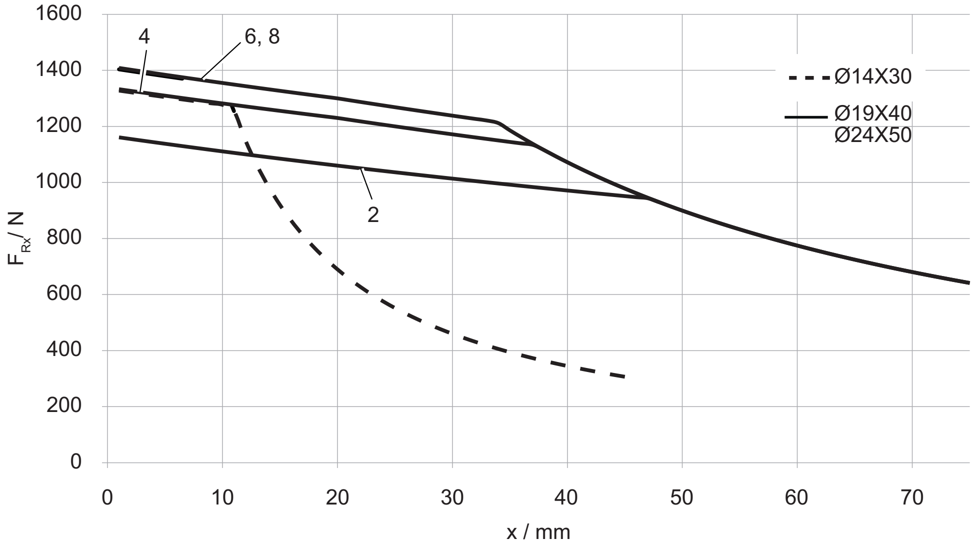
Overhung load diagram DR..80



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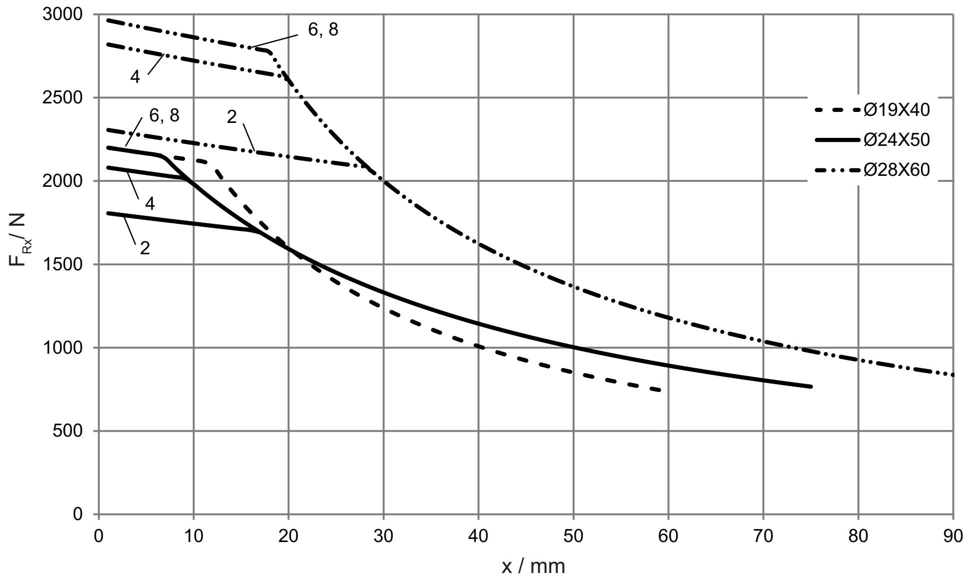
Overhung load diagram DR..90



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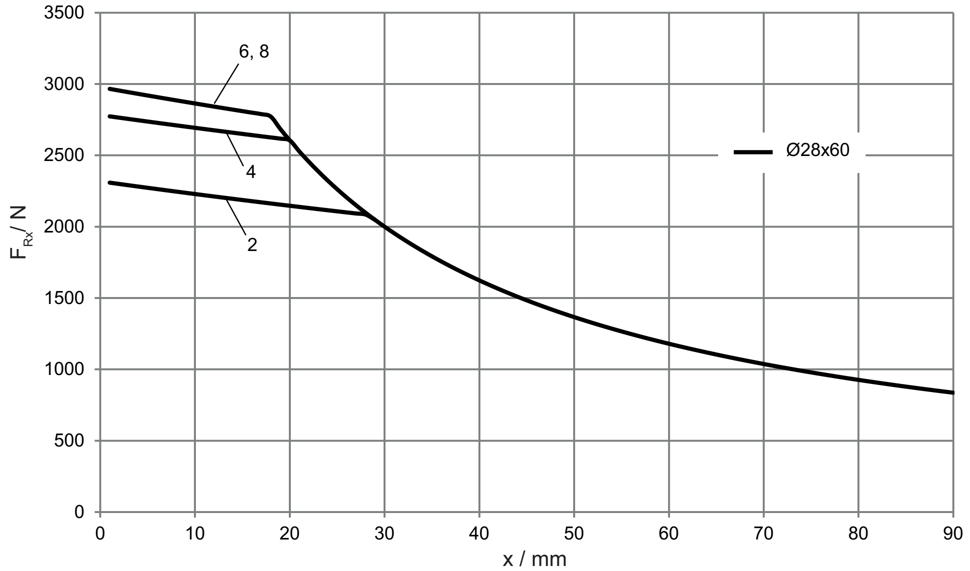
Overhung load diagram DR..100



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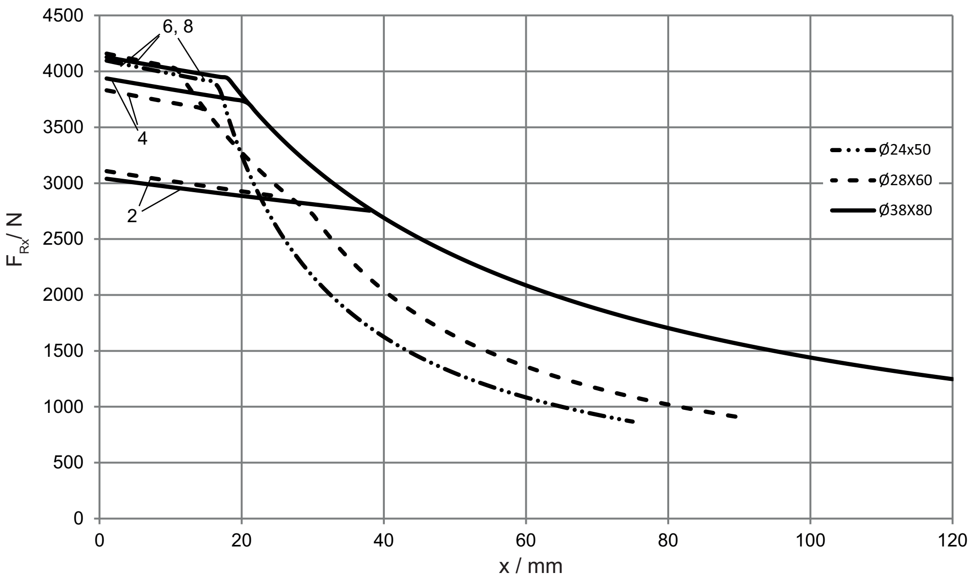
Overhung load diagram DR..112M – DR..132S



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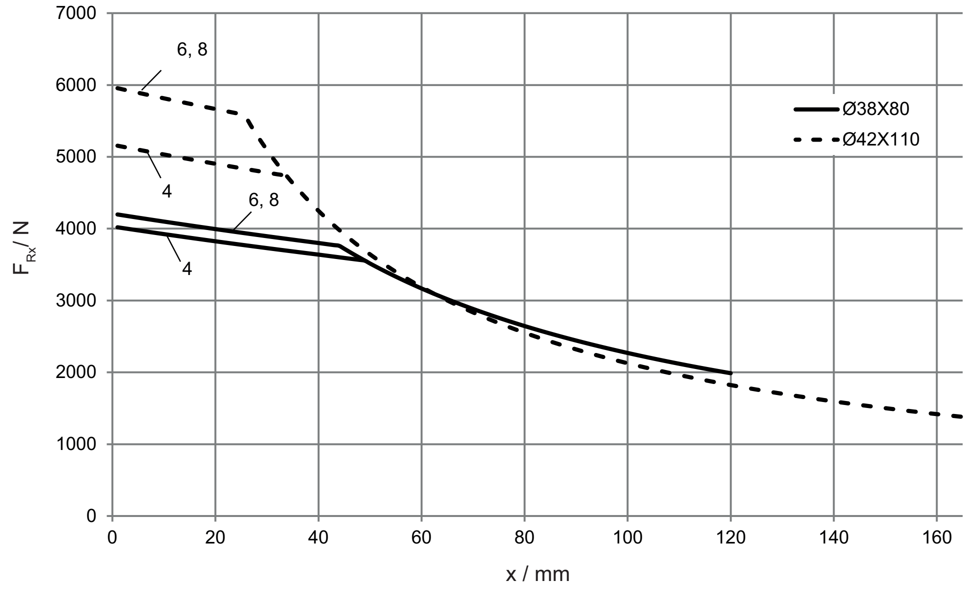
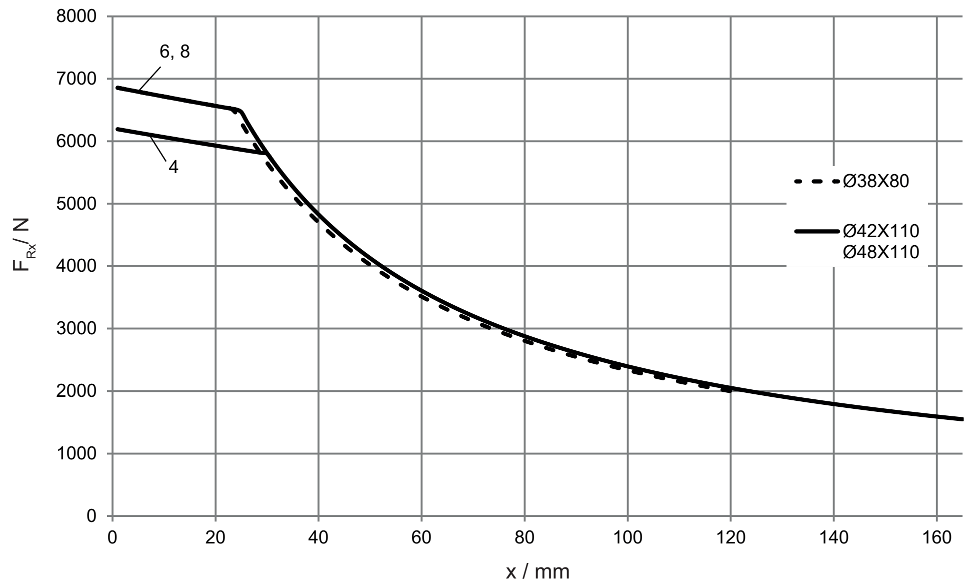
Overhung load diagram DR..132M – DR..132L



36028810481419019

Overhung load diagram DR..160



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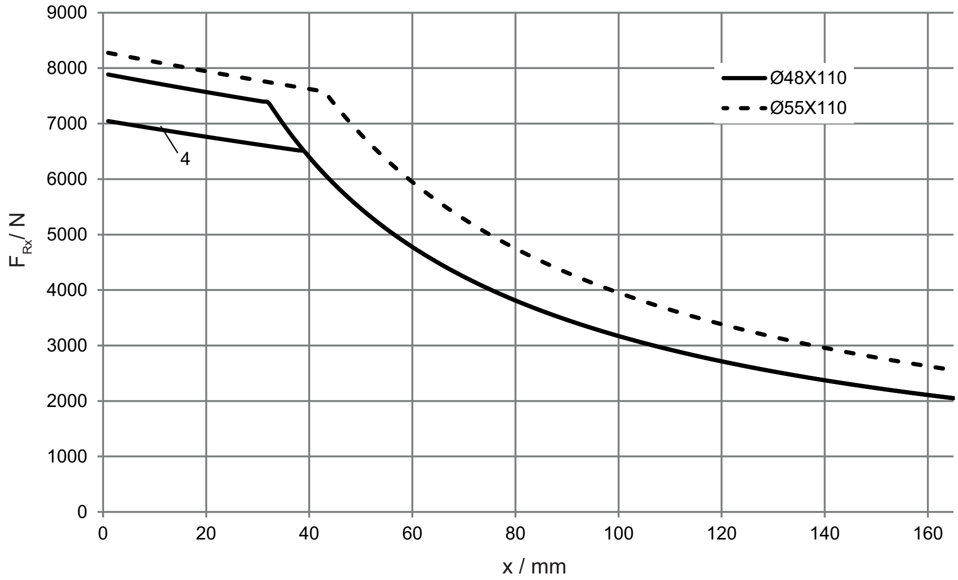
Overhung load diagram DR..180



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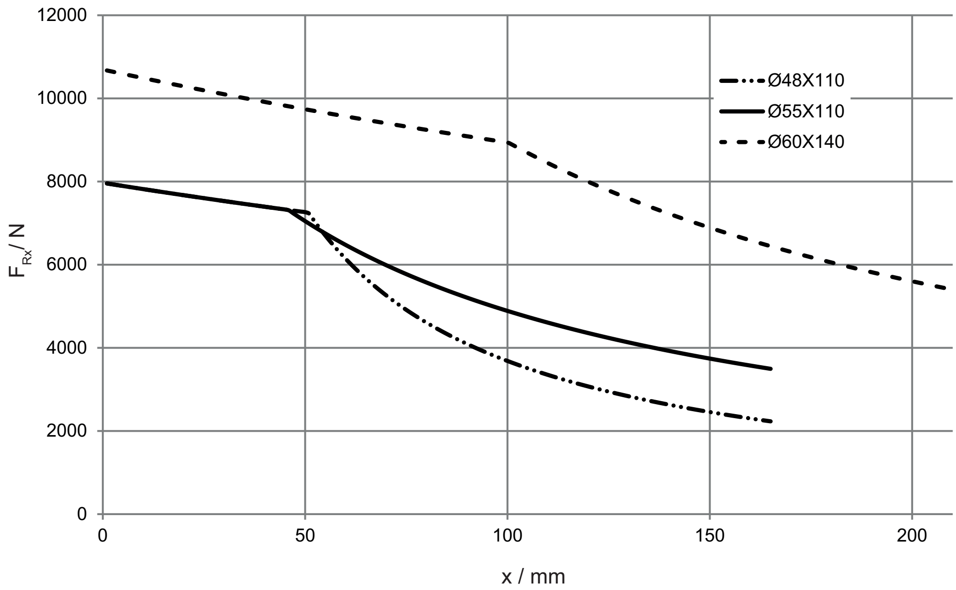
Overhung load diagram DR..200



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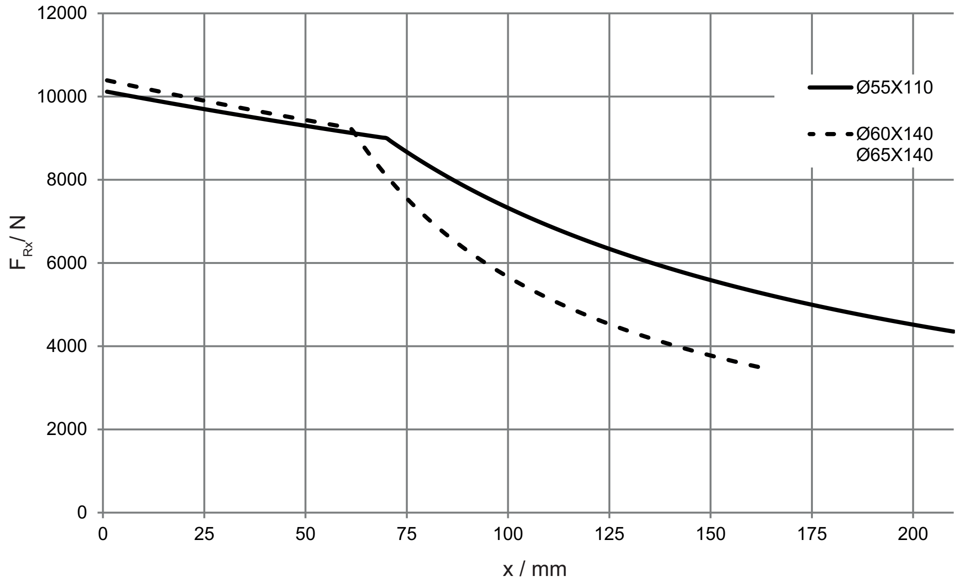
Overhung load diagram DR..225



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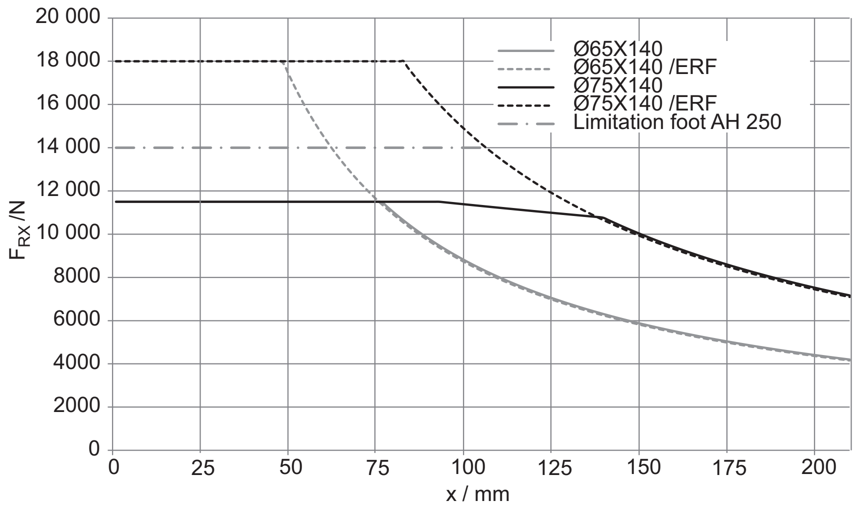
Overhung load diagram DRN250 – DRN280



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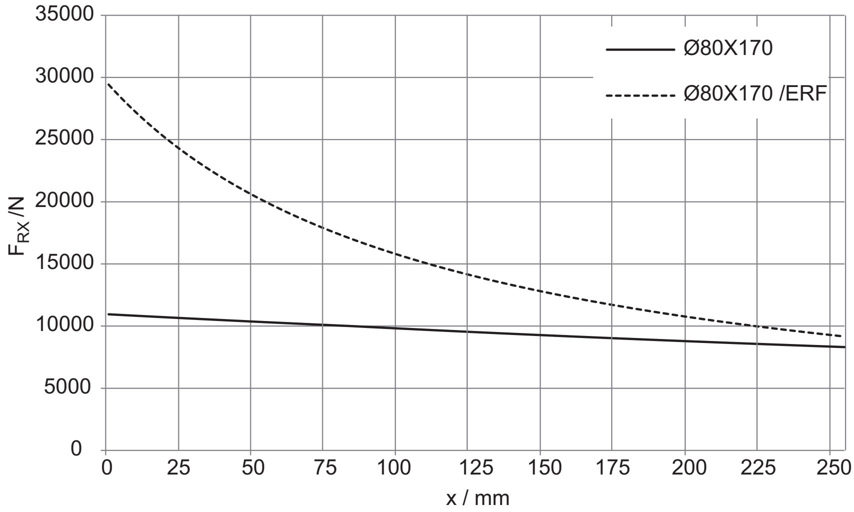
Overhung load diagram DRN315



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5.11 Bearings

5.11.1 Bearing types used

The asynchronous motors are delivered with deep groove ball bearings of the 62.. and 63.. series with cover plate and bearing clearance C3 as standard. For brakemotors, bearings with shield rings are used on the B-side to prevent brake dust from entering.

Depending on the selected options, the bearing selection can deviate from the standard.

Motor size	A-side bearing		B-side bearing
	IEC motor	Gearmotor	
56		6302	6001
63	6202	6303	6203
71	6204	6303	6203
80	6205	6304	6304
90	6305		6205
100	6306		6205
112	6308		6207
132S	6308		6207
132M/L	6308	6309	6209
160	6310	6312	6212
180	6311	6312	6212
200	6312	6314	6314
225	6314		6314
250	6317[1]		6315
280	6317[1]		6315
315S	6319[2]		6319[2]
315M/ME	6319[2]		6319[2]
315L	6319[2]	6322[2]	6322[2]
315H	6319[2]	6322[2]	6322[2]

1) Bearing clearance C4
2) Without cover plate and shield ring

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5.12 Maximum speeds

The mechanical limit speeds of the motors depend on the size and are binding for operation on inverters. For limit speeds that have been configured differently, larger limit speeds may be possible depending on the options. Contact SEW-EURODRIVE in such cases. The guide values for limit speeds are listed in the following table:

Motors	Mechanical limit speed n_{max} in min^{-1}		
	motor	Brakemotor	Motors with back-stop
DR..56	6000	4500	-
DR..63	6000	4500	5000
DR..S71	6000	4500	5000
DR..80	6000	4500	5000
DR..90	6000	3600	5000
DR..100	5200	3600	5000
DR..112	5000	3600	4500
DR..132S	5000	3600	4500
DR..132M/L	4500	3600	4500
DR..160	4500	3600	4500
DR..180	4500	3600	4000
DR..200	4500	BE30/32: 3600 BE60/62: 2500	3500
DR..225	4000	BE30/32: 3600 BE60/62: 2500	3100
DR..250	4000	2500	2600
DR..280	4000	2500	2600
DR..315	3600	2500	2500

Brakemotors

Also observe the following points for brakemotors:

- The applicable drive selection regulations with regard to the braking work, see manual "Project Planning for BE.. Brakes – DR.., DRN.., DR2.., EDR.., EDRN.. AC Motors – Standard Brake/Safety Brake".
- Braking from speeds > 1800 min^{-1} is not permitted for brake sizes BE30 – BE122. Observe the project planning procedure and the application-specific maximum speeds for braking operations in manual "Project Planning for BE.. Brakes – DR.., DRN.., DR2.., EDR.., EDRN.. AC Motors – Standard Brake/Safety Brake". Before activating the mechanical brake, use the controller to reduce the speed.

Backstop

For motors with backstop, please note that the backstop can only be operated wear-free above its lift-off speed due to its operating principle. Please note chapter "Mechanical backstop" (→ 🗎 609).

Other motor options

Additional motor options influence these speeds. Contact SEW-EURODRIVE in such cases.

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5.13 Ventilation

5.13.1 Type of ventilation

IC411

In the standard, asynchronous motors from SEW-EURODRIVE are fan-cooled (IC code 411). The fan is attached to the rotor shaft at the B-side of the motor. The impellers of the fan wheels generate the same air flow, irrespective of the direction of rotation. The intensity of the air flow depends on the motor speed. This means that the cooling capacity of the motor fan decreases with lower motor speeds (e.g. FI-controlled drives). For this reason, the rated motor torque can only be taken off at small speeds with additional measures during continuous duty.

IC416

The forced cooling fan option is available as another ventilation option, see the chapter "Forced cooling fan" (→ 🗎 601). For this option, the fan wheel is removed from the rotor shaft and replaced by a cover with an integrated active fan. The forced cooling fan has to be supplied externally and thus is operation-independent of the motor speed, see also chapter "Limit characteristic curves of DRN.. and DR2S.. motors in inverter operation" (→ 🗎 176).

IC410

In addition to the various ventilated options, asynchronous motors from SEW-EURODRIVE can also be delivered non-ventilated. You can choose between a housing that is completely closed (option /OL) on the B-side and a design where the standard fan wheel is removed (option /UL), see chapter "Non-ventilated motors" (→ 🗎 608). Consult SEW-EURODRIVE for configuration of non-ventilated motors.

5.13.2 Standard ventilation

The standard motor ventilation consists of a plastic fan that generates an air flow. The air is conducted directly onto and into the cooling fins on the motor's stator housing by the structural design of the fan guard and the fan grille. The fan guard consists of a galvanized sheet steel.

To fulfill different application-related requirements, the fan wheels can have different geometries and can be made of different materials. In the standard version, the motors are delivered with a plastic fan. The fans can be used in a temperature range of -20 °C to +60 °C. The technical data of the motors, e.g. the switching frequency or the inertia refer to the use of a plastic fan, see chapter "Technical data of the motors" (→ 🗎 81).

As an alternative, the fan wheels can also be made of aluminum or gray cast iron. When using other fan wheel materials, the properties of the motor will change. Observe the relevant conditions during drive selection and project planning. For detailed information on the different fan variants, refer to chapters "Aluminum fan" (→ 🗎 605) and "Additional flywheel mass" (→ 🗎 606).

5.13.3 Low noise fan guard

Low-noise fan guards (SEW designation /LN) are available for motor and brakemotor sizes DR.71 – 132, either as an option or as part of the design. The noise is reduced by 3 – 5 dB(A).

These guards are not available for encoder mounting and for forced cooling fans.

The low-noise fan guard is part of the series production for:

- 2-pole motors in sizes DR.71 – 132
- MOVIMOT® combinations in delta connection type

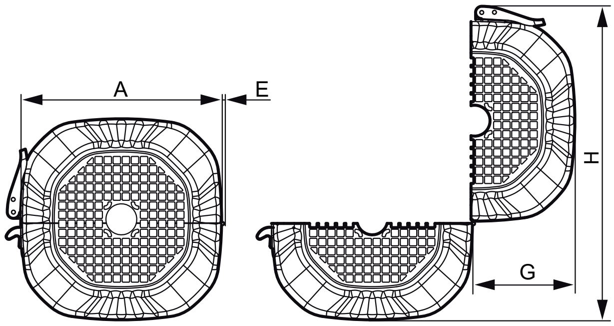
5.13.4 Axially separable fan guards on the brakemotor, brakemotor with encoder or with a second shaft end

Brake wear parts must be inspected and maintained on a cyclical basis for brakemotors. The information in the dimension sheets refers to the sufficient extra space in the axial direction in order to be able to remove the brakemotor fan guard.

If this space is not structurally possible in the system or machine due to the installation situation, the axially separable fan guard is an option that still allows the brake to be inspected. This special brakemotor fan guard design is available for motor sizes DR.71 – DR.225.

In this case, the brakemotor fan guard is split in half, please refer to the following diagram. The closing lever is normally positioned so it is aligned with the terminal box. Please contact SEW-EURODRIVE for different orientations.

When using the axially separable fan guards, please note that radial space is available for opening the guard, please refer to the following diagram.



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Motor size	Mounted brakes	Free space required	
		Axial for normal brakemotor fan guards in mm	Radial for separated brakemotor fan guards (A+E +G) × H in mm × mm
DR.71	BE05 or BE1	139	230 × 230
DR.80	BE05, BE1 or BE2	156	250 × 250
DR.90	BE1, BE2 or BE5	179	285 × 285
DR.100	BE2 or BE5	197	315 × 315
DR.112	BE5 or BE11	221	350 × 350
DR.132	BE5 or BE11	221	350 × 350
DR.160	BE11 or BE20	270	425 × 425
DR.180	BE20, BE30 or BE32	316	485 × 485
DR.200[1)]	BE30, BE32, BE60 or BE62	394	610 × 610
DR.225[1)]	BE30, BE32, BE60 or BE62	394	610 × 610
DR.250	BE60, BE62, BE120 or BE122	510	-
DR.280	BE60, BE62, BE120 or BE122	510	-

Motor size	Mounted brakes	Free space required	
		Axial for normal brakemotor fan guards in mm	Radial for separated brakemotor fan guards (A+E+G) × H in mm × mm
DR.315	BE120 or BE122	624	-

1) Please contact SEW-EURODRIVE when attaching the BE60/62 to the DR.200/225.

5.13.5 Non-ventilated motors – without fan (option /UL)

Depending on the ambient conditions, it may be necessary to use motors without fans to avoid dust turbulence. The lack of cooling means that the rated power in the sizes up to DR.225 has to be reduced to about 50% of the ventilated operation. The required power reduction is higher for sizes DR.250 and above.

In general, this means that the motor has to be designed in two to three sizes larger for the same power output.

Please contact SEW-EURODRIVE to obtain the precise size.

The non-ventilated design is released from the efficiency provisions in many countries. As a result, non-ventilated motors are generally selected based on the DRS.. motor types.

5.13.6 Non-ventilated motors – closed B-side (option /OL)

An alternative to the non-ventilated motor (without fan) is the motor design for which the fan guard is not installed and the rotor is shortened so that the B-side endshield can be designed in a closed form.

Once again, the motor only has a rated power of about 50% of the ventilated operation for sizes up to DR.225. The required power reduction is also higher for sizes DR.250 and above.

This design is possible for sizes DR.71 – DR.280. Please contact SEW-EURODRIVE to obtain the precise size.

5.13.7 Canopy (option /C)

If a vertical motor design with upright fan guard is installed in the system or machine, ensure that foreign bodies cannot penetrate through the fan grille into the fan wheel. Two options are available:

- structural measures in the system or the machine

  or
- the use of a canopy.

The canopy extends the motor or brakemotor. The specifications are provided in chapter "Dimension sheets".

Please contact SEW-EURODRIVE if there is the risk that parts may penetrate through the side of the canopy, between the fan guard and the canopy. A canopy with a different design may be a solution.

5.14 Degrees of protection according to IEC 60034-5

In the standard version, the DRN.. AC motors are designed in degree of protection IP54 according to IEC 60034-5. Degrees of protection up to IP66 are available on request.

Instead, the motors can also be delivered in a basic design in IP44 degree of protection.

Drive selection

The required degree of protection must be selected with care. Otherwise, there is a risk of damage due to dirt particles or water entering the motor. In addition, there is the option to specifically protect the drive against corrosion as well as aggressive ambient conditions, see chapter "Surface and corrosion protection" (→ 🗎 612).

Definition of degrees of protection according to IEC 60034-5

First characteristic numeral		Second characteristic numeral	
	Brief description		**Brief description**
0	Unprotected machine	0	Unprotected machine
1	Machine protected against solid foreign objects > 50 mm	1	Machine protected against dripping water
2	Machine protected against solid foreign objects > 12 mm	2	Machine protected against dripping water at inclination of 15°
3	Machine protected against solid foreign objects > 2.5 mm	3	Machine protected against spraying water
4	Machine protected against solid foreign objects > 1 mm	4	Machine protected against splashing water
5	Machine protected against dust	5	Machine protected against water jets
6	Machine dust-tight	6	Machine protected against effects of rough seas
–	–	7	Machine protected when immersing
–	–	8	Machine protected when fully immersed

5.14.1 Labeling of degree of protection for global motors

SEW-EURODRIVE classifies the motor degrees of protection according to the international standard IEC 60034-5.

In North America, on the other hand, identification of a different degree of protection is used.

The degree of protection and the type of cooling are represented with an abbreviation made up of 4 letters. In the case of the global motor, SEW-EURODRIVE employs the following identifications and includes this information on the nameplate.

Abbreviation	English designation	German translation
Totally enclosed, fan-cooled	Totally Enclosed Fan Cooled	completely closed, fan-cooled
TEBC	Totally Enclosed Blower Cooled	completely closed, forced cooling fan

Abbre-viation	English designation	German translation
TENV	Totally Enclosed Non Ventilated	completely closed, not ventilated

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5.15 Vibration class and increased vibration stress

Irrespective of the mount-on components on the B-side, AC motors from SEW-EURODRIVE fulfill the requirements for achieving vibration class A according to DIN EN 60034-14. If special requirements for the mechanical running smoothness exist, motors without mount-on components (no brake, forced cooling fan, encoder, etc.) can be delivered in a low-vibration design in vibration class B. For this design, special measures for balancing the rotors are carried out.

For vibration classes A or B, the motor rotors are always dynamically balanced with a half key.

5.15.1 Design for increased vibration stress

When installing the motors, make sure that the supports are even, the foot or flange mounting is solid and if there is direct coupling, align with precision. Avoid resonances between the rotational frequency and the double line frequency caused by the structure or the positioning of the motor.

If the installation of the drive cannot be ensured in accordance with the standard requirements by SEW-EURODRIVE, the motors can be delivered in a design for increased vibration stress.

Motors that are designed for increased vibration stress achieve vibration stress level 1 (Vibration Level 1 = VL1). The values from the following table can be applied. The values are based on standardized information pursuant to DIN ISO 10816-1.

Motors	Periodic vibrations	Shock stress 1g = 9.81 m/s²
DR.56M – 132S	Effective vibration speed ≤ 4.5 mm/s	Maximum acceleration = 10 g
DR.56M – 315H	Effective vibration speed ≤ 7.1 mm/s	Maximum acceleration = 15 g

If you require a drive for which the required values exceed the information for VL1, contact SEW-EURODRIVE.

The following design types and options for motors with increased vibration stress cannot be delivered:

Designation	Designation
Diagnostic unit for function and wear monitoring of the brake	/DUE
Built-in encoders	/EI7. and /EI8.
MOVIMOT®	/MM
MOVI-SWITCH®	/MSW
Plastic fan guard	/LN
Additional flywheel mass (heavy fan)	/Z
IEC foot-mounted motor up to size 132S	/FI
Motors according to VIK recommendation	–
Thermal class 180 (H)	–
Ambient temperature T_{amb} > 60 °C	–
Safety brake	–

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6 Dimension sheets for motors/brakemotors

6.1 Notes on the dimension sheets

Observe the following information regarding the dimension sheets:

- The collective term IV (= industrial plug connectors) in the dimension sheets includes the plug connectors AC.., AS.., AM.., AB.., AD.. and AK.. All other plug connectors have different dimensions, which are available on request.
- Not all cable entry positions X, 1, 2, 3 and terminal box positions 0°(R), 90°(B), 180°(L), 270°(T) are possible in any case. Some designs and options for the motor require a connection inside the terminal box, which means this terminal box is larger than the standard terminal box due to the normative air gaps and creepage distances. The dimension sheets depict only the standard terminal box.
- For motor sizes 56 and 63, the terminal box is encapsulated on the stator. The cable entry is therefore fixed at positions "X" and "2".
- Different positions are possible for the manual brake release, see following figure. The 4 positions 33°, 123°, 213° or 303° are basically possible. By default, the manual brake release is positioned at an angle of 303° to the terminal box – e.g., terminal box position 90° → position of manual brake release = 33°. If the position of the manual brake release is not specified, it rotates along with the terminal box. The manual brake release can be turned by 4 × 90°.

For more information on possible brake release positions, refer to the chapter "Manual brake release" (→ 🗎 390).

Due to the selection of specific designs and options, the dimensions of the motor can differ from the standard design. Observe the associated dimension sheets.

Observe the information in the order confirmation from SEW-EURODRIVE for special designs.

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6.1.1 Geometric tolerances

Shaft heights

The following tolerances apply to the indicated dimensions:

h	≤ 250 mm	→ -0.5 mm
h	> 250 mm	→ -1 mm

Shaft ends

Diameter tolerance:

Ø	≤ 28 mm	→ ISO j6
Ø	≤ 50 mm	→ ISO k6
Ø	> 50 mm	→ ISO m6

Center holes according to DIN 332, shape DR:

Ø	> 13 – 16 mm	→ M5	Ø	> 30 – 38 mm	→ M12
Ø	> 16 – 21 mm	→ M6	Ø	> 38 – 50 mm	→ M16
Ø	> 21 – 24 mm	→ M8	Ø	> 50 – 85 mm	→ M20
Ø	> 24 – 30 mm	→ M10	Ø	> 85 – 132 mm	→ M24

Keys: according to DIN 6885 (domed type)

Flanges

Centering shoulder tolerance:

Ø	≤ 250 mm (flange sizes FF100 – FF265)	→ ISO j6
Ø	> 250 mm (flange sizes FF300 – FF600)	→ ISO h6

Different flange dimensions are available for each motor and brakemotor size. The respective dimension sheets show the flanges per size defined in the normative size-to-power relationship according to DIN EN 50347.

6.1.2 Lifting eyebolts, lifting eyes

Motors up to size 100LS are delivered without special transportation fixtures.

Motors of size ≥ 100LM are equipped with removable lifting eyebolts.

6.1.3 Motor dimensions

Safety covers

The encoders are equipped with a protection device as standard to prevent damage.

This protection is implemented in the form of a safety cover. The encoder safety cover of motor sizes DRN80M to DRN280M has the same diameter as the fan guard.

Second shaft end

The standard design of the second shaft end is shown for motors DRN71M – 132S and DR2.71M – 132S.

Second shaft ends are available as alternative for these motor sizes, see chapter "Second shaft end (B-side)" (→ 🗎 557).

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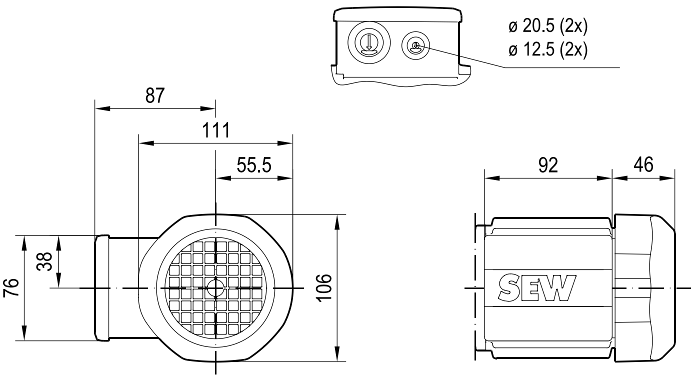
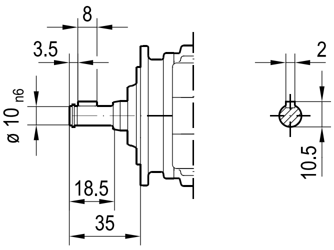
6.2 Dimension sheets for DRN.., DR2S..

DR2S56M 4
DR2S56MR 4

08 131 01 19
1(1)





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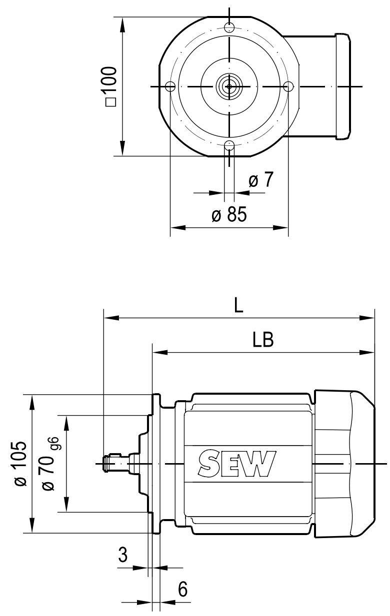

(→ 📖)	56M(R)							
L	196							
LB (B5/B14)	161							
LB (B3)	-							

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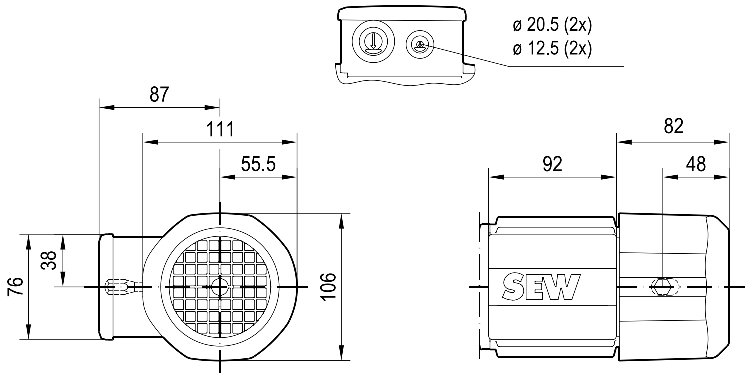
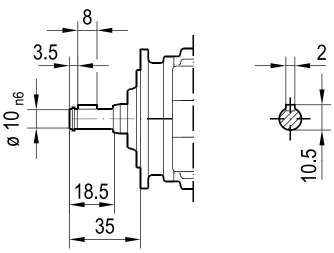
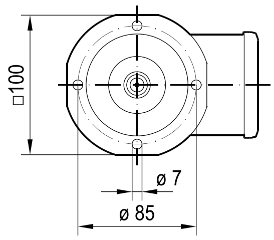
DR2S56M 4 BE
DR2S56MR 4 BE

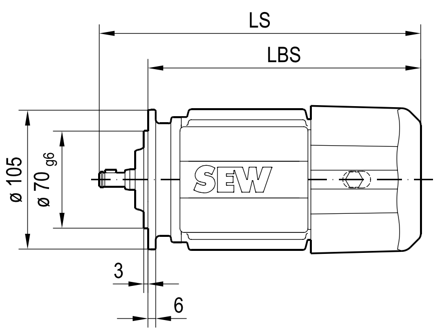
09 149 01 19
1(1)





/FG FG85D105





(→ 📖)	56M(R)							
LS	232							
LBS (B5/B14)	197							
LBS (B3)	-							

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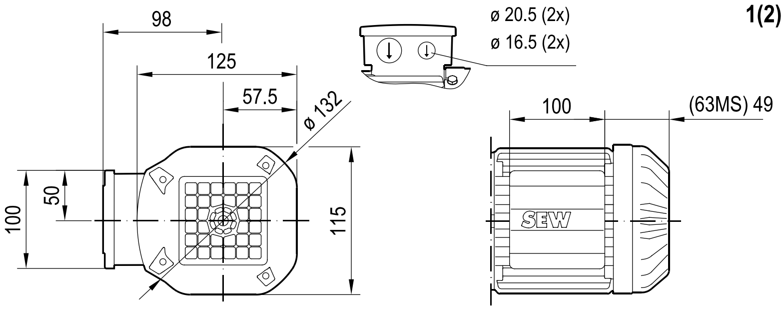
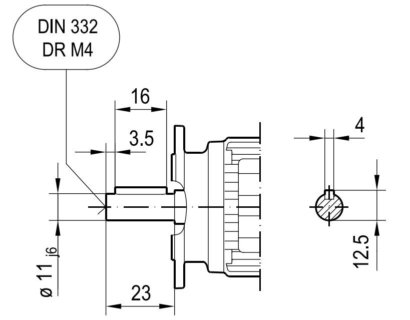
DRN63MS 2,4
DR2S63MS 2,4
DR2S63MSR 2,4
DRN63M 2,4,6
DRN63MR 6
DR2S63MR 6
DR2S63MQ 6

08 095 01 18
1(2)





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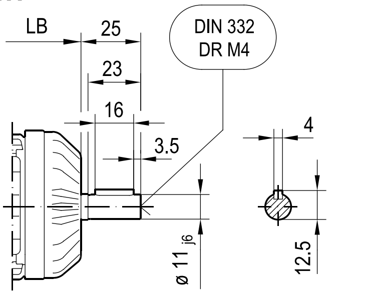

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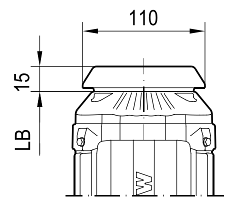

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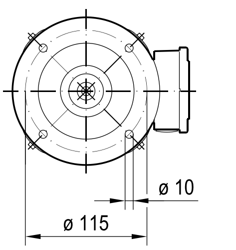
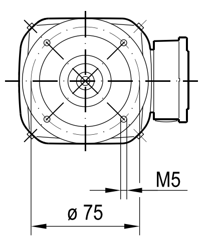


/FT (B14) FT75D90



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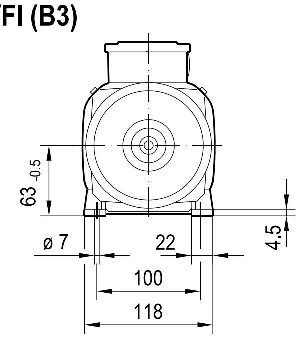

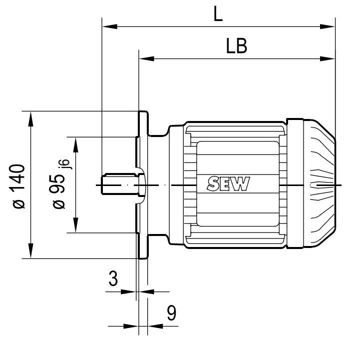

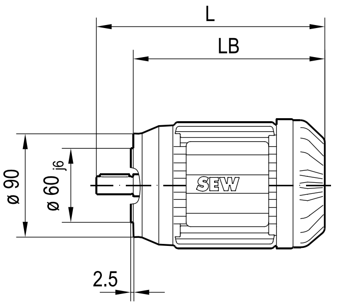

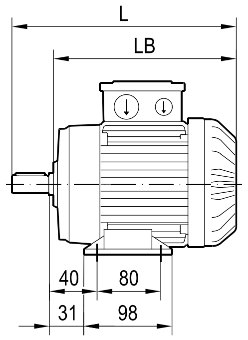

(→ 📖)	63MS(R)	63M(R/Q)						
L	208	222						
LB (B5/B14)	185	199						
LB (B3)	183	197						

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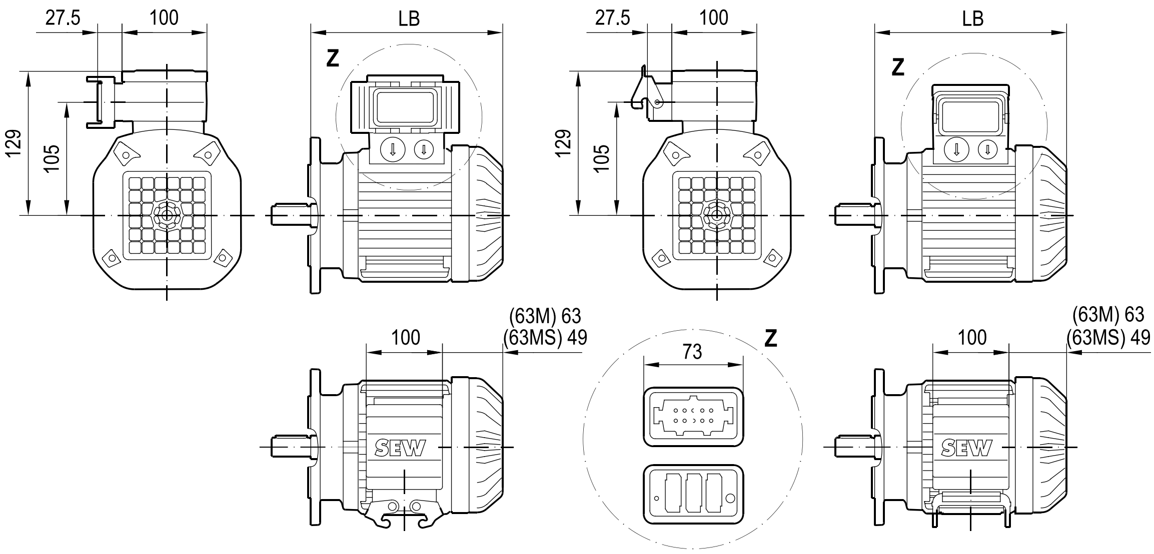
08 095 01 18
2(2)

/IV



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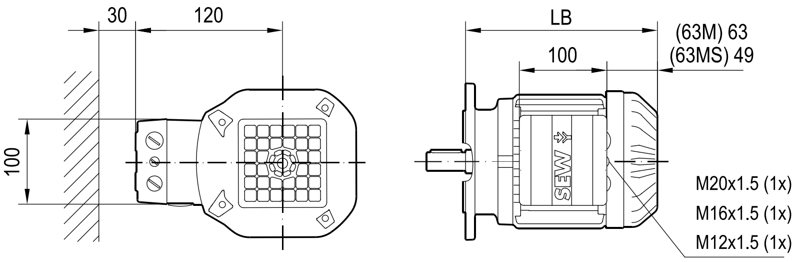

(→ 📖)	63MS(R)	63M(R/Q)						
L	208	222						
LB (B5/B14)	185	199						
LB (B3)	183	197						

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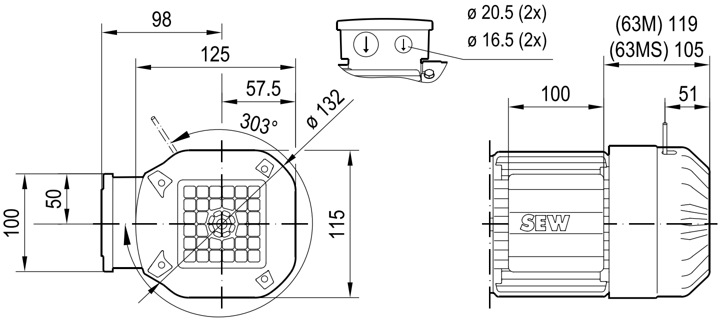
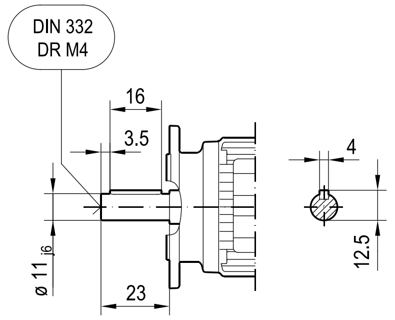
DRN63MS 2,4 BE
DR2S63MS 2,4 BE
DR2S63MSR 2,4 BE
DRN63M 2,4,6 BE
DRN63MR 6 BE
DR2S63MR 6 BE
DR2S63MQ 6 BE

09 113 01 18
1(2)





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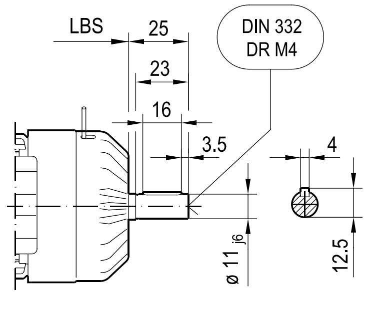

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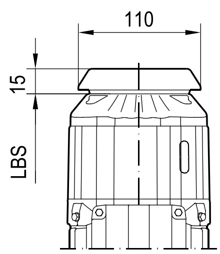
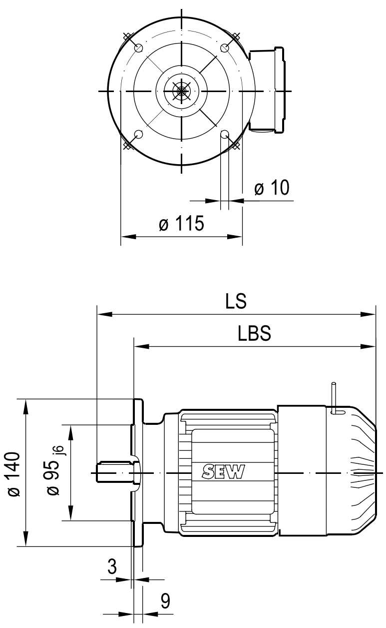
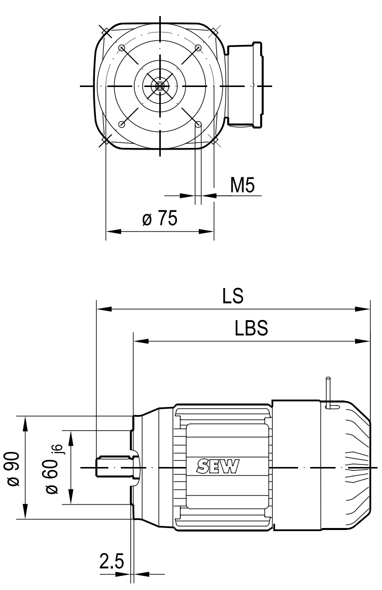


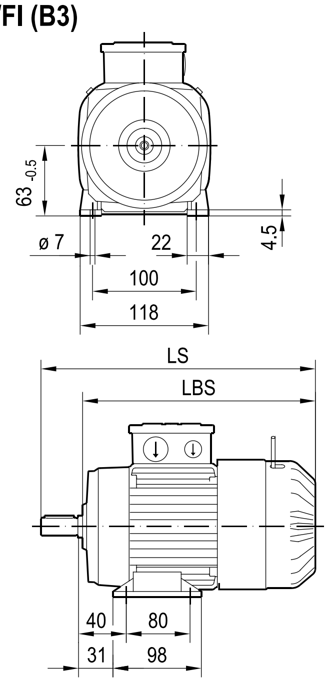
/FF (B5) FF115D140

/FT (B14) FT75D90

/FI (B3)







(→ 📖)	63MS(R)	63M(R/Q)						
LS	264	278						
LBS (B5/B14)	241	255						
LBS (B3)	239	253						

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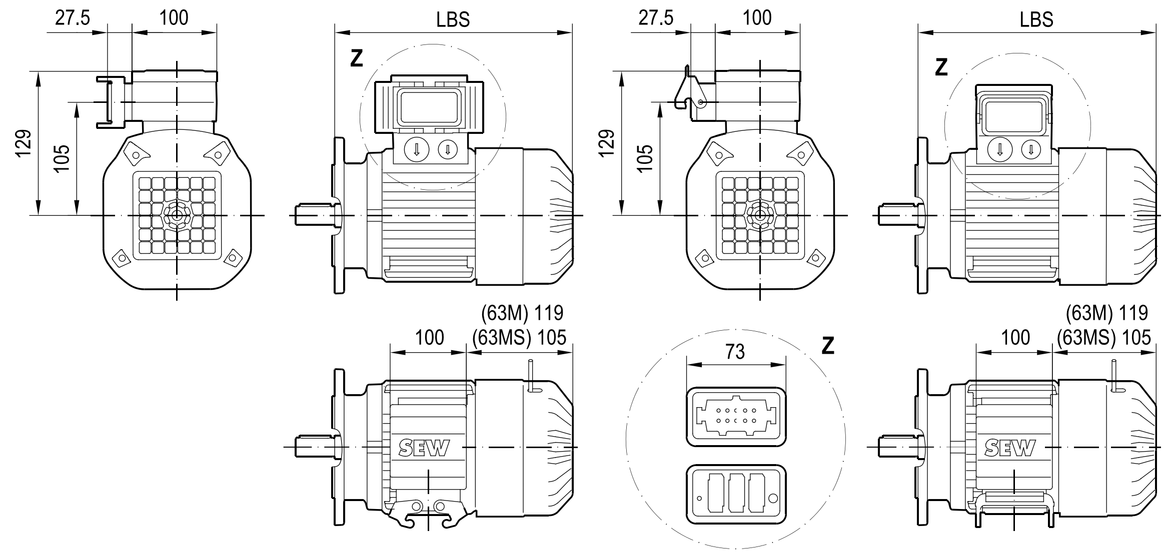
09 113 01 18
2(2)

/IV



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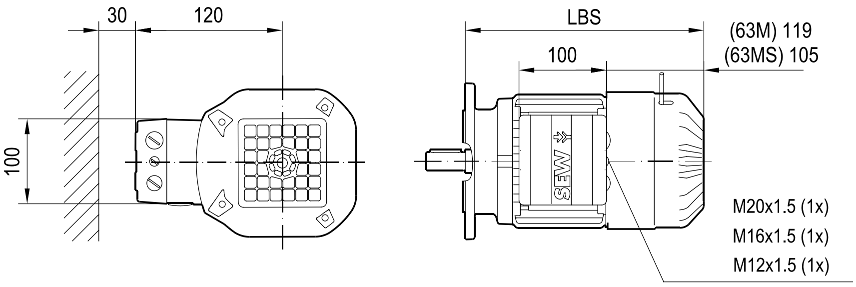

(→ 📖)	63MS(R)	63M(R/Q)						
LS	264	278						
LBS (B5/B14)	241	255						
LBS (B3)	239	253						

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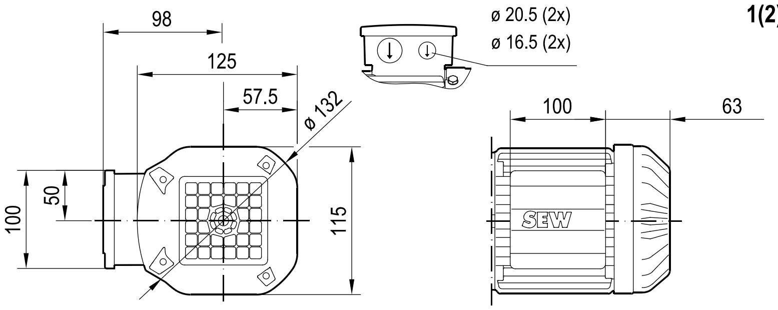
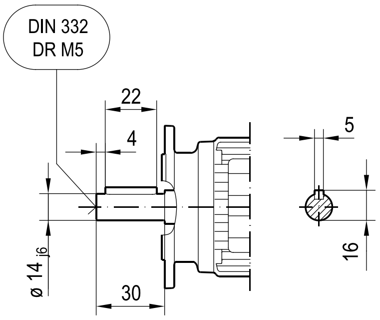
DR2S63M 2,4,6,4/2
DR2S63MR 4/2

08 103 01 18
1(2)





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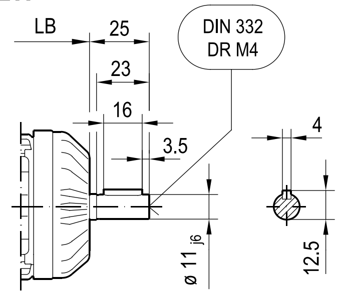

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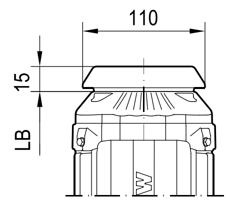
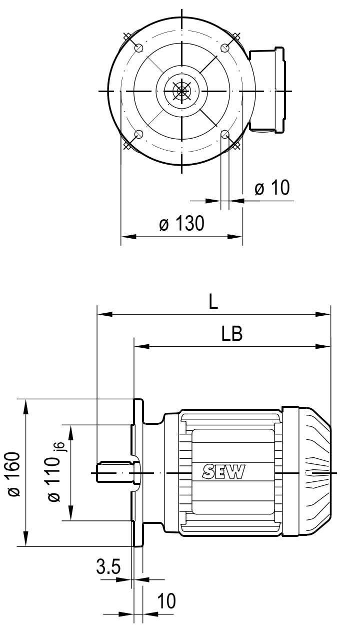
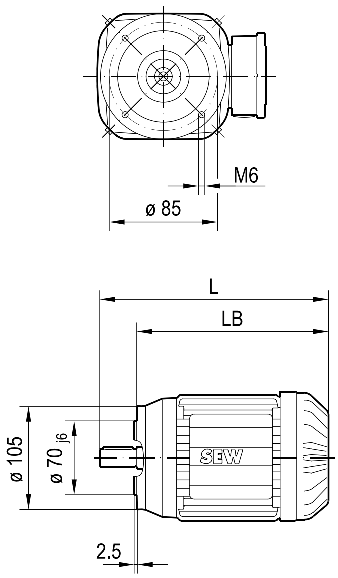


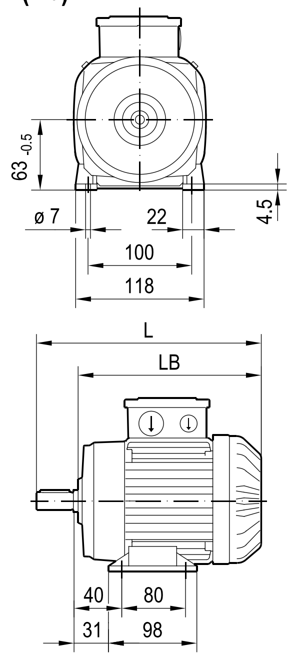
/FF (B5) FF130D160



/FT (B14) FT85D105



/FI (B3)



(→ 📖)	63M(R)						
L	229						
LB (B5/B14)	199						
LB (B3)	197						

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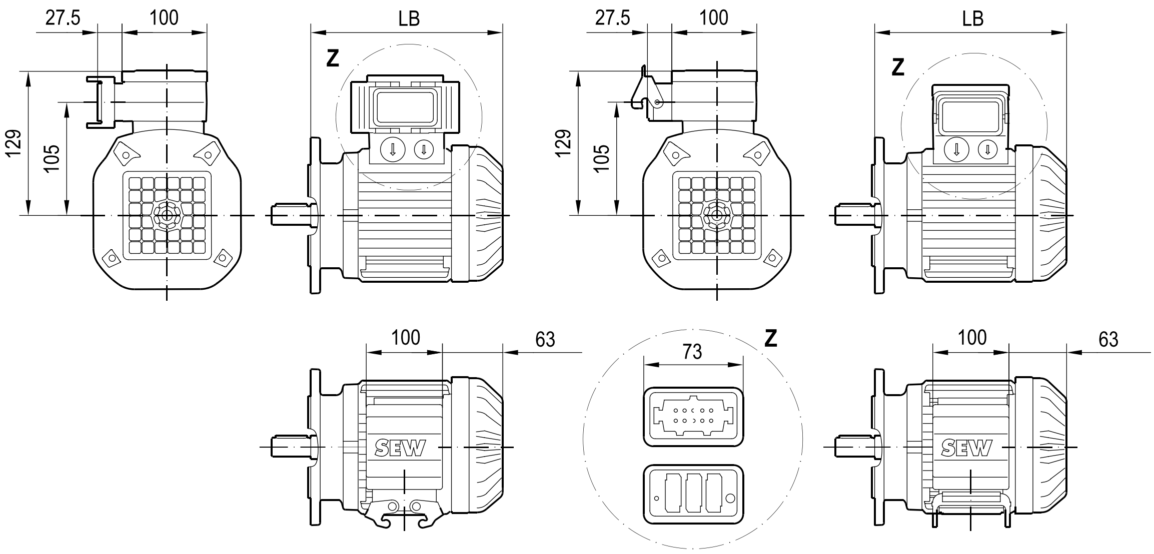
08 103 01 18
2(2)

/IV



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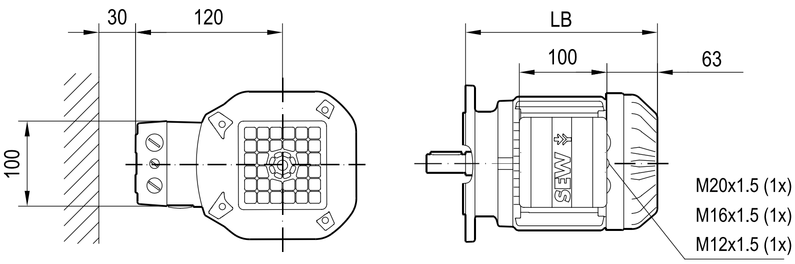

(→ 📖)	63M(R)							
L	229							
LB (B5/B14)	199							
LB (B3)	197							

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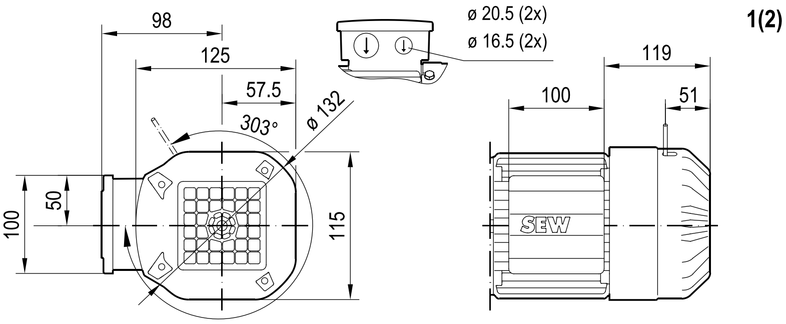
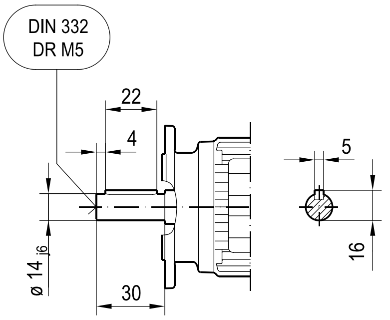
DR2S63M 2,4,6,4/2 BE
DR2S63MR 4/2 BE

09 118 01 18
1(2)





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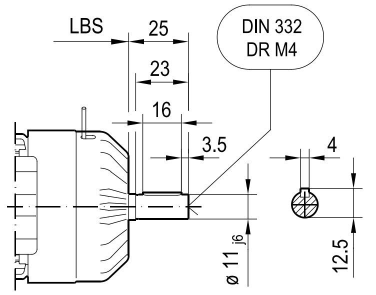

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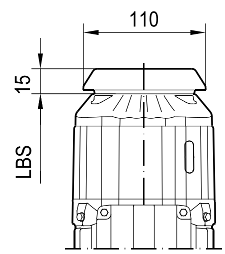
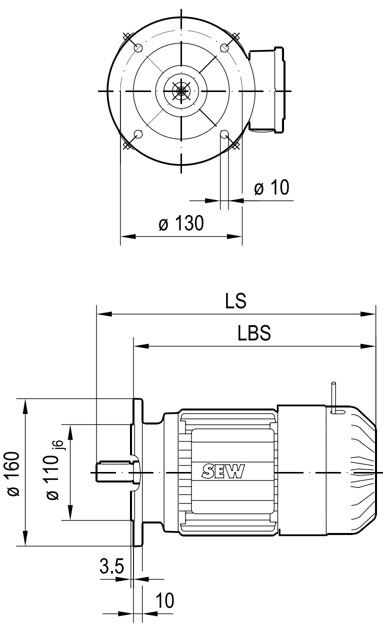
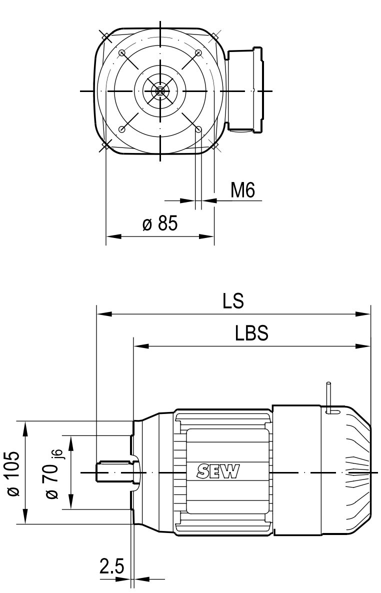


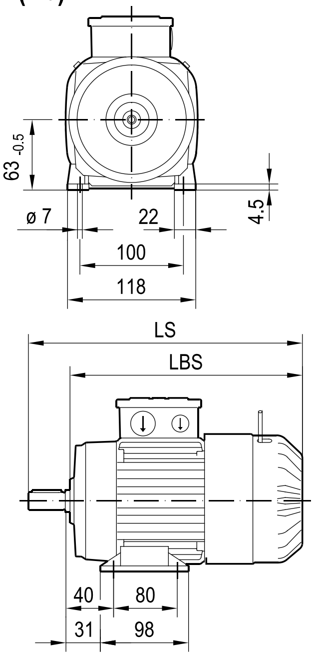
/FF (B5) FF130D160

/FT (B14) FT85D105

/FI (B3)



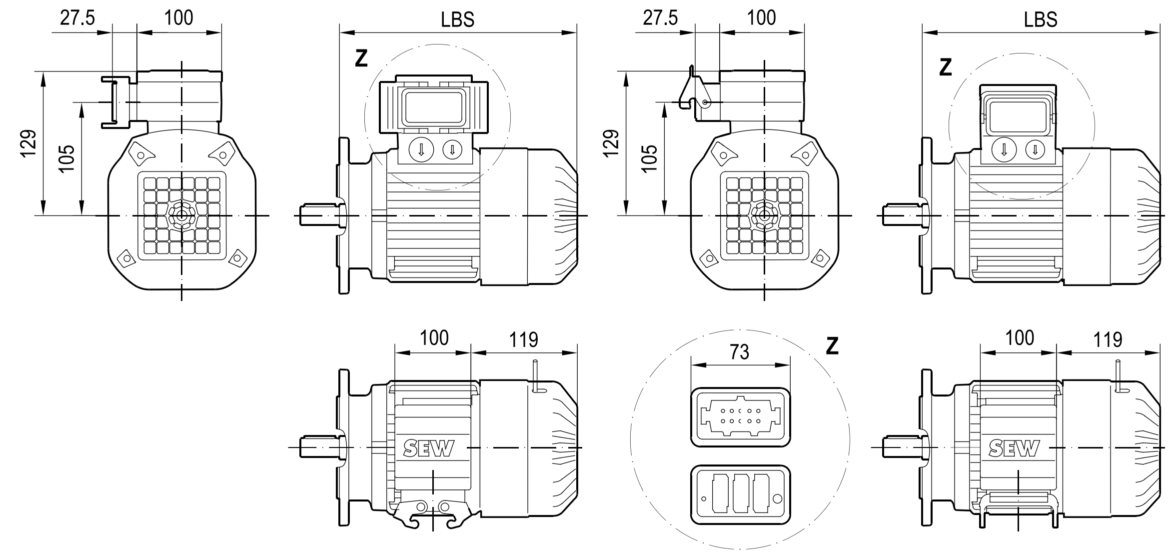




(→ 📖)	63M(R)							
LS	285							
LBS (B5/B14)	255							
LBS (B3)	253							

09 118 01 18
2(2)

/IV



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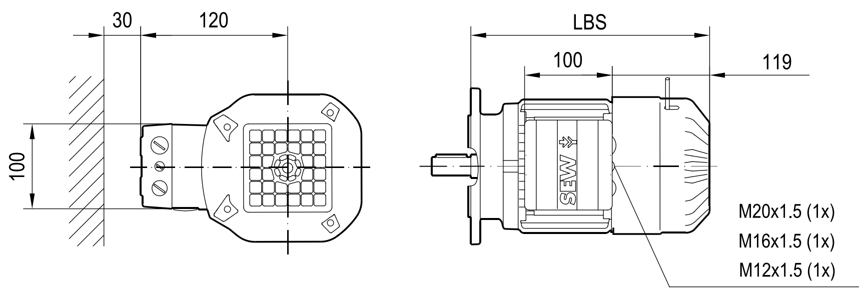

(→ 📖)	63M(R)							
LS	285							
LBS (B5/B14)	255							
LBS (B3)	253							

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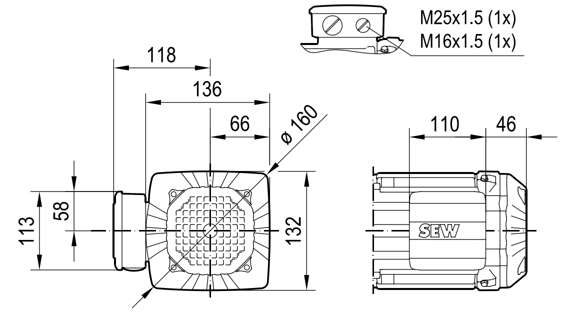
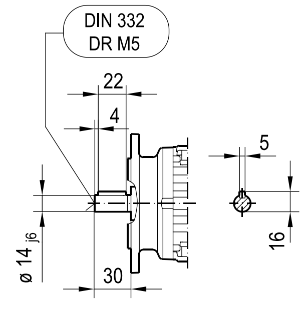
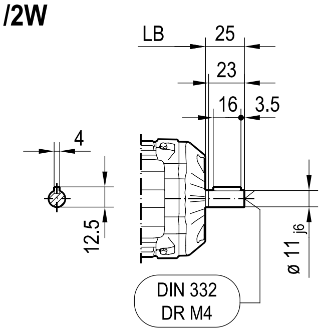
DRN71MS 2,4,6,8
DRN71MSR 8
DR2S71MS 4,6,4/2,8/2,8/4
DR2L71MS 4
DR2M71MS 12
DRN71M 2,4,6
DR2S71MR 2

08 092 02 18
1(2)





/2W



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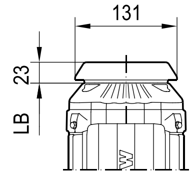
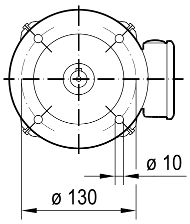


/FF (B5) FF130D160



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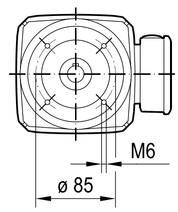
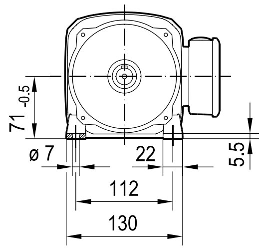
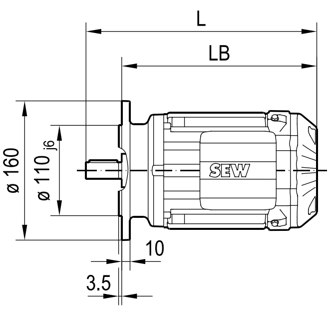
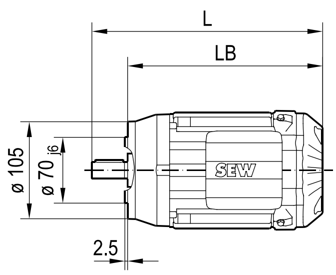
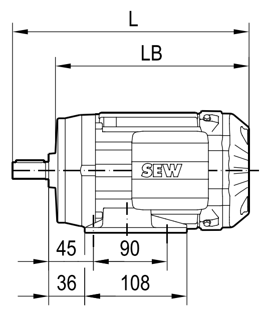


/FI (B3) FI71M









(→ 📖)	71MS(R)	71M(R)						
L	232	252						
LB (B5/B14)	202	222						
LB (B3)	200	220						

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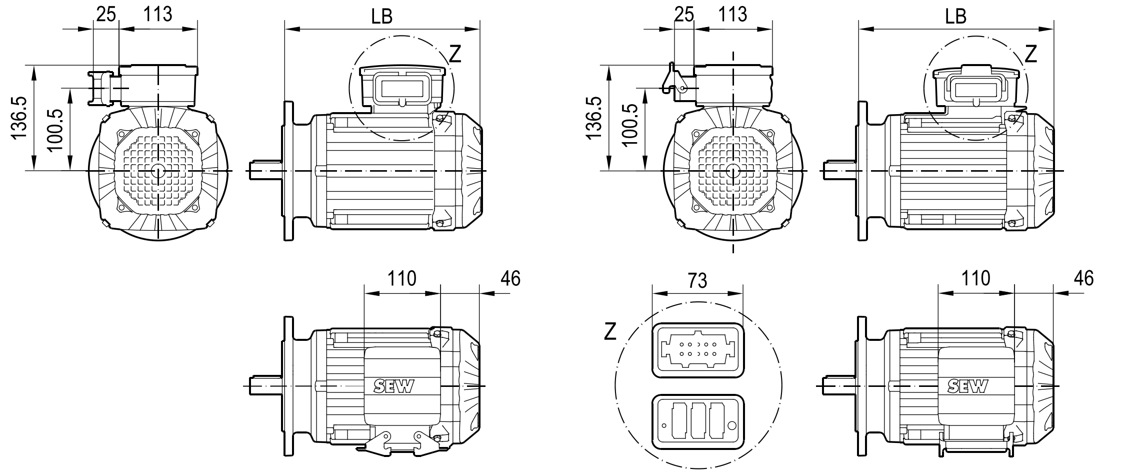
08 092 02 18
2(2)

/IV



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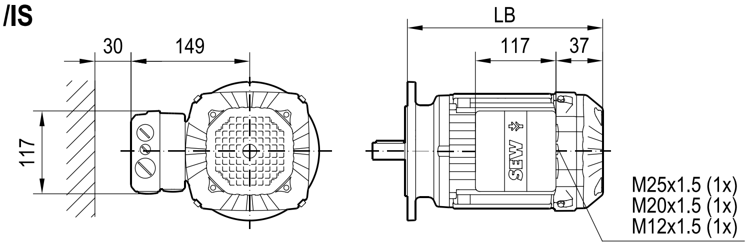

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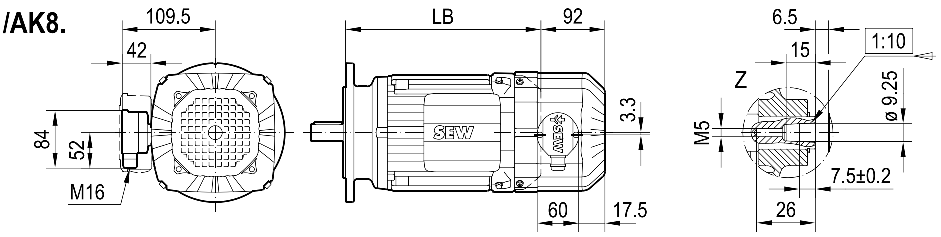
/AK8.



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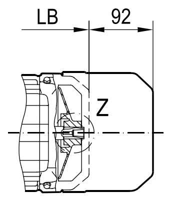

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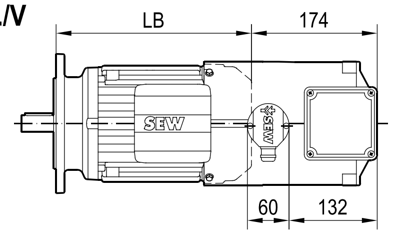
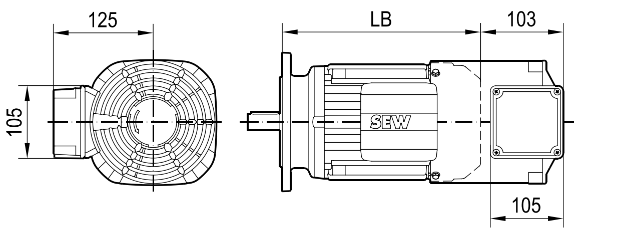
/AK8./V



/V



(→ 📖)	71MS(R)	71M(R)						
L	232	252						
LB (B5/B14)	202	222						
LB (B3)	200	220						

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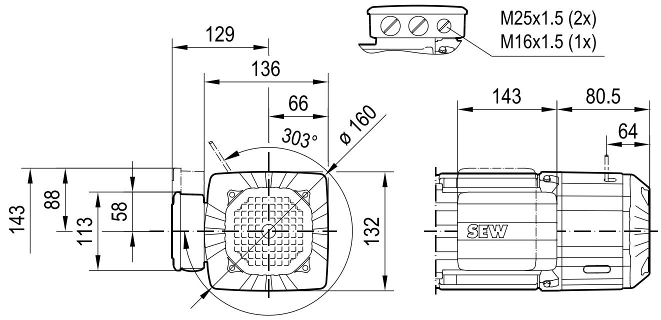
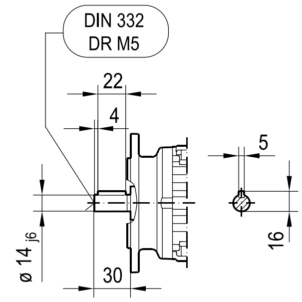
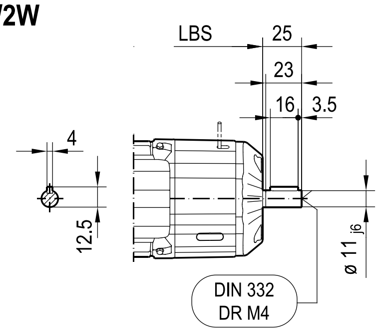
DRN71MS 2,4,6,8 BE
DRN71MSR 8 BE
DR2S71MS 4,6,4/2,8/2,8/4 BE
DR2L71MS 4 BE
DR2M71MS 12 BE
DRN71M 2,4,6 BE
DR2S71MR 2 BE

09 110 02 18
1(2)





/2W



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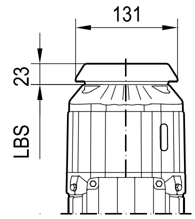

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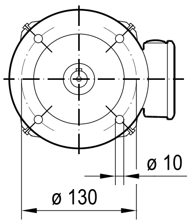
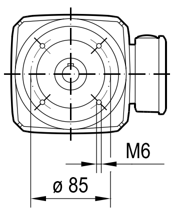


/FT (B14) FT85D105



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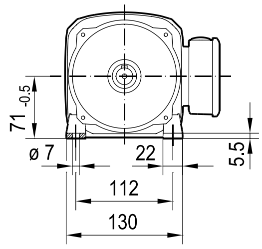

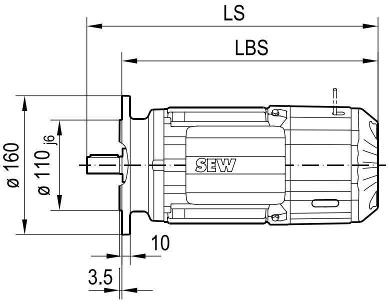

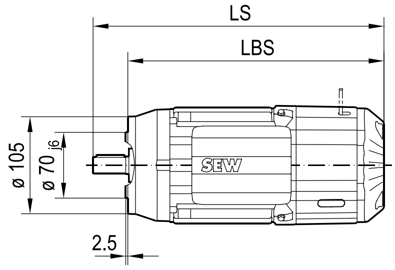

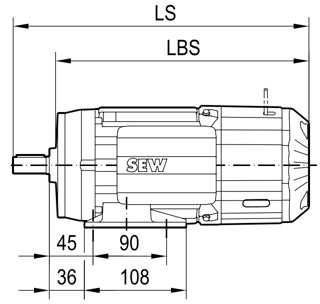

(→ 📖)	71MS(R)	71M(R)						
LS	299	319						
LBS (B5/B14)	269	289						
LBS (B3)	267	287						

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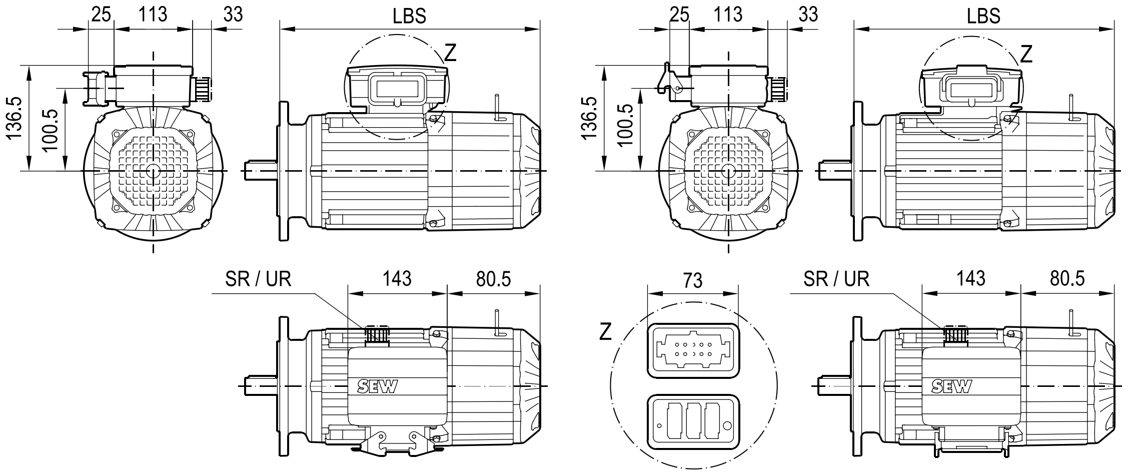
09 110 02 18
2(2)

/IV



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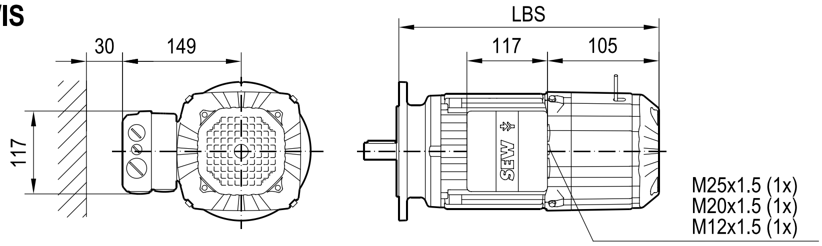

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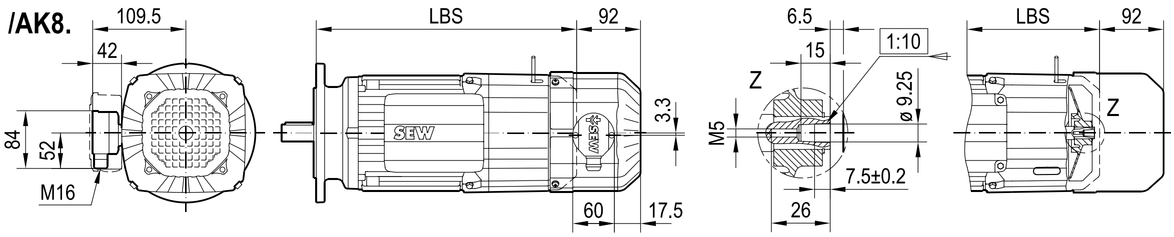
/AK8.

/EK8A



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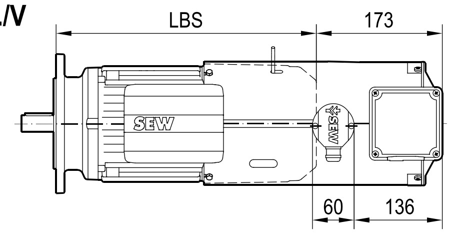

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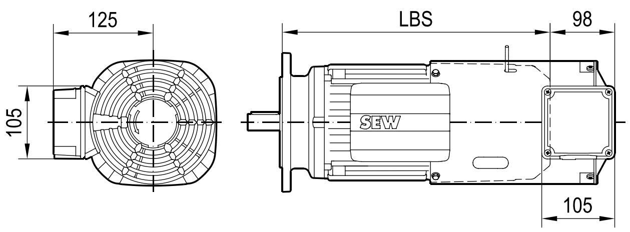

(→ 📖)	71MS(R)	71M(R)						
LS	299	319						
LBS (B5/B14)	269	289						
LBS (B3)	267	287						

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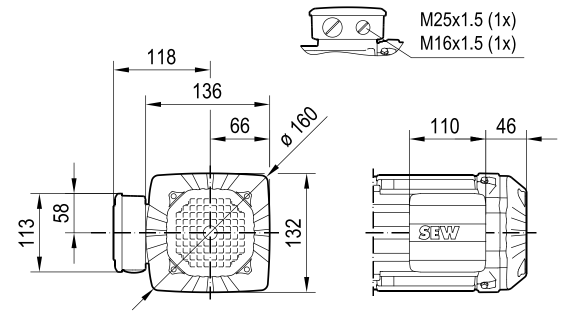
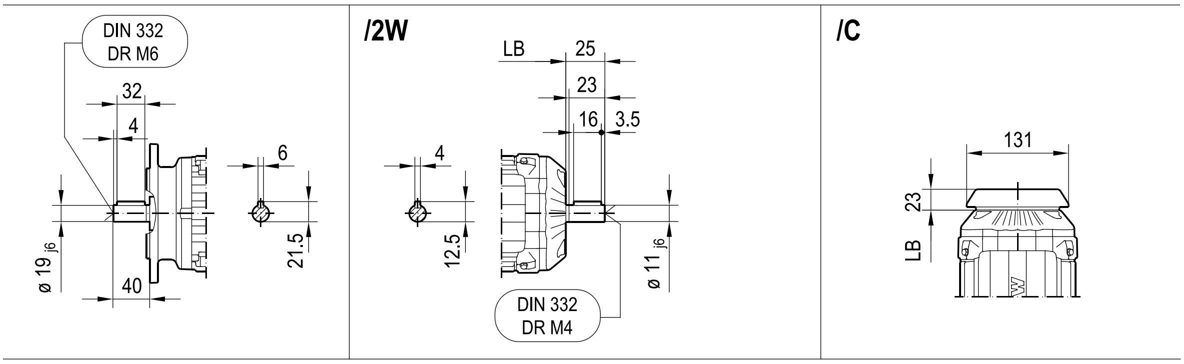
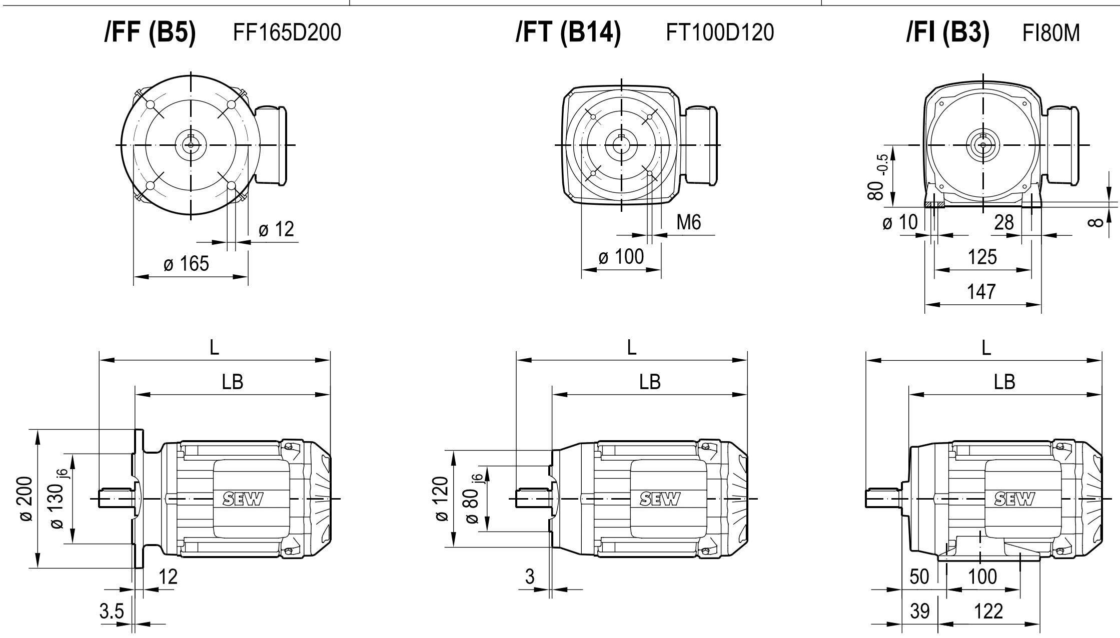
DR2S71M 2,4,6,4/2,8/2,8/4
DR2L71M 4
DR2M71M 12

08 104 02 18
1(2)



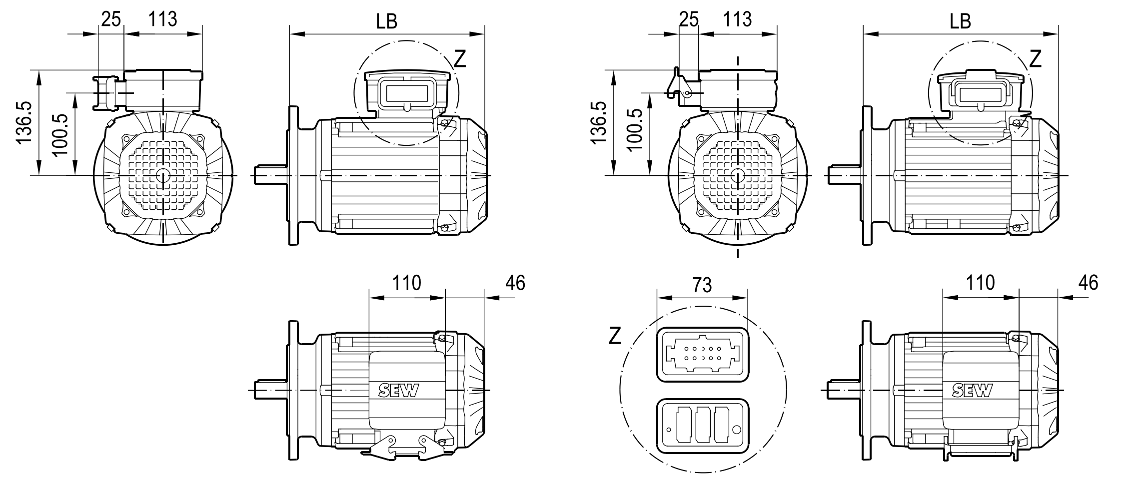




(→ 📖)	71M							
L	262							
LB (B5/B14)	222							
LB (B3)	220							

08 104 02 18
2(2)

/IV



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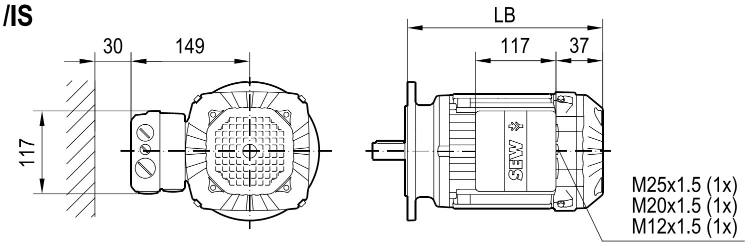

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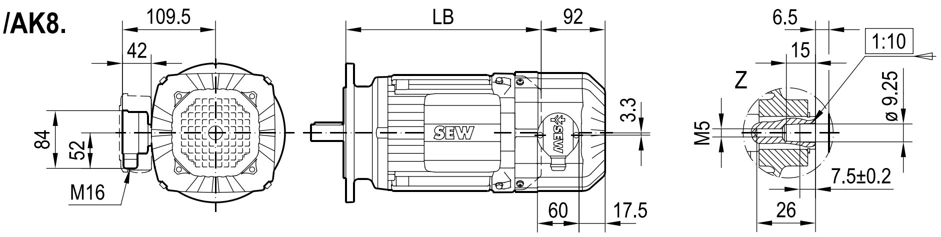
/AK8.



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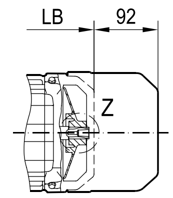

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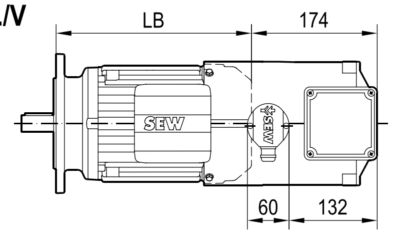
/AK8./V



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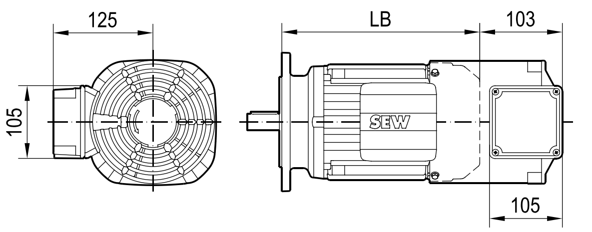
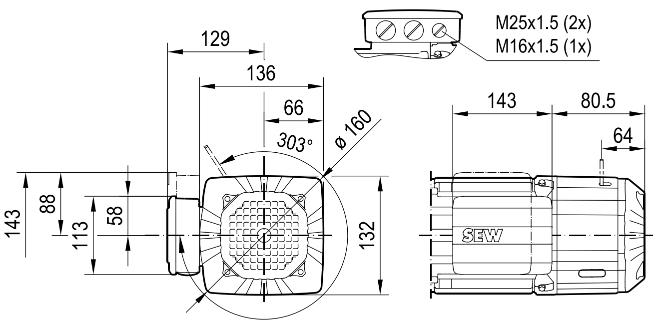
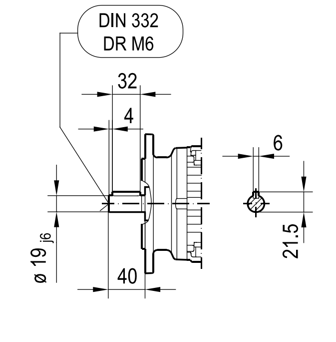


(→ 📖)	71M						
L	262						
LB (B5/B14)	222						
LB (B3)	220						

DR2S71M 2,4,6,4/2,8/2,8/4 BE **09 119 02 18**
DR2L71M 4 BE **1(2)**
DR2M71M 12 BE





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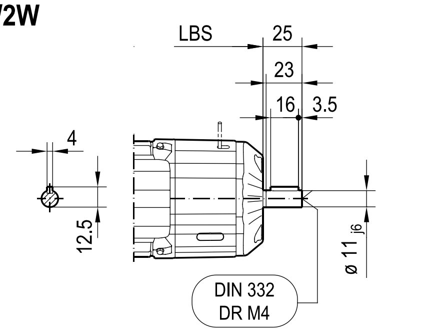

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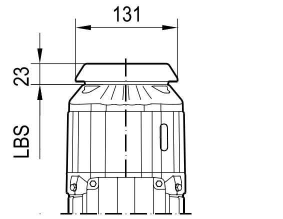
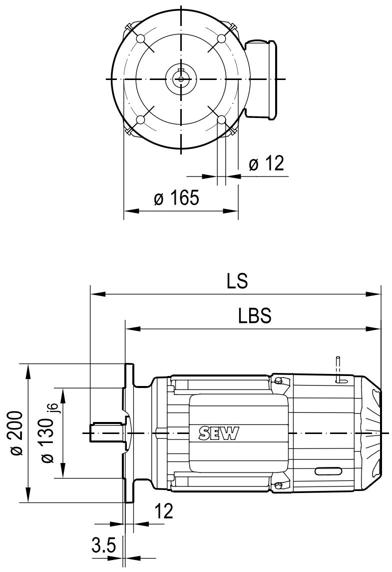
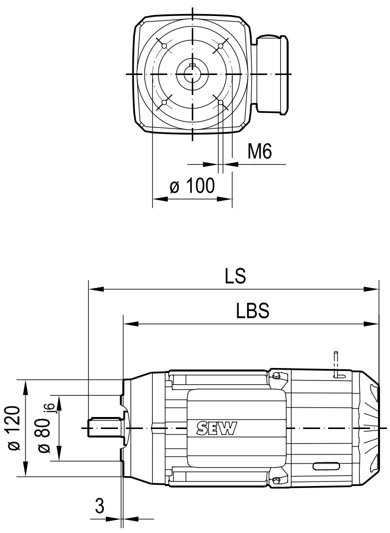
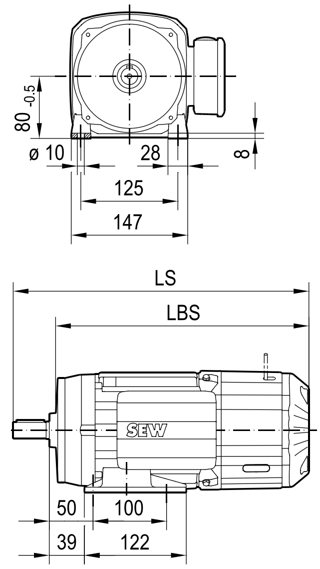


/FF (B5) FF165D200 **/FT (B14)** FT100D120 **/FI (B3)** FI80M







(→)	71M							
LS	329							
LBS (B5/B14)	289							
LBS (B3)	287							

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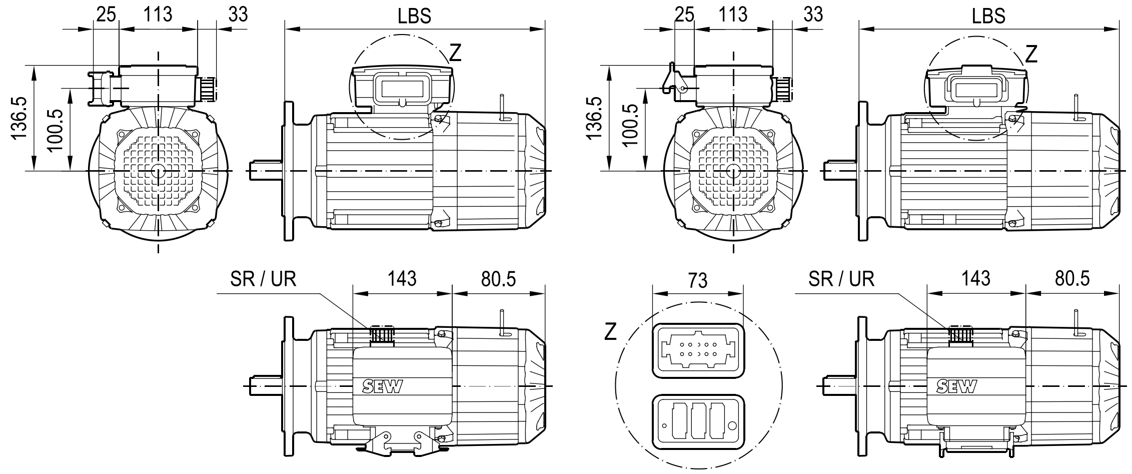
09 119 02 18
2(2)

/IV



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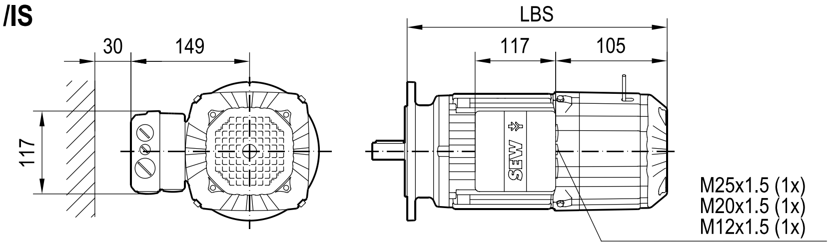

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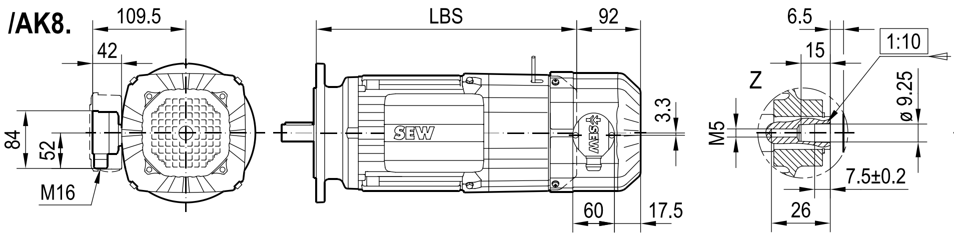
/AK8.



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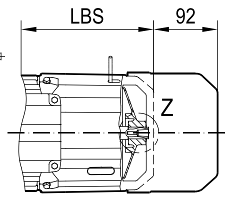

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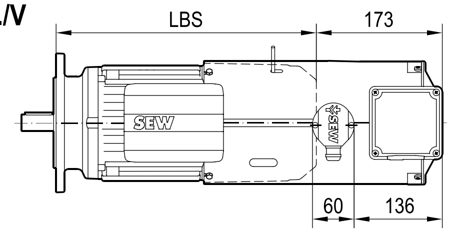
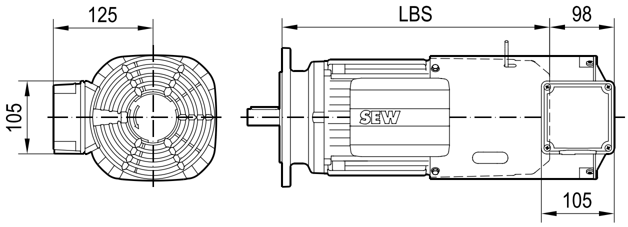
/AK8./V



/V



(→ 📖)	71M							
LS	329							
LBS (B5/B14)	289							
LBS (B3)	287							

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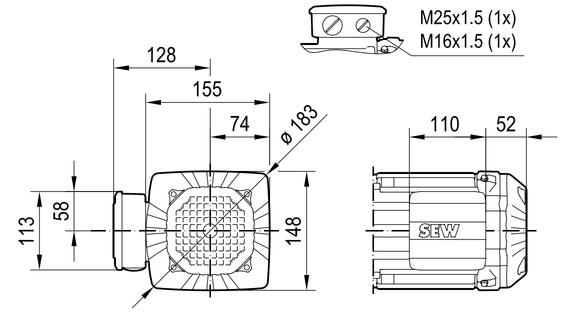
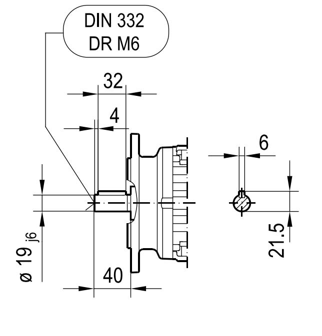
DRN80MK 4,6,8
DR2S80MK 4,6
DR2L80MK 4
DRN80MS 2
DR2S80MS 8/2,8/4
DRN80M 2,4,8

08 094 02 18
1(2)





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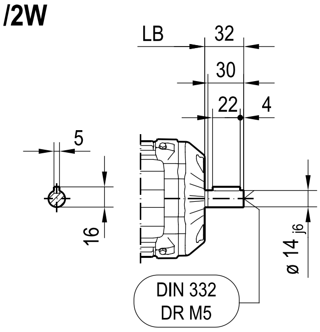
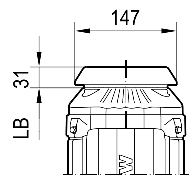


/C



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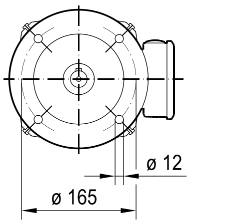

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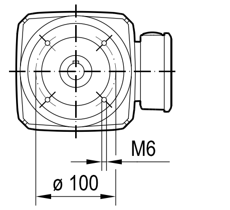

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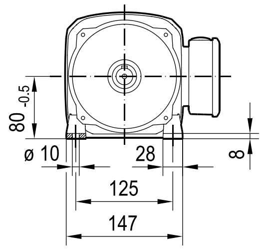

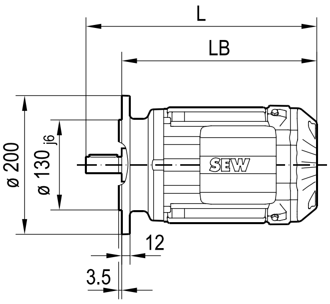

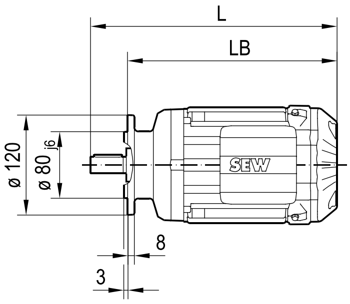

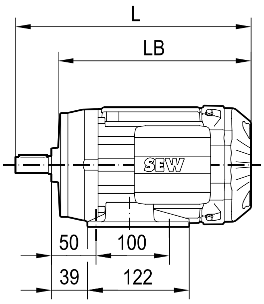

(→ 📖)	80MK	80MS	80M					
L	281	299	327					
LB (B5/B14)	241	259	287					
LB (B3)	239	257	285					

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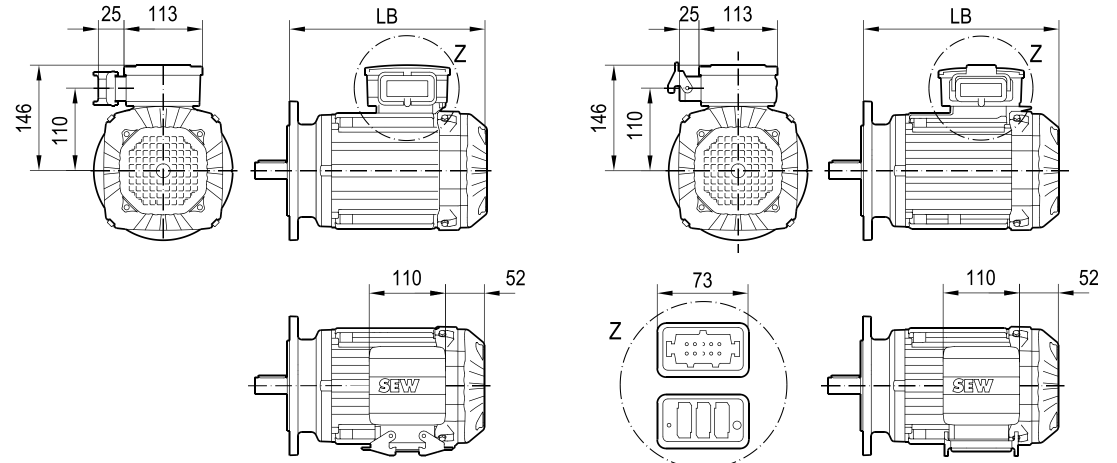
08 094 02 18
2(2)

/IV



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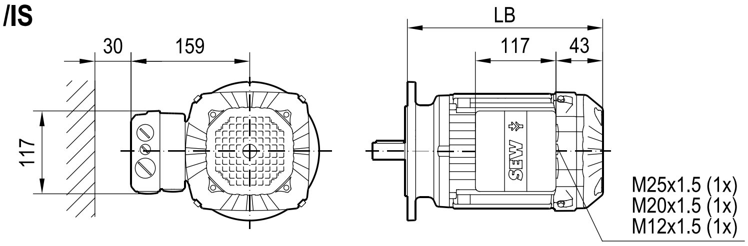

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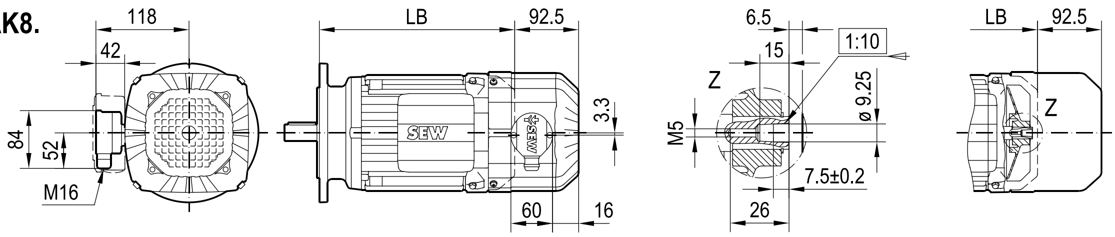
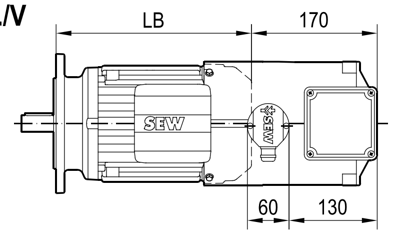
/AK8.

/EK8A



/EK8./V
/AK8./V



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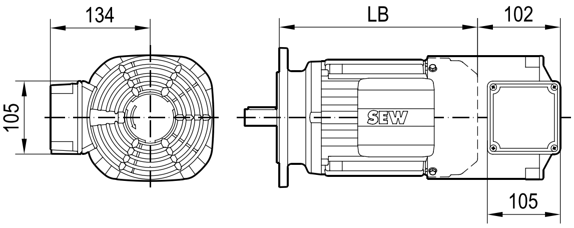

(→ 📖)	80MK	80MS	80M					
L	281	299	327					
LB (B5/B14)	241	259	287					
LB (B3)	239	257	285					

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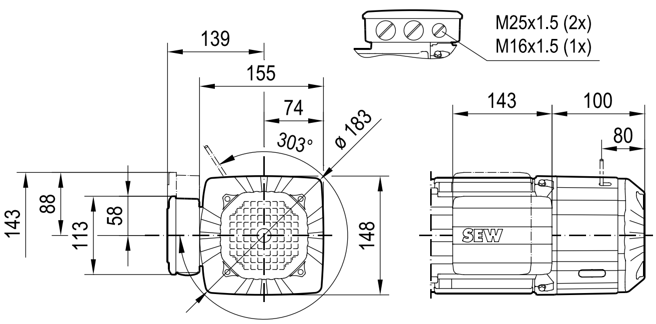
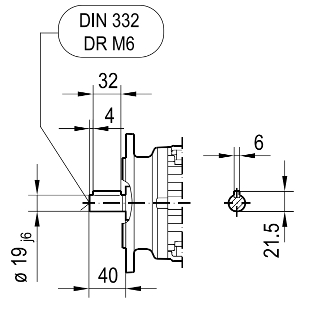
DRN80MK 4,6,8 BE
DR2S80MK 4,6 BE
DR2L80MK 4 BE
DRN80MS 2 BE
DR2S80MS 8/2,8/4 BE
DRN80M 2,4,8 BE

09 112 02 18
1(2)





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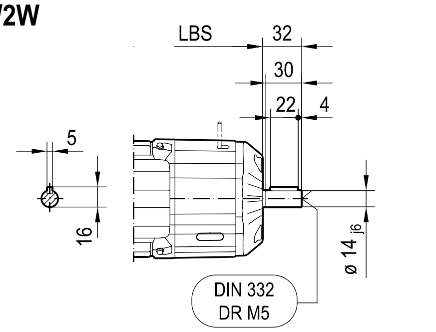

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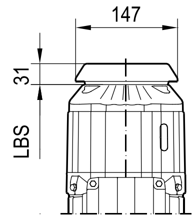

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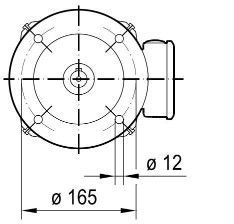

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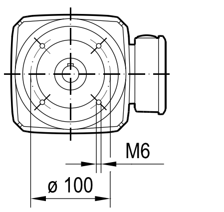

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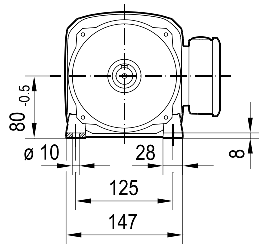
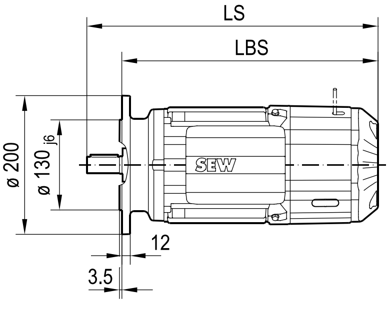
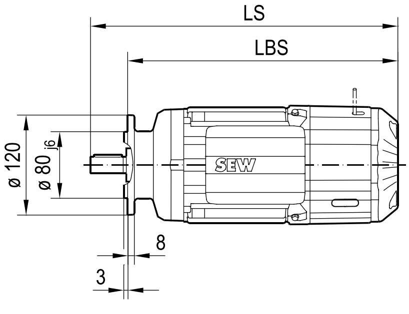
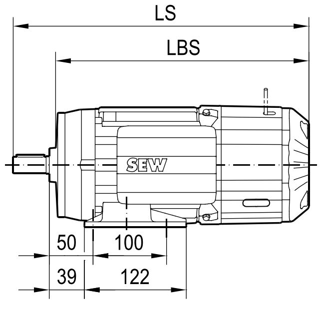




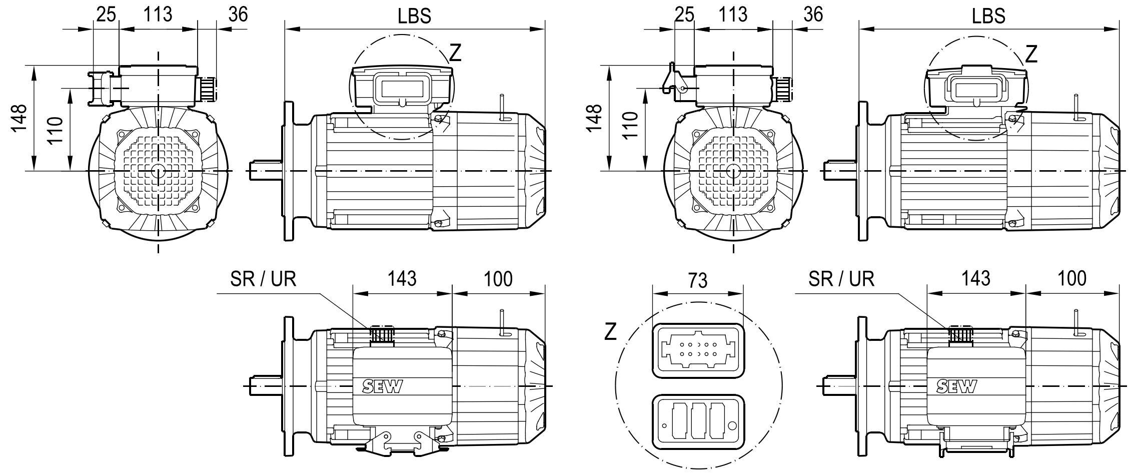




(→ 📖)	80MK	80MS	80M					
LS	362	380	408					
LBS (B5/B14)	322	340	368					
LBS (B3)	320	338	366					

09 112 02 18
2(2)

/IV



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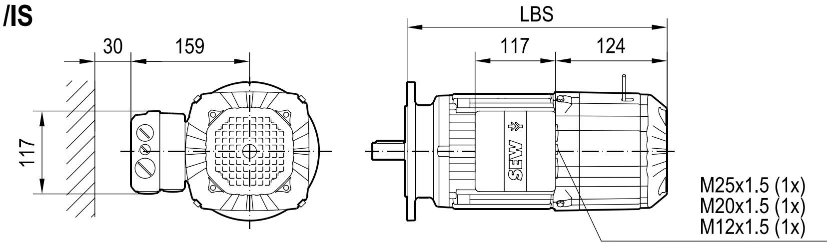

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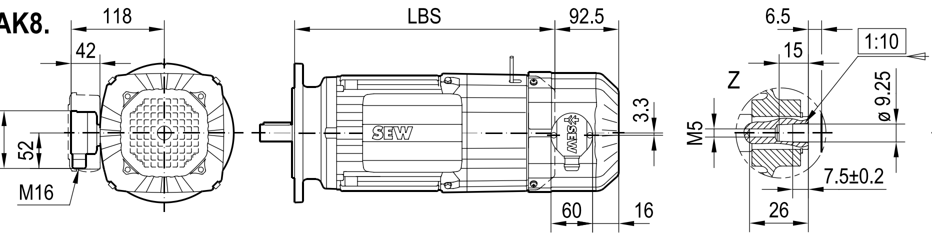

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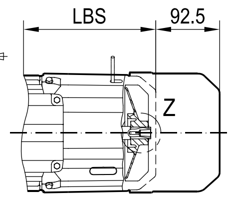

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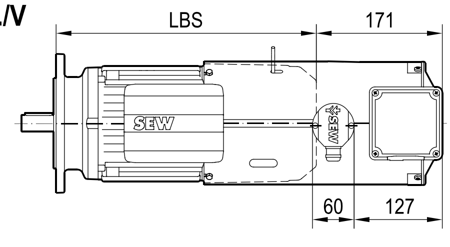

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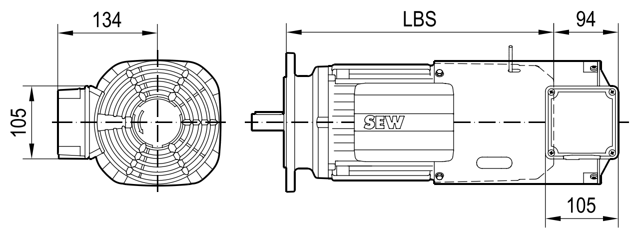

(→ 📖)	80MK	80MS	80M					
LS	362	380	408					
LBS (B5/B14)	322	340	368					
LBS (B3)	320	338	366					

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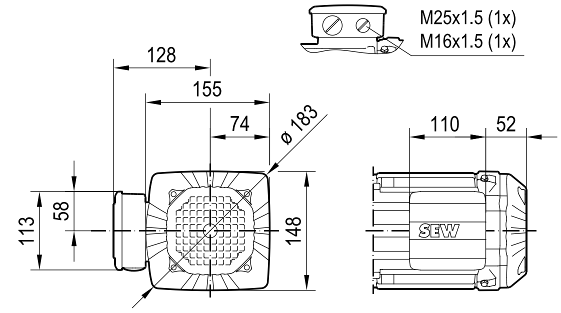
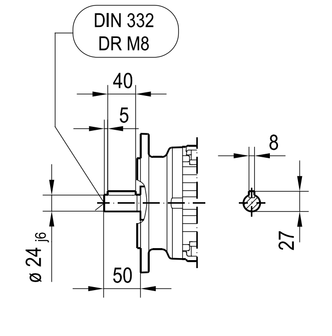
DR2S80M 2,4,4/2,8/2
DR2L80M 4

08 105 02 18
1(2)





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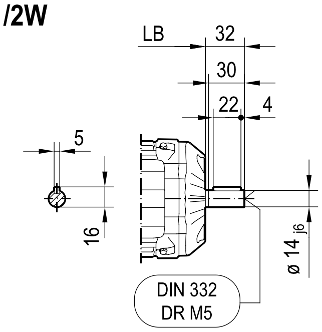

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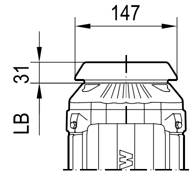

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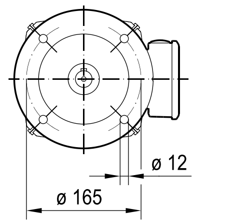

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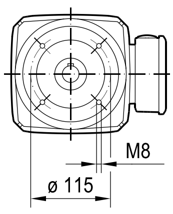

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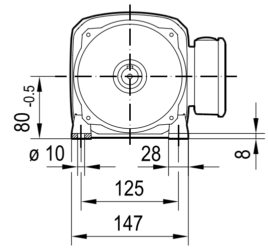

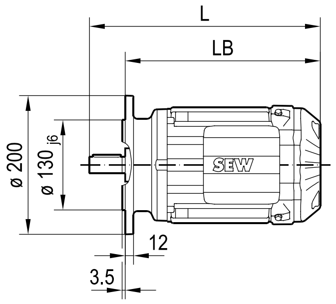

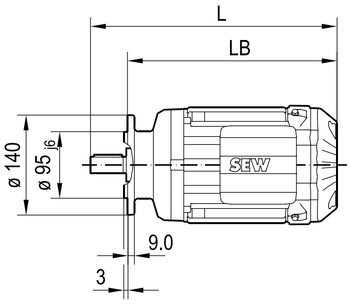

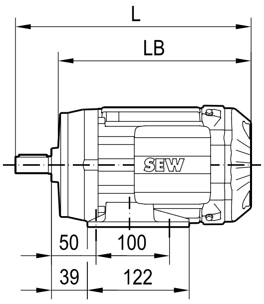

(→ 📖)	80M							
L	337							
LB (B5/B14)	287							
LB (B3)	285							

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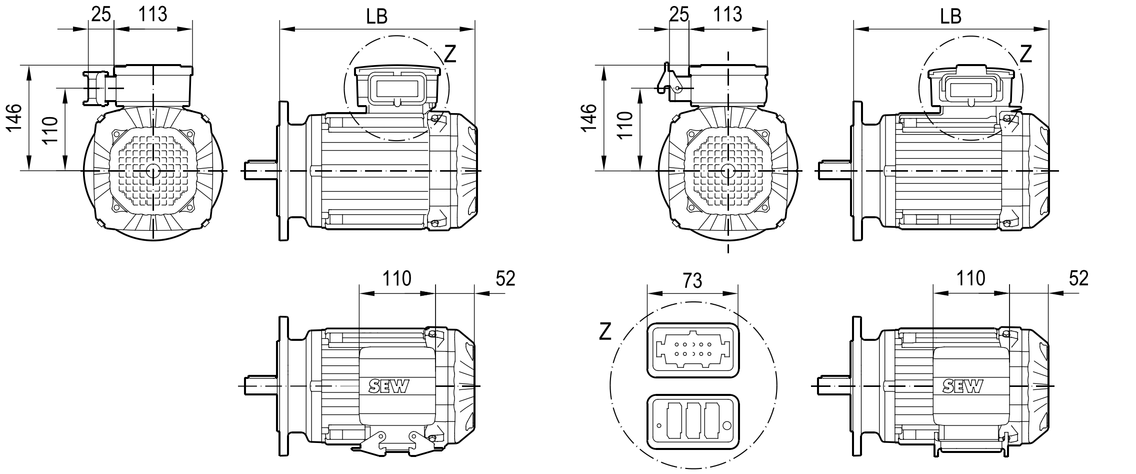
08 105 02 18
2(2)

/IV



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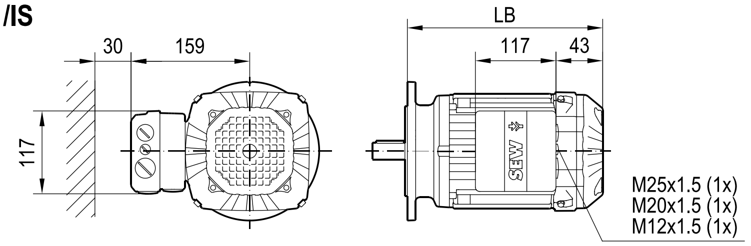

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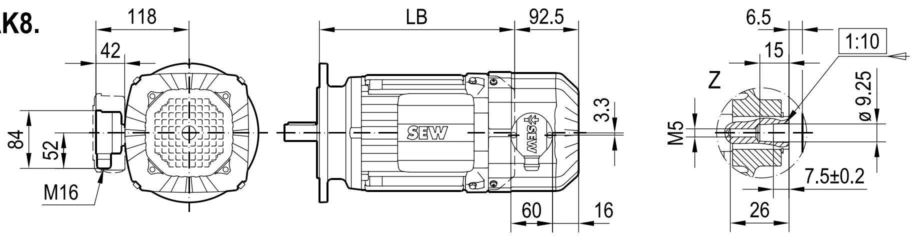

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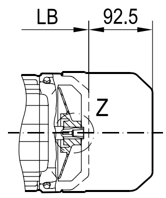

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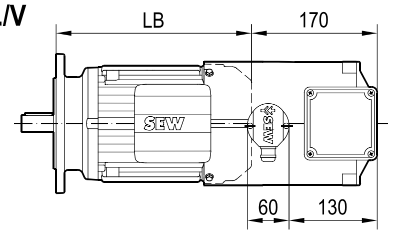
/AK8./V



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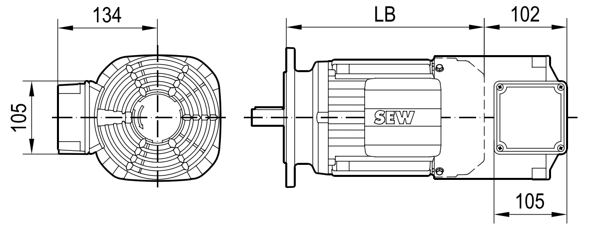
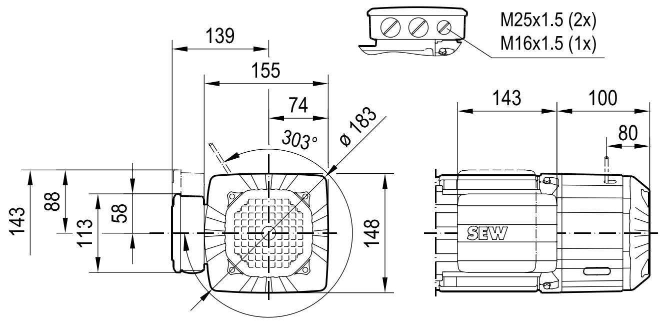
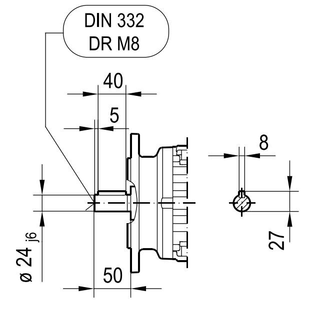


(→ 📖)	80M							
L	337							
LB (B5/B14)	287							
LB (B3)	285							

DR2S80M 2,4,4/2,8/2 BE
DR2L80M 4 BE

09 120 02 18
1(2)





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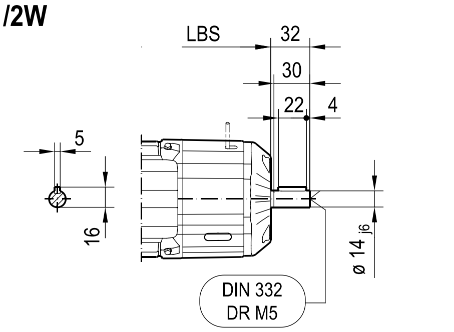

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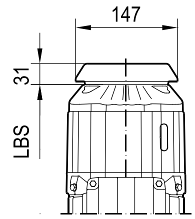

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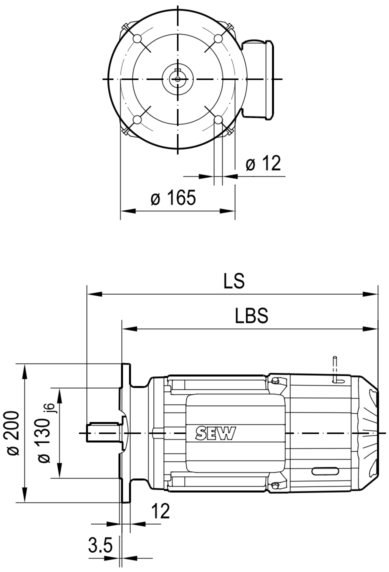

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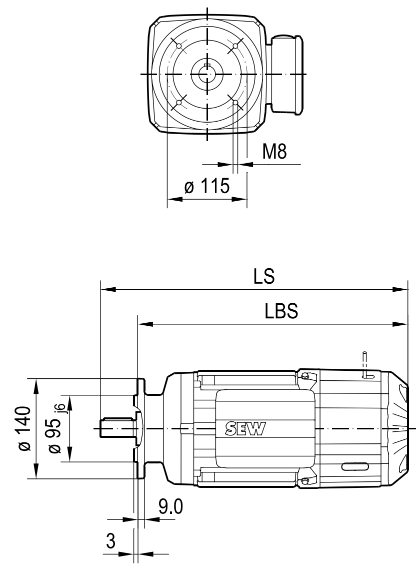

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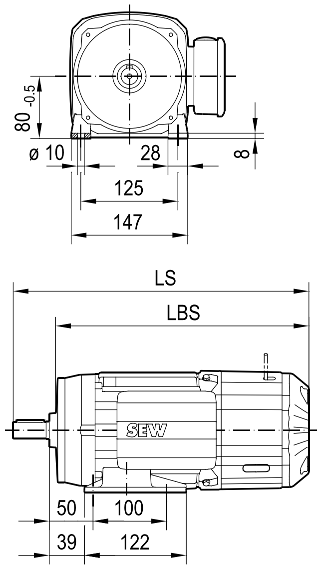

(→ 📖)	80M							
LS	418							
LBS (B5/B14)	368							
LBS (B3)	366							

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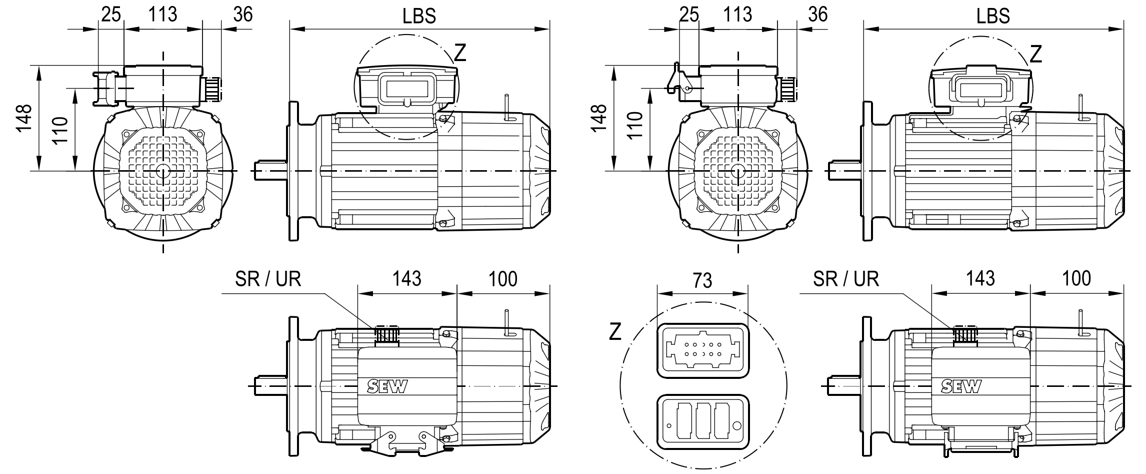
09 120 02 18
2(2)

/IV



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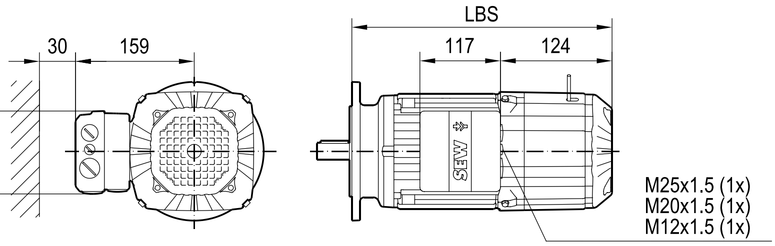

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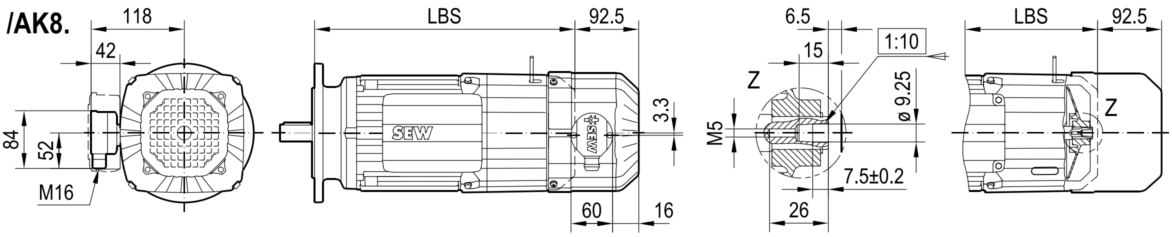

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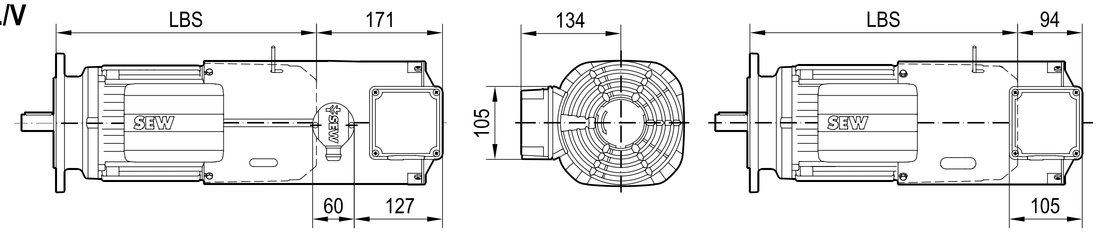
/V



(→ 📖)	80M							
LS	418							
LBS (B5/B14)	368							
LBS (B3)	366							

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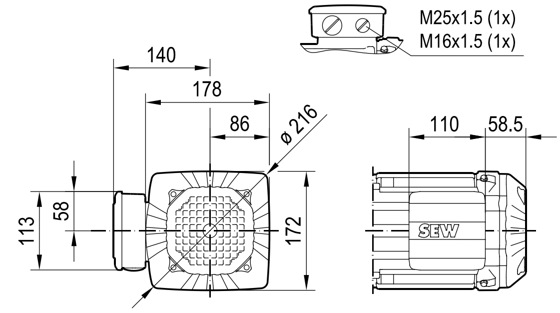
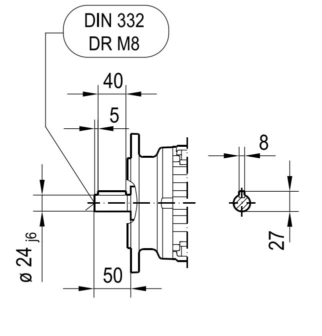
DRN90S 2,4,6,8
DRN90SR 6
DR2S90S 4
DRN90L 2,4,6,8

08 567 03 14
1(2)





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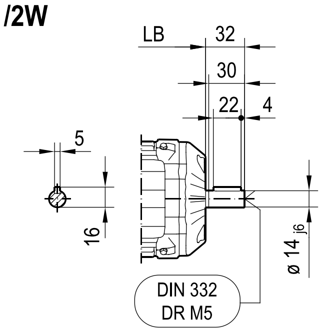

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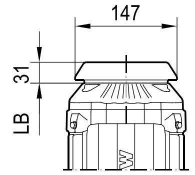

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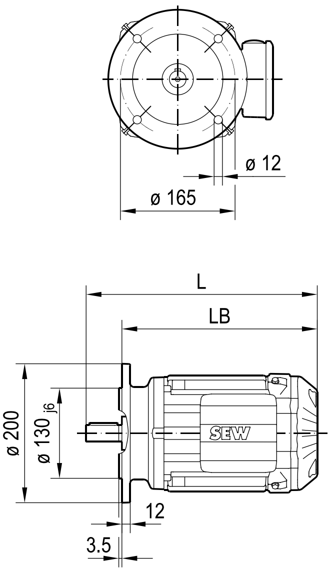
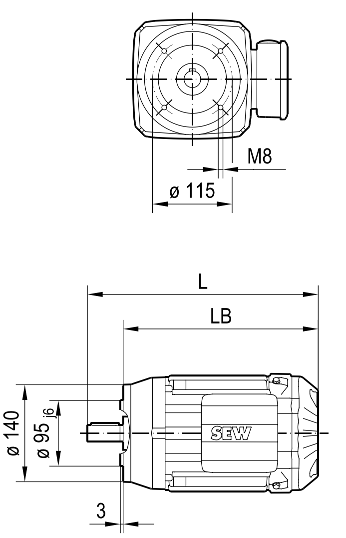
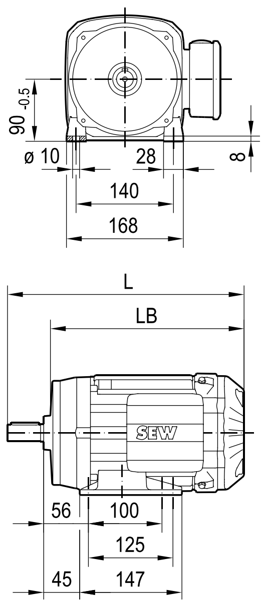


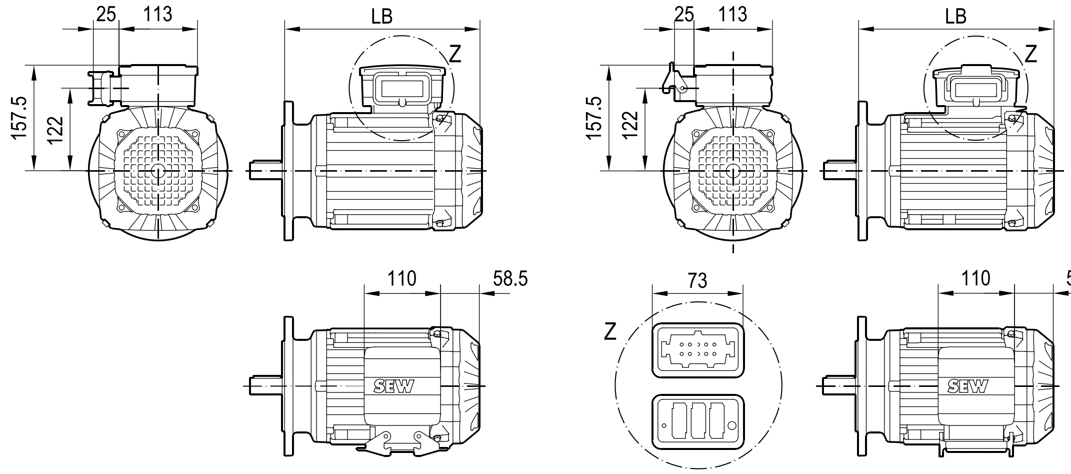




(→ 📖)	90S(R)	90L						
L	331	363						
LB (B5/B14)	281	313						
LB (B3)	279	311						

08 567 03 14
2(2)

/IV



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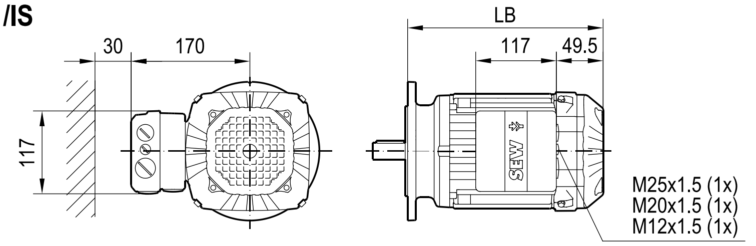

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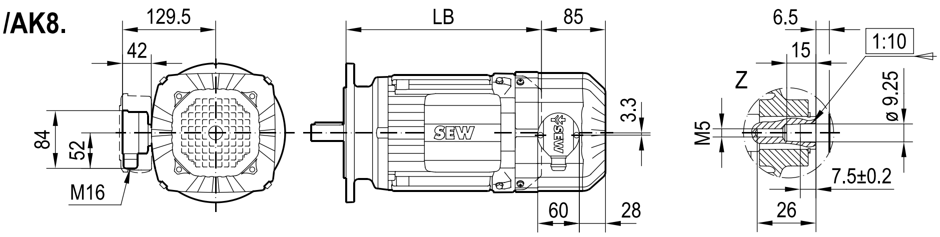

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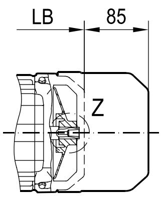

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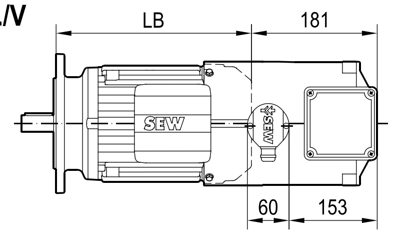

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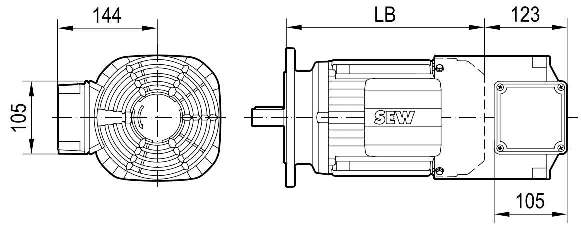

(→ 📖)	90S(R)	90L						
L	331	363						
LB (B5/B14)	281	313						
LB (B3)	279	311						

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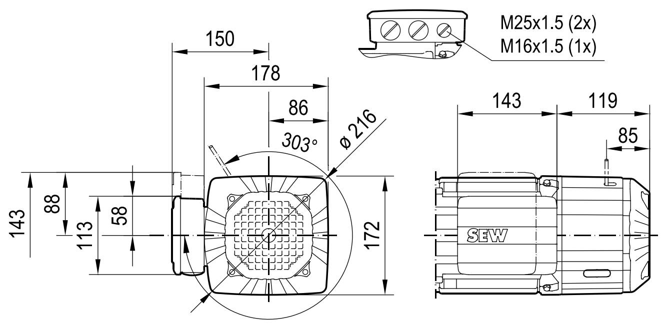
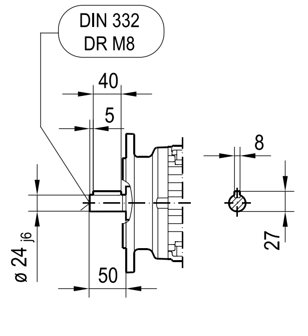
DRN90S 2,4,6,8 BE
DRN90SR 6 BE
DR2S90S 4 BE
DRN90L 2,4,6,8 BE

09 932 03 14
1(2)





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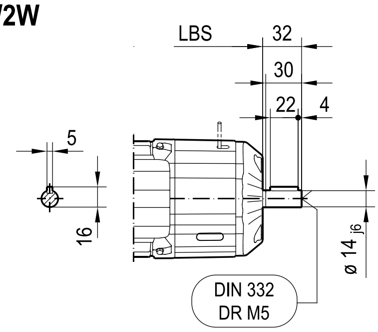

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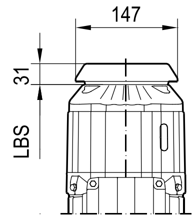

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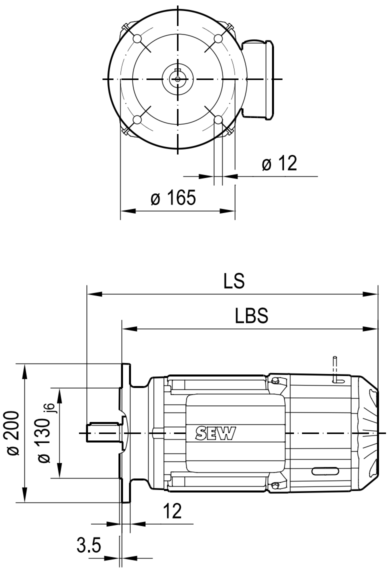

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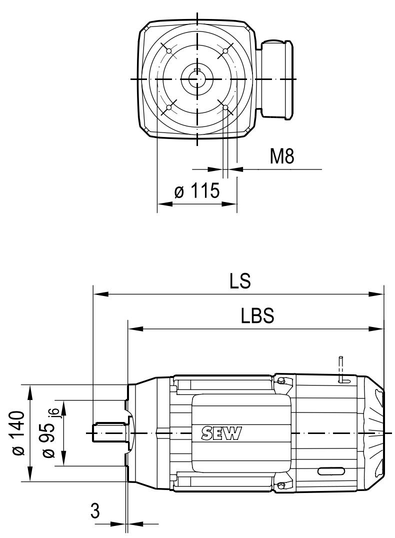

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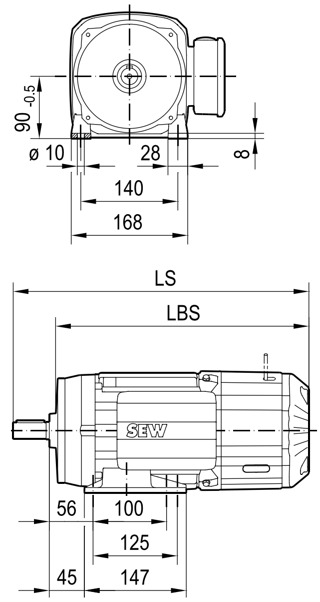

(→ 📖)	90S(R)	90L						
LS	425	457						
LBS (B5/B14)	375	407						
LBS (B3)	373	405						

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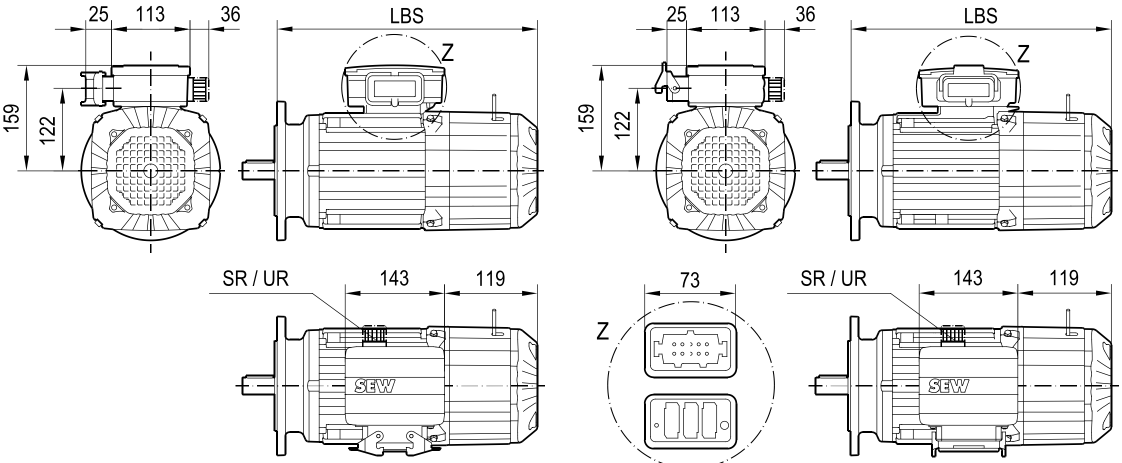
09 932 03 14
2(2)

/IV



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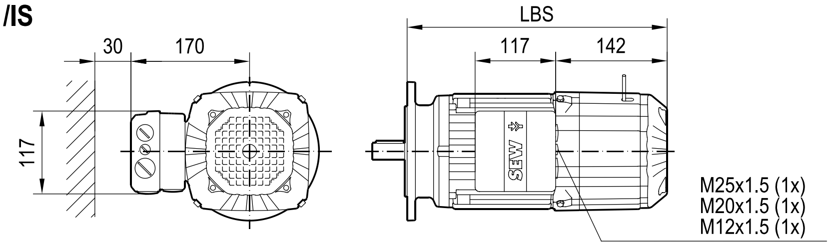

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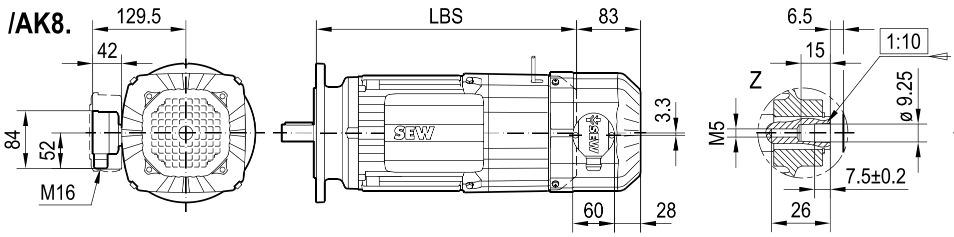

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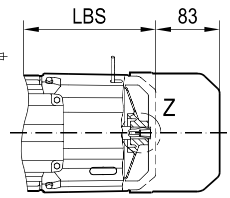
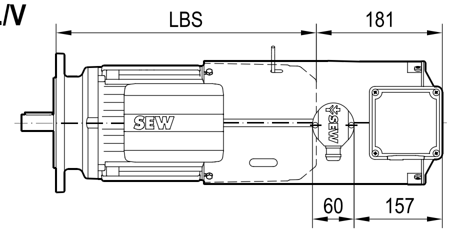


/EK8./V
/AK8./V



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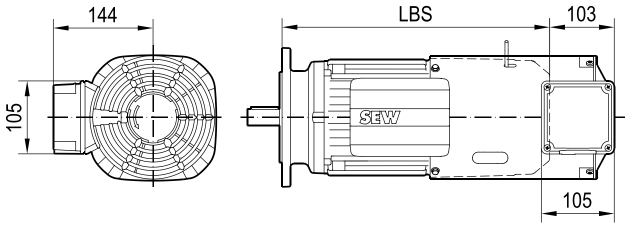
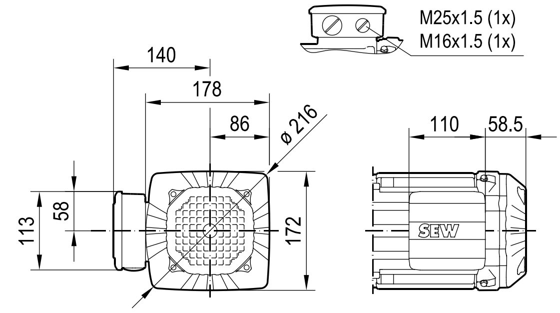
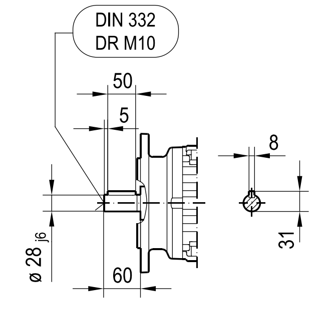


(→ 📖)	90S(R)	90L						
LS	425	457						
LBS (B5/B14)	375	407						
LBS (B3)	373	405						

DR2S90L 4

08 281 01 21
1(2)





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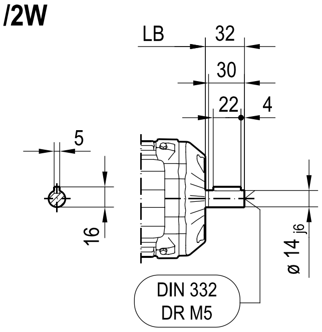

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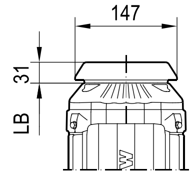

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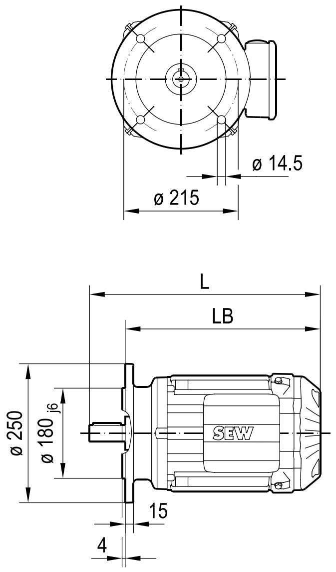

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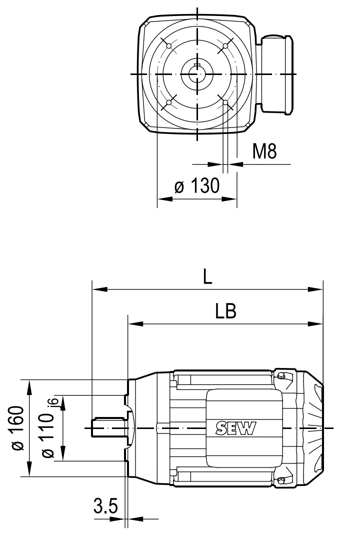
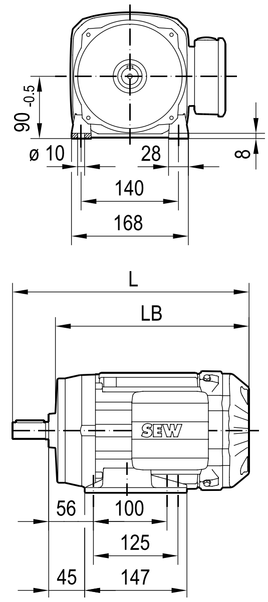


/FI (B3)



(→ 📖)	90L							
L	373							
LB (B5/B14)	313							
LB (B3)	311							

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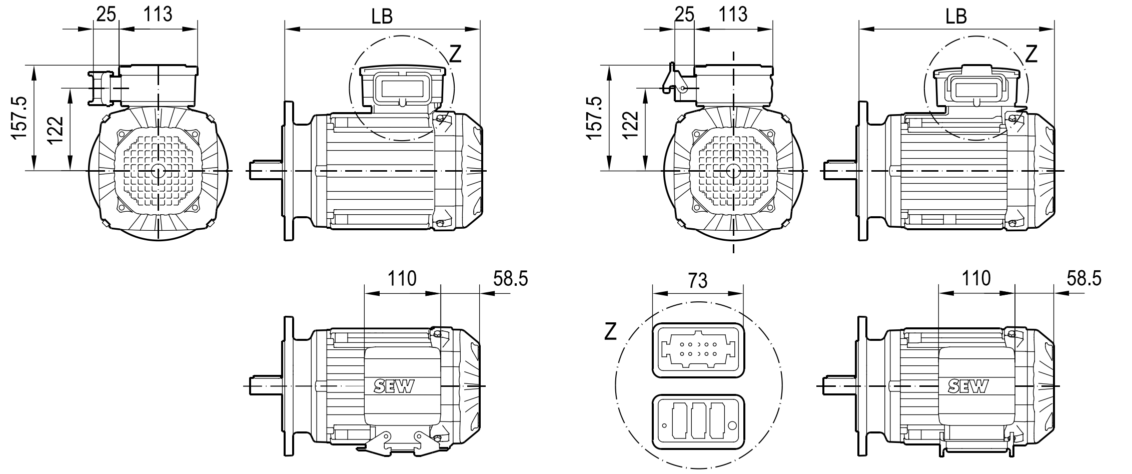
08 281 01 21
2(2)

/IV



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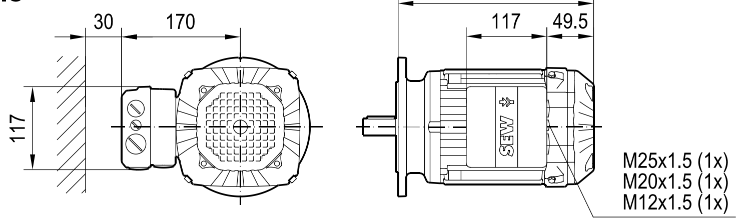

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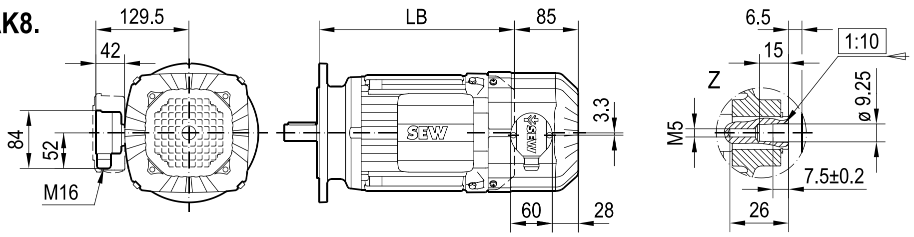
/AK8.



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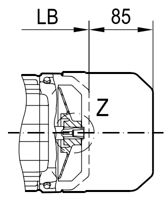

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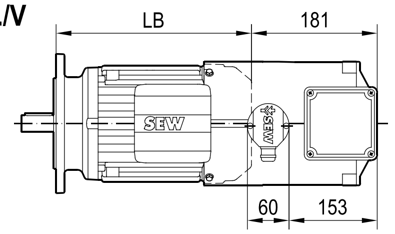
/AK8./V



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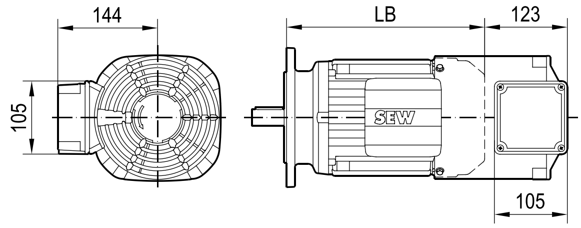

(→ 📖)	90L							
L	373							
LB (B5/B14)	313							
LB (B3)	311							

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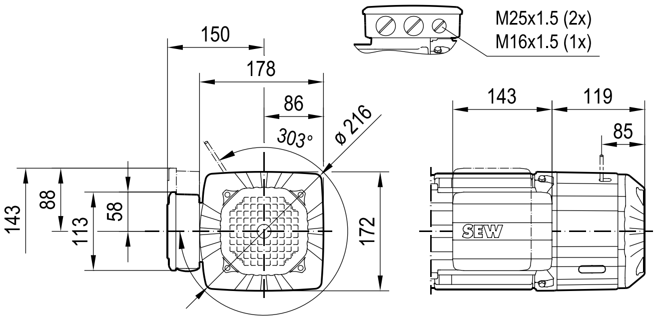
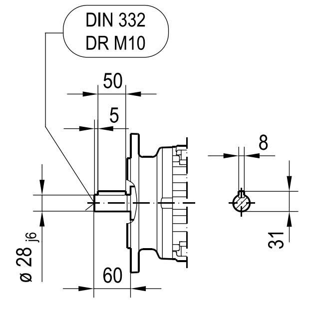
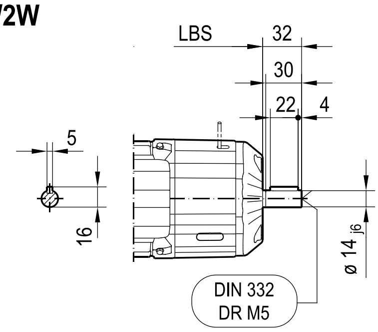
DR2S90L 4 BE

09 193 01 21
1(2)

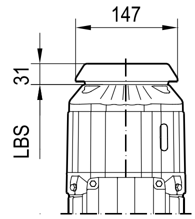




/2W



/C



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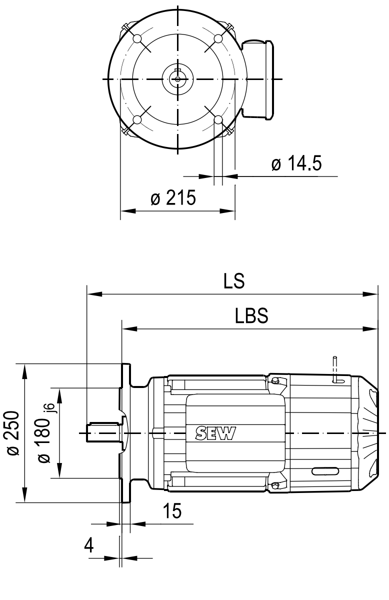

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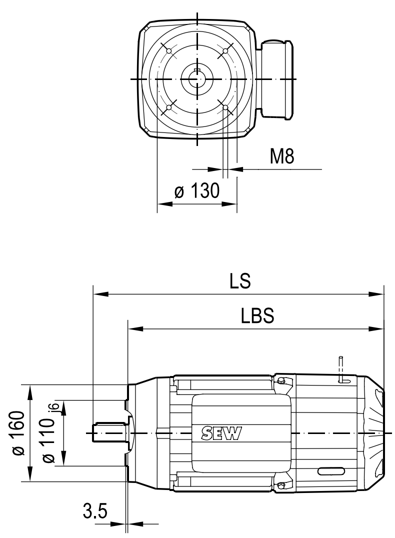

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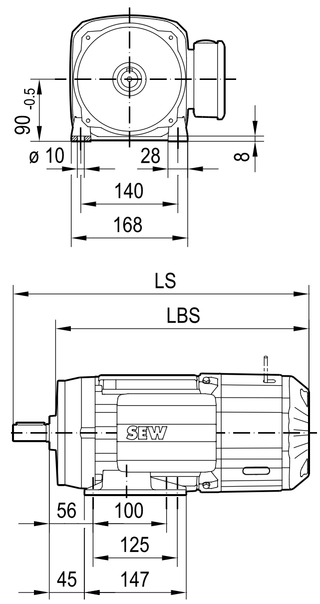

(→ 📖)	90L							
LS	467							
LBS (B5/B14)	407							
LBS (B3)	405							

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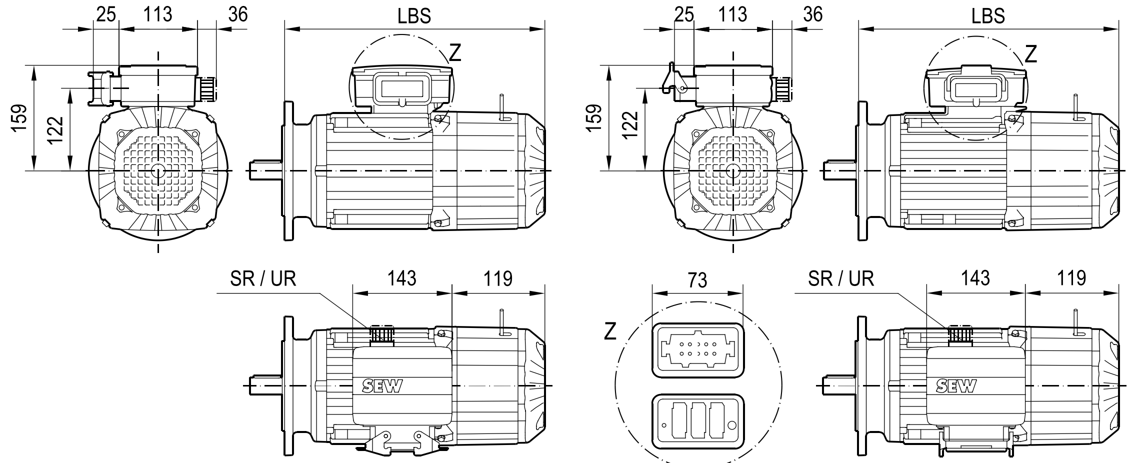
09 193 01 21
2(2)

/IV



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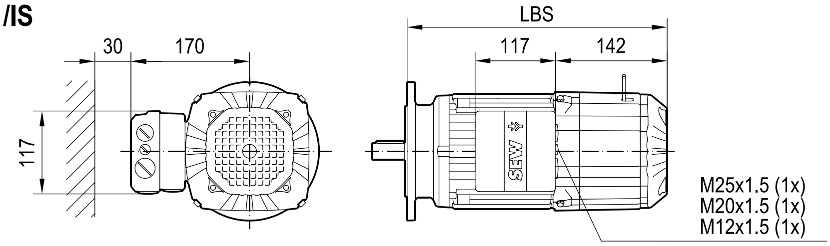
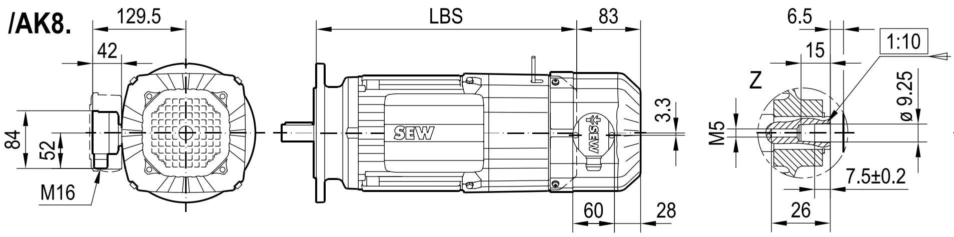


/EK8.
/AK8.



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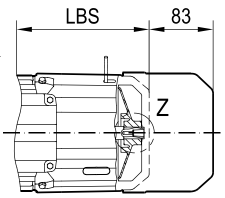
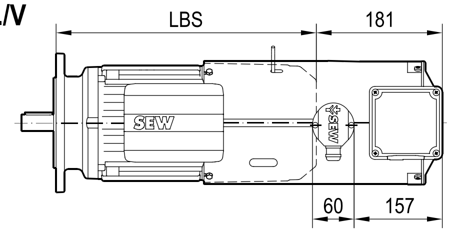


/EK8./V
/AK8./V



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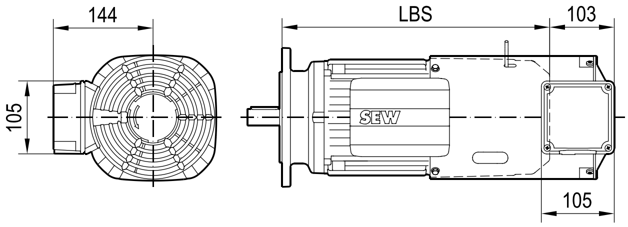

(→ 📖)	90L							
LS	467							
LBS (B5/B14)	407							
LBS (B3)	405							

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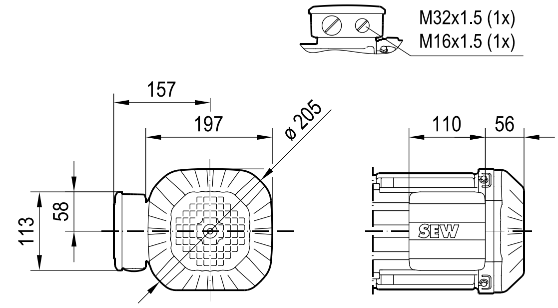
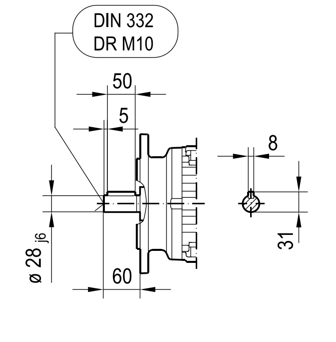
DRN100LS 4,8
DR2S100LS 4

08 569 03 14
1(2)





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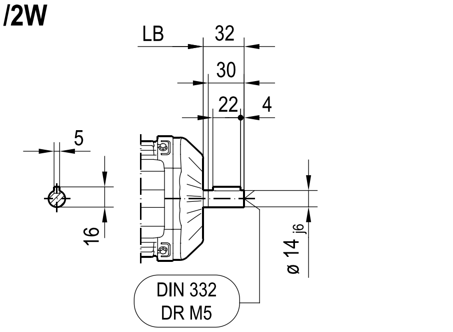

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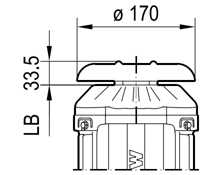
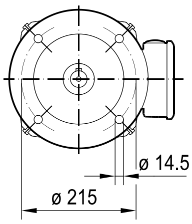
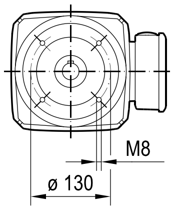


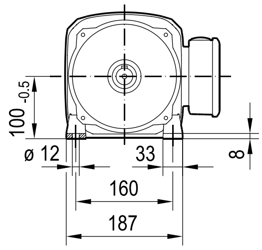
/FF (B5) FF215D250

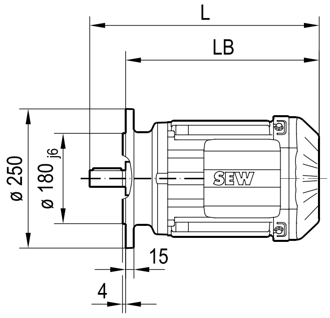


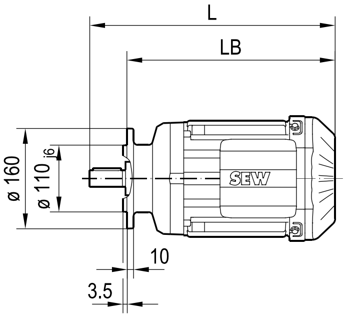
/FT (B14) FT130D160

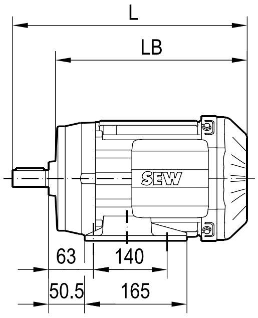


/FI (B3)









(→ 📖)	100LS							
L	369							
LB (B5/B14)	309							
LB (B3)	307							

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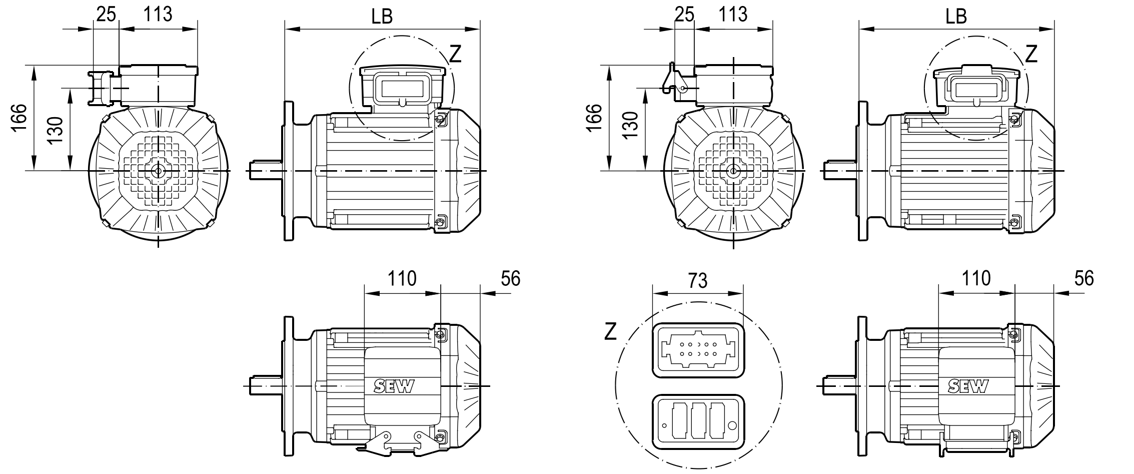
08 569 03 14
2(2)

/IV



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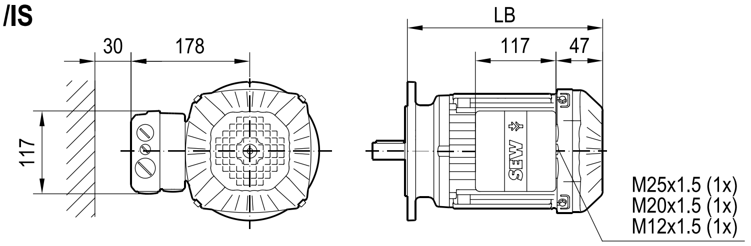

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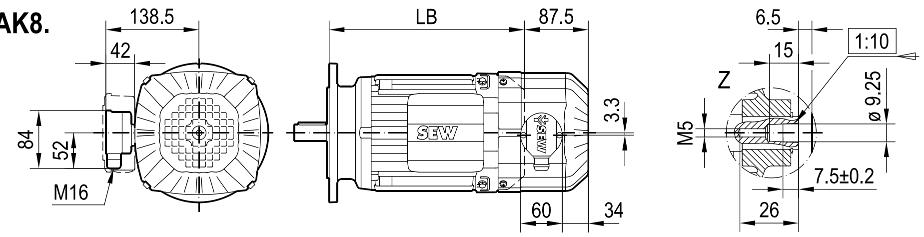
/AK8.



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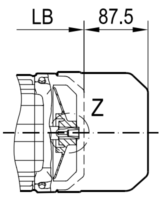
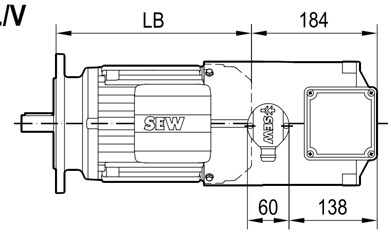
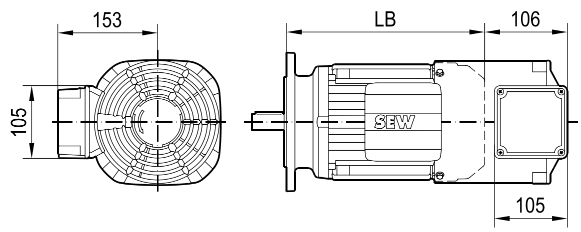


/EK8./V
/AK8./V



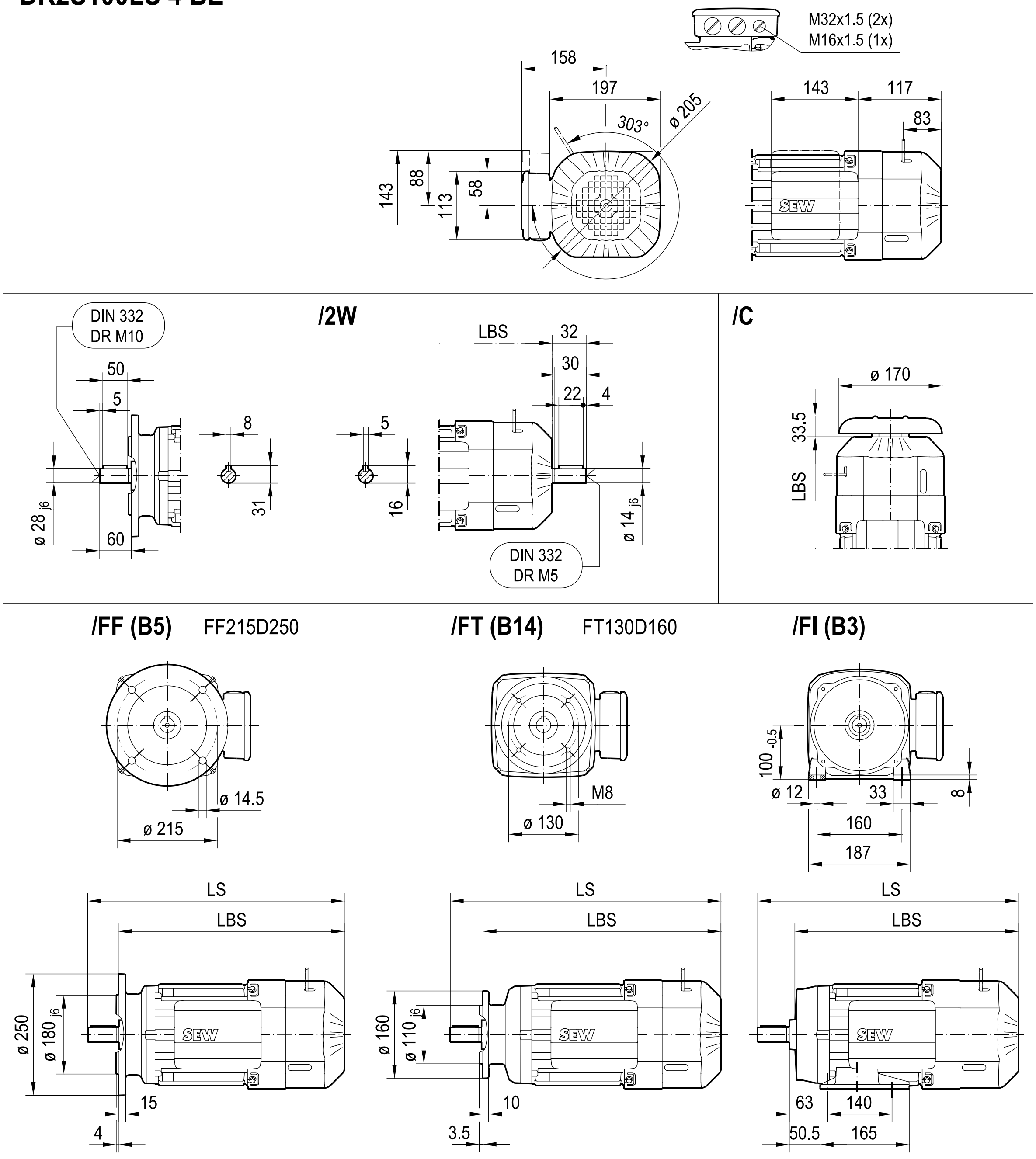
/V



(→ 📖)	100LS							
L	369							
LB (B5/B14)	309							
LB (B3)	307							

DRN100LS 4,8 BE
DR2S100LS 4 BE

09 934 03 14
1(2)



(→ 📖)	100LS							
LS	462							
LBS (B5/B14)	402							
LBS (B3)	400							

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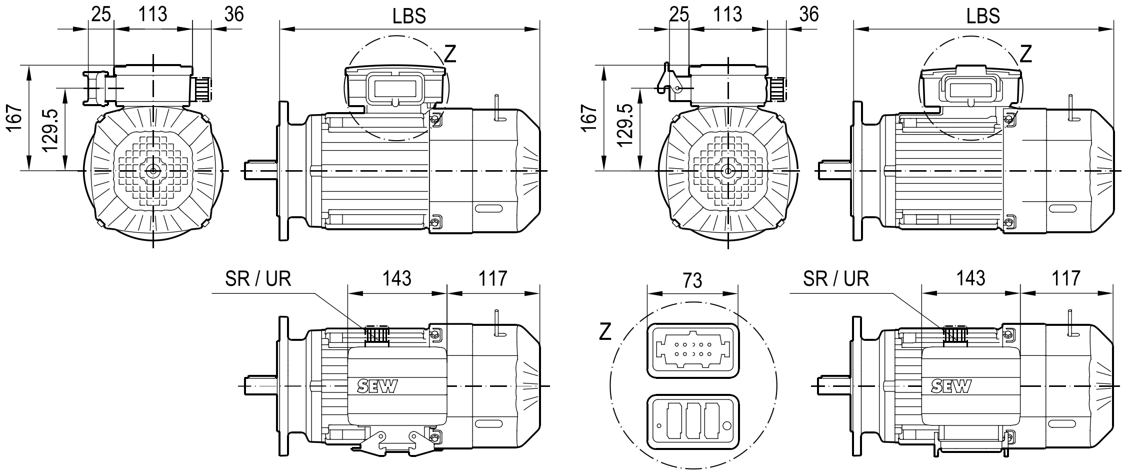
09 934 03 14
2(2)

/IV



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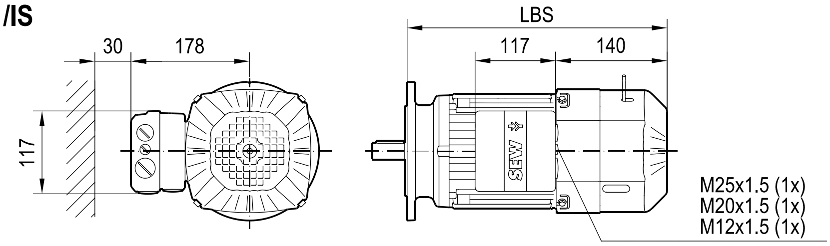

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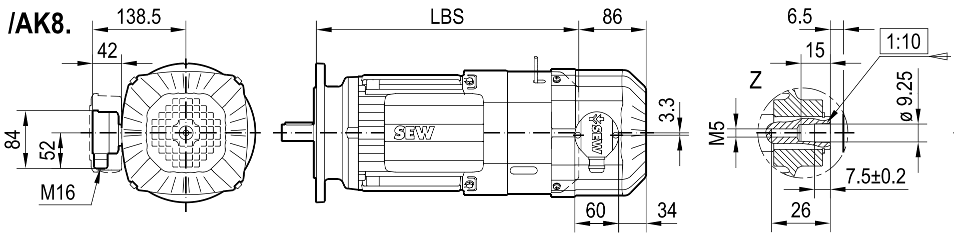

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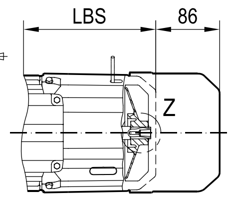
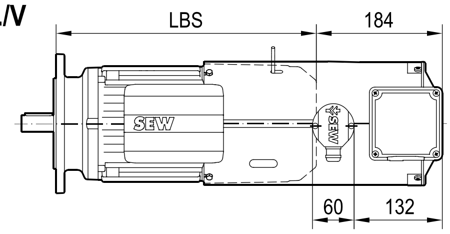
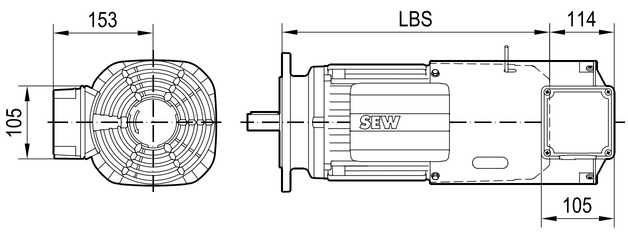


/EK8./V
/AK8./V



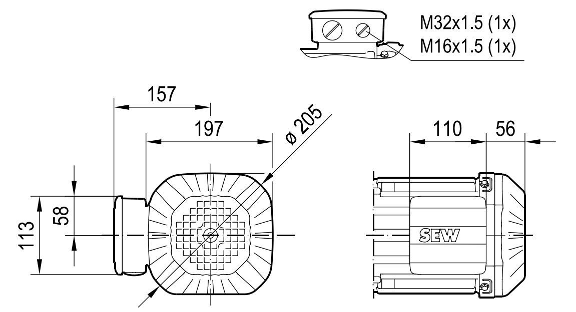
/V

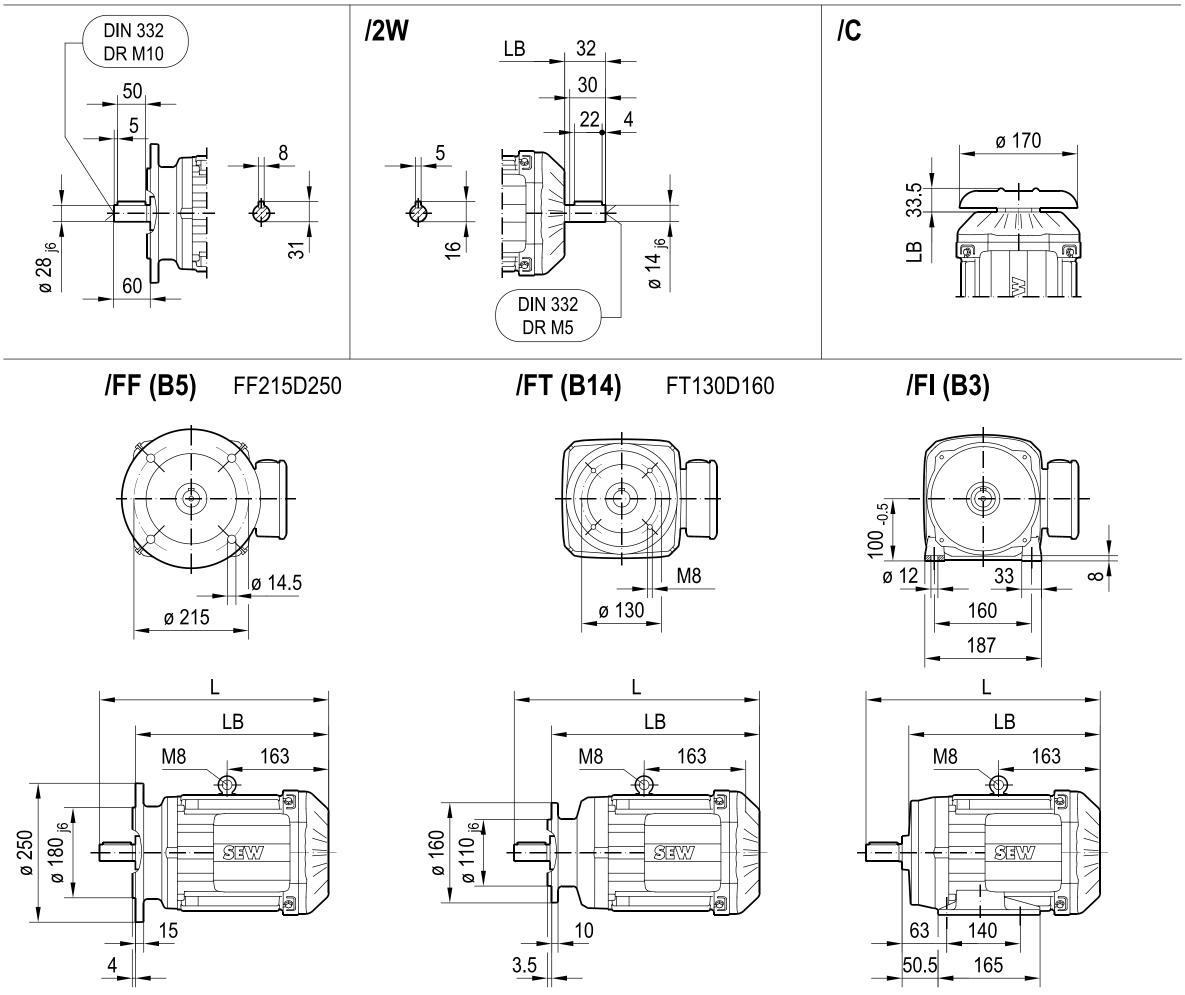


(→ 📖)	100LS							
LS	462							
LBS (B5/B14)	402							
LBS (B3)	400							

DRN100LM 2
DRN100L 4,6,8
DR2S100L 4

08 570 04 14
1(2)





(→ 📖)	100LM	100L(R)						
L	419	419						
LB (B5/B14)	359	359						
LB (B3)	357	357						

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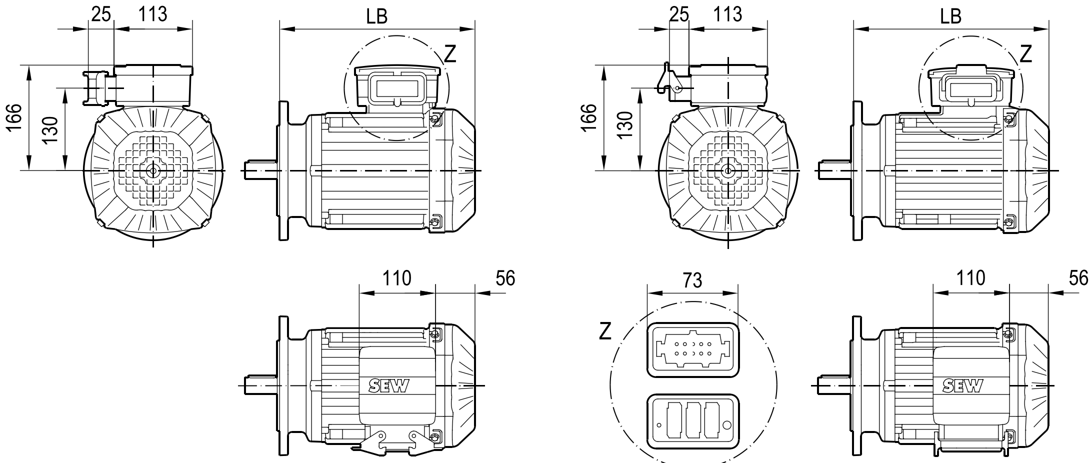
08 570 04 14
2(2)

/IV



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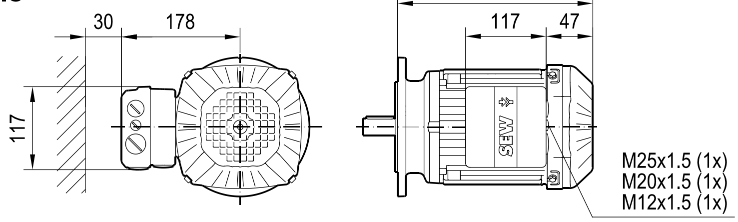

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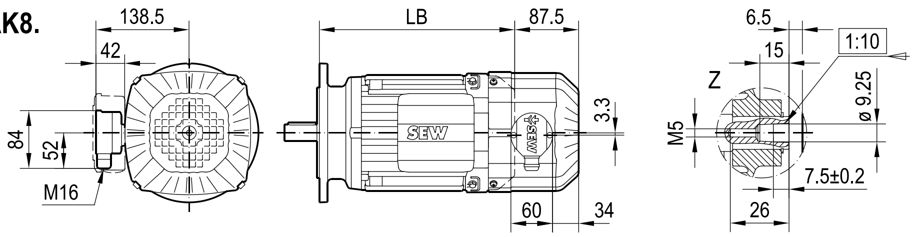
/AK8.



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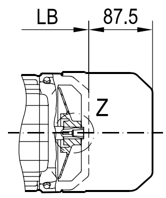
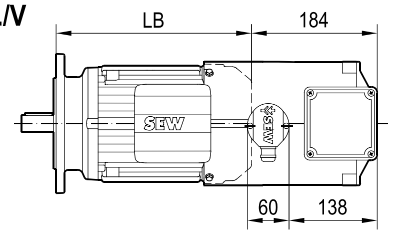
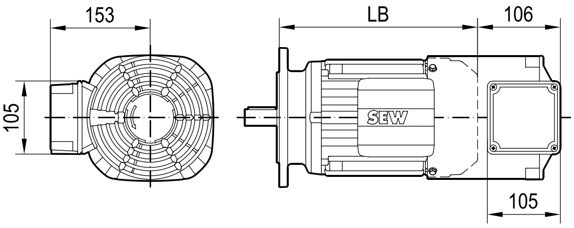


/EK8./V
/AK8./V



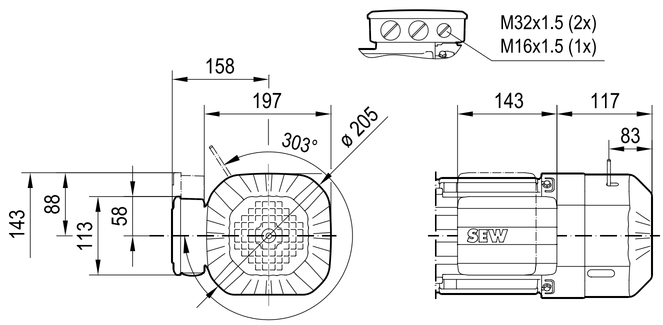
/V

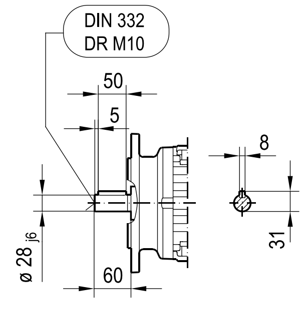


(→ 📖)	100LM	100L(R)	100L(R)					
L	419	419	419					
LB (B5/B14)	359	359	359					
LB (B3)	357	357	357					

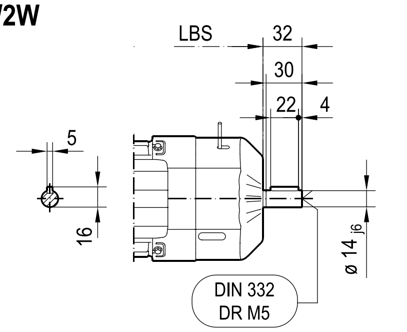
DRN100LM 2 BE
DRN100L 4,6,8 BE
DR2S100L 4 BE

09 935 04 14
1(2)

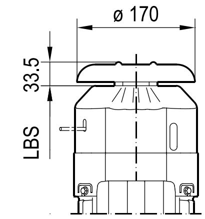




/2W



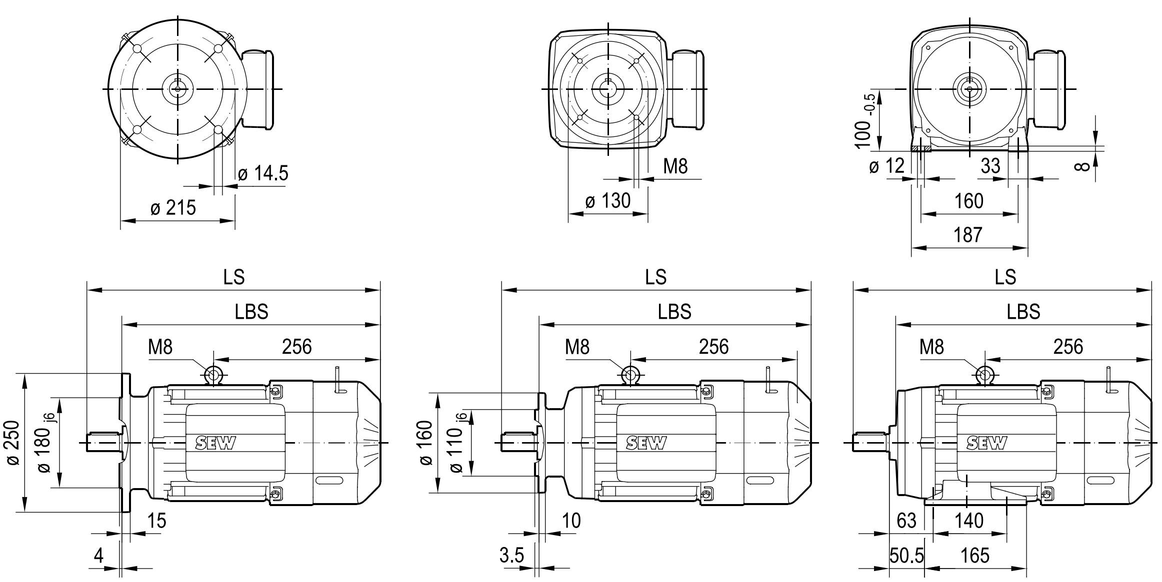
/C



/FF (B5) FF215D250

/FT (B14) FT130D160

/FI (B3)



(→ 📖)	100LM	100L(R)						
LS	512	512						
LBS (B5/B14)	452	452						
LBS (B3)	450	450						

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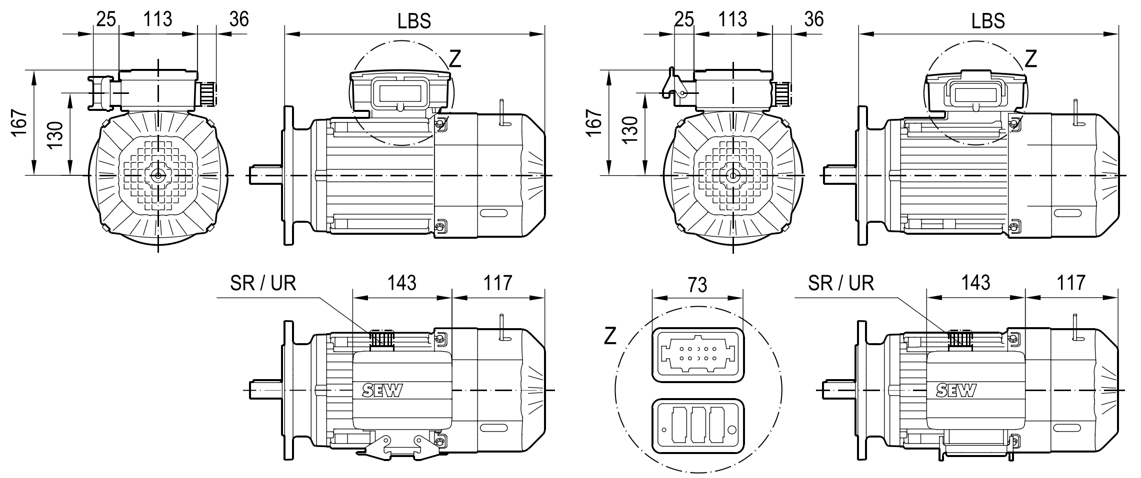
09 935 04 14
2(2)

/IV



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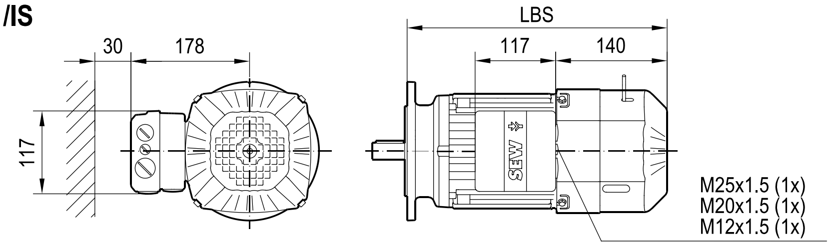

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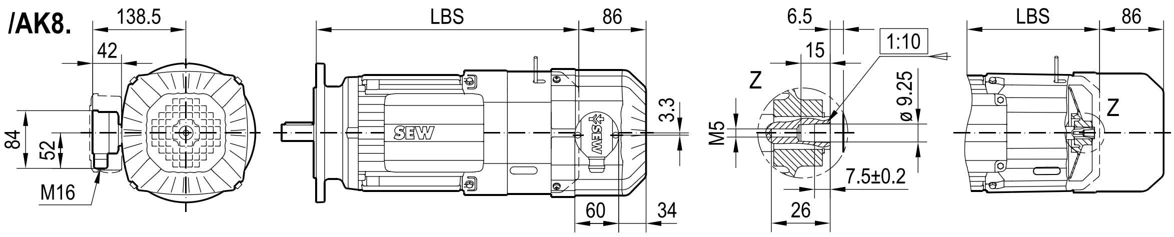

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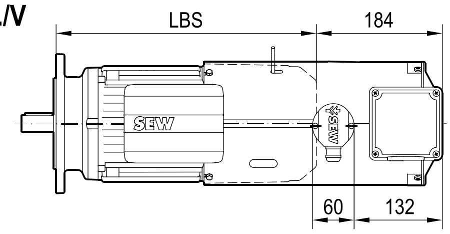

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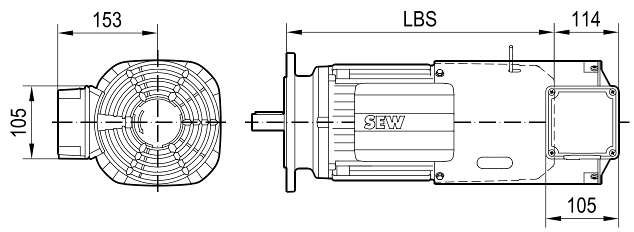

(→ 📖)	100LM	100L(R)						
LS	512	512						
LBS (B5/B14)	452	452						
LBS (B3)	450	450						

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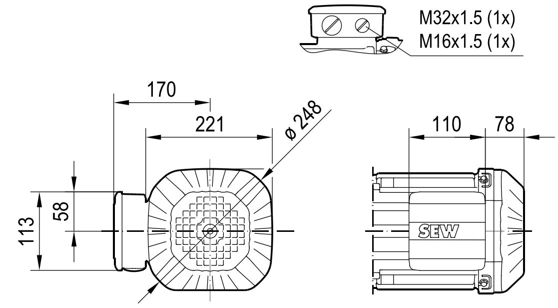
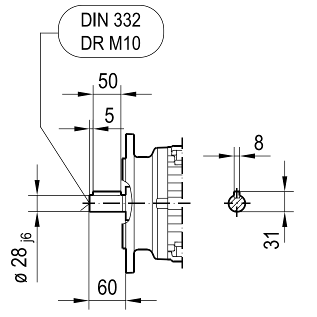
DRN112M 2,4,6,8

08 571 03 14
1(2)





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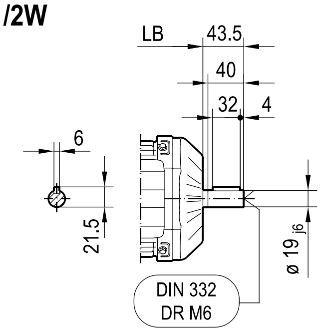

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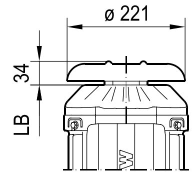

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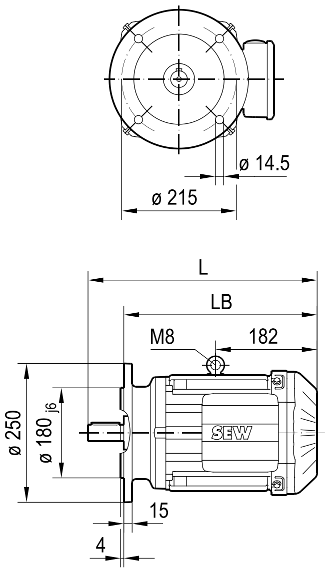

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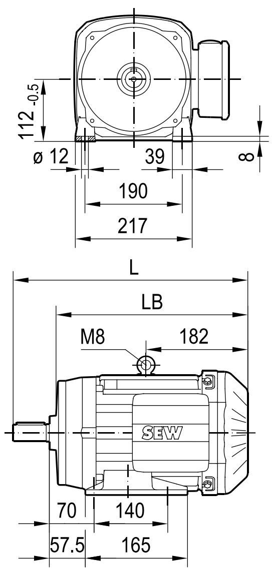

(→ 📖)	112M							
L	447							
LB (B5/B14)	387							
LB (B3)	385							

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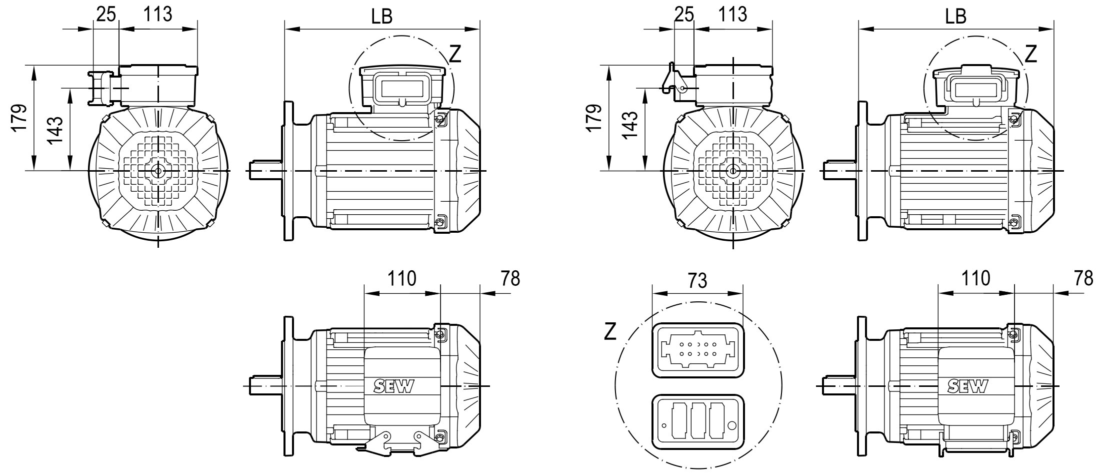
08 571 03 14
2(2)

/IV



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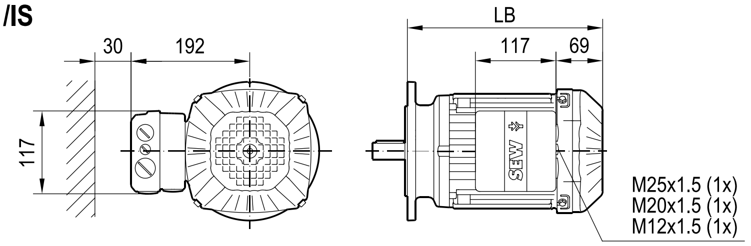

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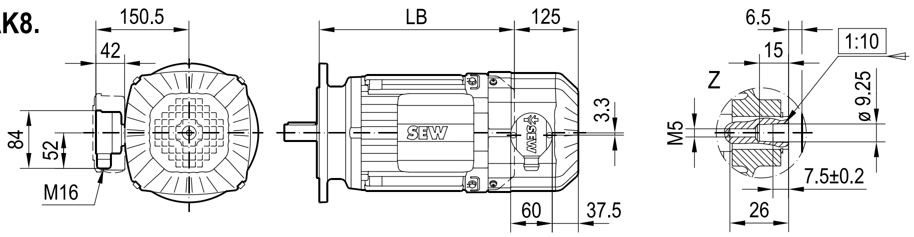

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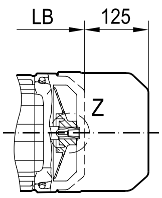

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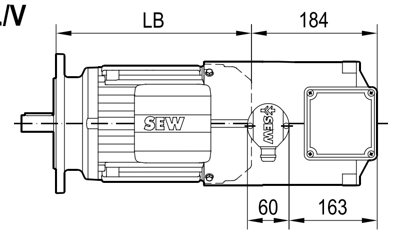

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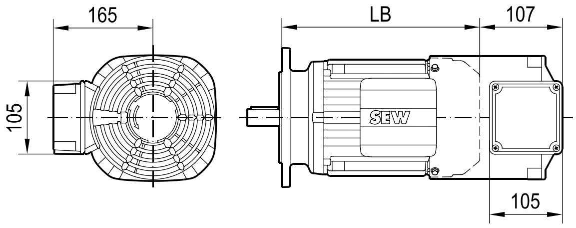

(→ 📖)	112M							
L	447							
LB (B5/B14)	387							
LB (B3)	385							

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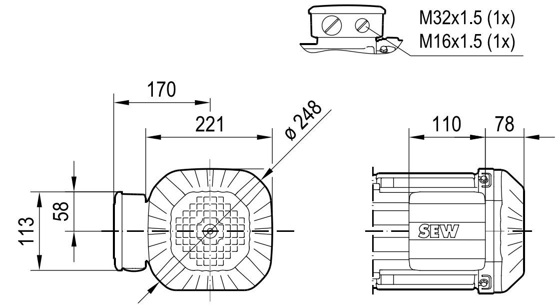
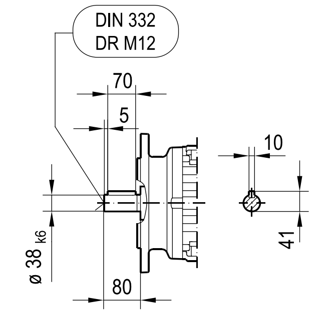
DR2S112M 4

08 284 01 21
1(2)





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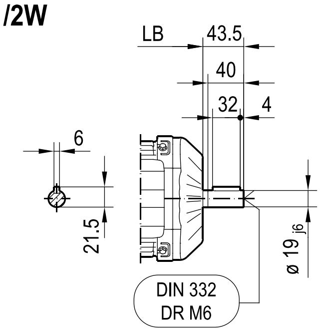

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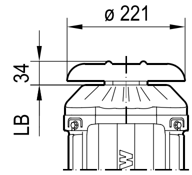

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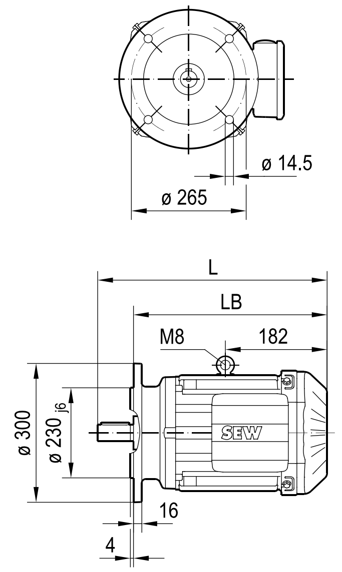

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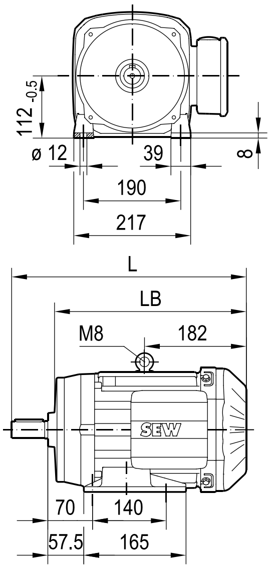
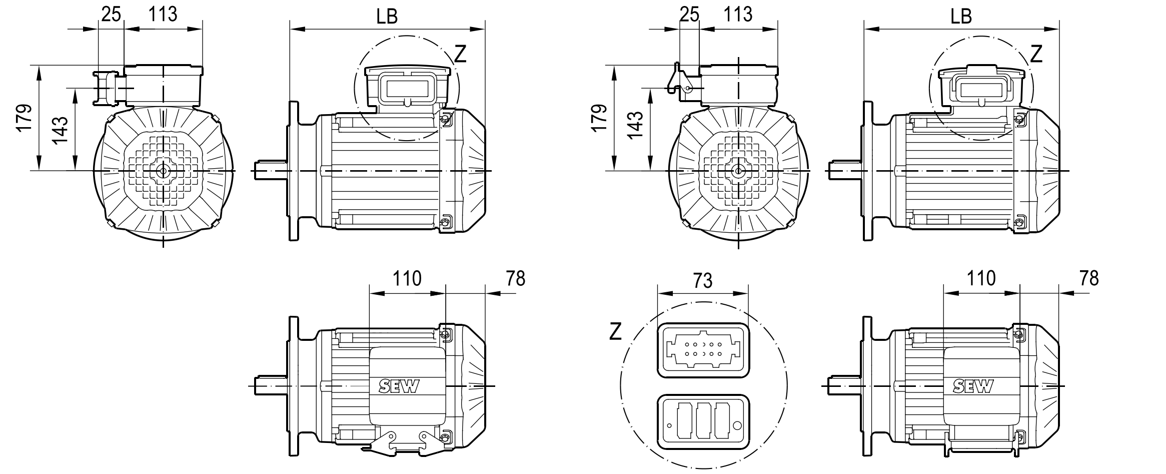


(→ 📖)	112M							
L	467							
LB (B5/B14)	387							
LB (B3)	385							

08 284 01 21
2(2)

/IV



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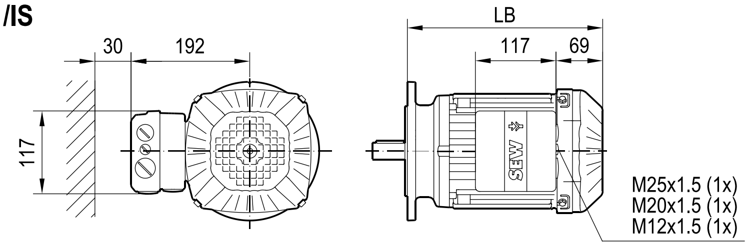

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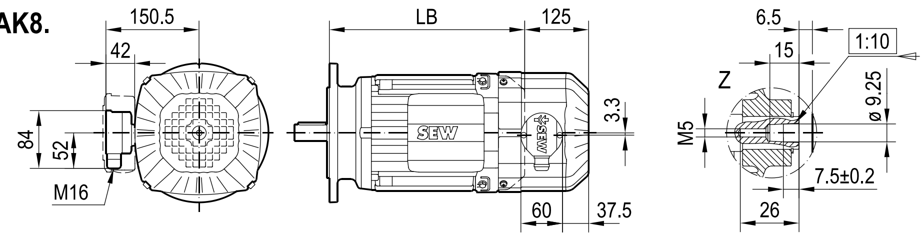

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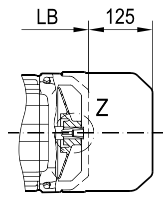

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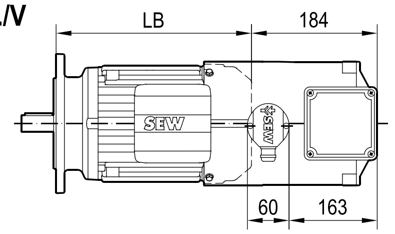

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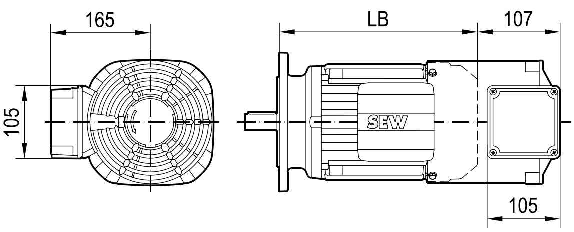

(→)	112M							
L	467							
LB (B5/B14)	387							
LB (B3)	385							

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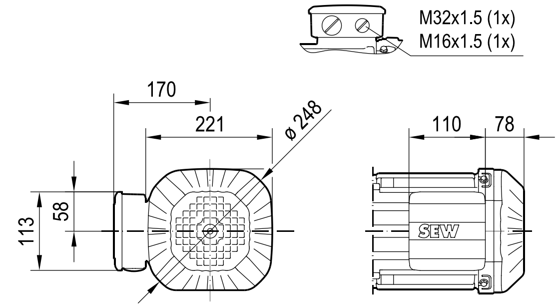
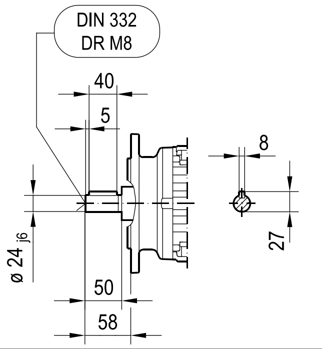
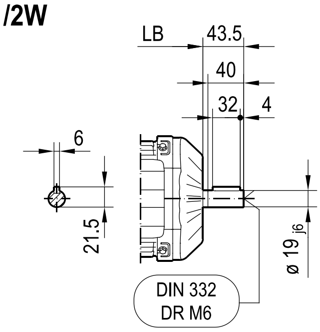
DRN112M 6

08 150 03 19
1(2)





/2W



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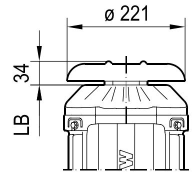

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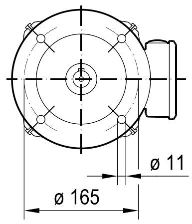

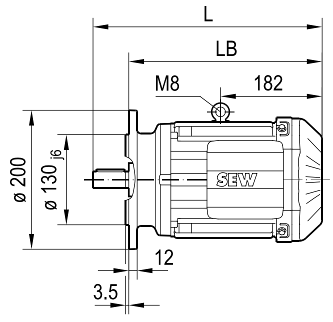

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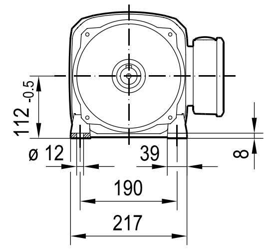

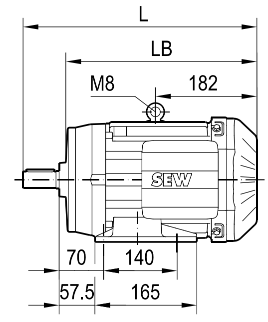

(→ 📖)	112M							
L	437							
LB (B5/B14)	379							
LB (B3)	385							

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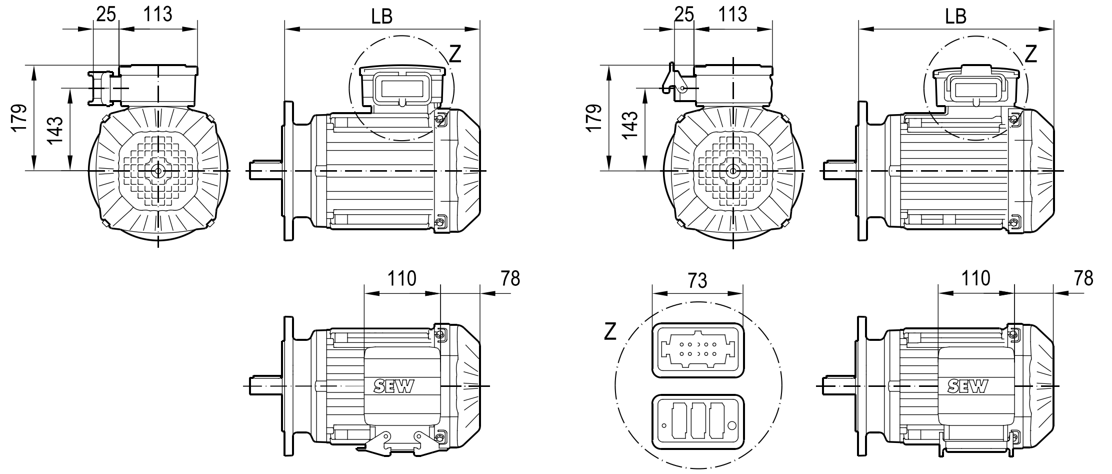
08 150 03 19
2(2)

/IV



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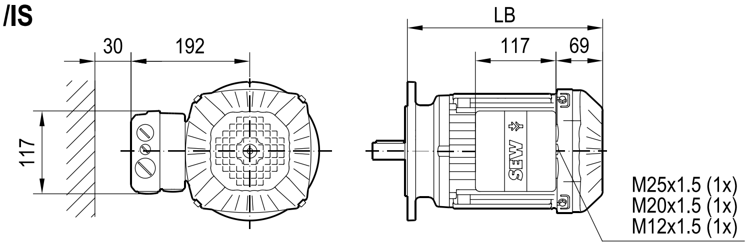

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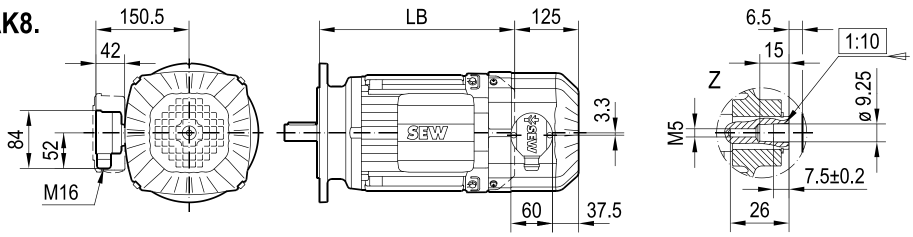

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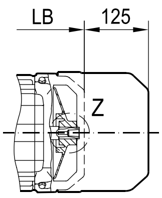

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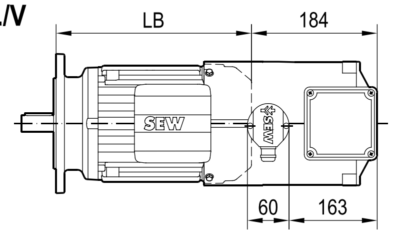
/AK8./V



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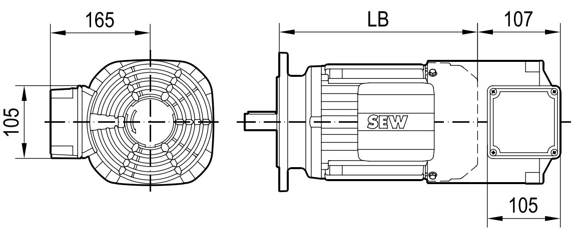

(→ 📖)	112M							
L	437							
LB (B5/B14)	379							
LB (B3)	385							

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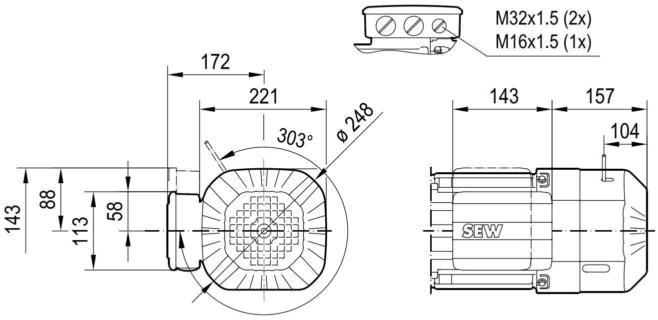
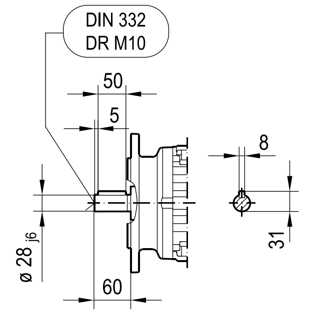
DRN112M 2,4,6,8 BE

09 936 03 14
1(2)





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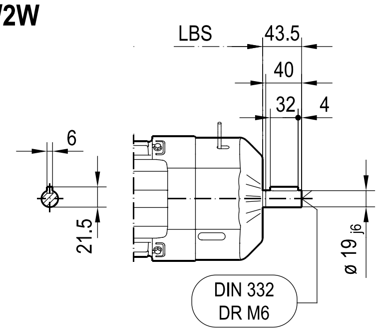

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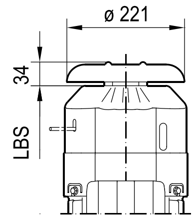

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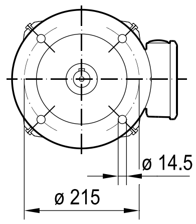

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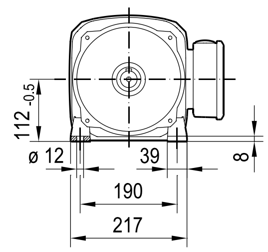

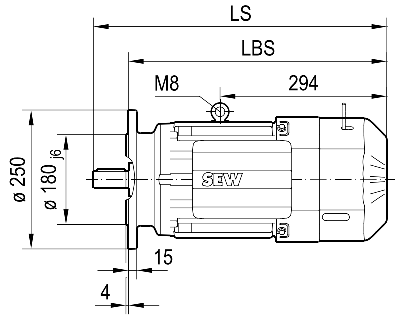

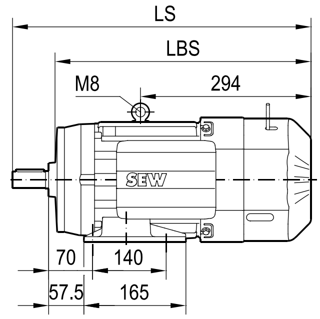

(→ 📖)	112M							
LS	559							
LBS (B5/B14)	499							
LBS (B3)	497							

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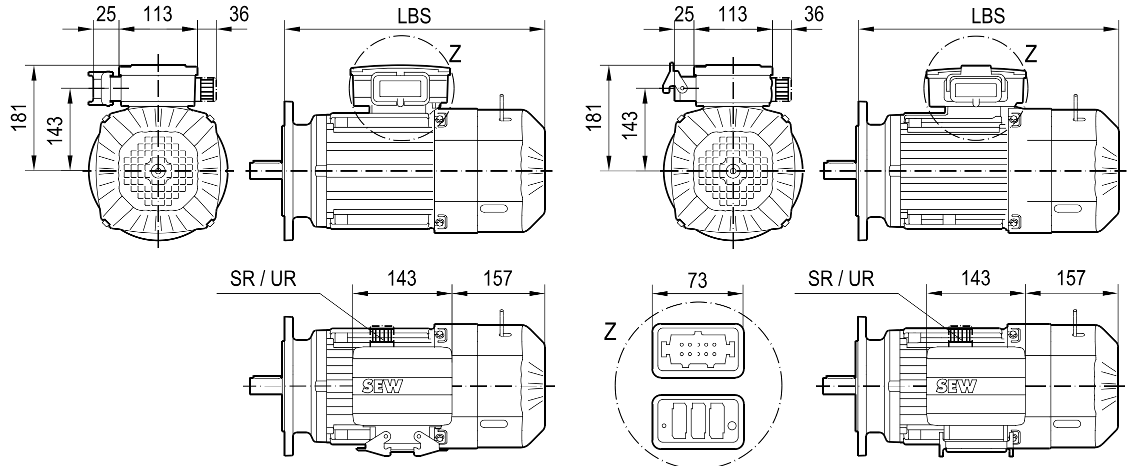
09 936 03 14
2(2)

/IV



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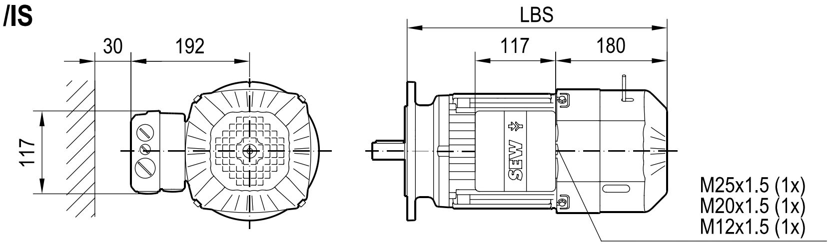

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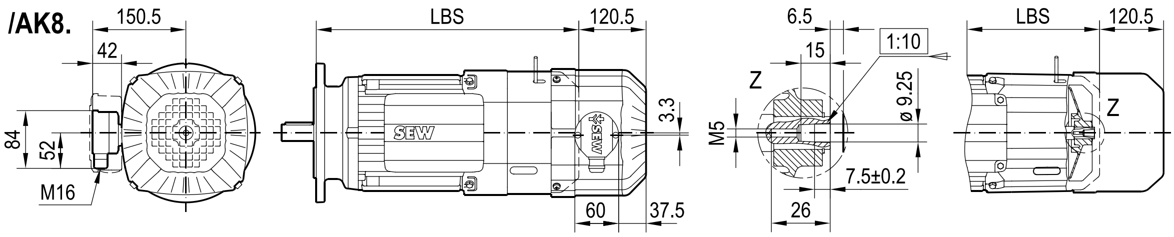
/EK8A



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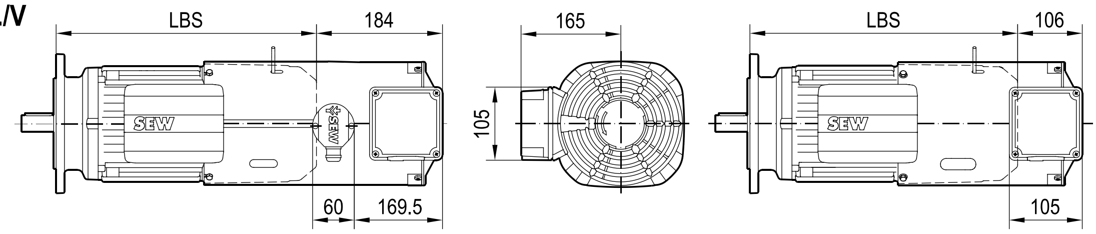
/AK8./V

/V



(→ 📖)	112M							
LS	559							
LBS (B5/B14)	499							
LBS (B3)	497							

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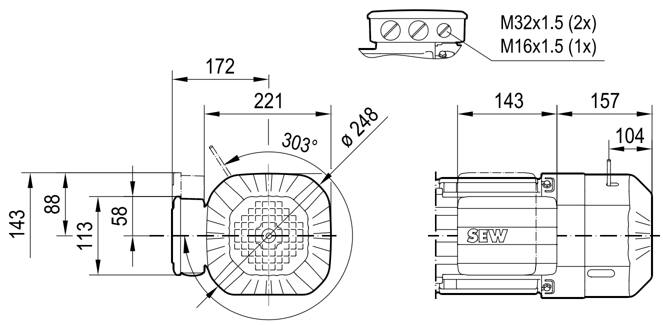
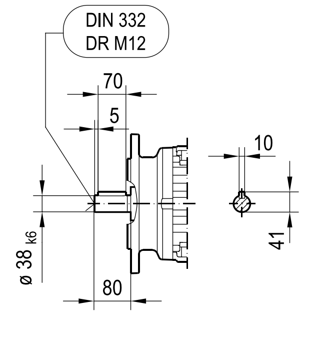
DR2S112M 4 BE

09 197 01 21
1(2)





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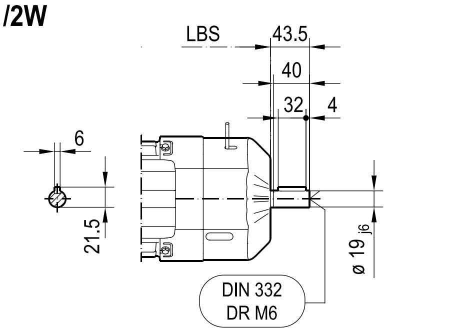

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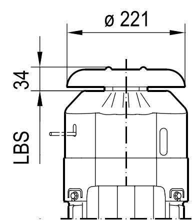

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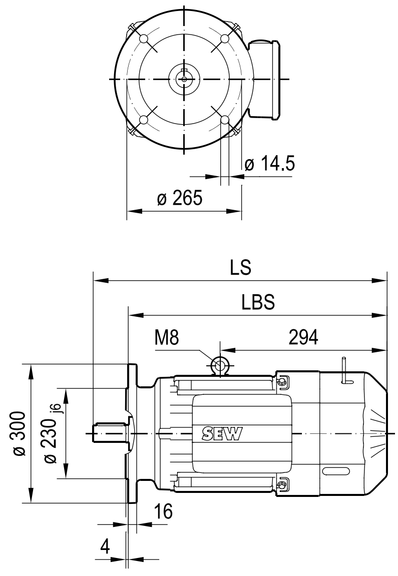
FF265D300



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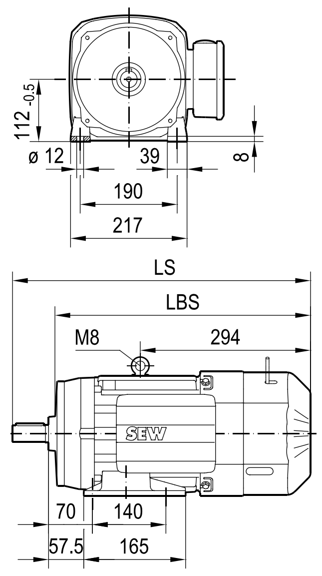

(→ 📖)	112M							
LS	579							
LBS (B5/B14)	499							
LBS (B3)	497							

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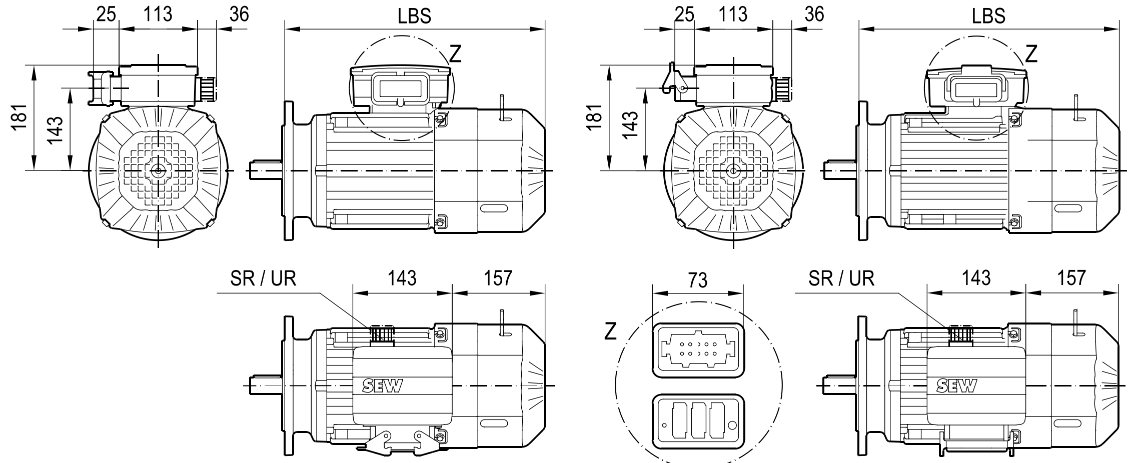
09 197 01 21
2(2)

/IV



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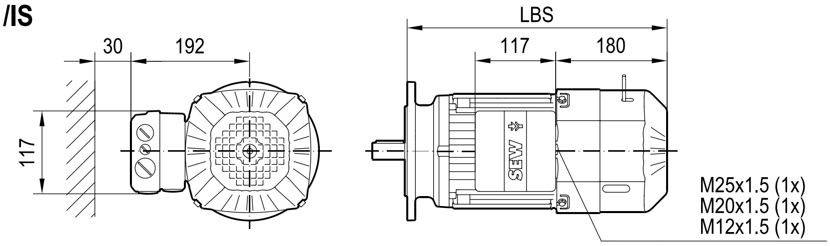

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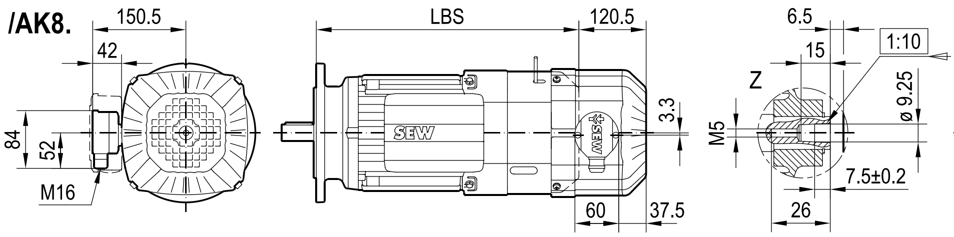
/AK8.



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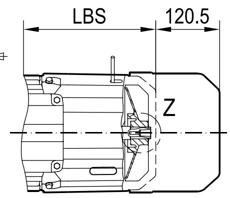
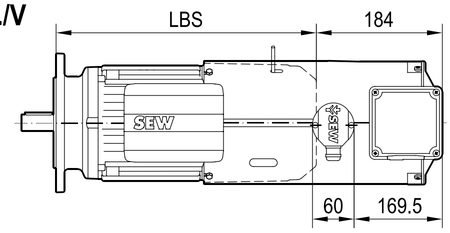
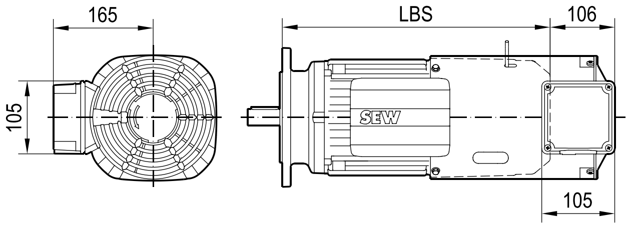


/EK8./V
/AK8./V



/V



(→ 📖)	112M							
LS	579							
LBS (B5/B14)	499							
LBS (B3)	497							

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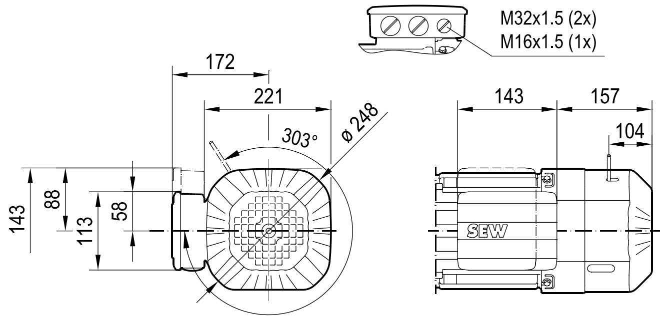
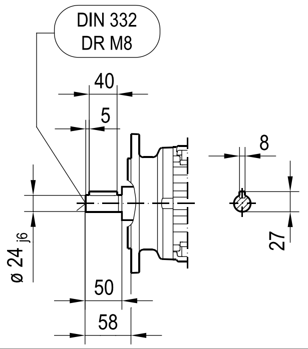
DRN112M 6 BE

09 151 03 19
1(2)





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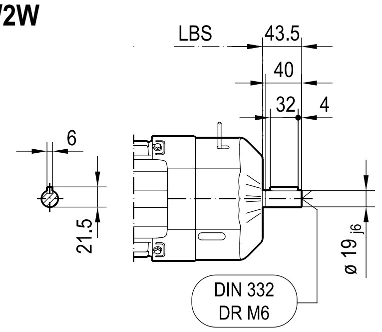

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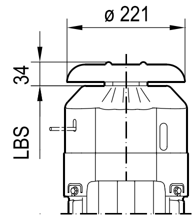

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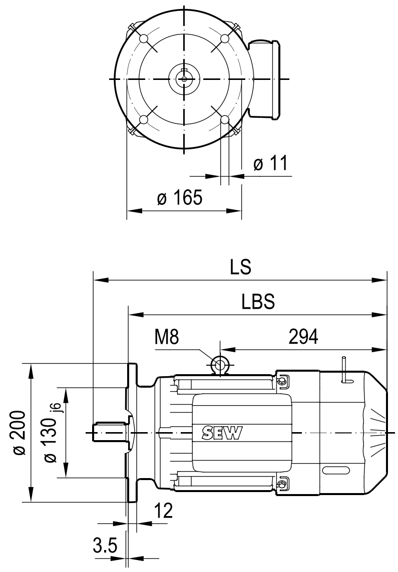

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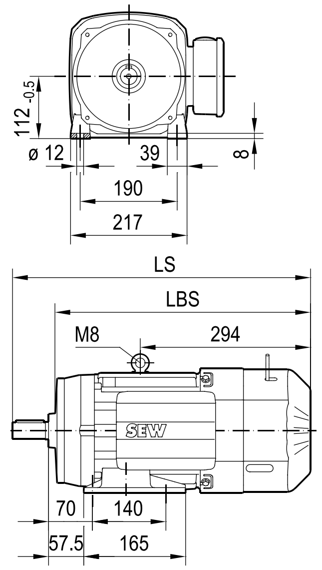
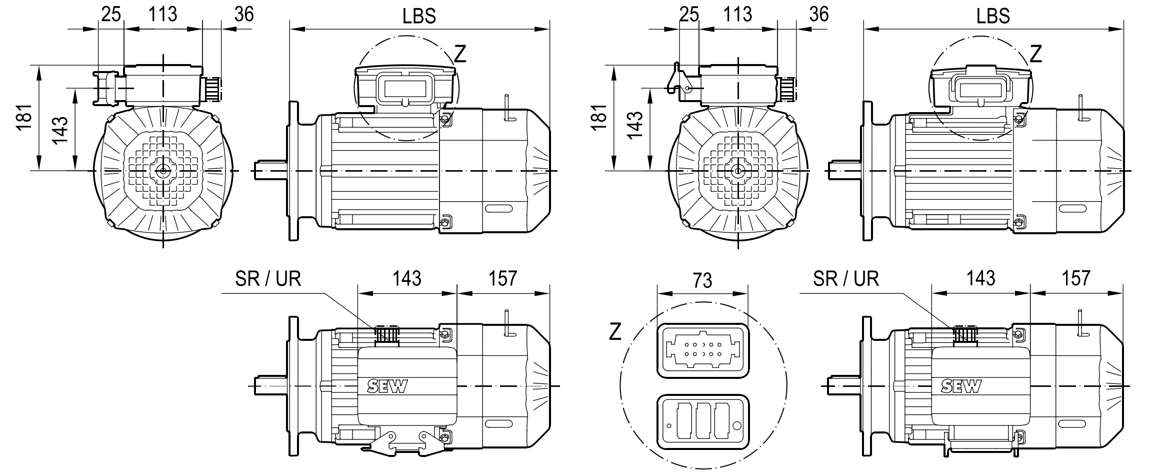


(→ 📖)	112M							
LS	549							
LBS (B5/B14)	491							
LBS (B3)	497							

09 151 03 19
2(2)

/IV



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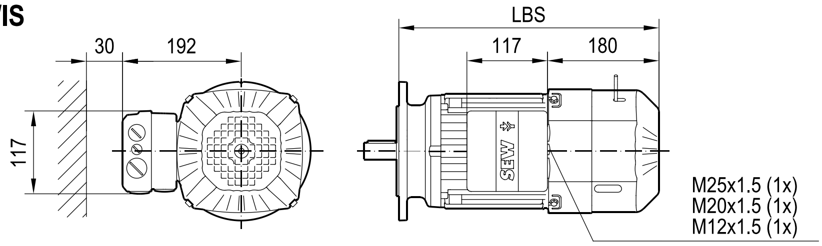

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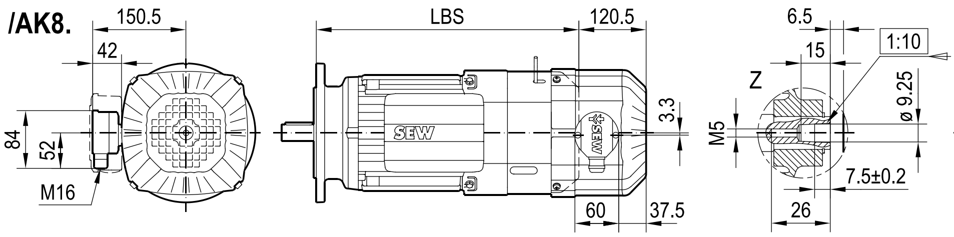

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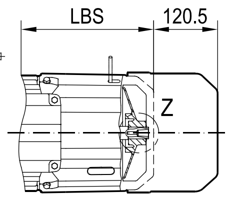

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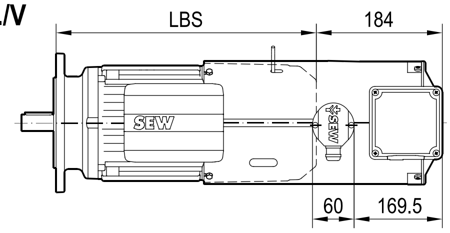
/AK8./V



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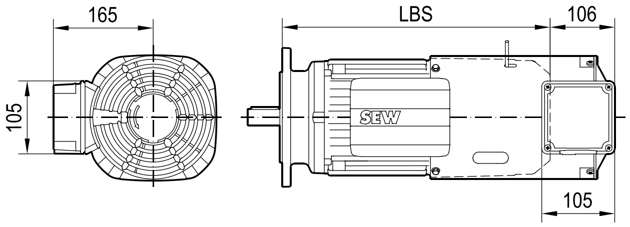

(→ 📖)	112M							
LS	549							
LBS (B5/B14)	491							
LBS (B3)	497							

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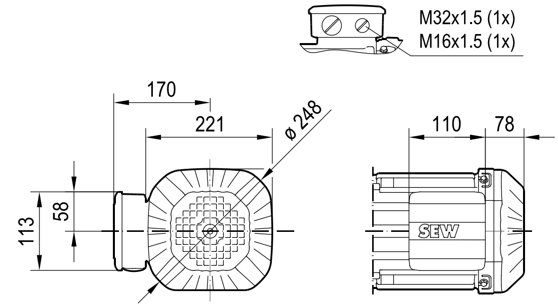
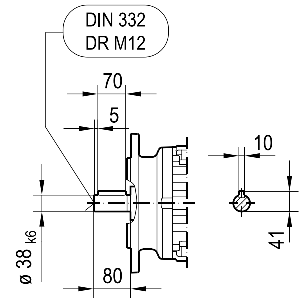
DRN132S 2,4,6,8
DR2S132S 4

08 572 03 14
1(2)





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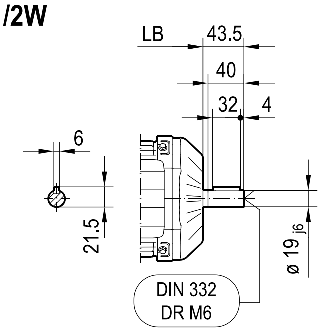

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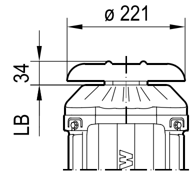

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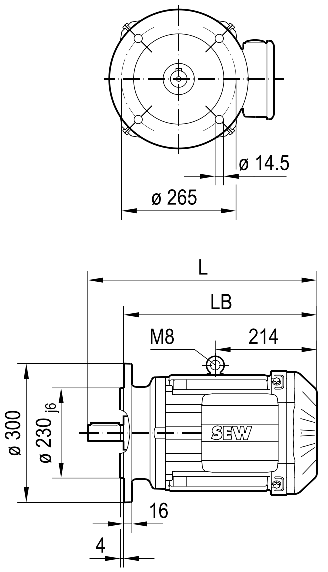
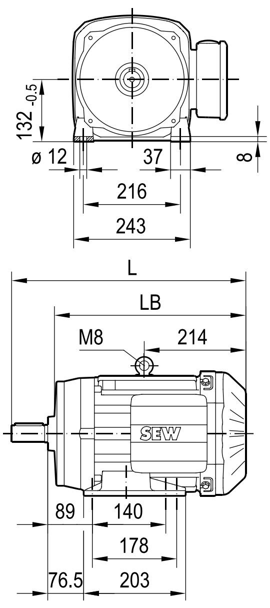


/FI (B3)



(→ 📖)	132S							
L	517							
LB (B5/B14)	437							
LB (B3)	435							

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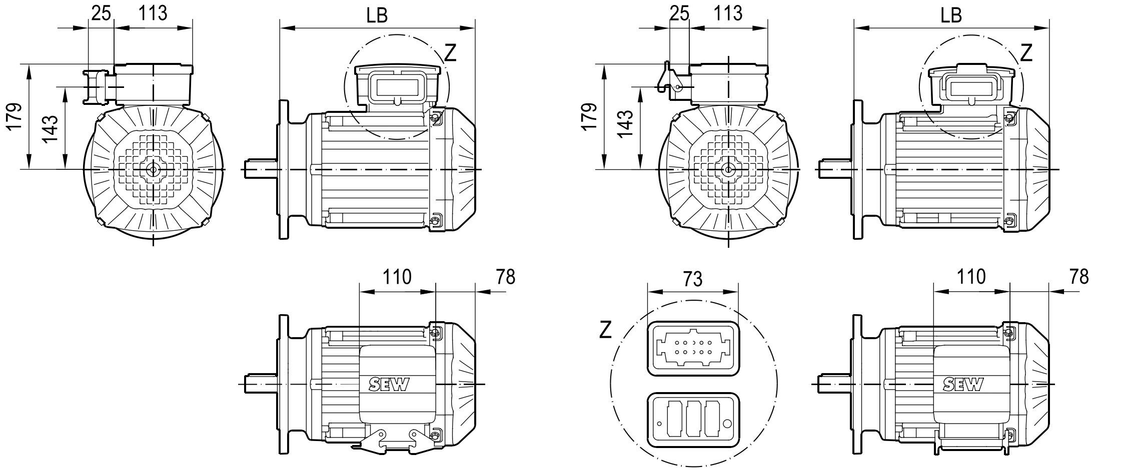
08 572 03 14
2(2)

/IV



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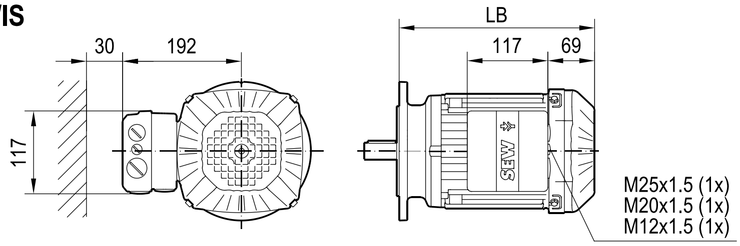

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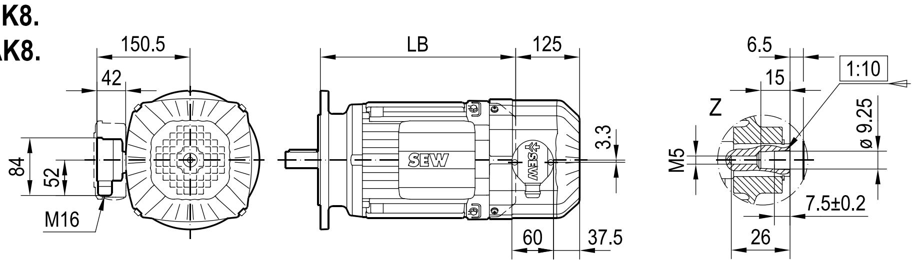

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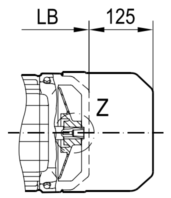

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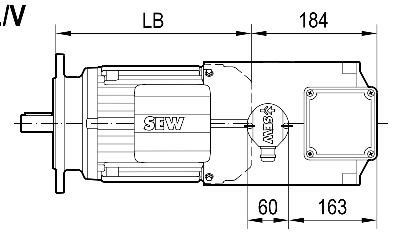
/AK8./V



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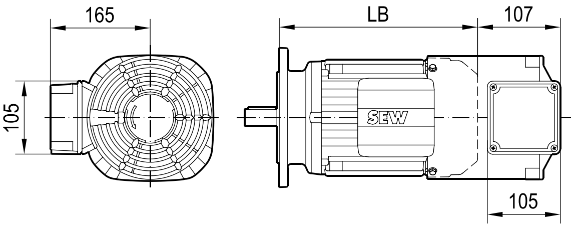

(→ 📖)	132S						
L	517						
LB (B5/B14)	437						
LB (B3)	435						

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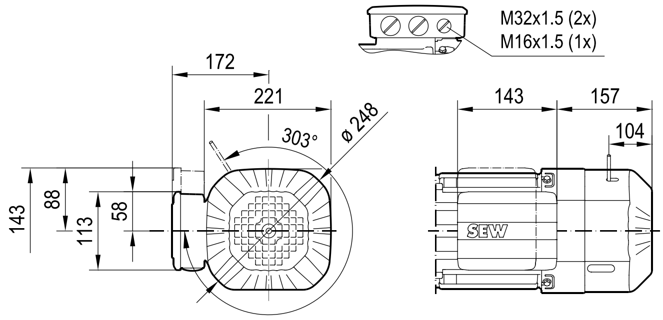
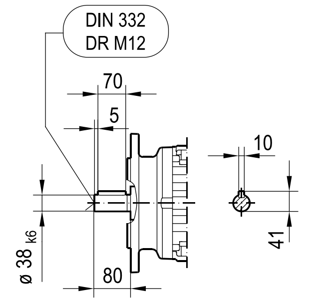
DRN132S 2,4,6,8 BE
DR2S132S 4 BE

09 937 03 14
1(2)





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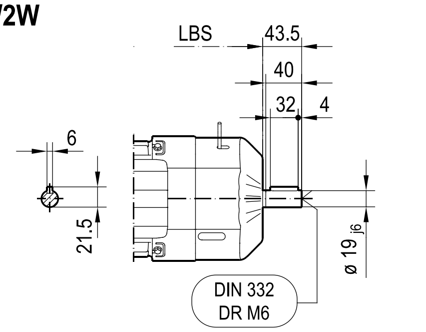

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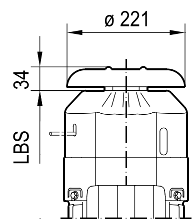

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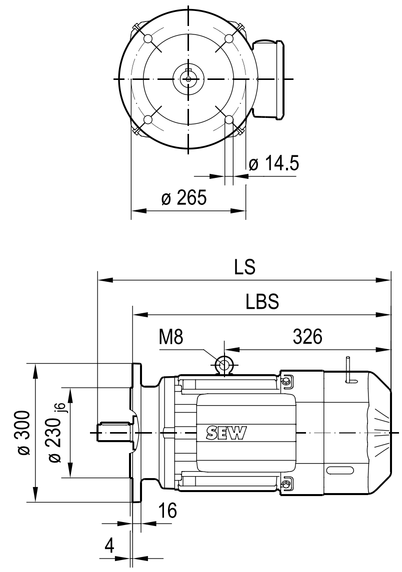

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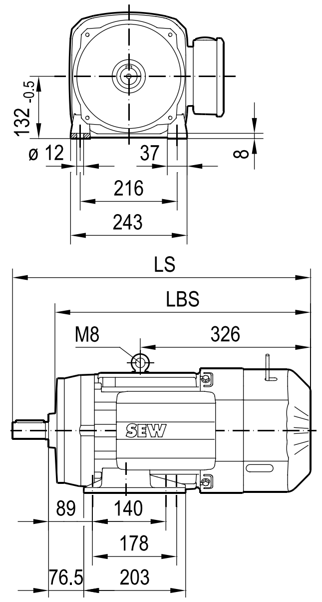

(→ 📖)	132S							
LS	629							
LBS (B5/B14)	549							
LBS (B3)	547							

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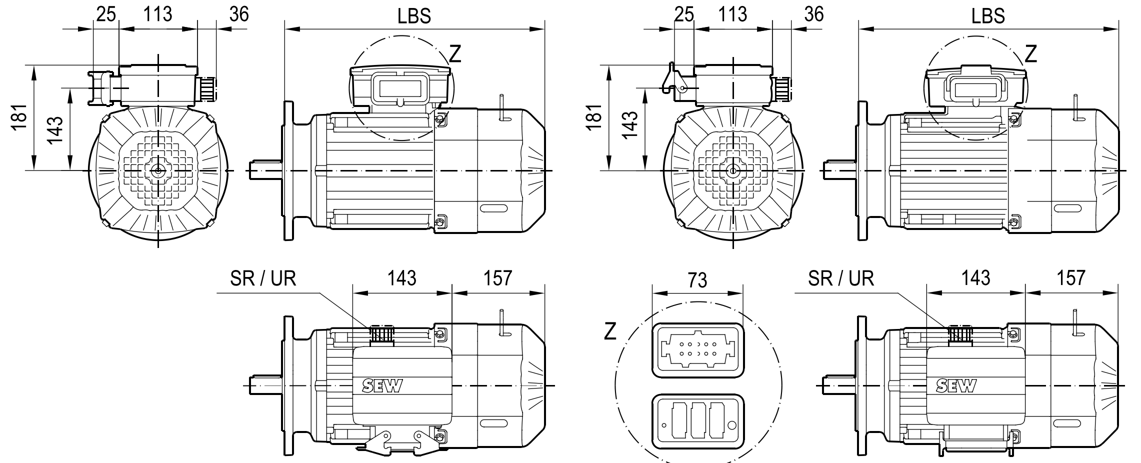
09 937 03 14
2(2)

/IV



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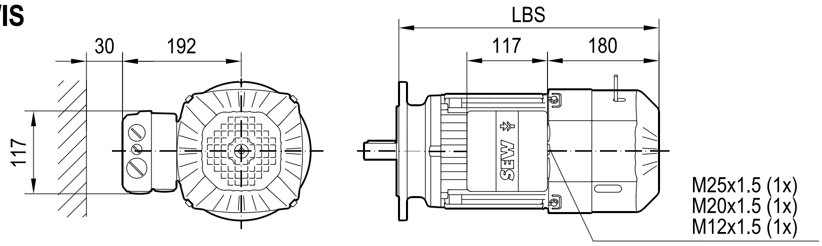

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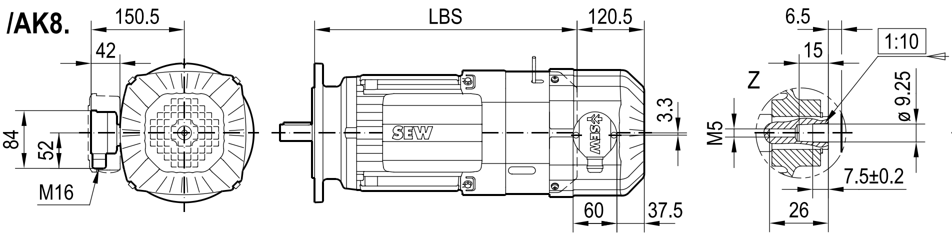

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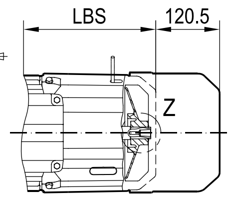

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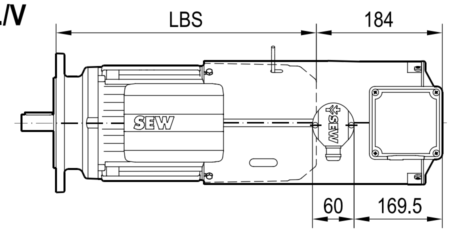
/AK8./V



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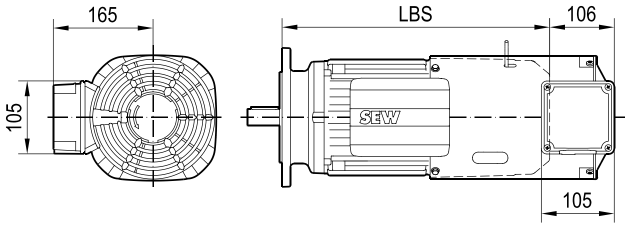
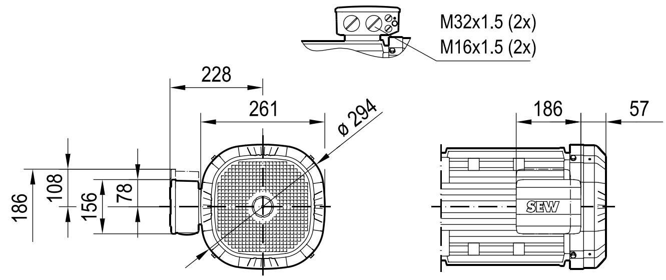


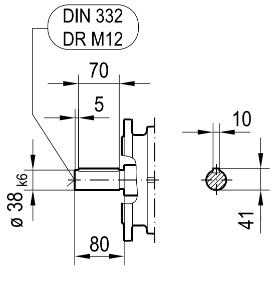
(→ 📖)	132S							
LS	629							
LBS (B5/B14)	549							
LBS (B3)	547							

30590116/EN – 03/2023

DRN132M 4,8
DR2S132M 4
DRN132L 4,6

08 573 06 14
1(2)





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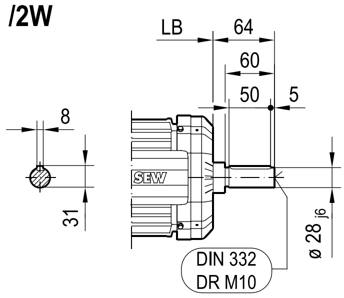

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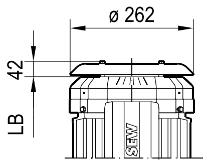

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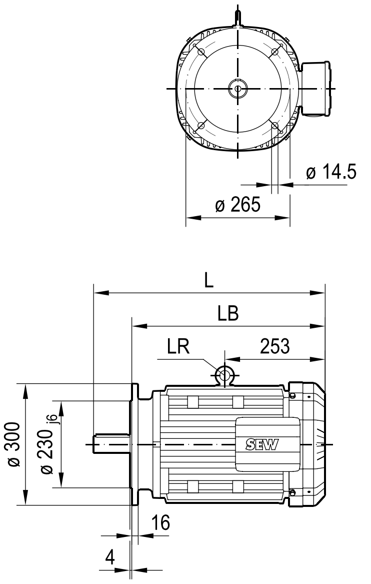

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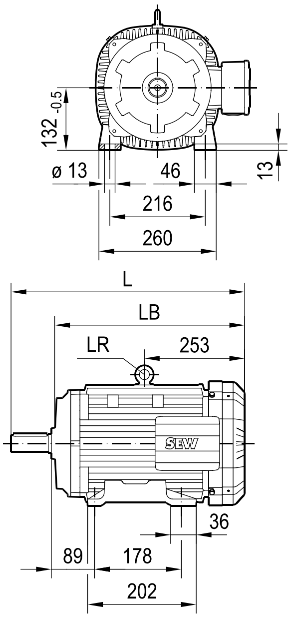
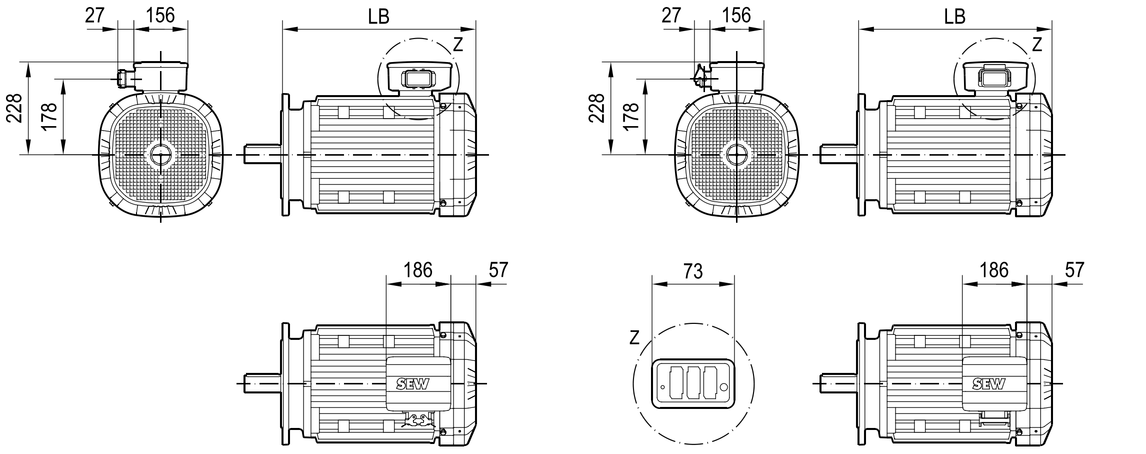


(→ 📖)	132M	132L						
L	519	544						
LB (B5/B14)	439	464						
LB (B3)	437	462						
LR	M10	M12						

30590116/EN – 03/2023

08 573 06 14
2(2)

/IV



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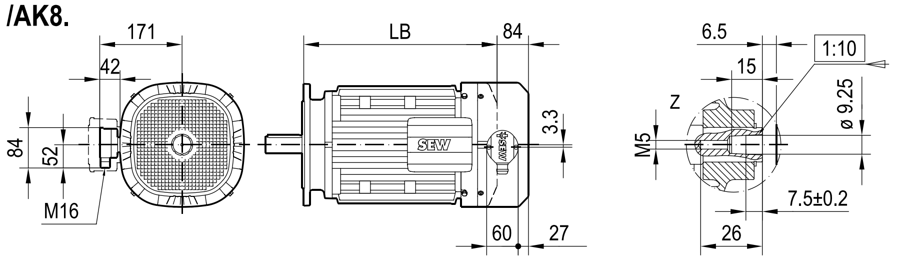
/AK8.



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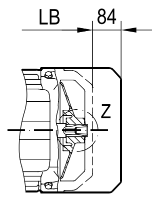

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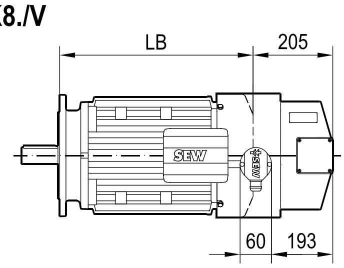
/AK8./V



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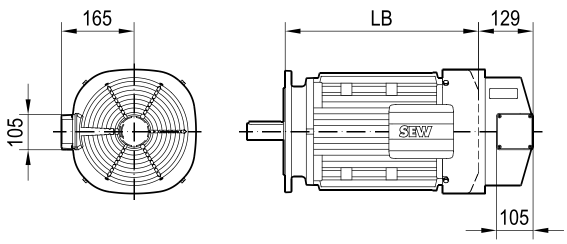

(→ 📖)	132M	132L						
L	519	544						
LB (B5/B14)	439	464						
LB (B3)	437	462						
LR	M10	M12						

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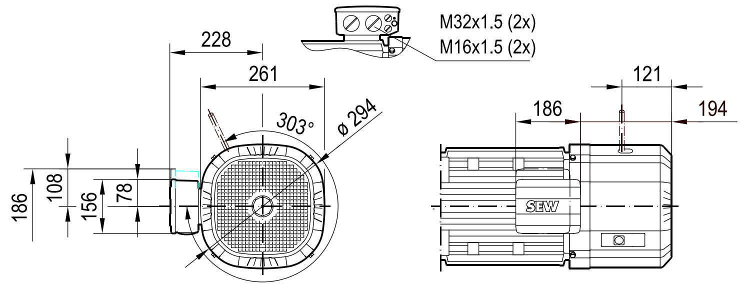
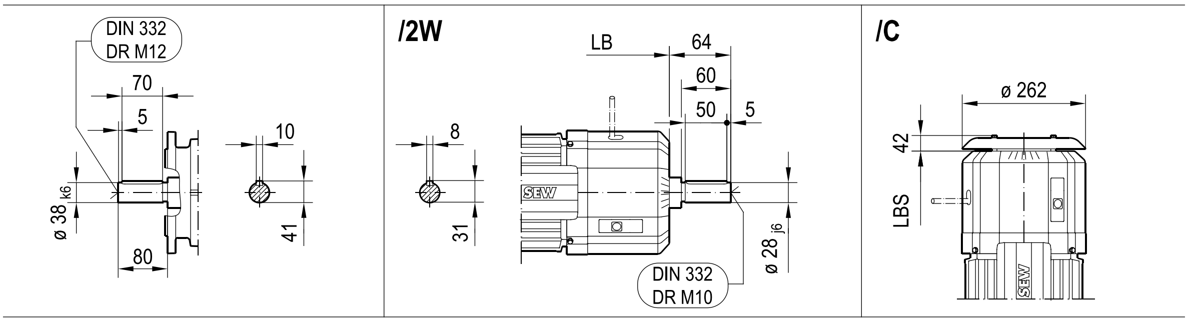
DRN132M 4,8 BE
DR2S132M 4 BE
DRN132L 4,6 BE

09 938 06 14
1(2)





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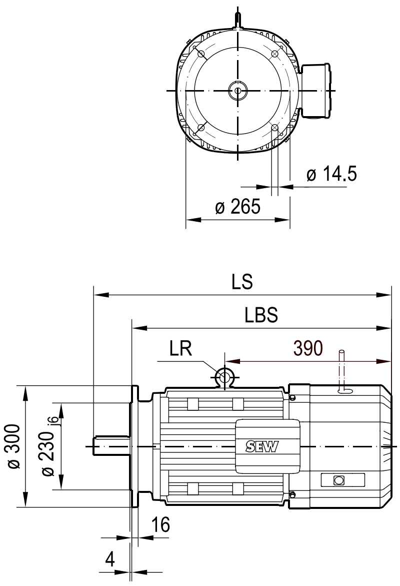

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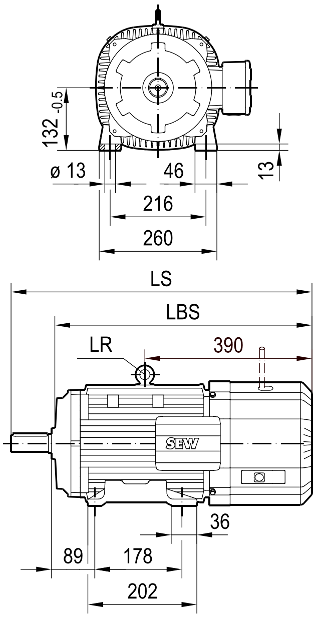

(→ 📖)	132M	132L						
LS	656	681						
LBS (B5/B14)	576	601						
LBS (B3)	574	599						
LR	M10	M12						

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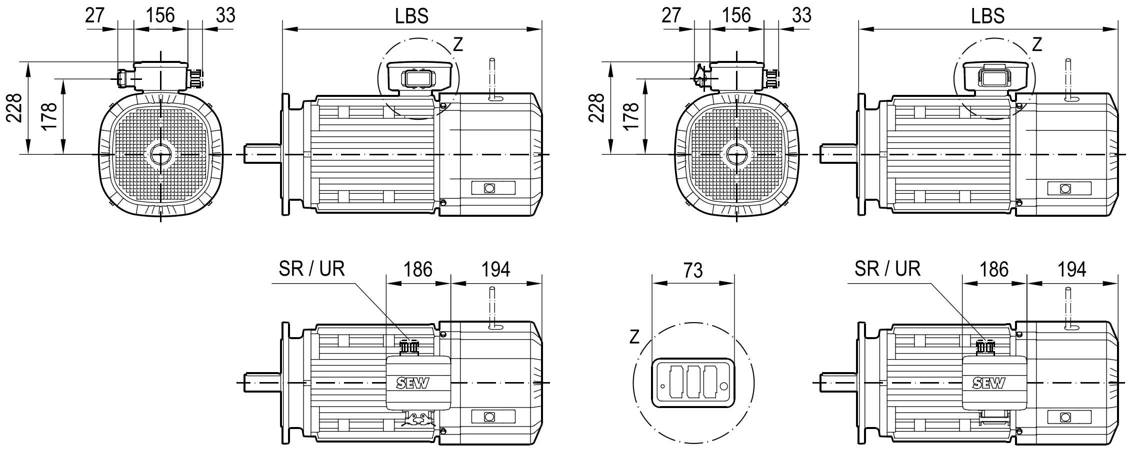
09 938 06 14
2(2)

/IV



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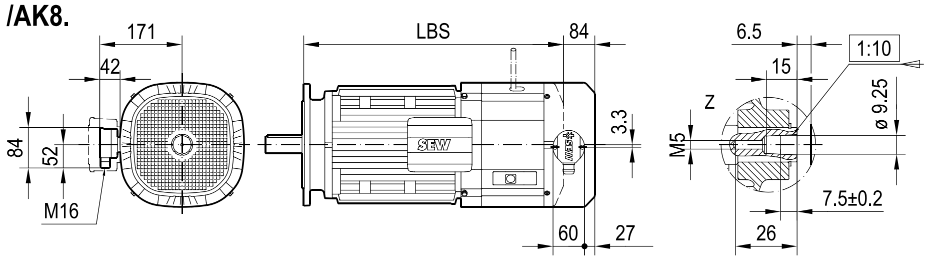
/AK8.



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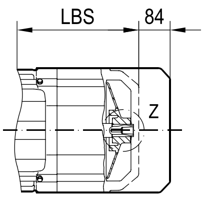

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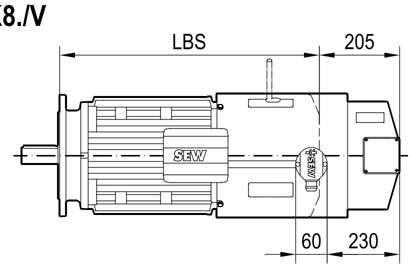
/AK8./V



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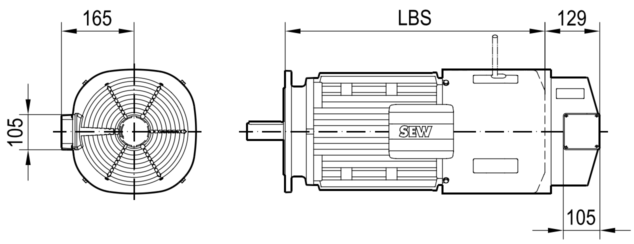
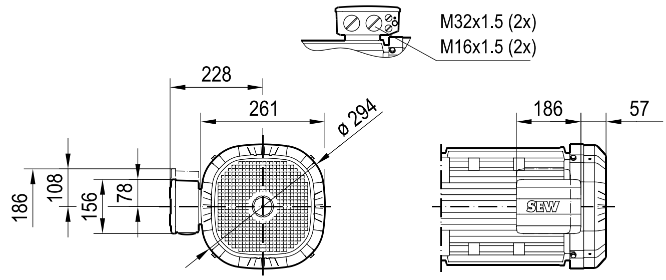
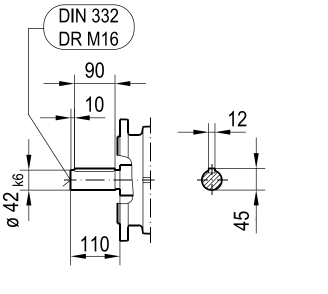


(→ 📖)	132M	132L						
LS	656	681						
LBS (B5/B14)	576	601						
LBS (B3)	574	599						
LR	M10	M12						

DR2S132L 4

08 283 02 21
1(2)





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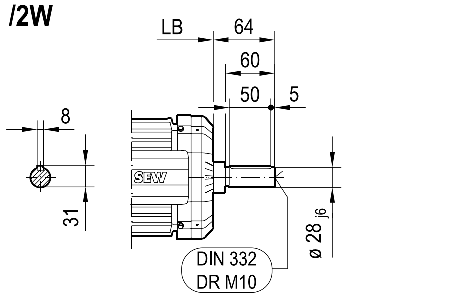
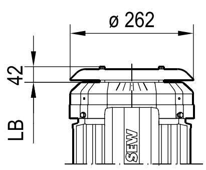


/C



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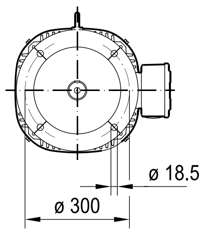
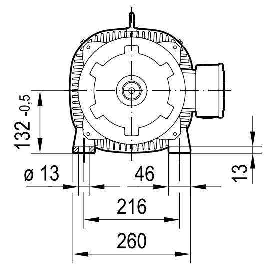
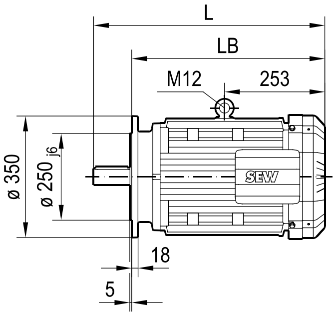
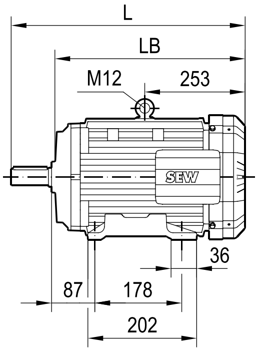


/FI (B3)







(→ 📖)	132L							
L	572							
LB (B5/B14)	462							
LB (B3)	459							

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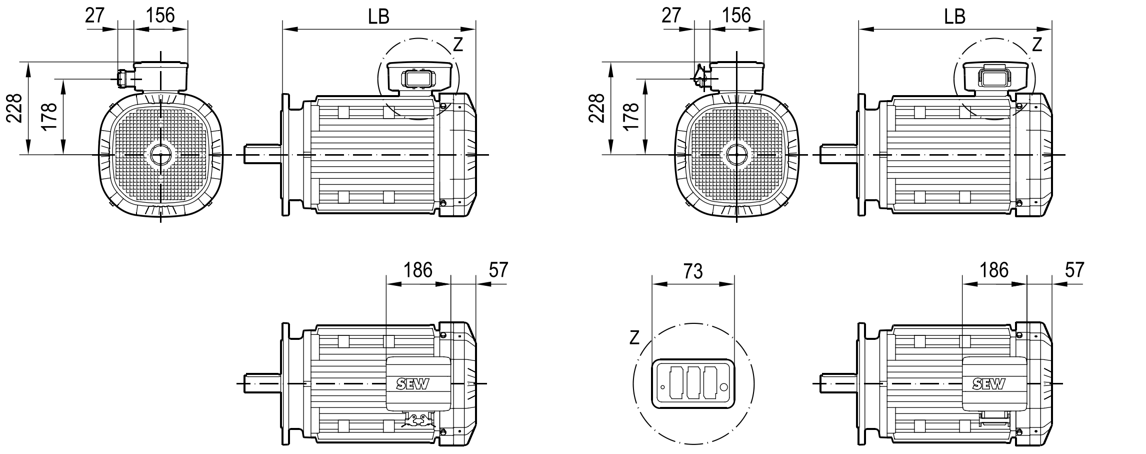
08 283 02 21
2(2)

/IV



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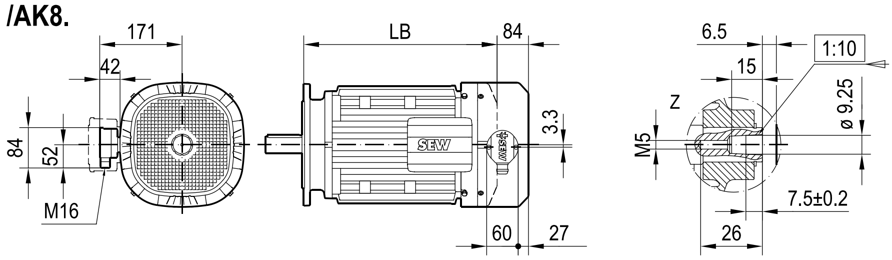

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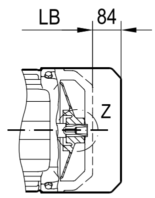

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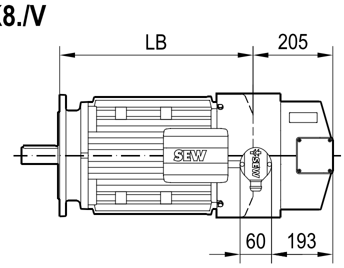

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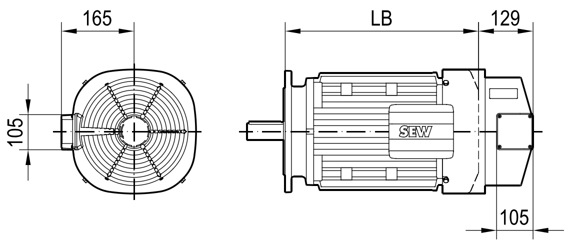

(→ 📖)	132L							
L	572							
LB (B5/B14)	462							
LB (B3)	459							

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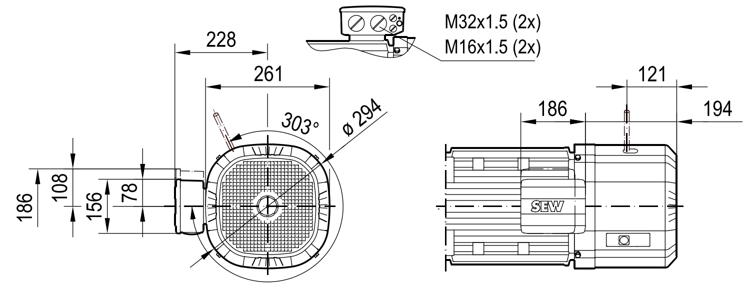
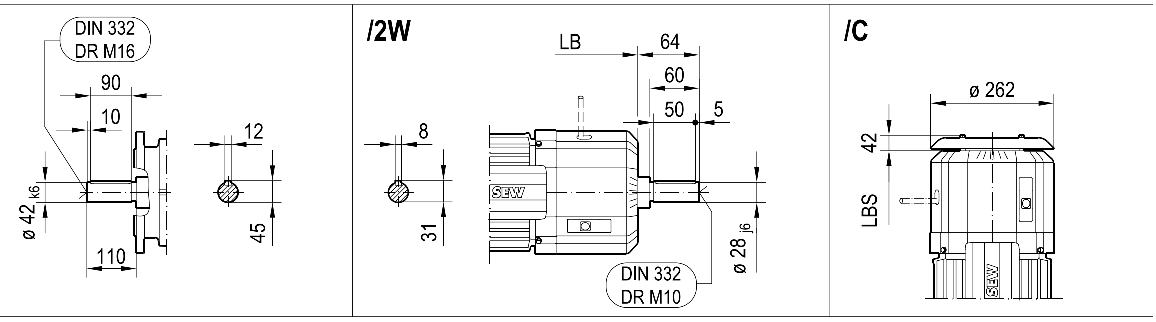
DR2S132L 4 BE

09 195 02 21
1(2)





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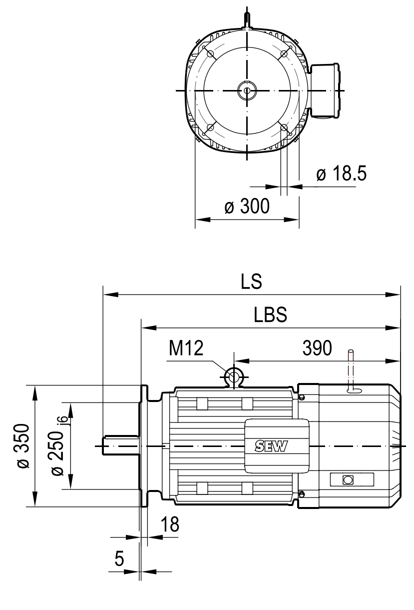

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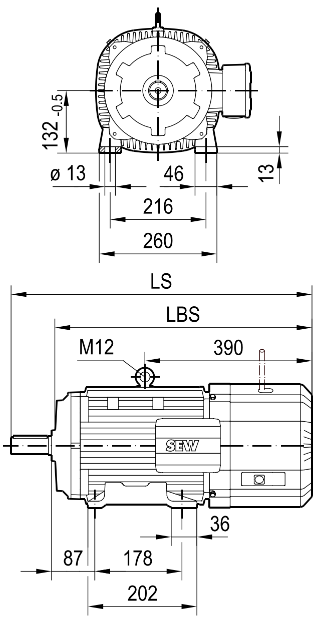
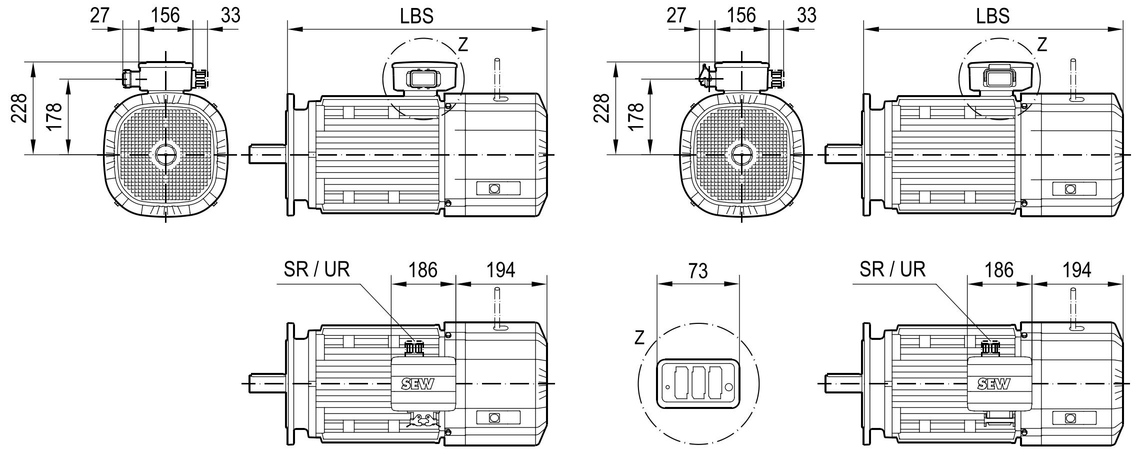


(→ 📖)	132L							
LS	709							
LBS (B5/B14)	599							
LBS (B3)	596							

30590116/EN – 03/2023

09 195 02 21
2(2)

/IV



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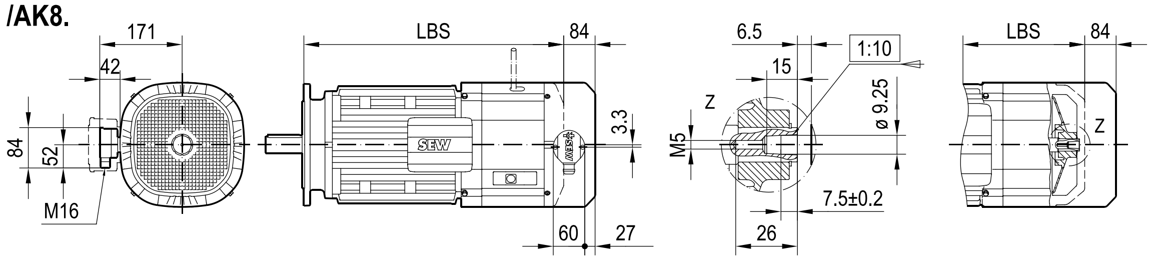

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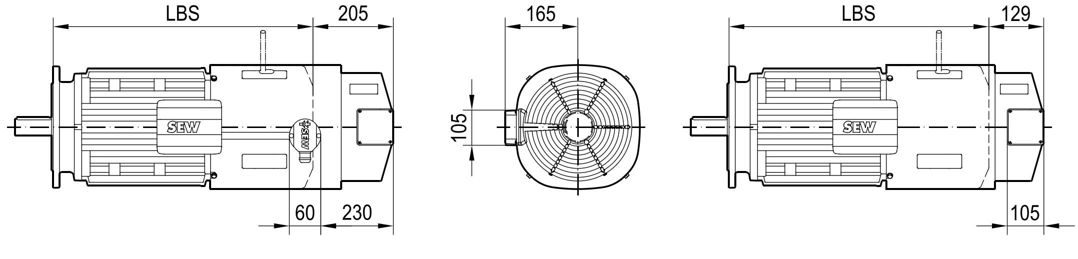
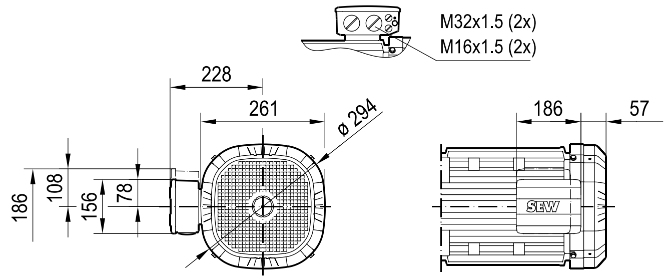
/AK8./V

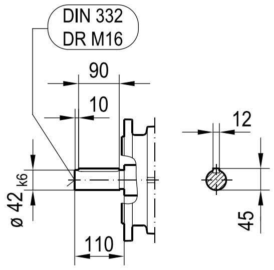


(→ 📖)	132L							
LS	709							
LBS (B5/B14)	599							
LBS (B3)	596							

DRN132L 8

08 279 02 21
1(2)





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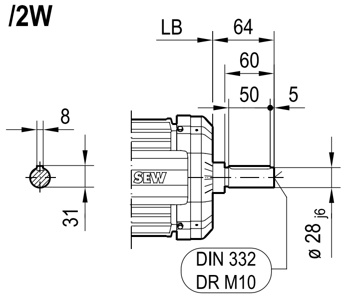

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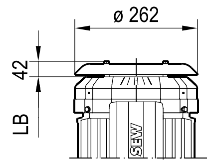

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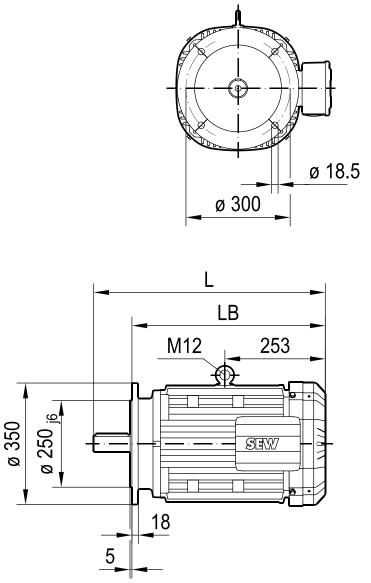

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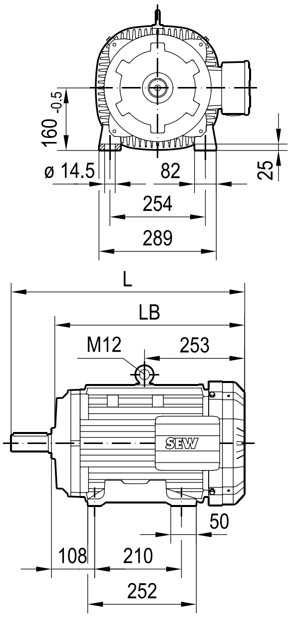
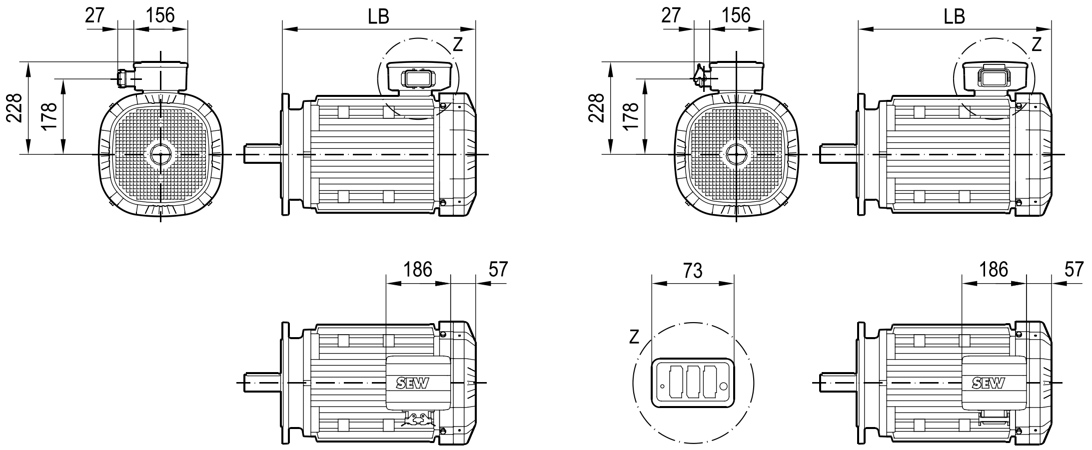


(→ 📖)	132L							
L	572							
LB (B5/B14)	462							
LB (B3)	459							

30590116/EN – 03/2023

08 279 02 21
2(2)

/IV



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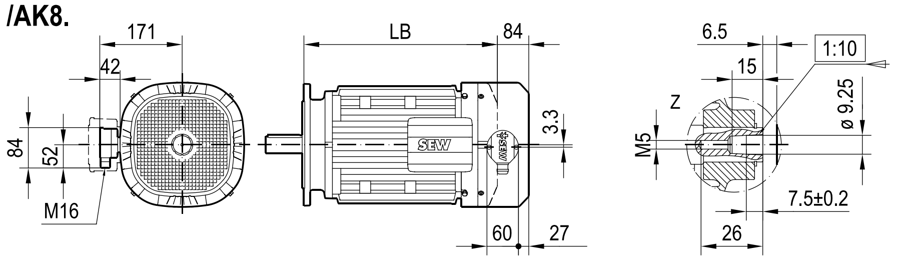

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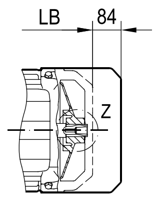

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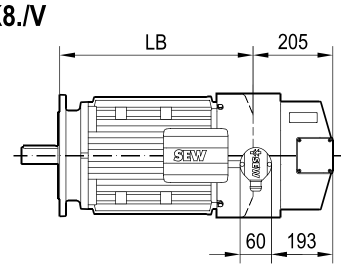
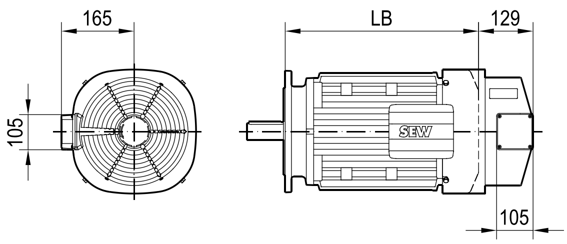
/AK8./V



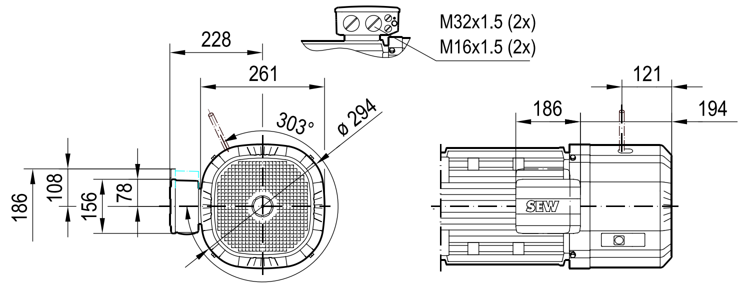
/V

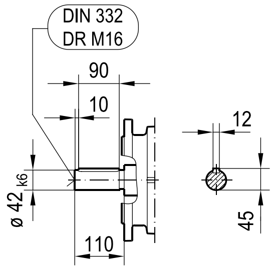


(→ 📖)	132L							
L	572							
LB (B5/B14)	462							
LB (B3)	459							

DRN132L 8 BE

09 192 01 21
1(2)





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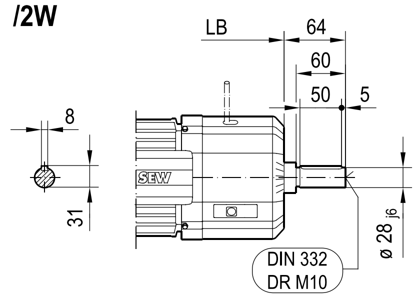

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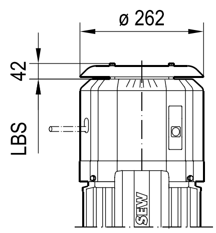

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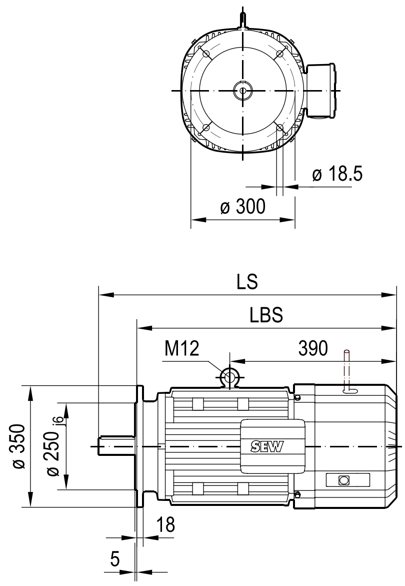

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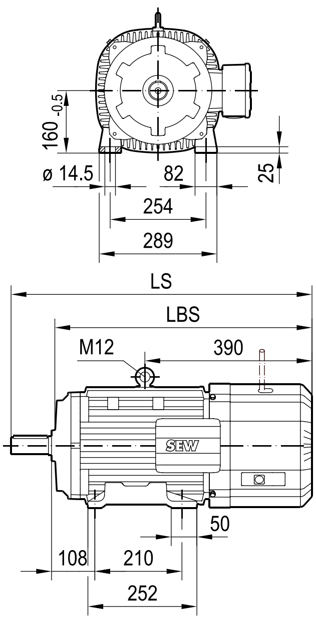

(→ 📖)	132L							
LS	709							
LBS (B5/B14)	599							
LBS (B3)	596							

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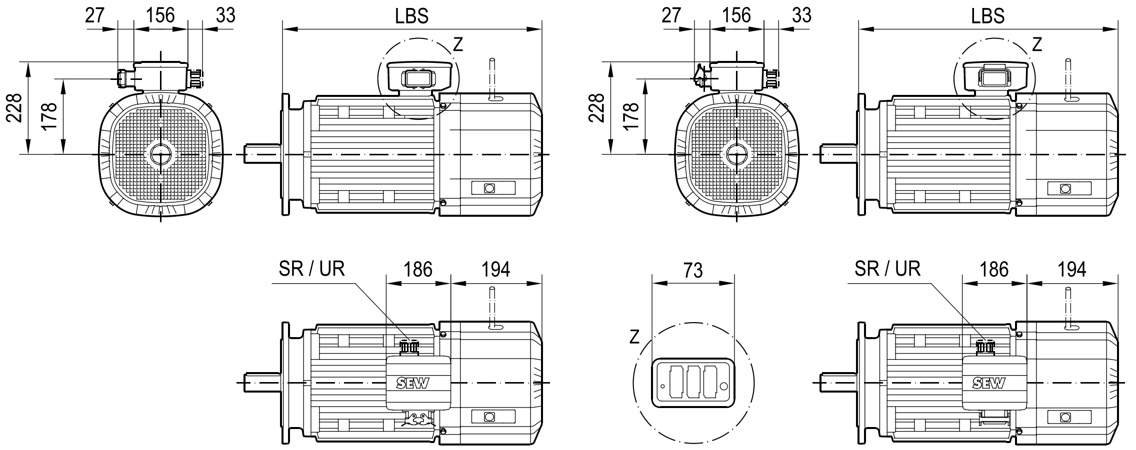
09 192 01 21
2(2)

/IV



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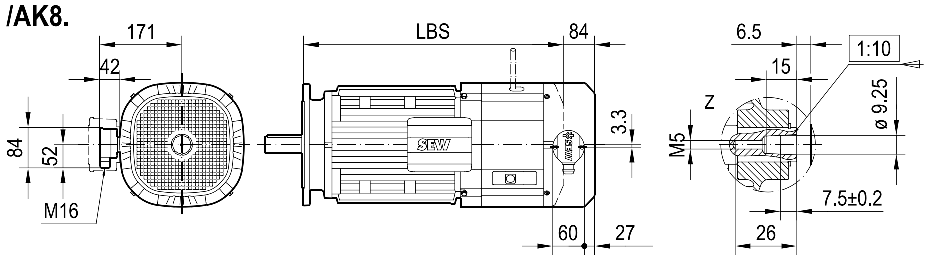

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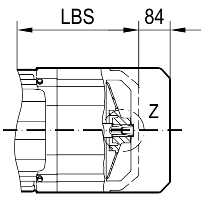

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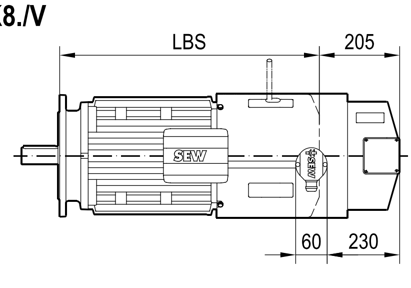

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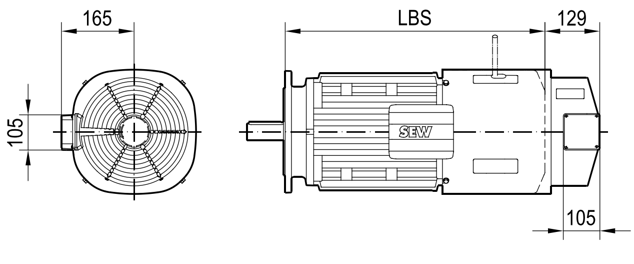
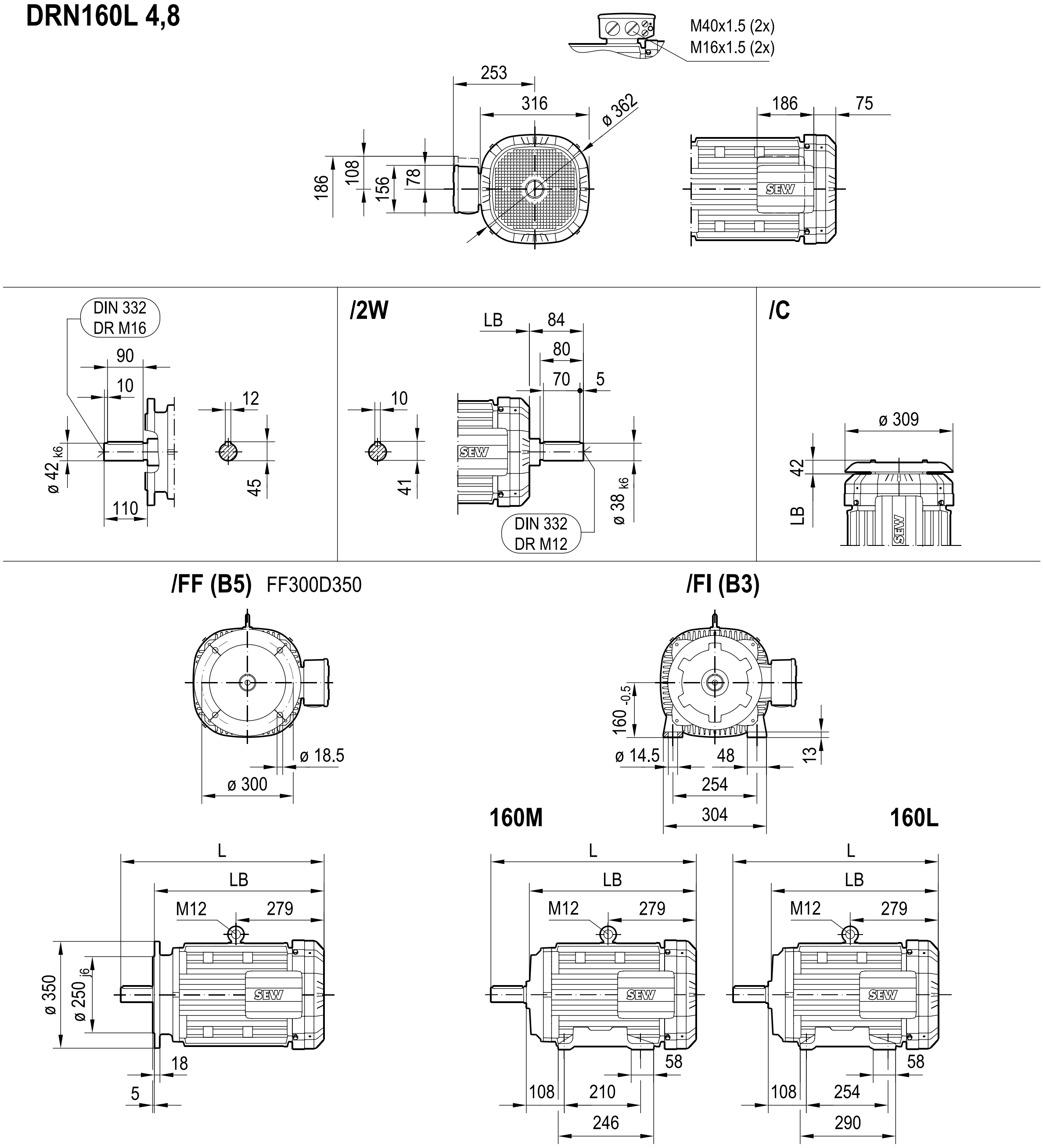


(→ 📖)	132L							
LS	709							
LBS (B5/B14)	599							
LBS (B3)	596							

DRN160M 4,6,8
DR2S160M 4
DRN160L 4,8

08 575 07 14
1(2)



(→ 📖)	160M(I/G)	160L						
L	642	642						
LB (B5/B14)	532	532						
LB (B3)	529	529						

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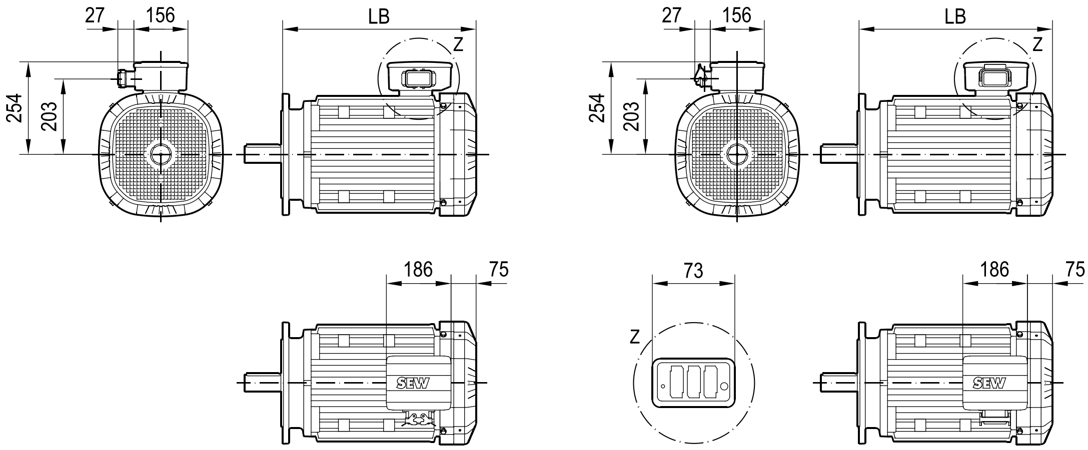
08 575 07 14
2(2)

/IV



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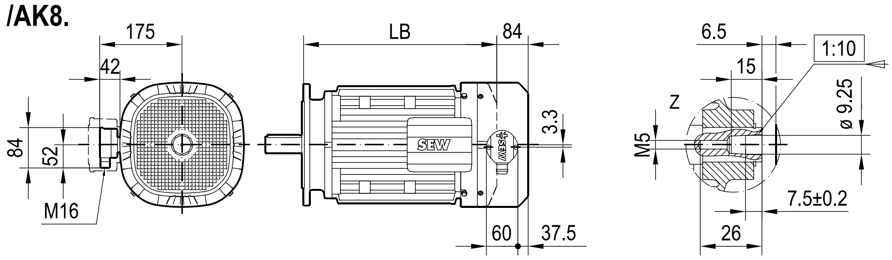

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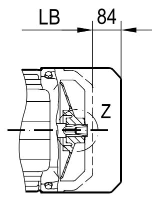

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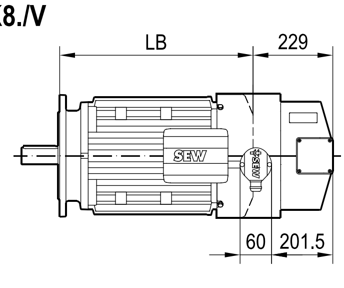

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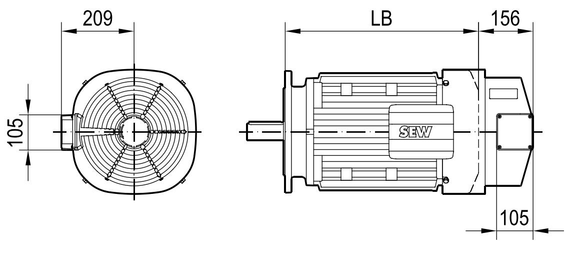
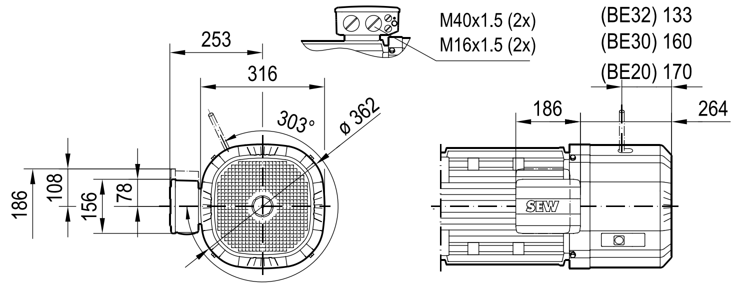
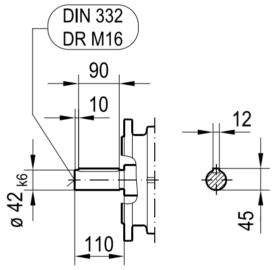


(→ 📖)	160M(G)	160L						
L	642	642						
LB (B5/B14)	532	532						
LB (B3)	529	529						

DRN160M 4,6,8 BE
DR2S160M 4 BE
DRN160L 4,8 BE

09 940 07 14
1(2)





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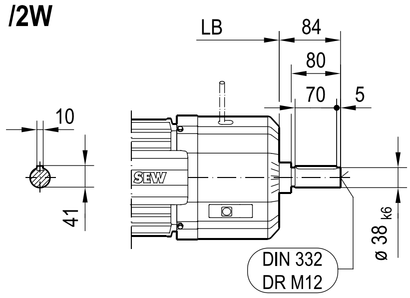

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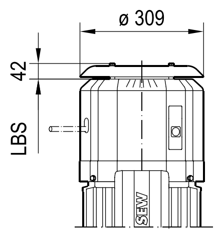

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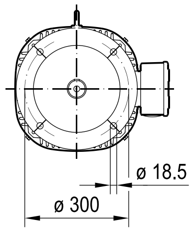

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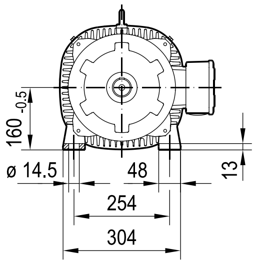
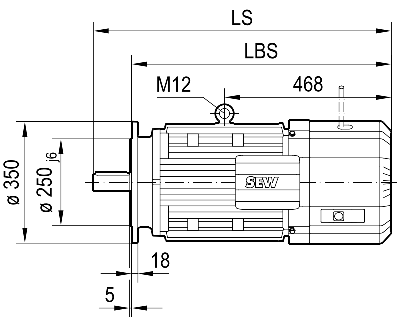
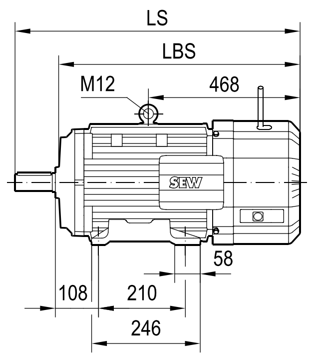
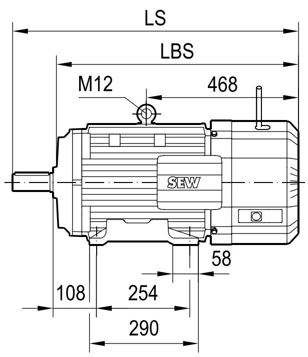




160M



160L



(→ 📖)	160M(I/G)	160L						
LS	831	831						
LBS (B5/B14)	721	721						
LBS (B3)	718	718						

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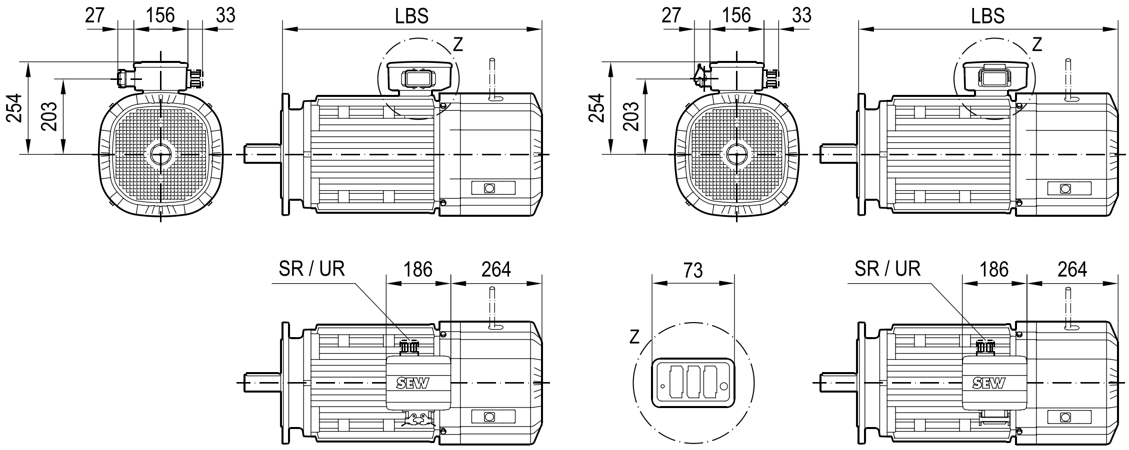
09 940 07 14
2(2)

/IV



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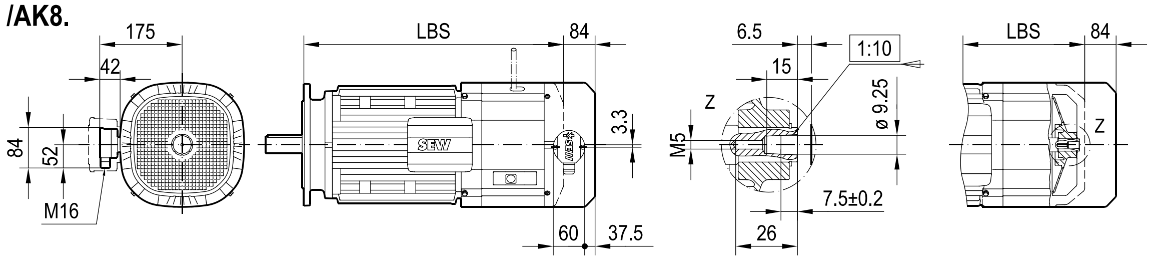
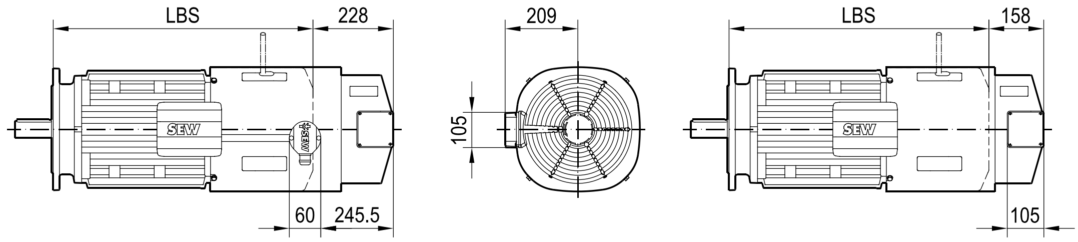
/AK8.

/EK8A



/EK8./V
/AK8./V

/V



(→ 📖)	160M(I/G)	160L						
LS	831	831						
LBS (B5/B14)	721	721						
LBS (B3)	718	718						

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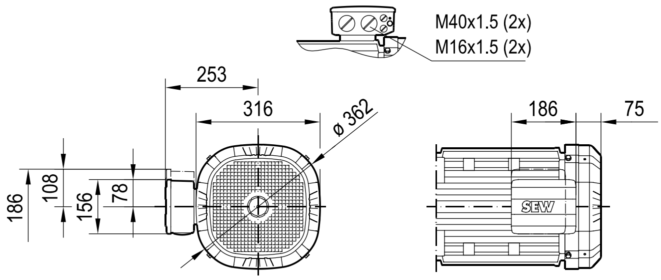
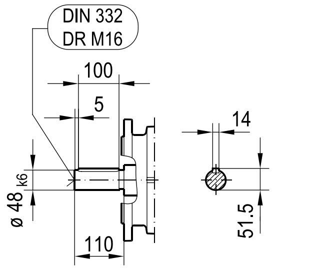
DR2S160L 4

08 282 01 21
1(2)





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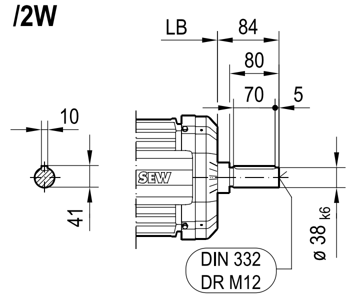

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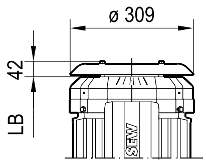

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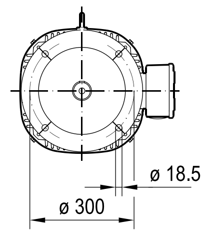

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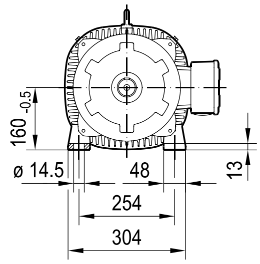

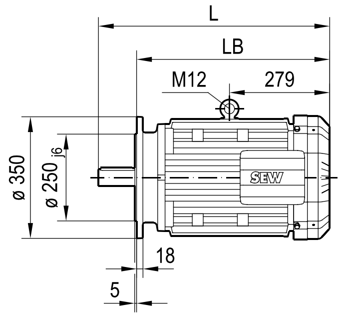

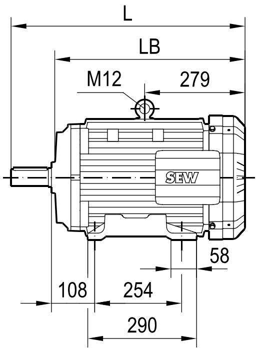

(→ 📖)	160L							
L	642							
LB (B5/B14)	532							
LB (B3)	529							

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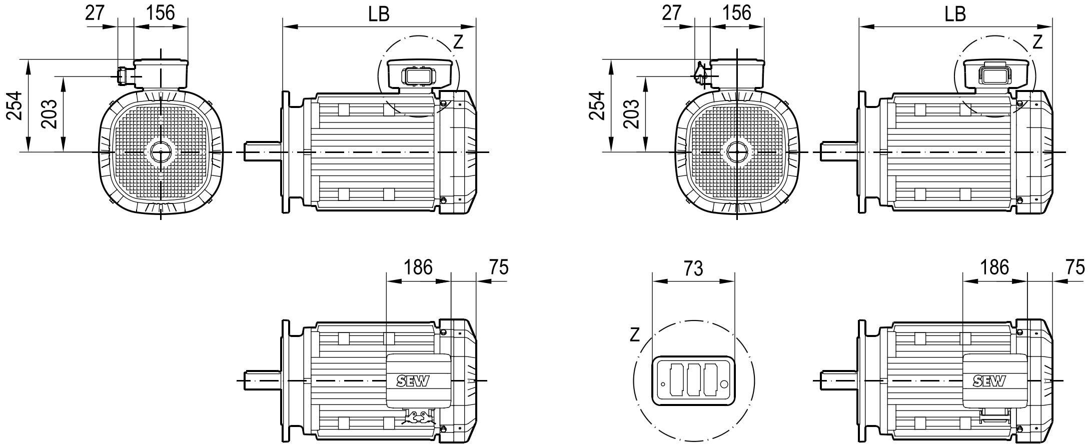
08 282 01 21
2(2)

/IV



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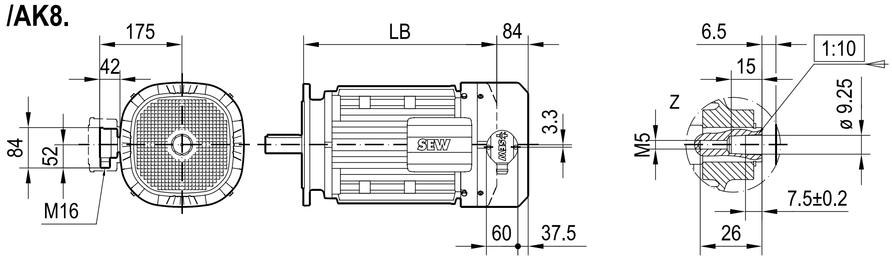
/AK8.



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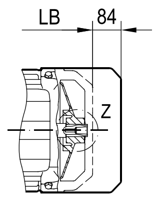
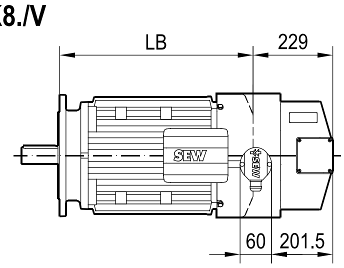
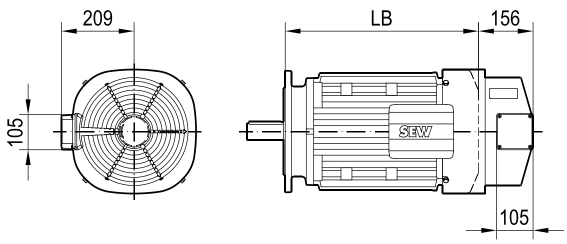


/EK8./V
/AK8./V



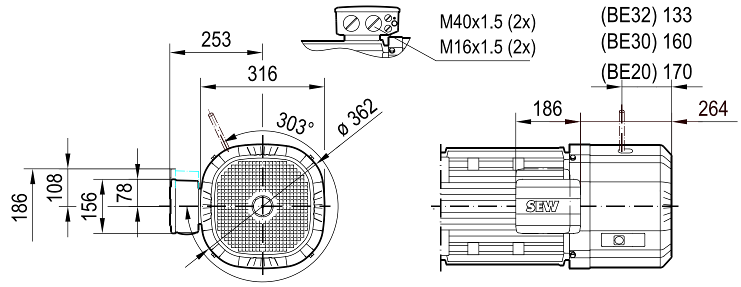
/V

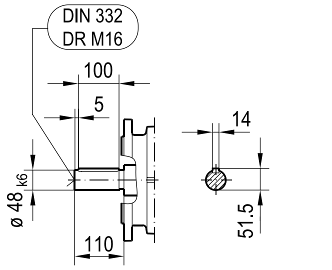


(→ 📖)	160L							
L	642							
LB (B5/B14)	532							
LB (B3)	529							

DR2S160L 4 BE

09 194 01 21
1(2)





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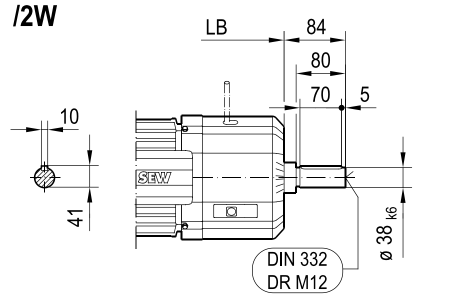

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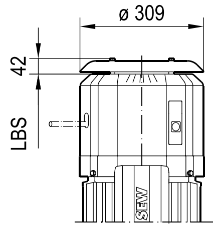

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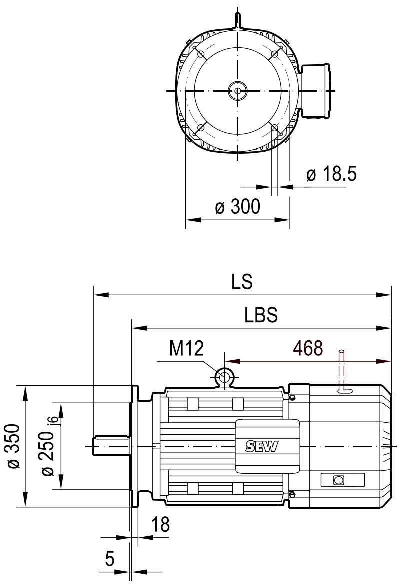

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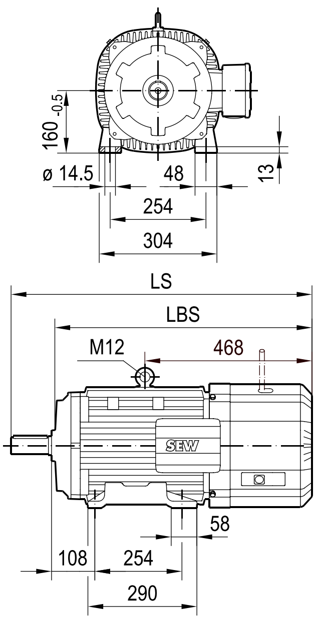

(→ 📖)	160L							
LS	831							
LBS (B5/B14)	721							
LBS (B3)	718							

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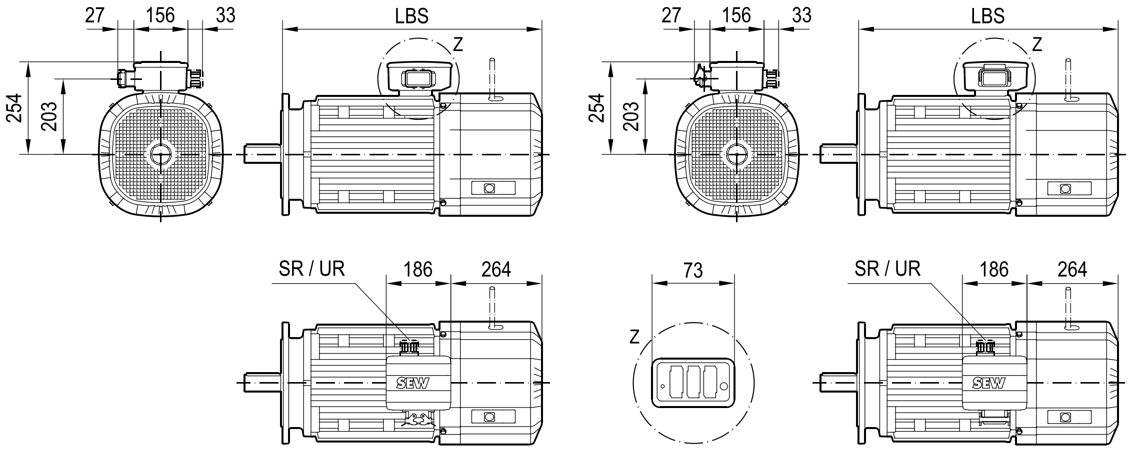
09 194 01 21
2(2)

/IV



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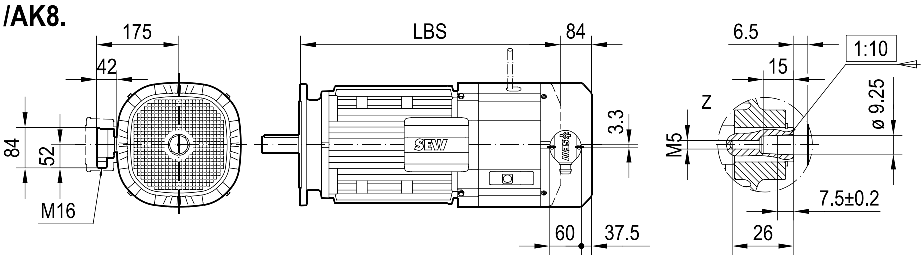

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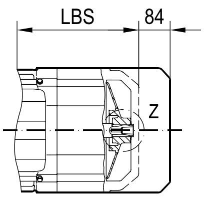

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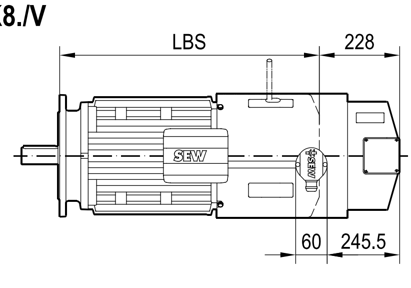

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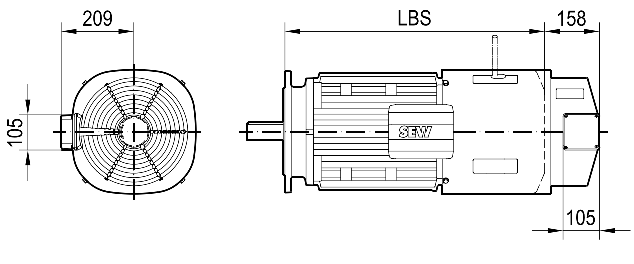
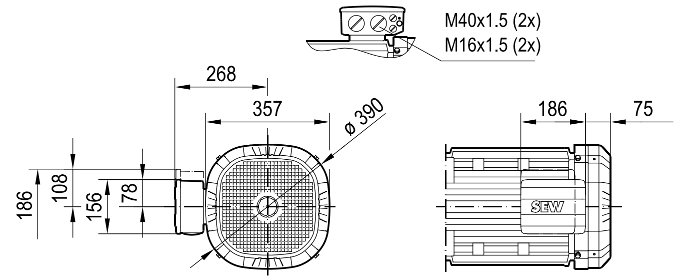
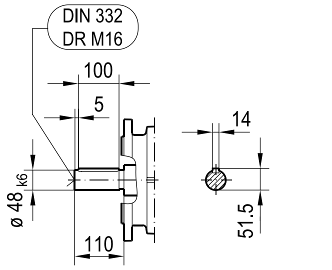


(→ 📖)	160L							
LS	831							
LBS (B5/B14)	721							
LBS (B3)	718							

DRN180M 4
DR2S180M 4
DR2L180M 4
DRN180L 4,8

08 576 05 14
1(2)





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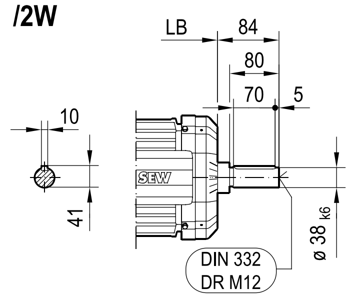

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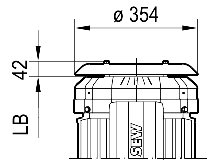

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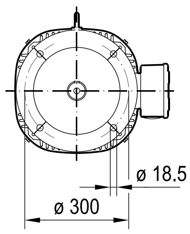

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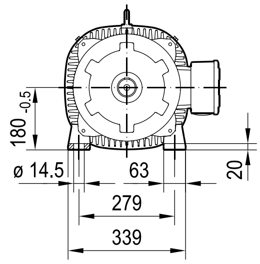
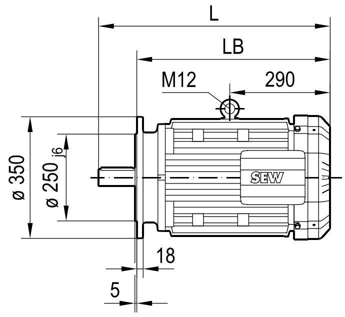
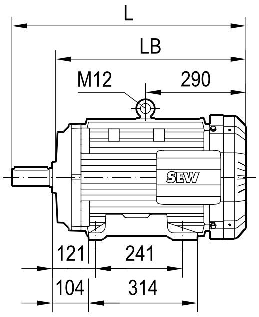
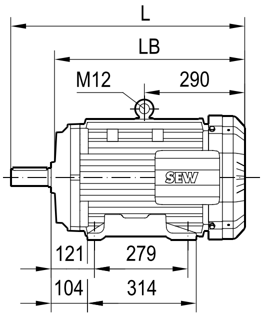




180M



180L



(→ 📖)	180M	180L(R)						
L	665	665						
LB (B5/B14)	555	555						
LB (B3)	554	554						

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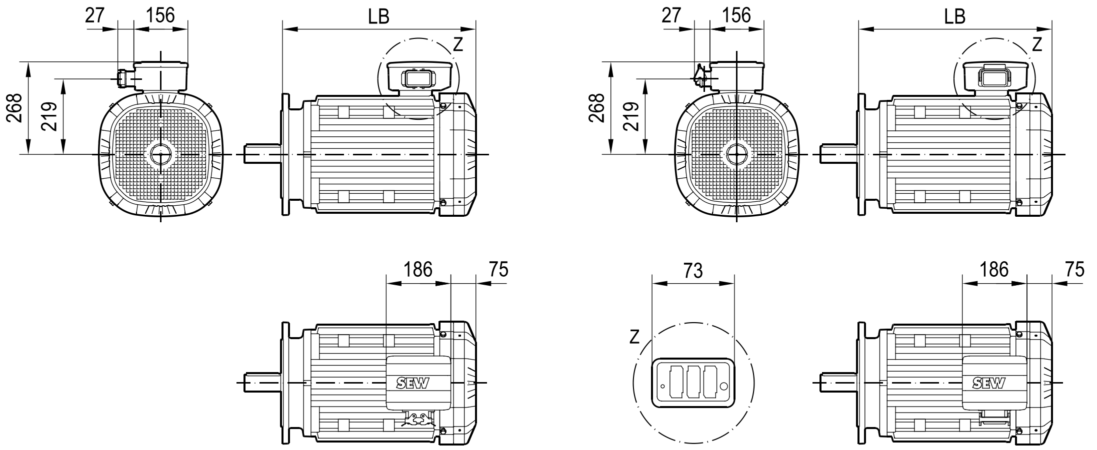
08 576 05 14
2(2)

/IV



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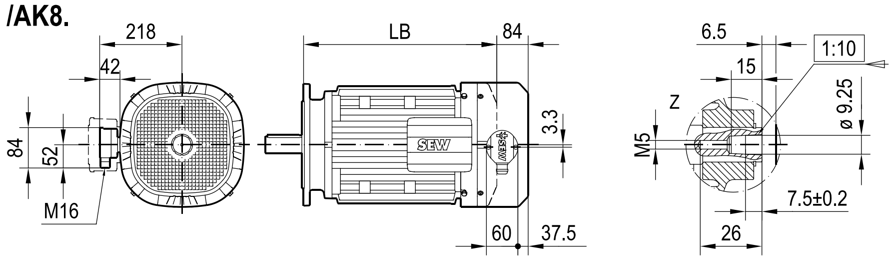
/AK8.



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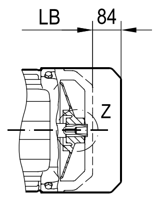
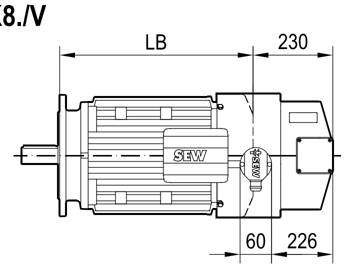
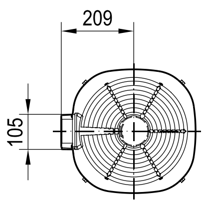
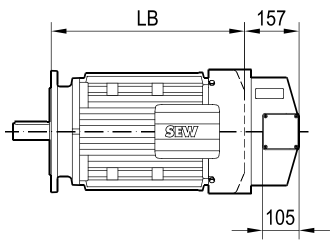


/EK8./V
/AK8./V



/V

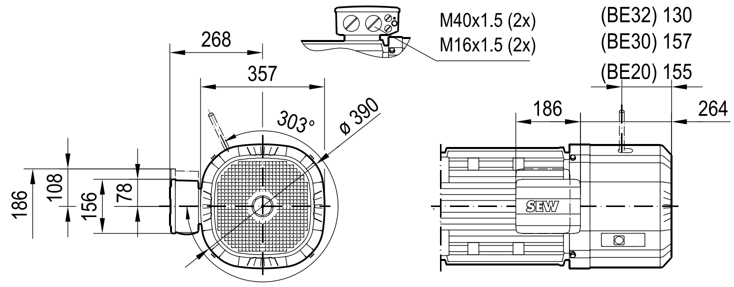


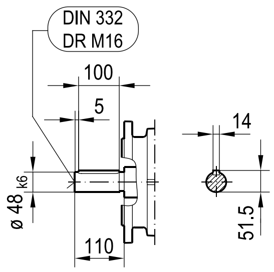


(→ 🕮)	180M	180L(R)						
L	665	665						
LB (B5/B14)	555	555						
LB (B3)	554	554						

DRN180M 4 BE
DR2S180M 4 BE
DR2L180M 4 BE
DRN180L 4,8 BE

09 941 05 14
1(2)





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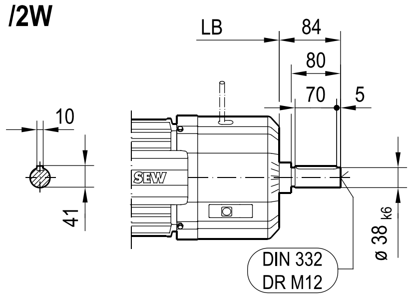

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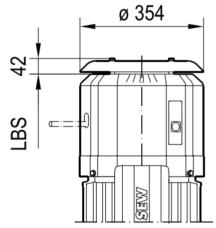

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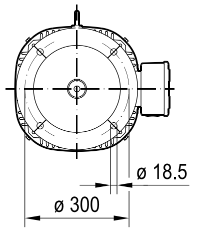
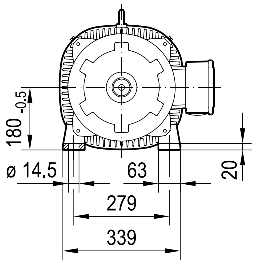
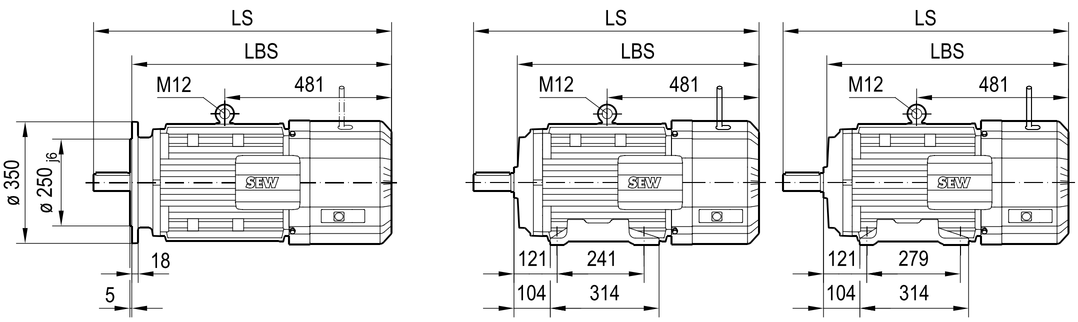


/FI (B3)



180M **180L**



(→ 📖)	180M	180L(R)						
LS	858	858						
LBS (B5/B14)	748	748						
LBS (B3)	745	745						

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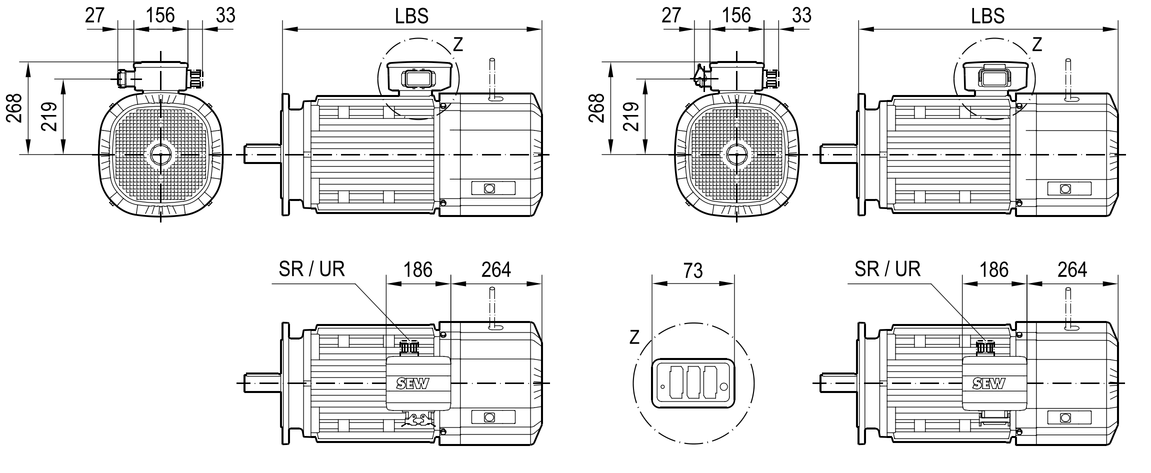
09 941 05 14
2(2)

/IV



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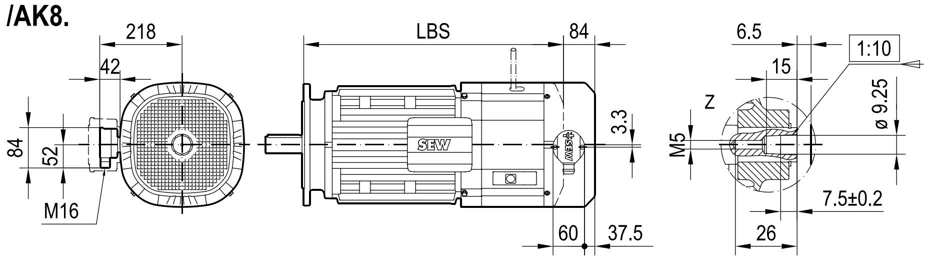

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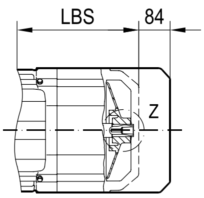
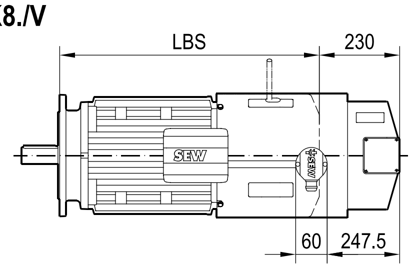
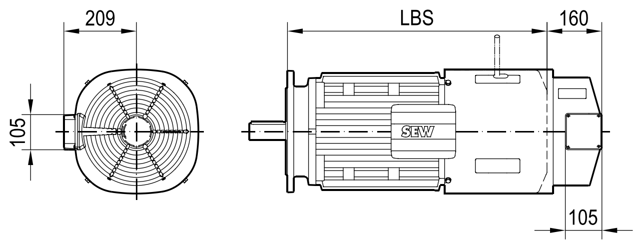


/EK8./V
/AK8./V



/V



(→ 📖)	180M	180L(R)						
LS	858	858						
LBS (B5/B14)	748	748						
LBS (B3)	745	745						

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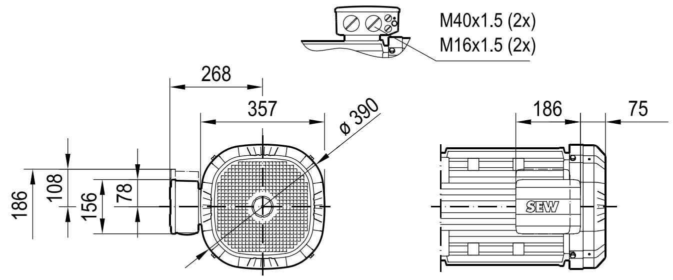
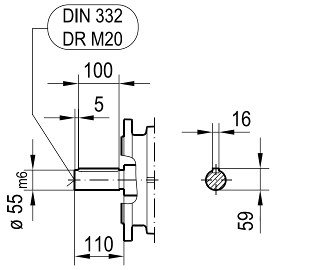
DR2S180L 4
DR2L180L 4

08 227 00 20
1(2)





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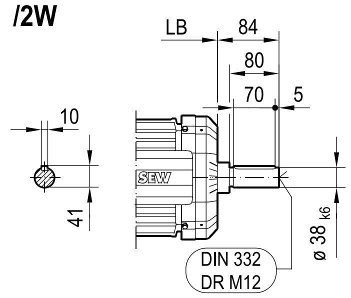

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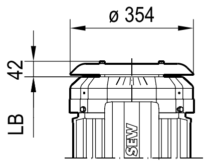

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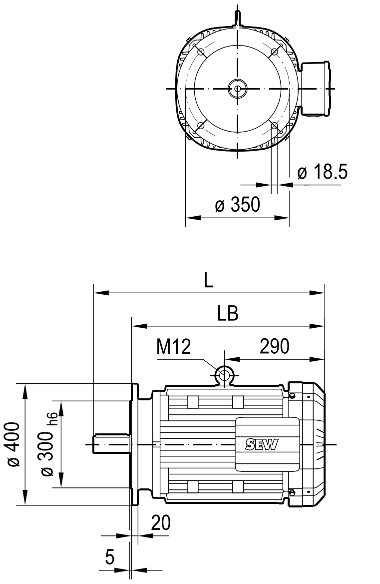

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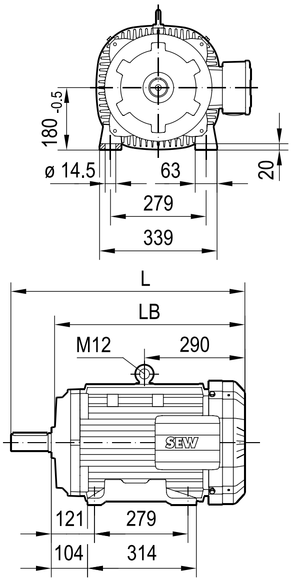
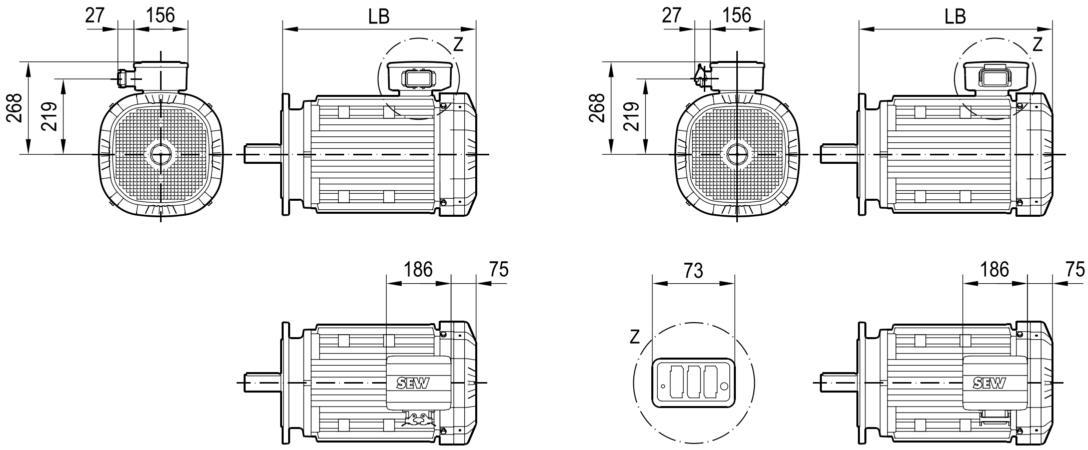


(→ 📖)	180L							
L	665							
LB (B5/B14)	555							
LB (B3)	554							

08 227 00 20
2(2)

/IV



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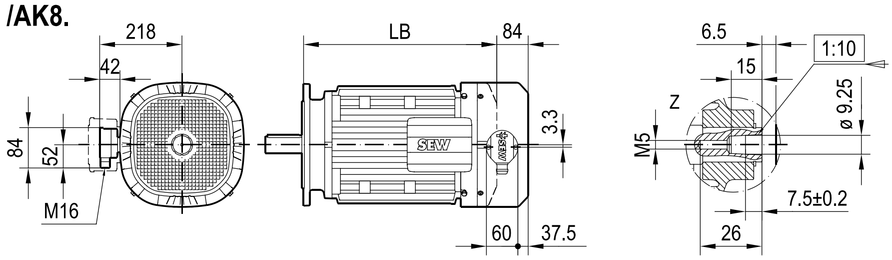
/AK8.



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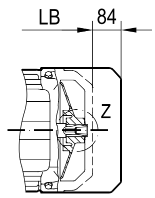
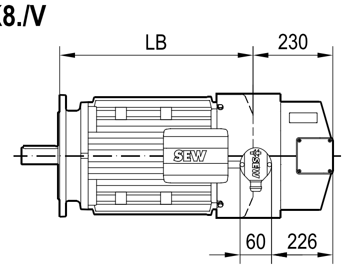


/EK8./V
/AK8./V



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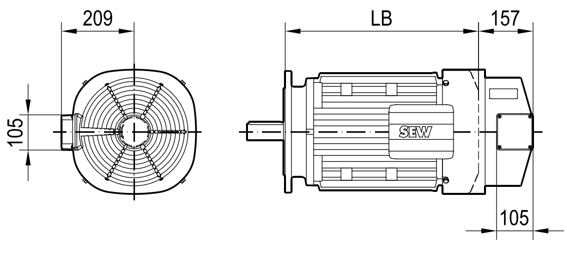

(→ 📖)	180L							
L	665							
LB (B5/B14)	555							
LB (B3)	554							

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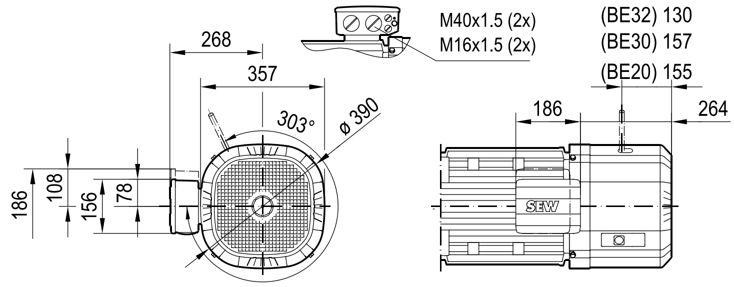
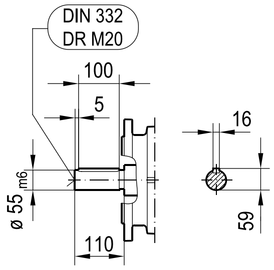
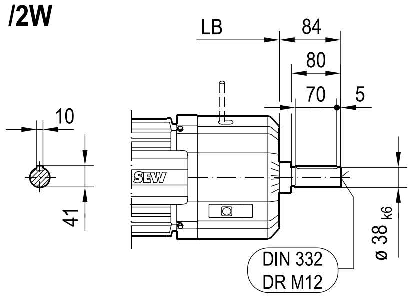
DR2S180L 4 BE **09 178 00 20**
DR2L180L 4 BE **1(2)**





/2W



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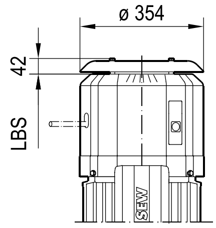

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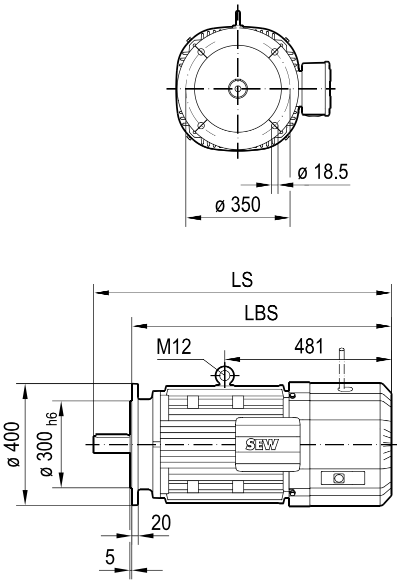

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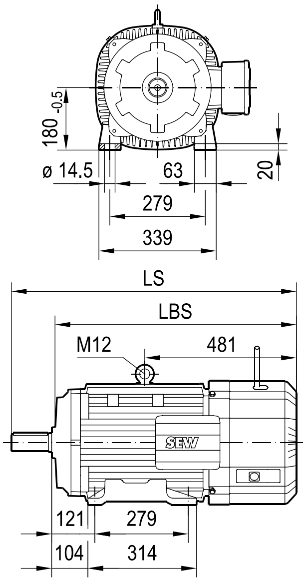

(→ 📖)	180L							
LS	858							
LBS (B5/B14)	748							
LBS (B3)	745							

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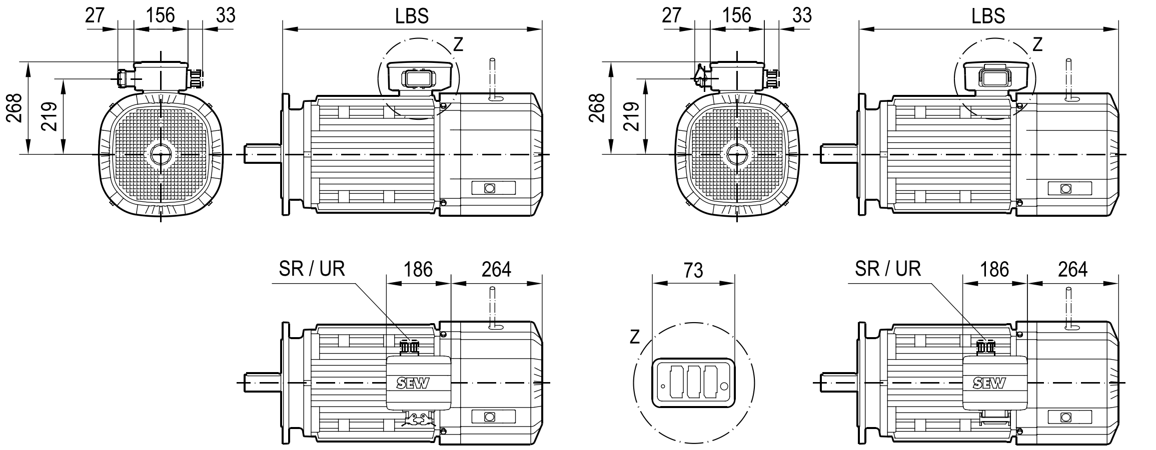
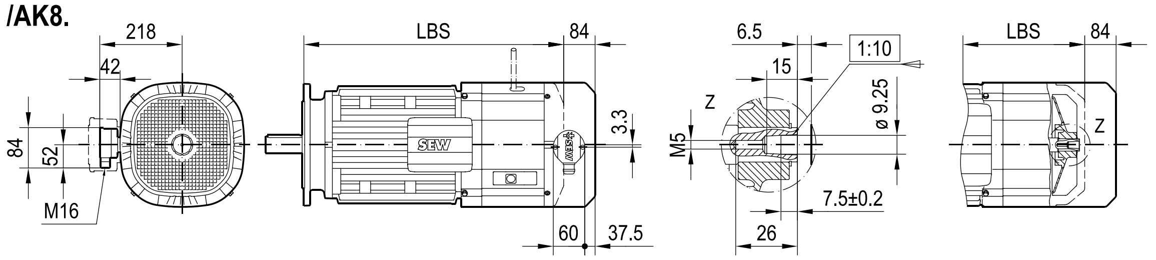
09 178 00 20
2(2)

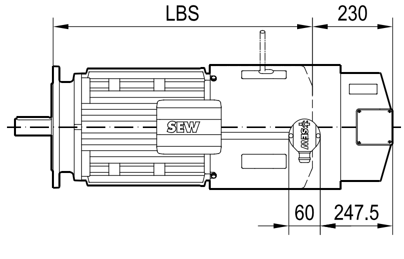
/IV

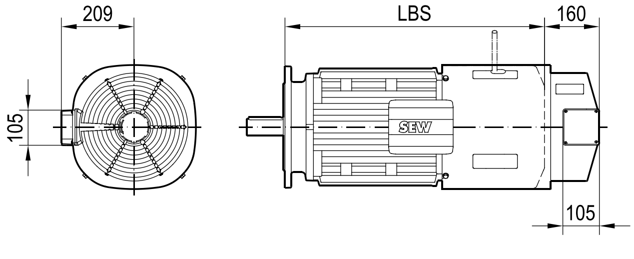


/EK8. **/EK8A**
/AK8.



/EK8./V **/V**
/AK8./V





(→ 📖)	180L							
LS	858							
LBS (B5/B14)	748							
LBS (B3)	745							

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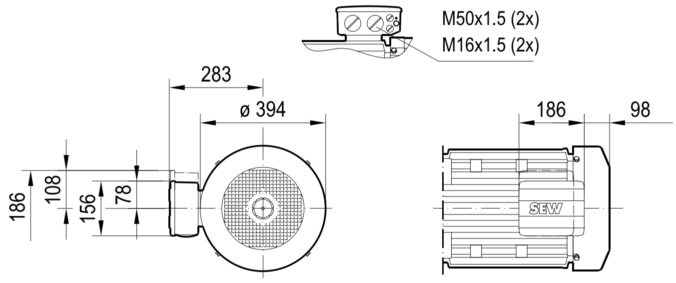
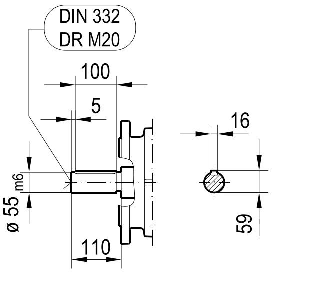
DRN200L 4
DR2S200L 8/4

08 577 04 14
1(2)





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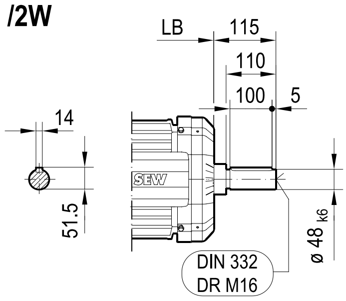

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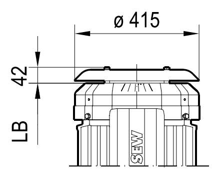

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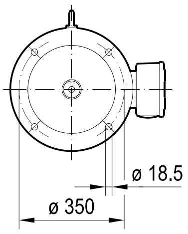

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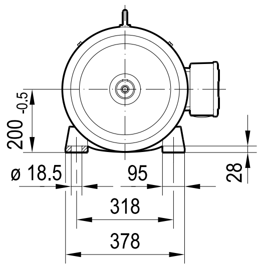

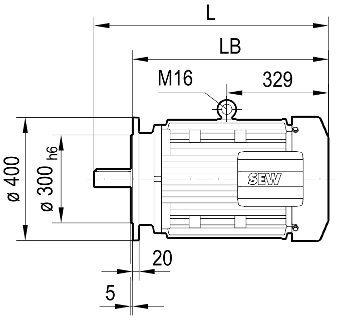

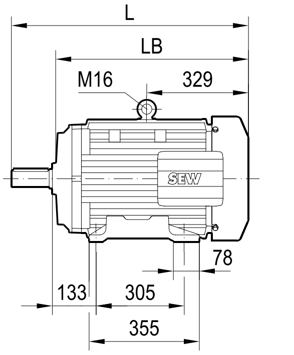

(→ 📖)	200L							
L	759							
LB (B5/B14)	649							
LB (B3)	646							

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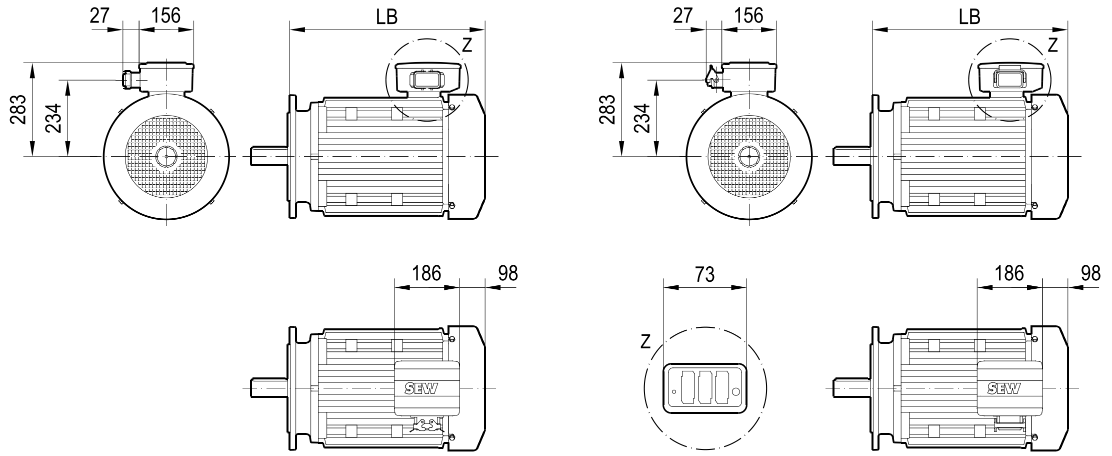
08 577 04 14
2(2)

/IV



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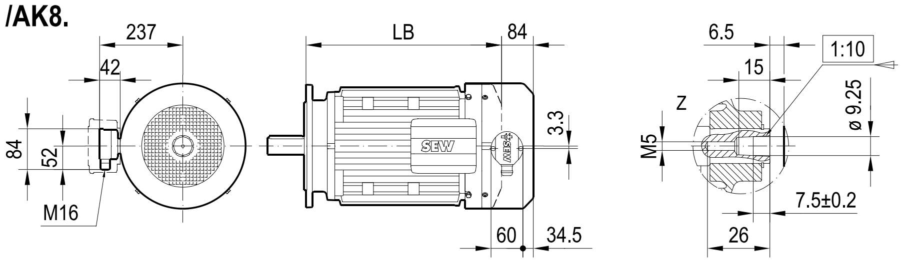

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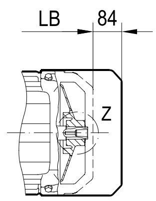

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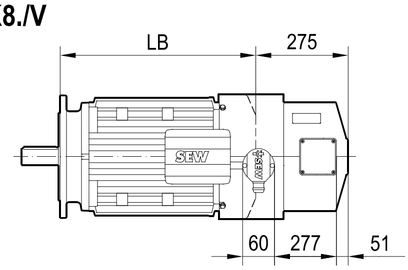
/AK8./V



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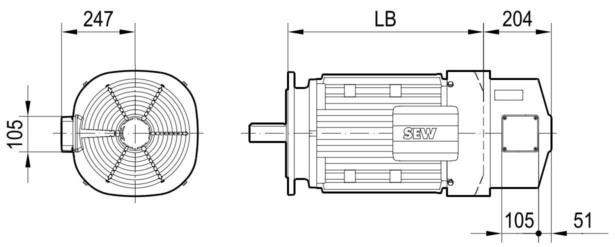

(→ 📖)	200L							
L	759							
LB (B5/B14)	649							
LB (B3)	646							

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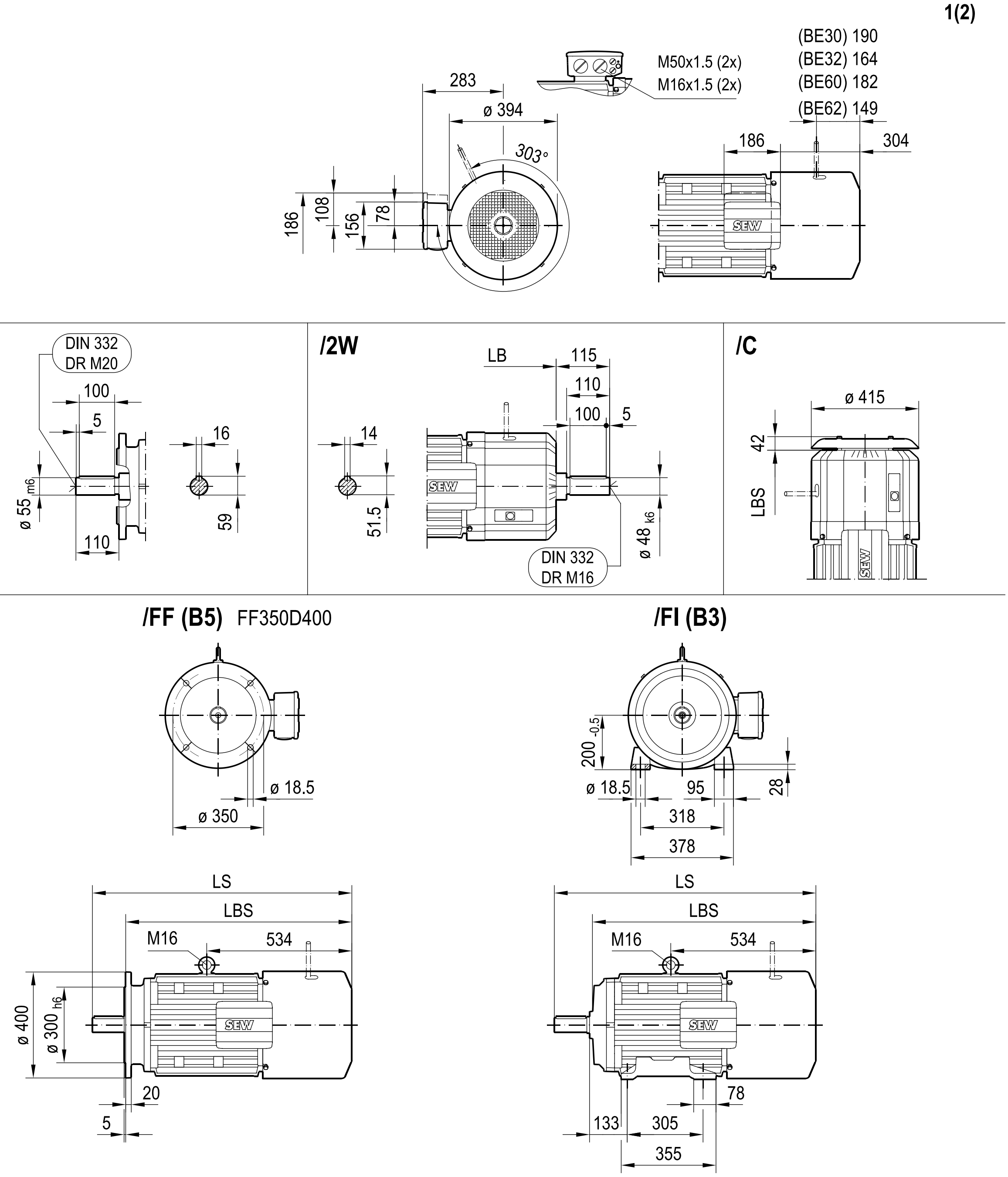
DRN200L 4 BE

09 942 03 14
1(2)



(→ 📖)	200L							
LS	964							
LBS (B5/B14)	854							
LBS (B3)	851							

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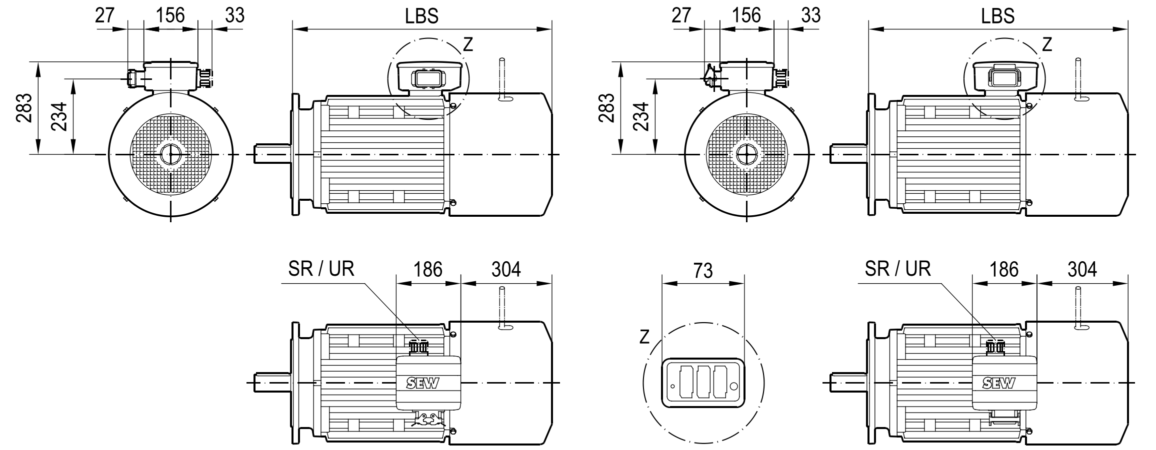
09 942 03 14
2(2)

/IV



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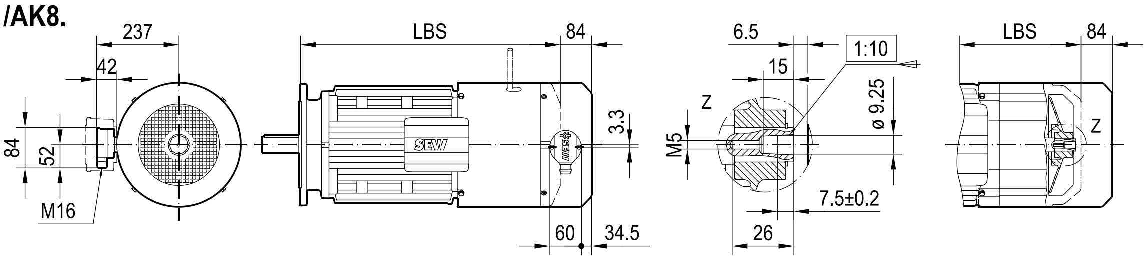

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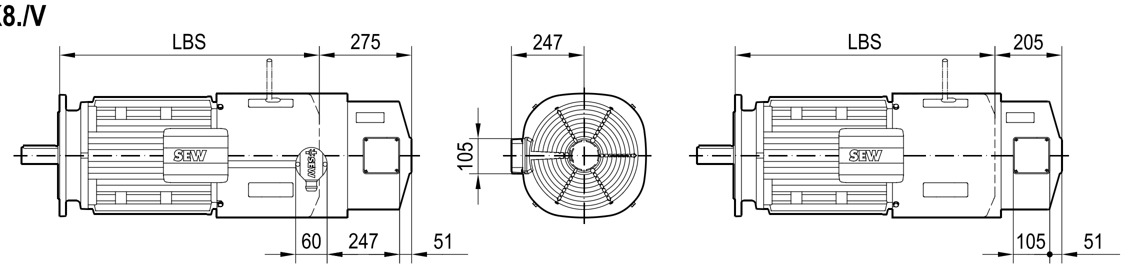

(→ 📖)	200L							
LS	964							
LBS (B5/B14)	854							
LBS (B3)	851							

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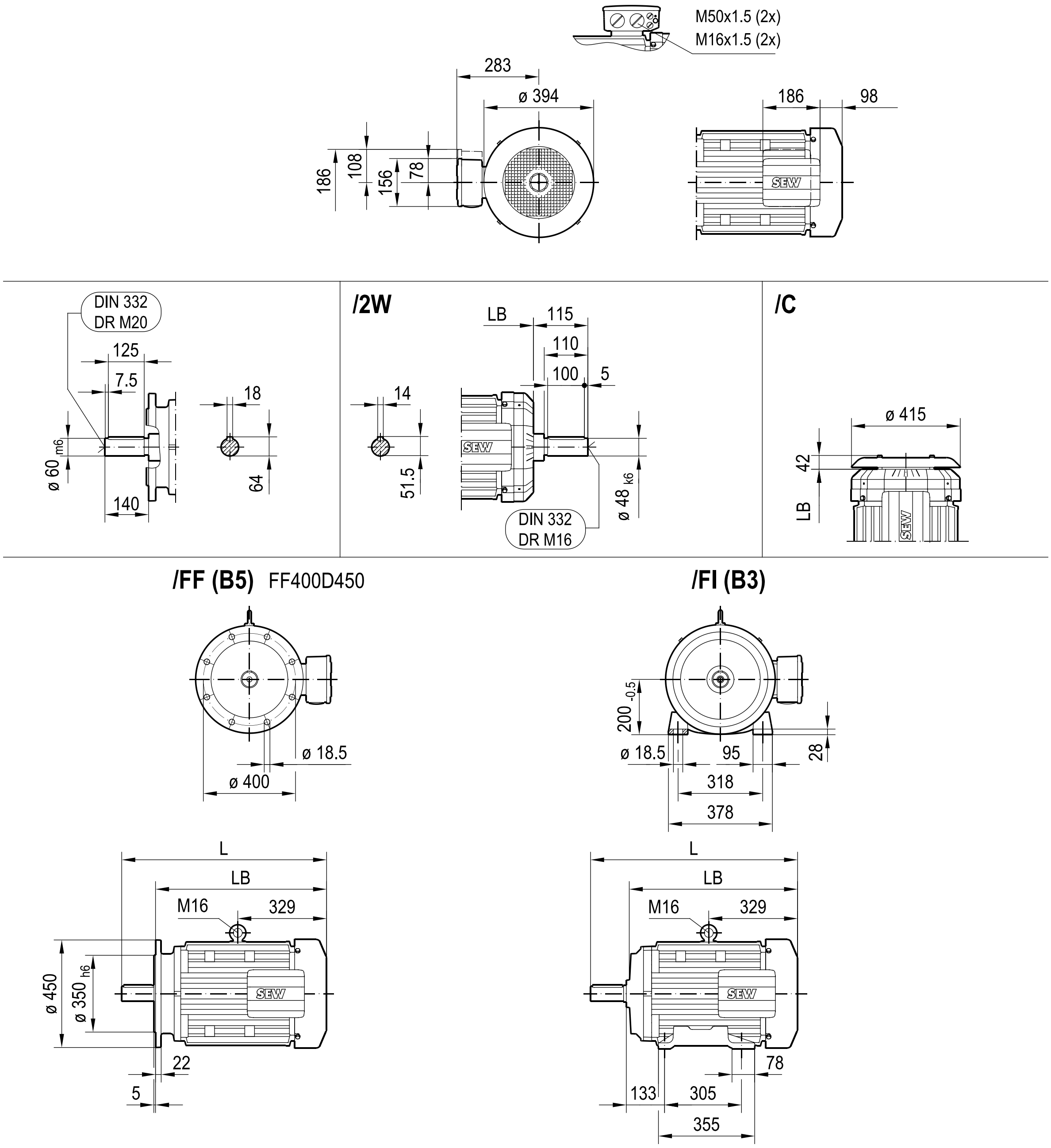
DR2S200L 4
DR2L200L 4

08 234 01 20
1(2)

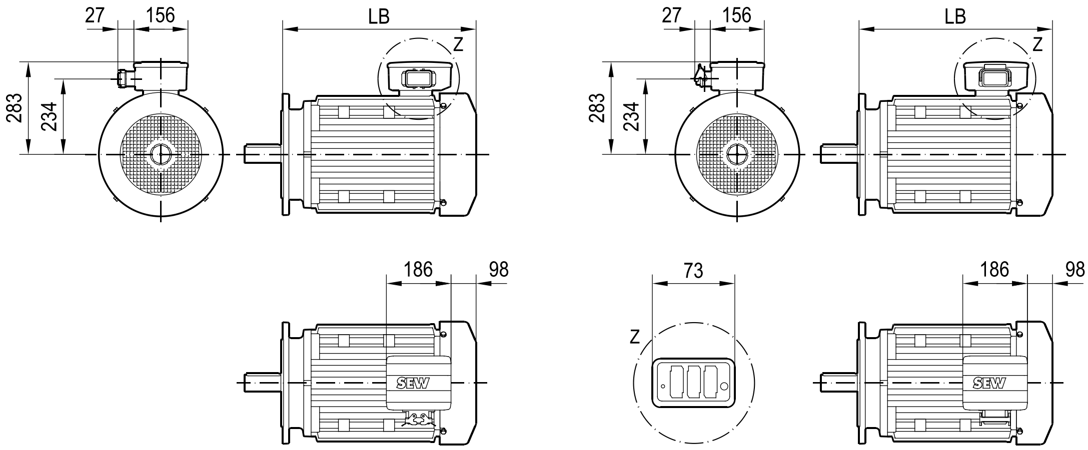


(→ 📖)	200L							
L	789							
LB (B5/B14)	649							
LB (B3)	646							

30590116/EN – 03/2023

08 234 01 20
2(2)

/IV



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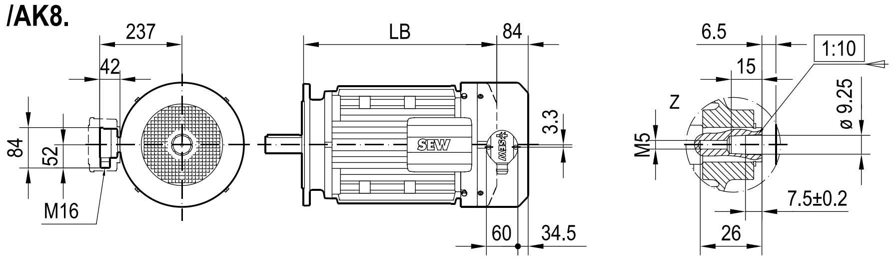

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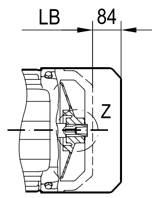

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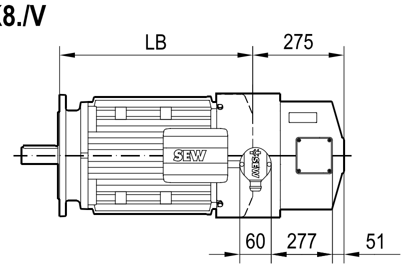

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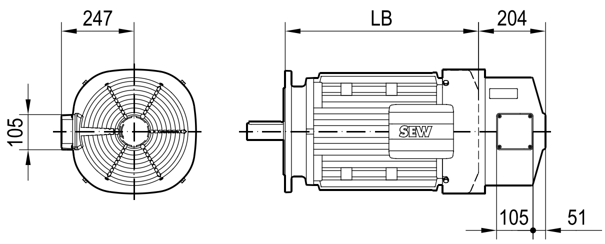

(→ 📖)	200L							
L	789							
LB (B5/B14)	649							
LB (B3)	646							

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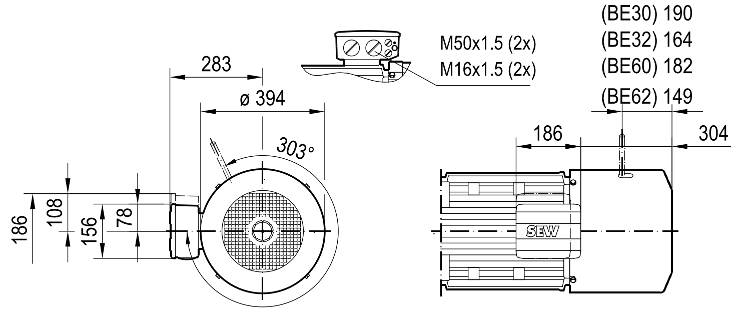
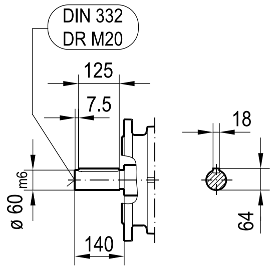
DR2S200L 4 BE
DR2L200L 4 BE

09 179 01 20
1(2)





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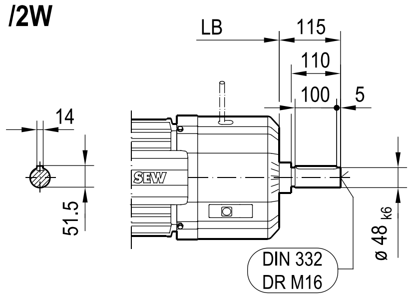

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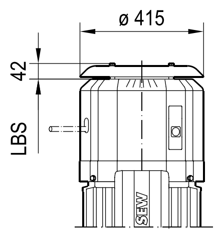

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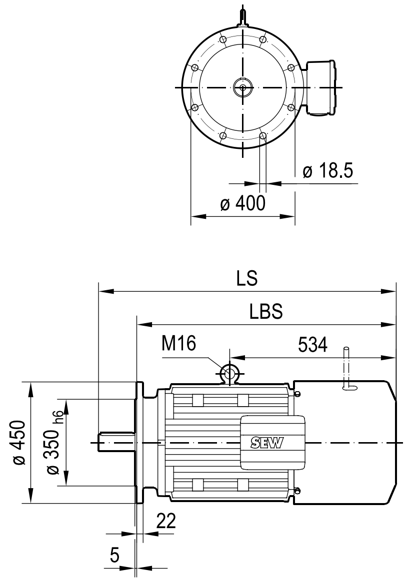

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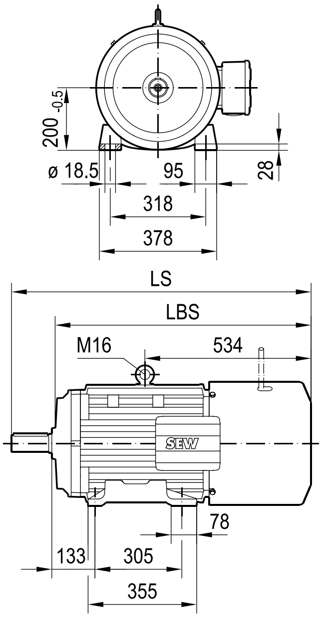

(→ 📖)	200L							
LS	994							
LBS (B5/B14)	854							
LBS (B3)	851							

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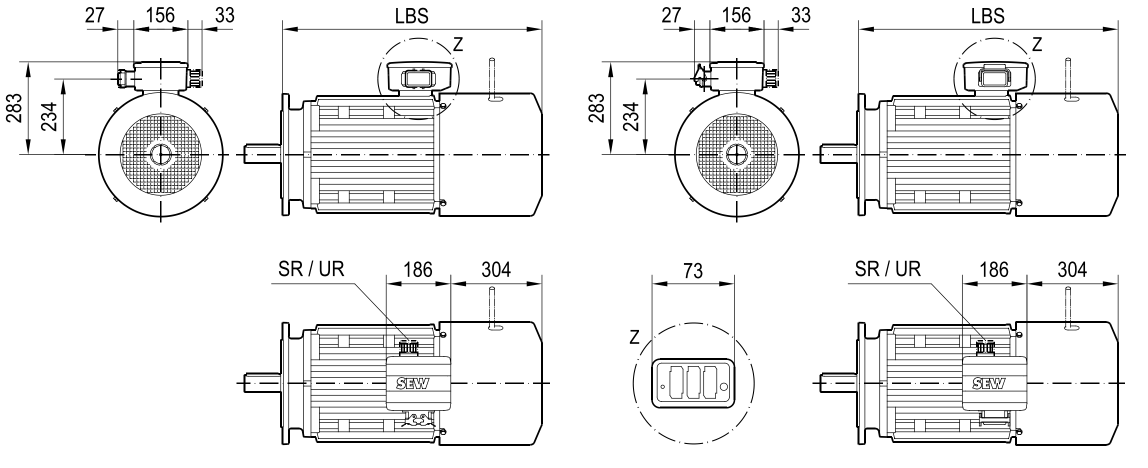
09 179 01 20
2(2)

/IV



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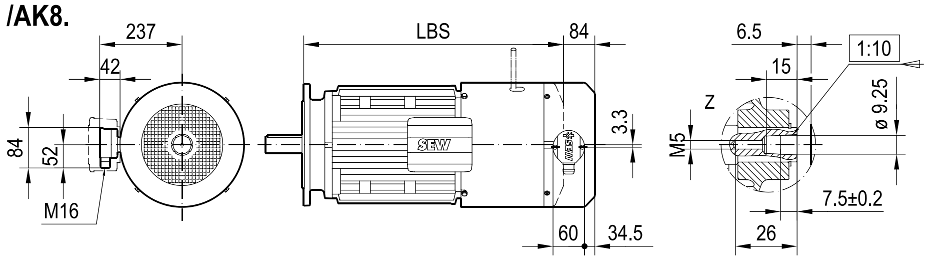

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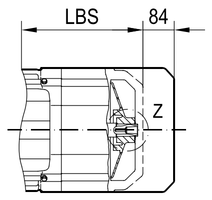

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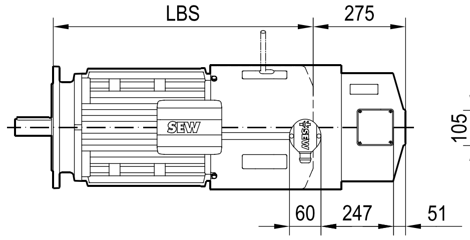
/AK8./V



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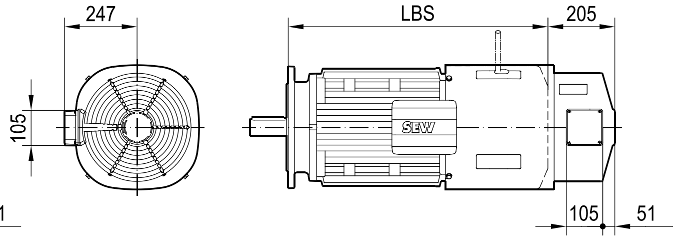
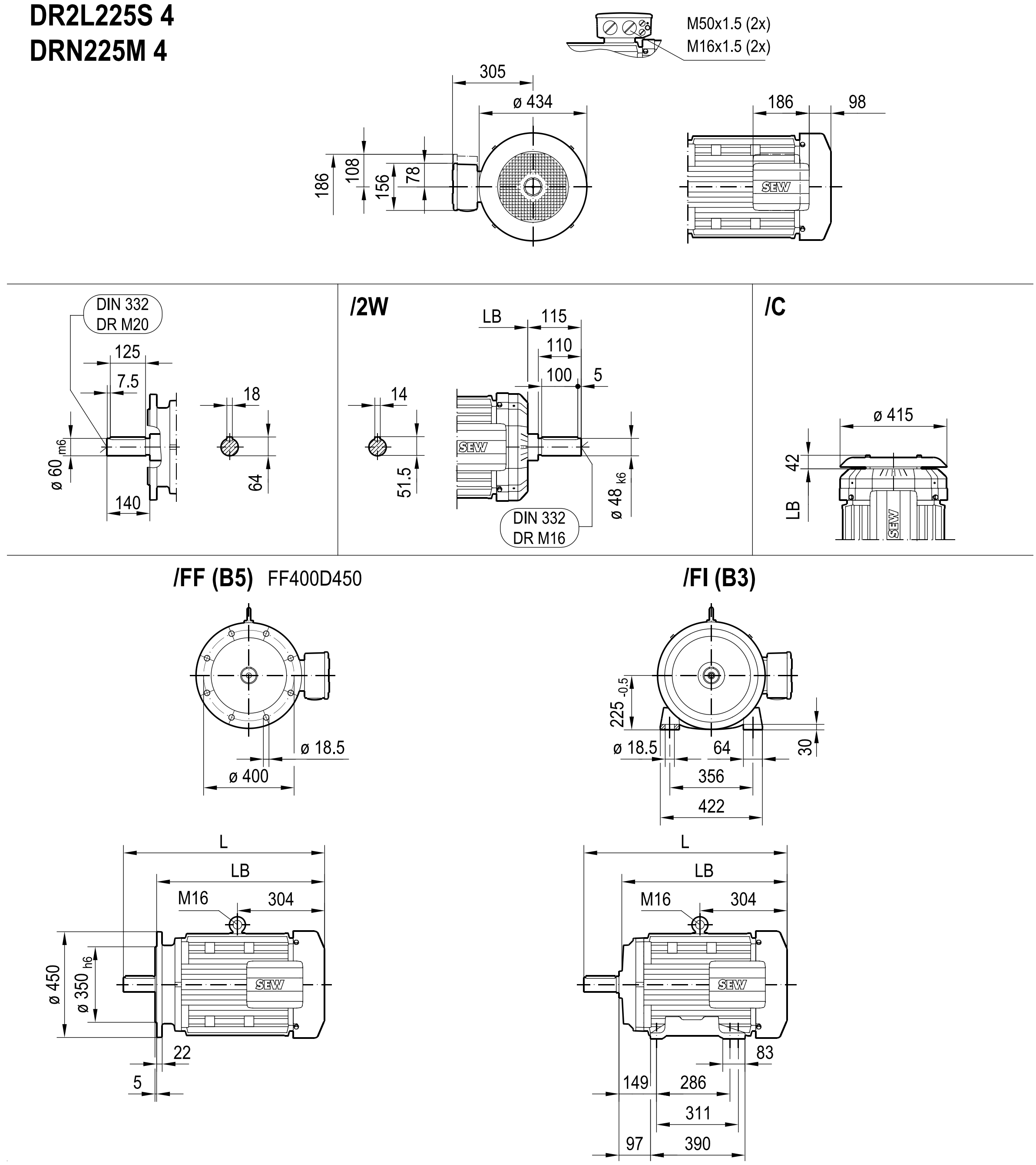


(→ 📖)	200L							
LS	994							
LBS (B5/B14)	854							
LBS (B3)	851							

DRN225S 4
DR2S225S 4
DR2L225S 4
DRN225M 4

08 578 04 14
1(2)



(→ 📖)	225S	225M						
L	757	757						
LB (B5/B14)	617	617						
LB (B3)	614	614						

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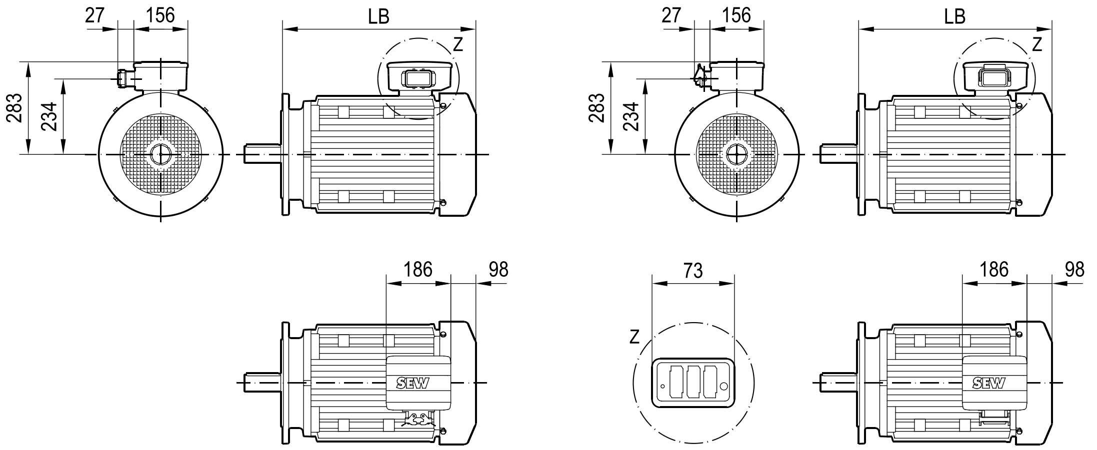
08 578 04 14
2(2)

/IV



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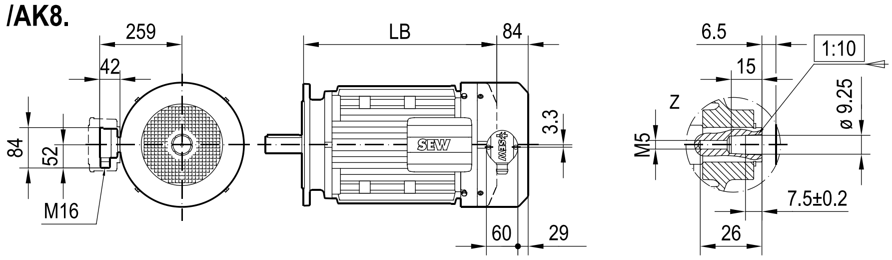
/AK8.



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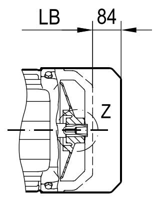

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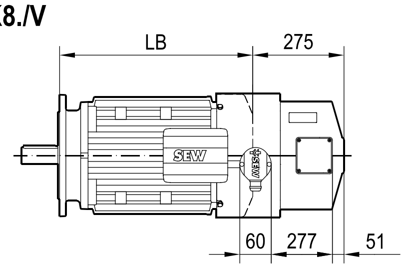
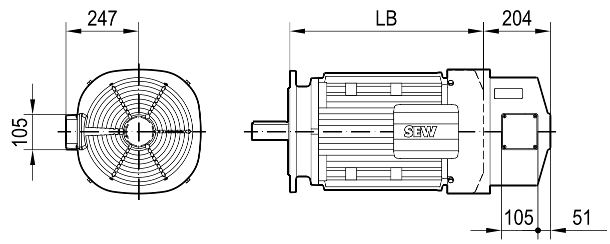


/V



(→ 📖)	225S	225M						
L	757	757						
LB (B5/B14)	617	617						
LB (B3)	614	614						

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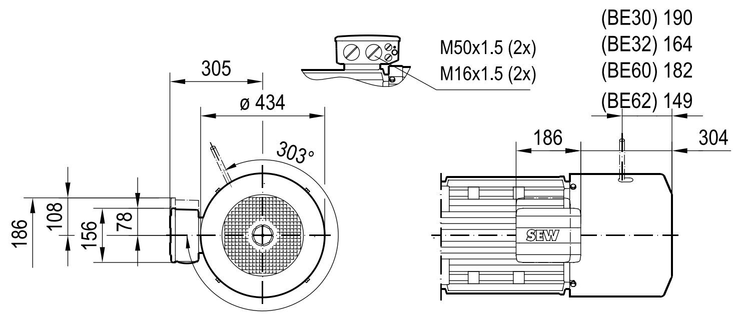
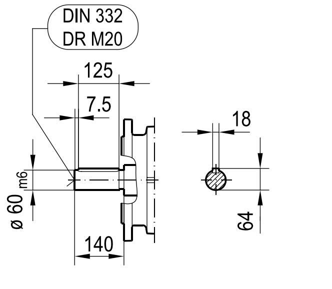
DRN225S 4 BE
DR2S225S 4 BE
DR2L225S 4 BE
DRN225M 4 BE

09 943 04 14
1(2)





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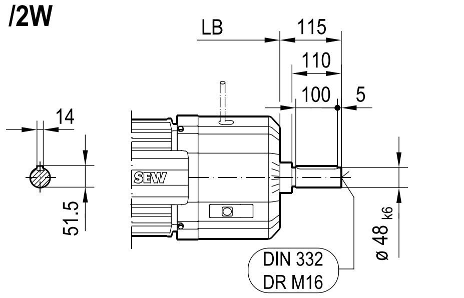

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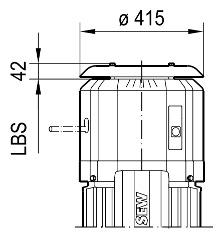

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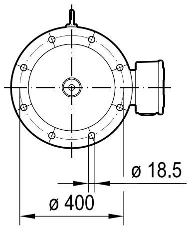

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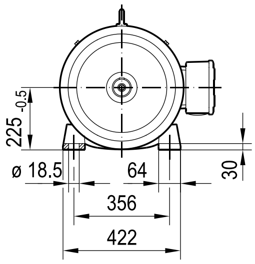

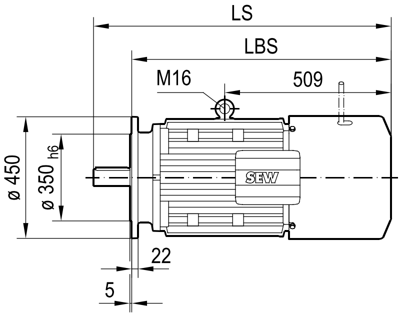

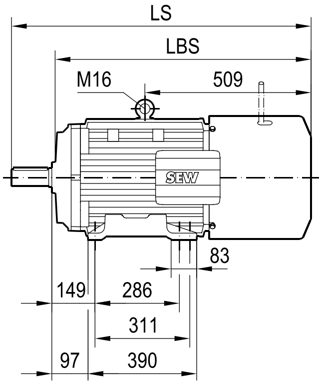

(→ 📖)	225S	225M						
LS	962	962						
LBS (B5/B14)	822	822						
LBS (B3)	819	819						

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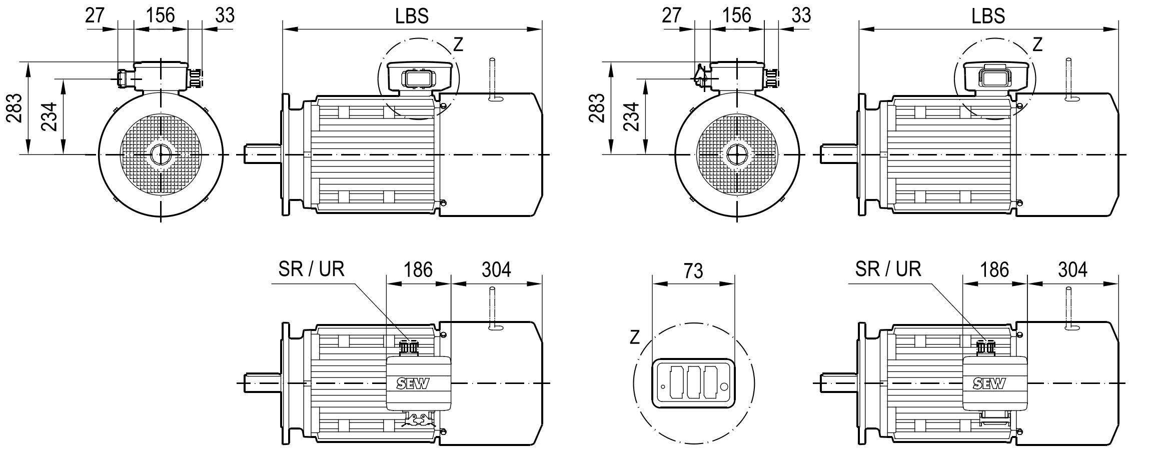
09 943 04 14
2(2)

/IV



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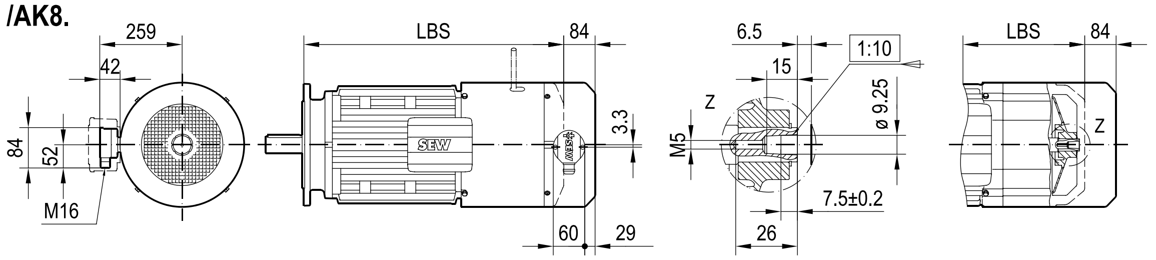
/AK8.

/EK8A



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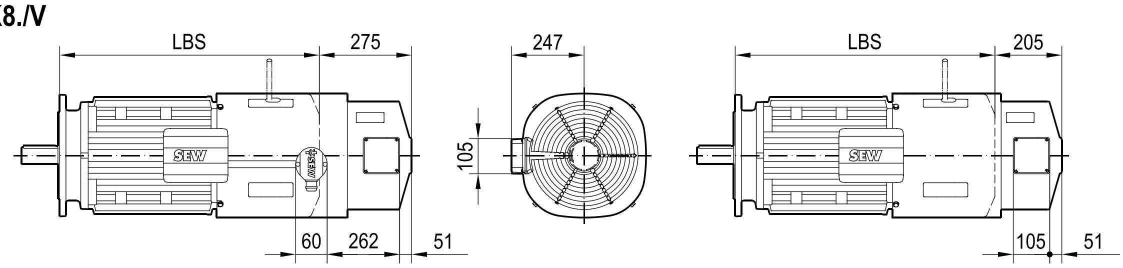
/AK8./V

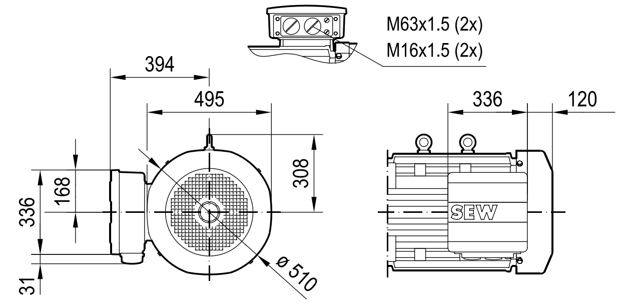
/V

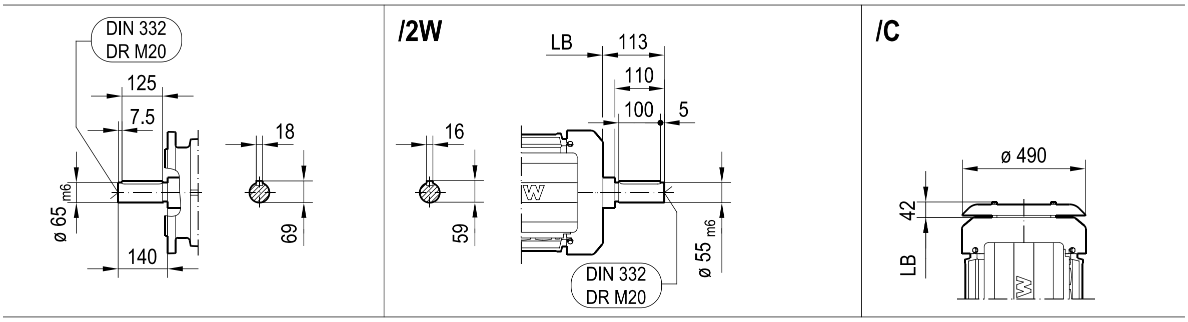


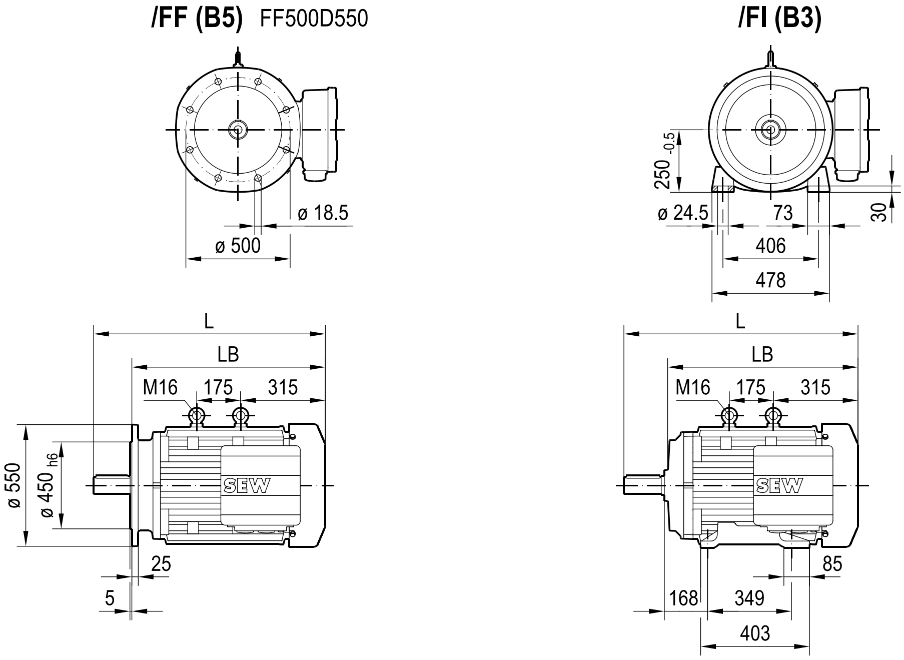
(→ 📖)	225S	225M						
LS	962	962						
LBS (B5/B14)	822	822						
LBS (B3)	819	819						

DRN250M 4
DRN250ME 4

08 579 02 14
1(2)







(→ 📖)	250M	250ME						
L	892	892						
LB (B5/B14)	752	752						
LB (B3)	750	750						

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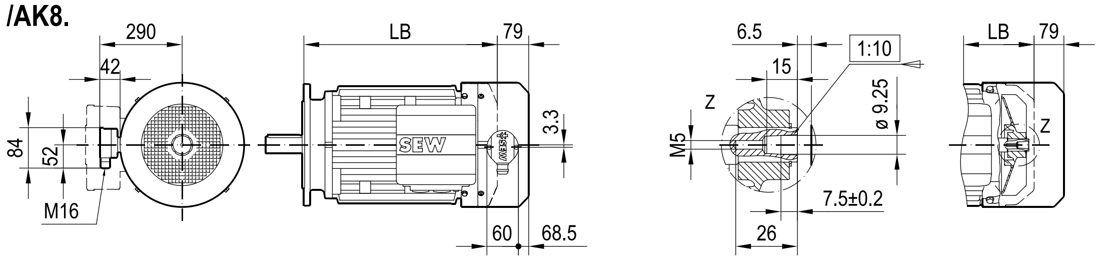
08 579 02 14
2(2)

/EK8.
/AK8.

/EK8A



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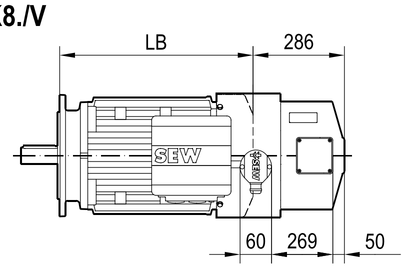
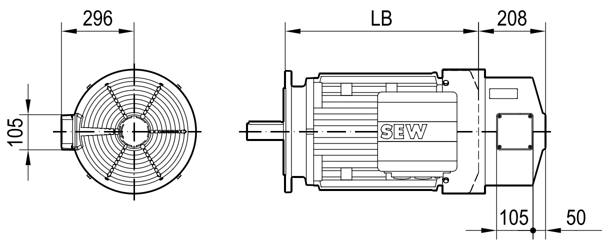


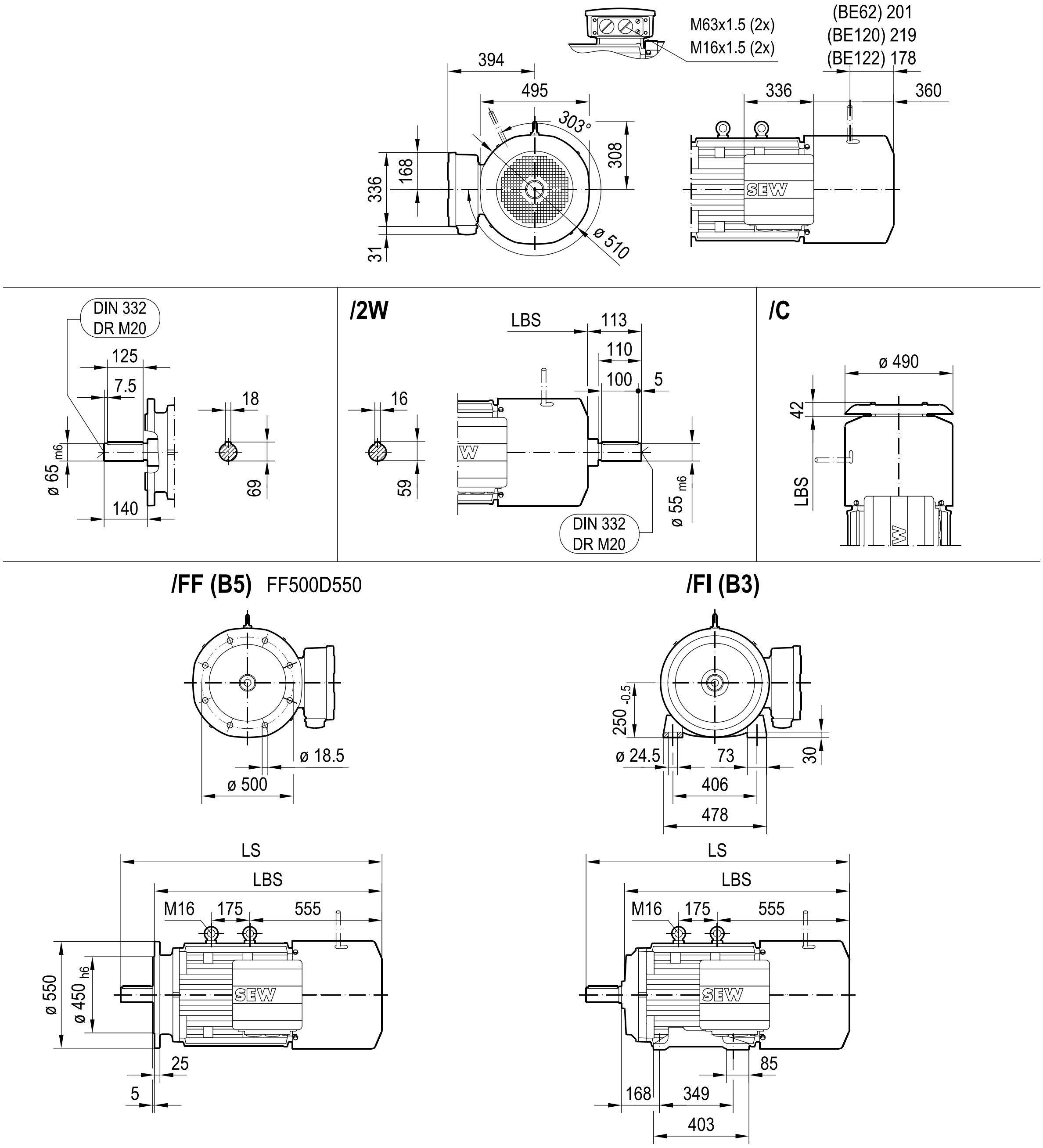
/V



(→ 📖)	250M	250ME						
L	892	892						
LB (B5/B14)	752	752						
LB (B3)	750	750						

DRN250M 4 BE
DRN250ME 4 BE

09 944 02 14
1(2)



(→ 📖)	250M	250ME						
LS	1132	1132						
LBS (B5/B14)	992	992						
LBS (B3)	990	990						

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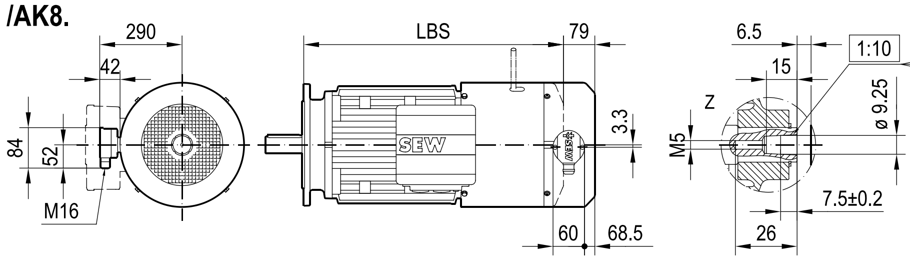
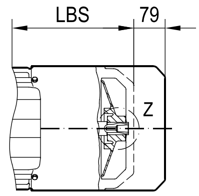
09 944 02 14
2(2)

/EK8.
/AK8.



/EK8A



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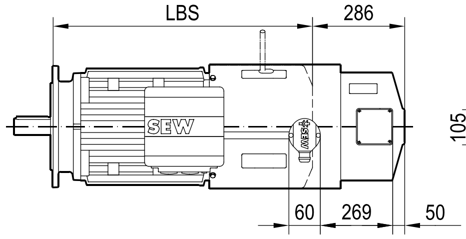

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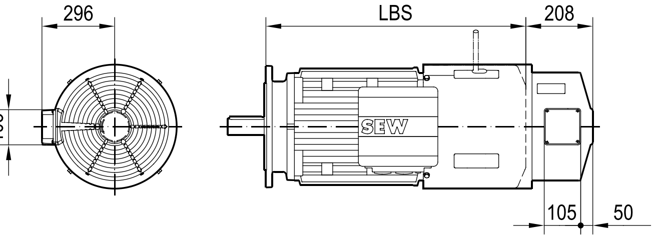

(→ 📖)	250M	250ME						
LS	1132	1132						
LBS (B5/B14)	992	992						
LBS (B3)	990	990						

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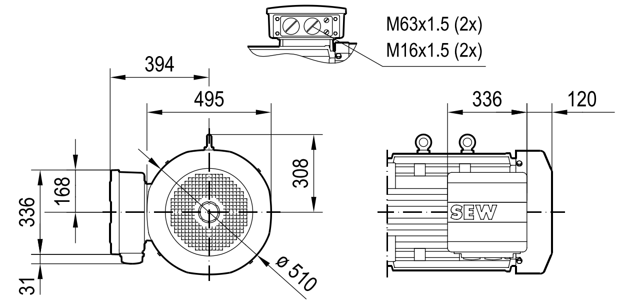
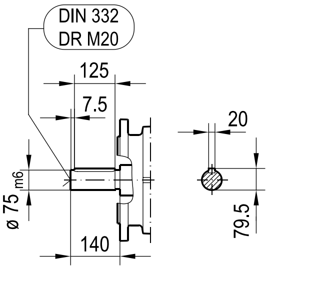
DRN280S 4
DRN280M 4

08 580 03 14
1(2)





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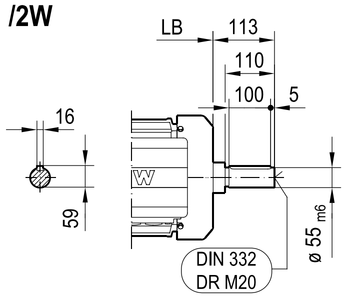

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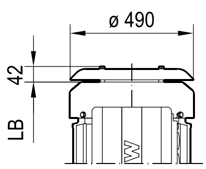
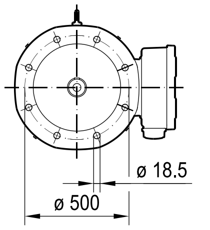


/FF (B5) FF500D550



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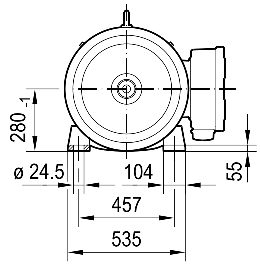

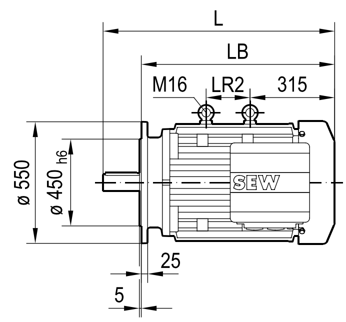

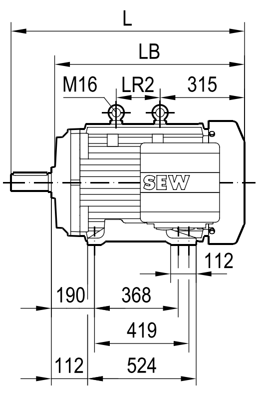

(→ 📖)	280S	280M						
L	892	987						
LB (B5/B14)	752	847						
LB (B3)	750	845						
LR2	175	270						

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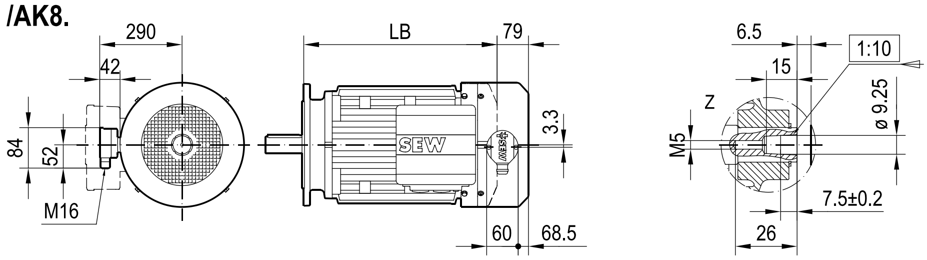
08 580 03 14
2(2)

/EK8.
/AK8.



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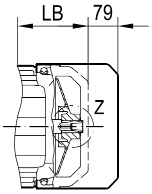
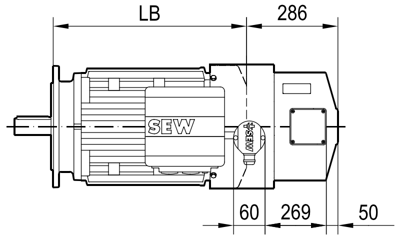
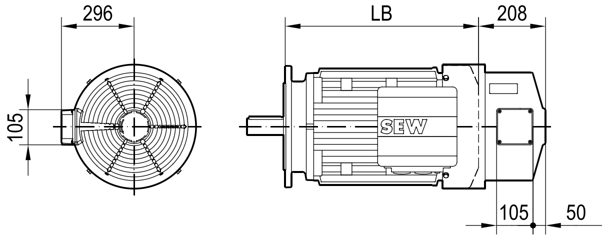


/EK8./V
/AK8./V



/V



(→ 📖)	280S	280M						
L	892	987						
LB (B5/B14)	752	847						
LB (B3)	750	845						
LR2	175	270						

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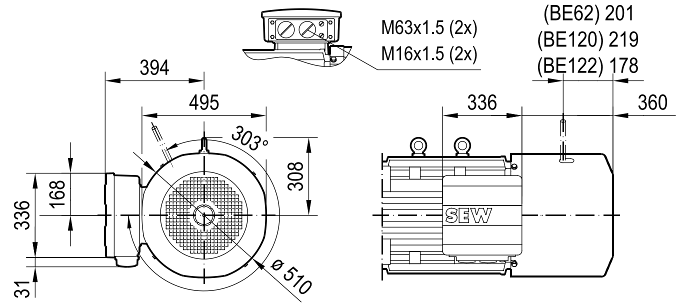
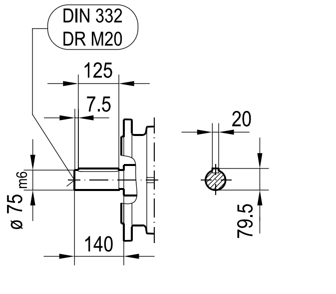
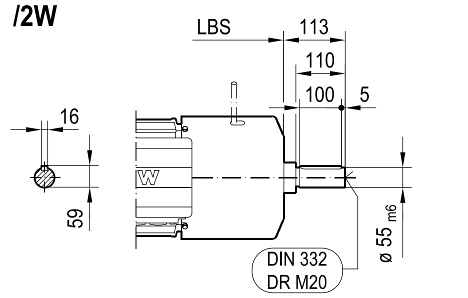
DRN280S 4 BE
DRN280M 4 BE

09 945 03 14
1(2)

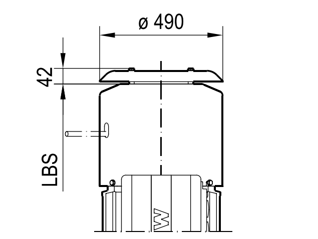




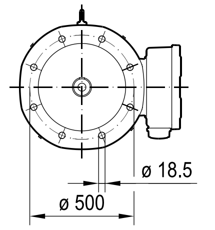
/2W



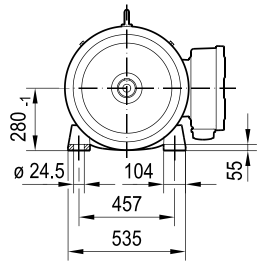
/C

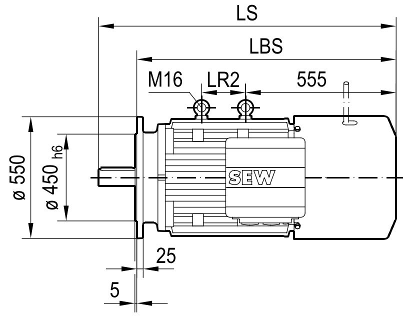


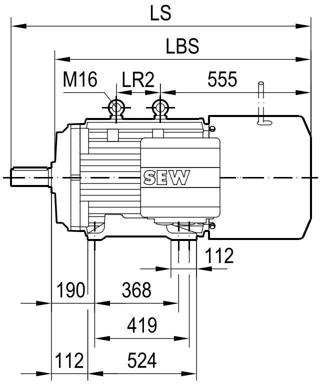
/FF (B5) FF500D550



/FI (B3)



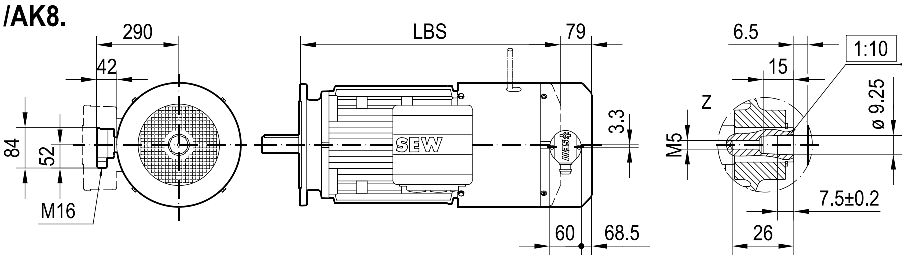




(→ 📖)	280S	280M						
LS	1132	1227						
LBS (B5/B14)	992	1087						
LBS (B3)	990	1085						
LR2	175	270						

09 945 03 14
2(2)

/EK8.
/AK8.



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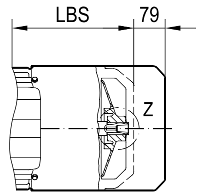
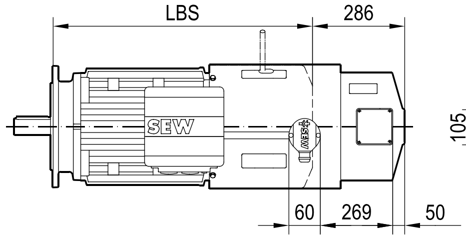


/EK8./V
/AK8./V



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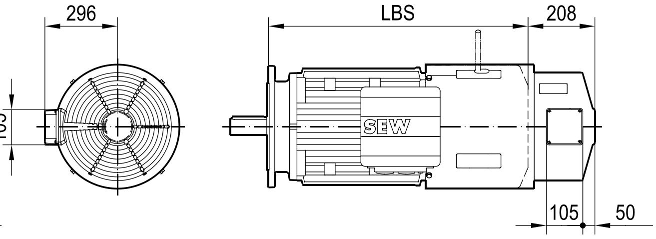

(→ 📖)	280S	280M						
LS	1132	1227						
LBS (B5/B14)	992	1087						
LBS (B3)	990	1085						
LR2	175	270						

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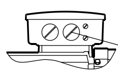
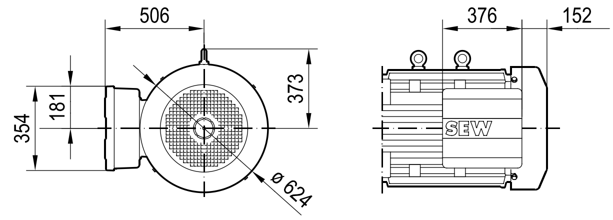
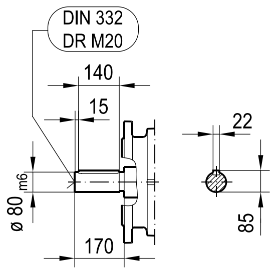
DRN315S 4
DRN315M 4
DRN315ME 4

08 582 04 14
1(2)







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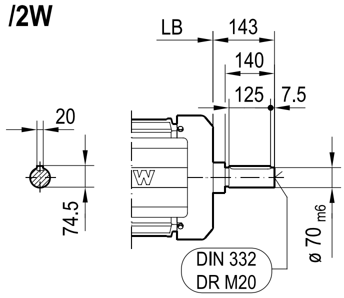
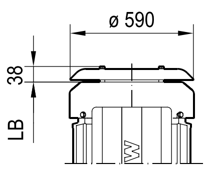
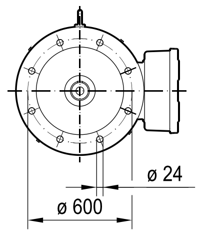


/C



/FF (B5) FF600D660



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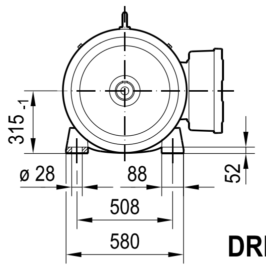
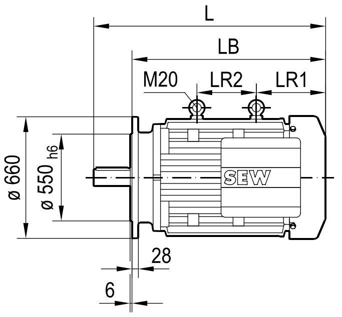
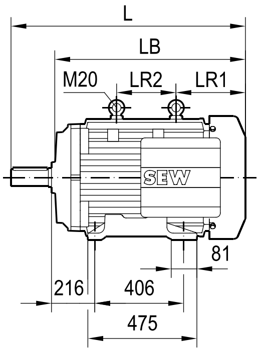
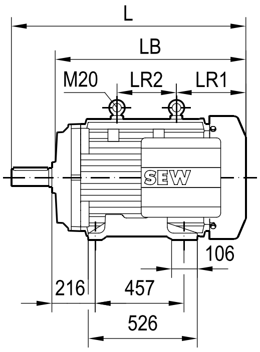




DRN315S



DRN315M/ME



(→ 📖)	315S	315M	315ME					
L	1111	1111	1241					
LB (B5/B14)	941	941	1071					
LB (B3)	939	939	1069					
LR1	334	334	364					
LR2	300	300	400					

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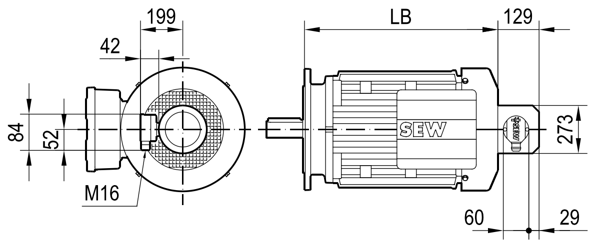
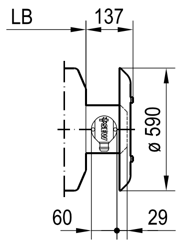
08 582 04 14
2(2)

/EK8.
/AK8.



/EK8./C
/AK8./C



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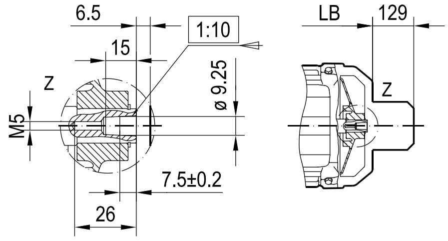
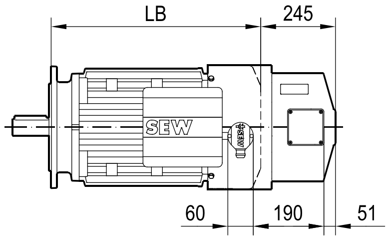


/EK8./V
/AK8./V



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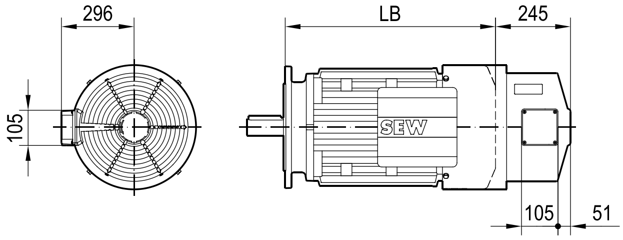
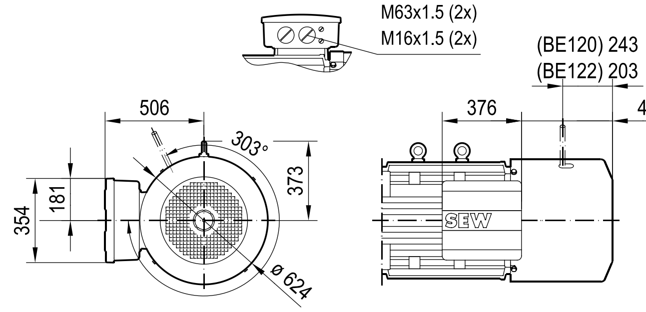
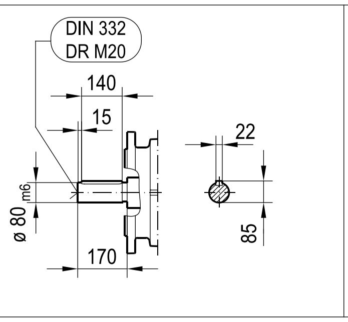


(→ 📖)	315S	315M	315ME					
L	1111	1111	1241					
LB (B5/B14)	941	941	1071					
LB (B3)	939	939	1069					
LR1	334	334	364					
LR2	300	300	400					

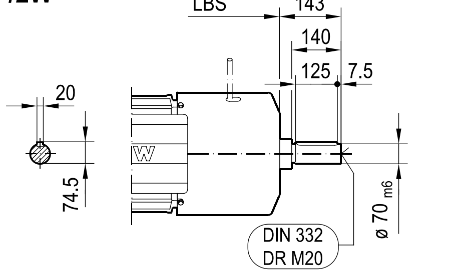
DRN315S 4 BE
DRN315M 4 BE
DRN315ME 4 BE

09 947 04 14
1(2)

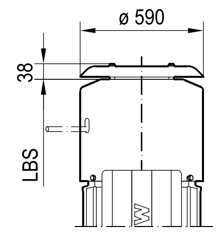




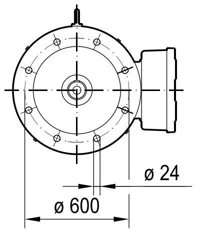
/2W



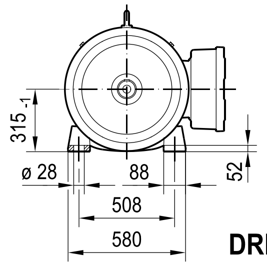
/C

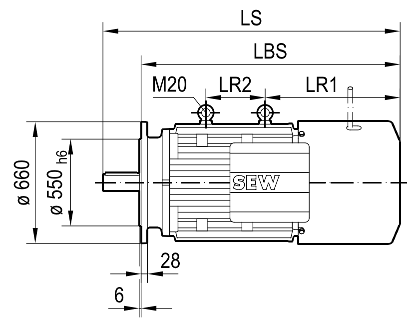


/FF (B5) FF600D660

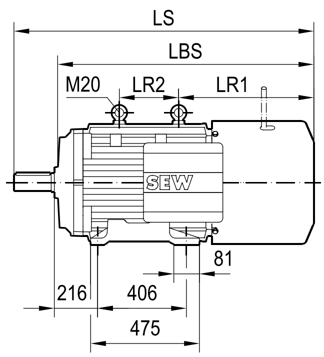


/FI (B3)

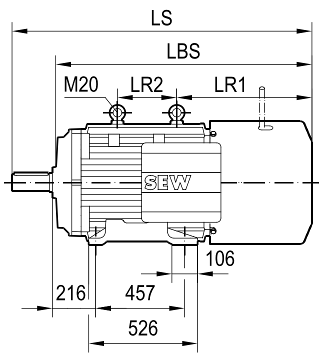




DRN315S



DRN315M/ME



(→ 📖)	315S	315M	315ME					
LS	1362	1362	1492					
LBS (B5/B14)	1192	1192	1322					
LBS (B3)	1190	1190	1320					
LR1	585	585	615					
LR2	300	300	400					

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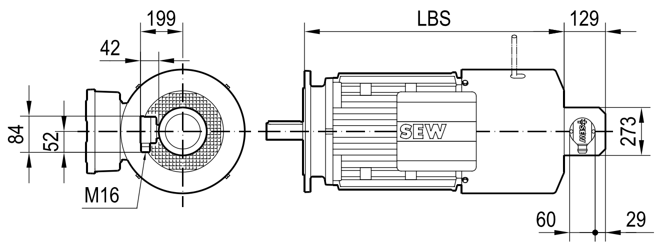
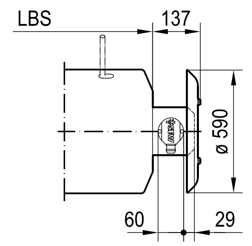
09 947 04 14
2(2)

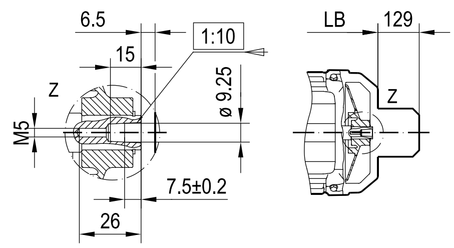
/EK8.
/AK8.



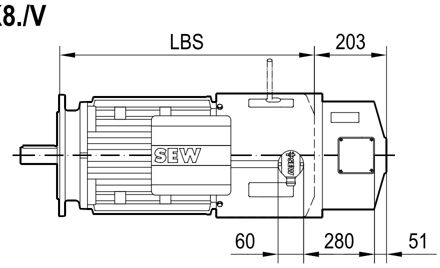
/EK8./C
/AK8./C



/EK8A



/EK8./V
/AK8./V



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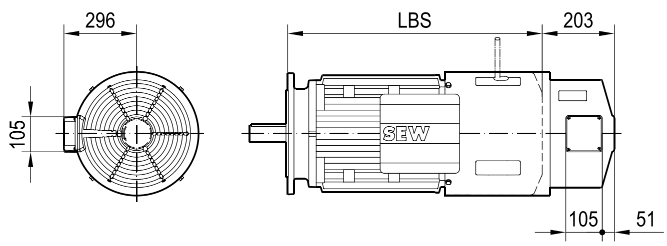

(→ 📖)	315S	315M	315ME					
LS	1362	1362	1492					
LBS (B5/B14)	1192	1192	1322					
LBS (B3)	1190	1190	1320					
LR1	585	585	615					
LR2	300	300	400					

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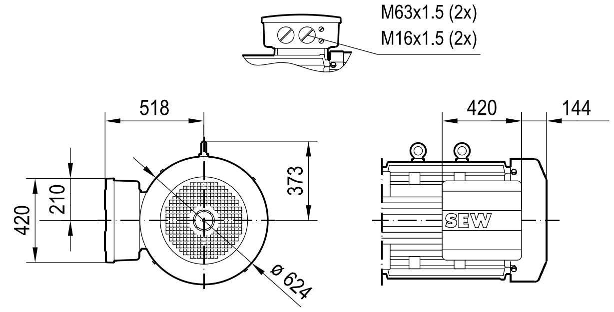
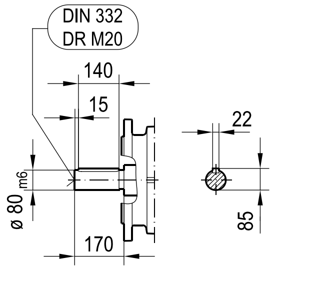
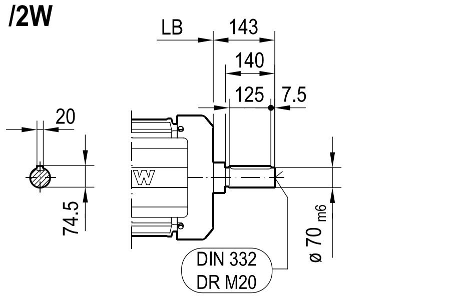
DRN315L 4 / DRN315H 4

08 584 04 14
1(2)

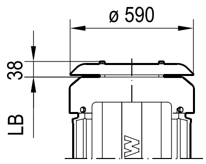




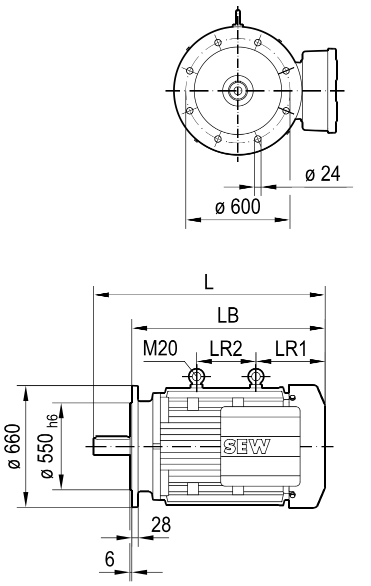
/2W



/C



/FF (B5) FF600D660



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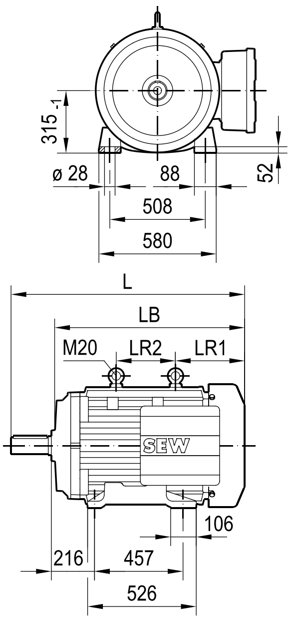

(→ 📖)	315L	315H						
L	1241	1241						
LB (B5/B14)	1071	1071						
LB (B3)	1069	1069						
LR1	364	364						
LR2	400	400						

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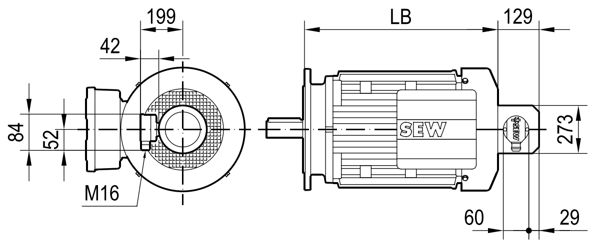
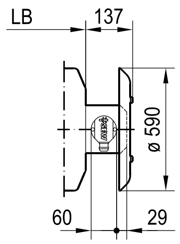
08 584 04 14
2(2)

/EK8.
/AK8.



/EK8./C
/AK8./C



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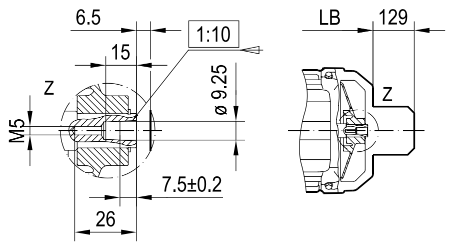
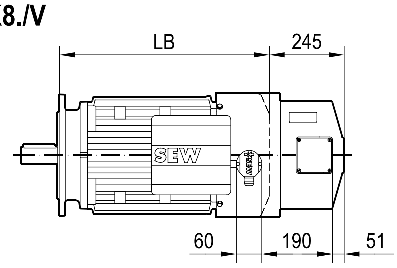


/EK8./V
/AK8./V



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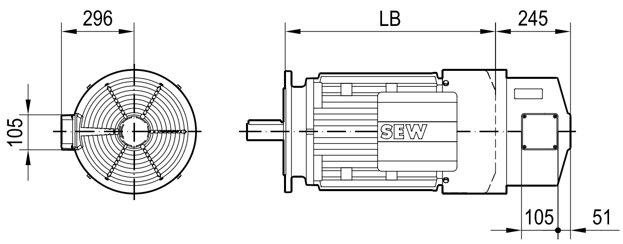

(→ 📖)	315L	315H						
L	1241	1241						
LB (B5/B14)	1071	1071						
LB (B3)	1069	1069						
LR1	364	364						
LR2	400	400						

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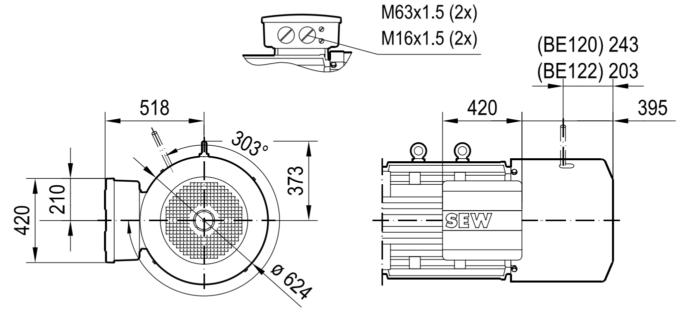
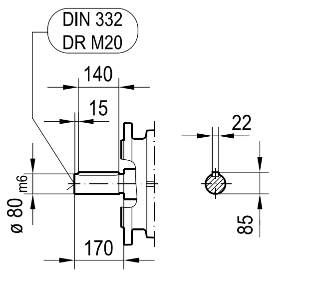
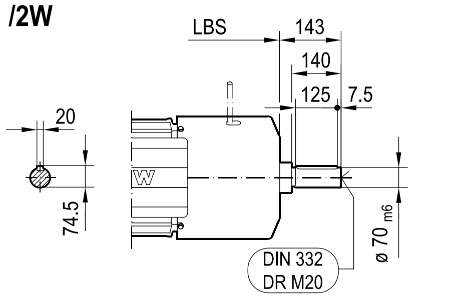
DRN315L 4 BE
DRN315H 4 BE

09 949 04 14
1(2)

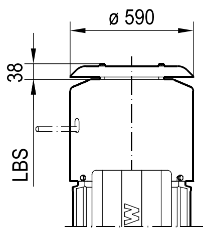




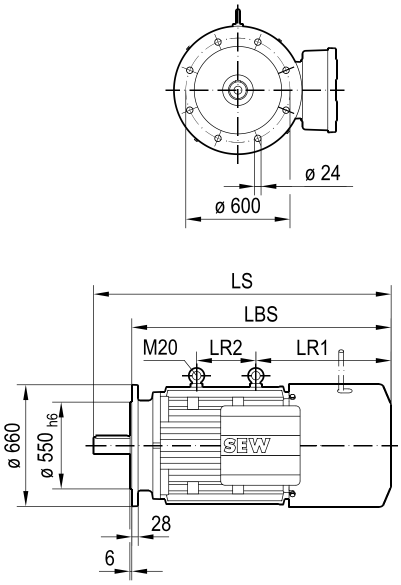
/2W



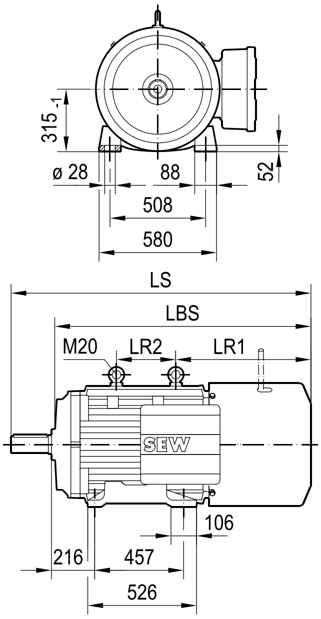
/C



/FF (B5) FF600D660



/FI (B3)



(→ 📖)	315L	315H						
LS	1492	1492						
LBS (B5/B14)	1322	1322						
LBS (B3)	1320	1320						
LR1	615	615						
LR2	400	400						

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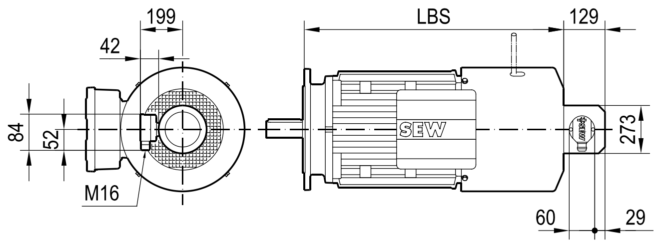
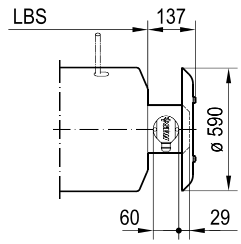
09 949 04 14
2(2)

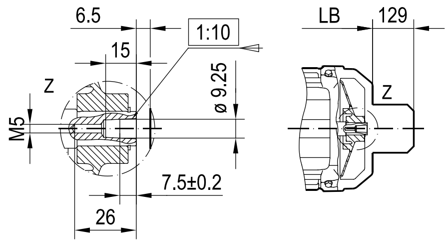
/EK8.
/AK8.



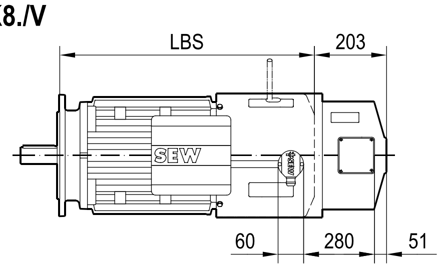
/EK8./C
/AK8./C



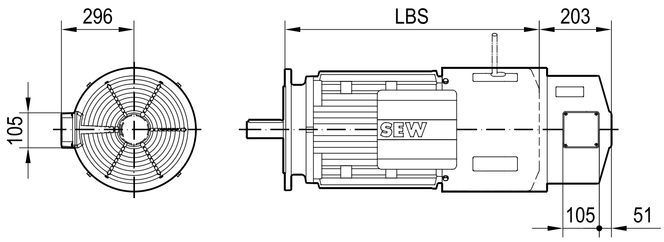
/EK8A



/EK8./V
/AK8./V



/V

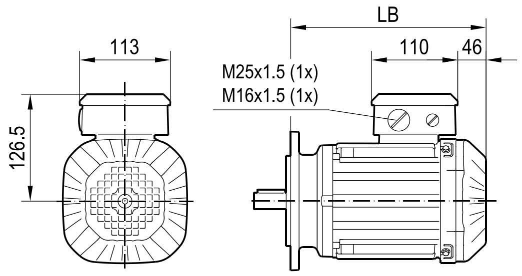


(→ 📖)	315L	315H						
LS	1492	1492						
LBS (B5/B14)	1322	1322						
LBS (B3)	1320	1320						
LR1	615	615						
LR2	400	400						

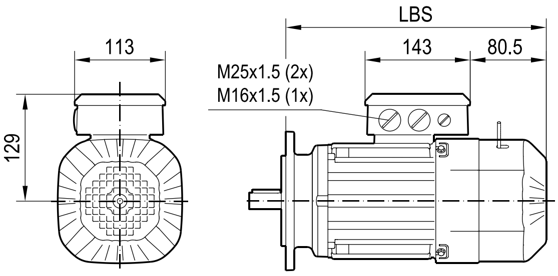
6.3 Dimension sheets for DRN.., DR2S.. with cage clamp terminal KCC, KC1

DRN71-90 **/KCC** **08 595 02 14**
DR2.71-80 **1(2)**

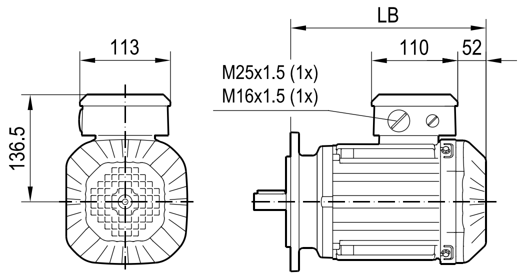
DRN71..KCC
DR2.71..KCC



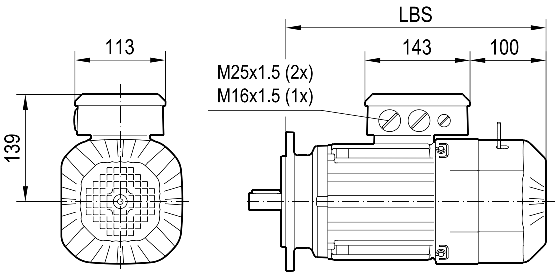
DRN71..BE KCC
DR2.71..BE KCC



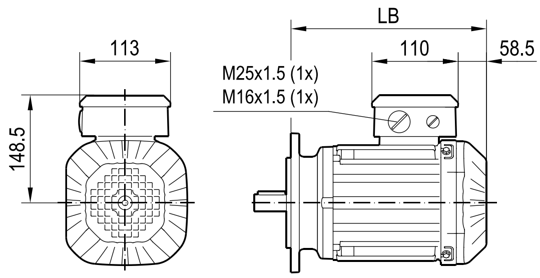
DRN80..KCC
DR2.80..KCC



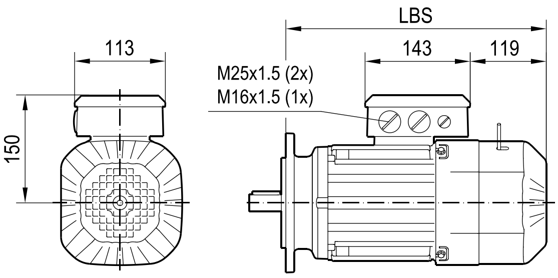
DRN80..BE KCC
DR2.80..BE KCC



DRN90..KCC



DRN90..BE KCC



(→ 🕮)	71MS	71M	80MK	80MS	80M	90S(R)	90L	
LB (B5/B14)	202	222	241	259	287	281	313	
LB (B3)	200	220	239	257	285	279	311	
LBS (B5/B14)	269	289	322	340	368	375	407	
LBS (B3)	267	287	320	338	366	373	405	

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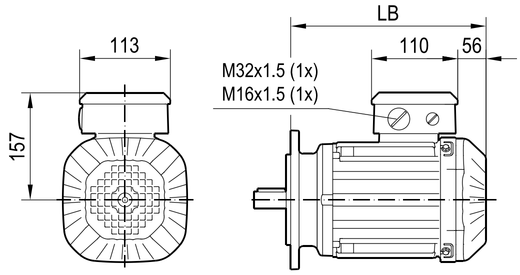
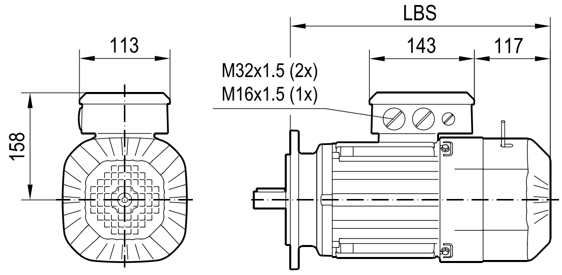
DRN100-132S /KCC **08 595 02 14**
2(2)

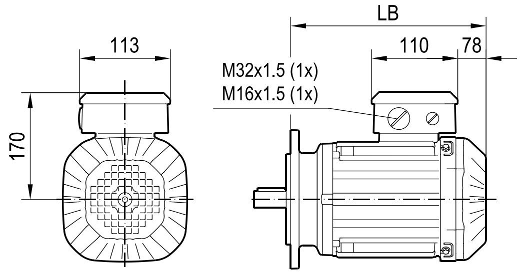
DRN100..KCC



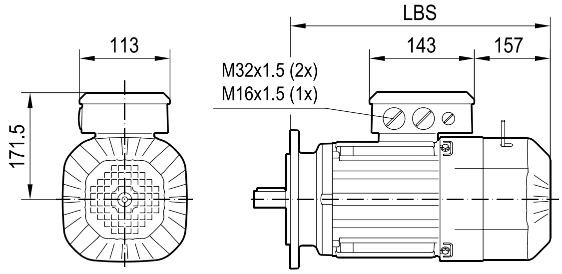
DRN100..BE KCC



DRN112-132S..KCC



DRN112-132S..BE KCC

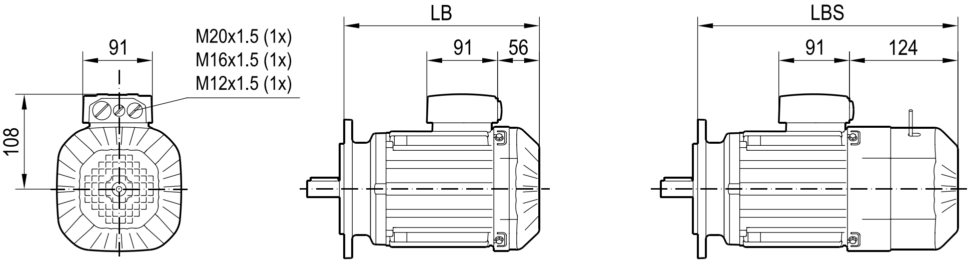


(→ 📖)	100LS	100LM	100L	112M(B)	132S			
LB (B5/B14)	309	359	359	387	437			
LB (B3)	307	357	357	385	435			
LBS (B5/B14)	402	452	452	499	549			
LBS (B3)	400	450	450	497	547			

DRN71-100 **/KC1** **08 596 02 14**
DR2.71-80 **1(1)**

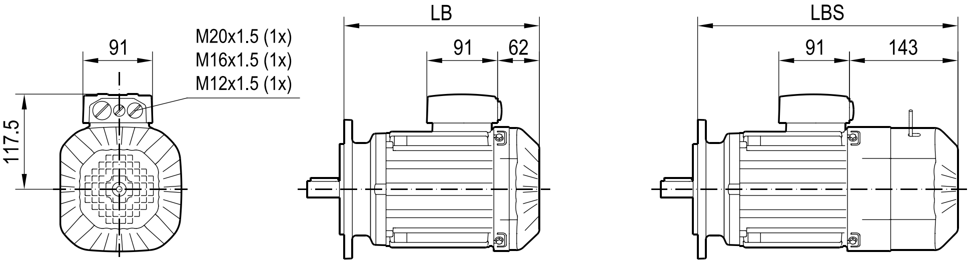
DRN71..KC1
DR2.71..KC1

DRN71..BE KC1
DR2.71..BE KC1



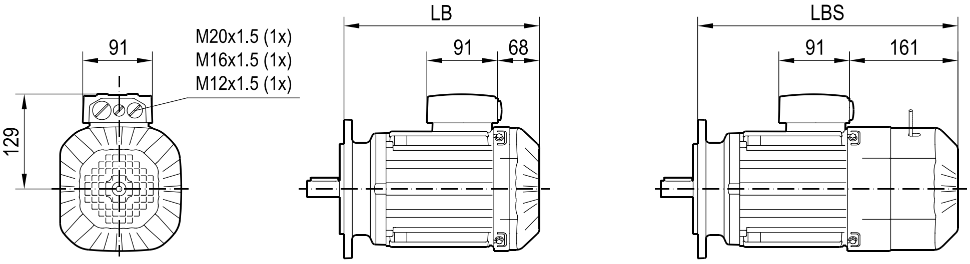
DRN80..KC1
DR2.80..KC1

DRN80..BE KC1
DR2.80..BE KC1



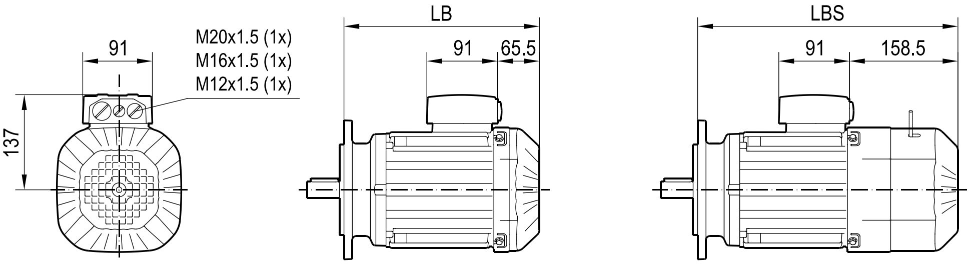
DRN90..KC1

DRN90..BE KC1



DRN100..KC1

DRN100..BE KC1



(→ 📖)	71MS	71M	80MK	80MS	80M	90S(R)	90L	100LS	100LM	100L
LB (B5/B14)	202	222	241	259	287	281	313	309	359	359
LB (B3)	200	220	239	257	285	279	311	307	357	357
LBS (B5/B14)	269	289	322	340	368	375	407	402	452	452
LBS (B3)	267	287	320	338	366	373	405	400	450	450

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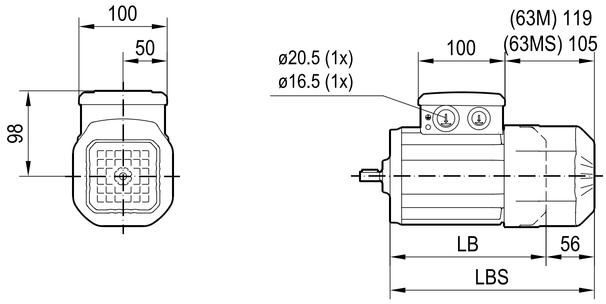
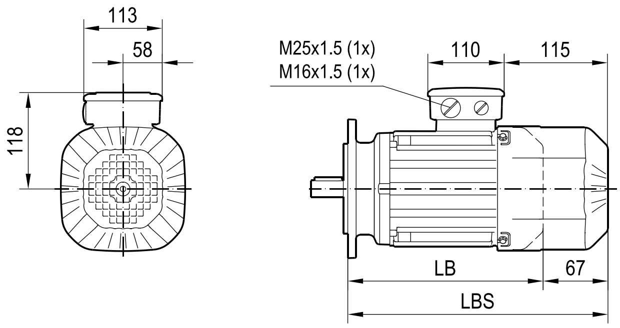
6.4 Dimension sheets for DRN.., DR2S.. with backstop RS

DRN63-90 **/RS** **08 599 02 14**
DR2.63-80 **1(4)**

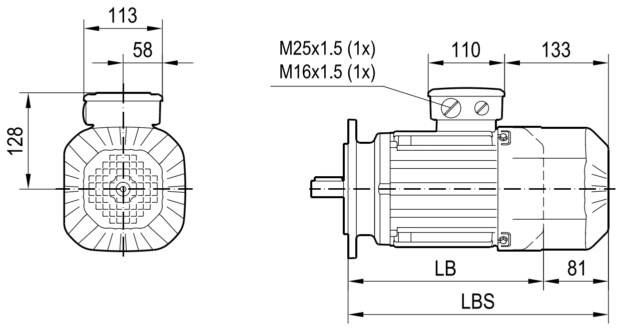
DRN63..RS
DR2.63..RS



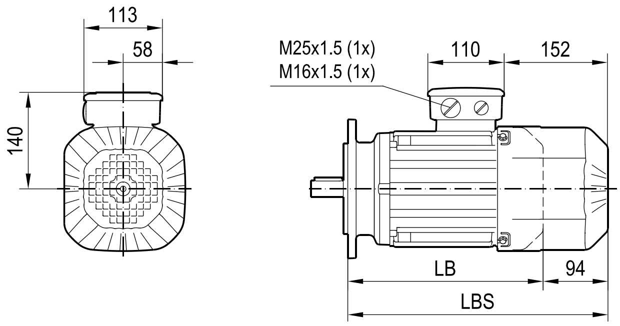
DRN71..RS
DR2.71..RS



DRN80..RS
DR2.80..RS



DRN90..RS



(→ 📖)	63MS	63M	71MS	71M	80MK	80MS	80M	90S	90L
LBS (B5/B14)	241	255	269	289	322	340	368	375	407
LBS (B3)	239	253	267	287	320	338	366	373	405

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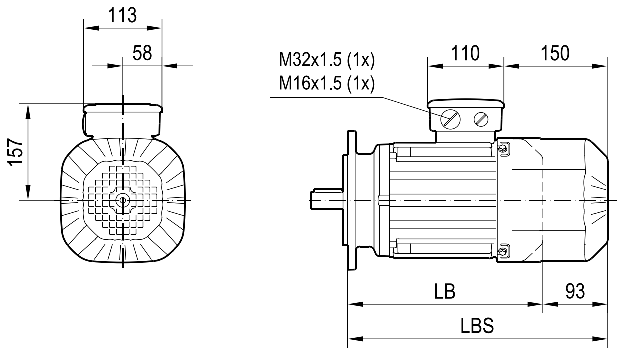
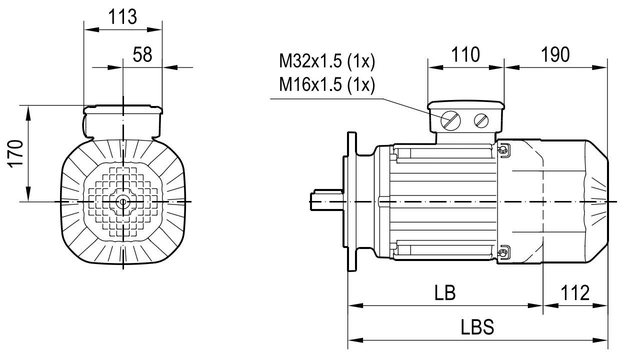
DRN100-132M/L /RS

08 599 02 14
2(4)

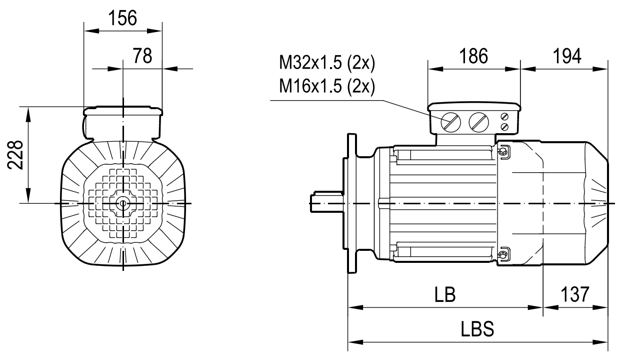
DRN100..RS



DRN112-132S..RS



DRN132M/L..RS



(→)	100LS	100LM	100L	112M(B)	132S	132M	132L	
LBS (B5/B14)	402	452	452	499	549	576	601	
LBS (B3)	400	450	450	497	547	574	599	

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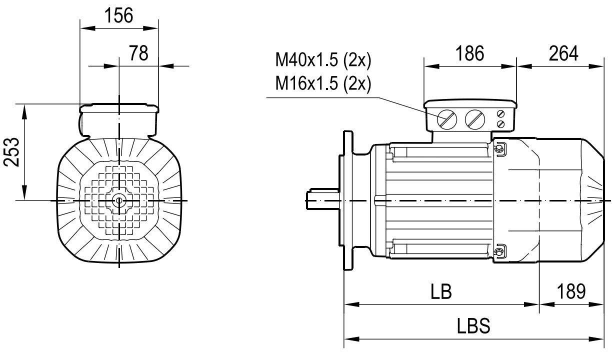
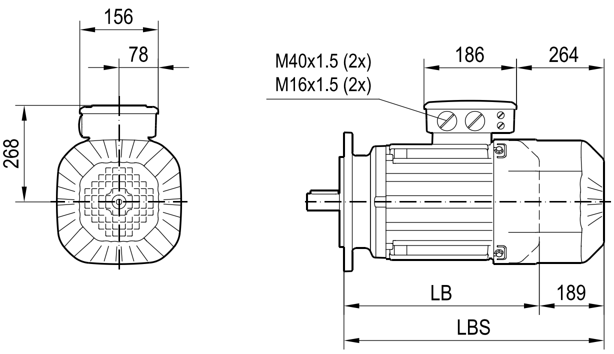
DRN160-200 /RS **08 599 02 14**
3(4)

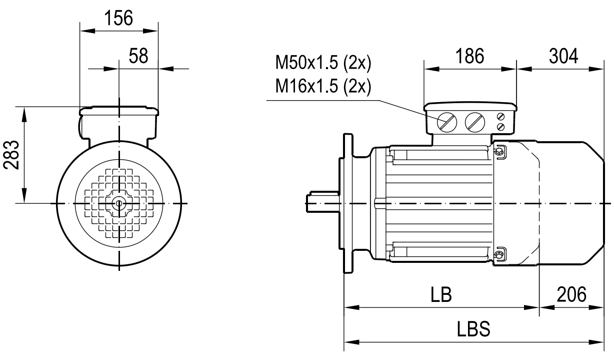
DRN160..RS



DRN180..RS



DRN200..RS



(→ 📖)	160M	160L	180M	180L	200L			
LBS (B5/B14)	721	721	748	748	854			
LBS (B3)	718	718	745	745	851			

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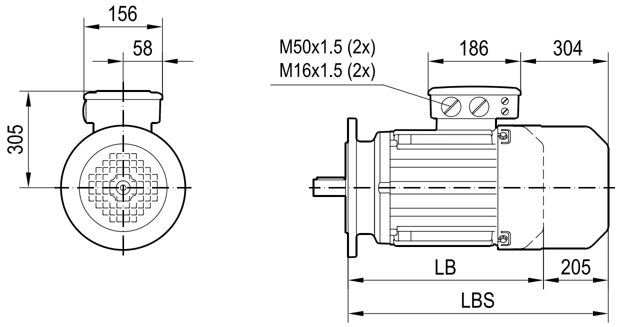
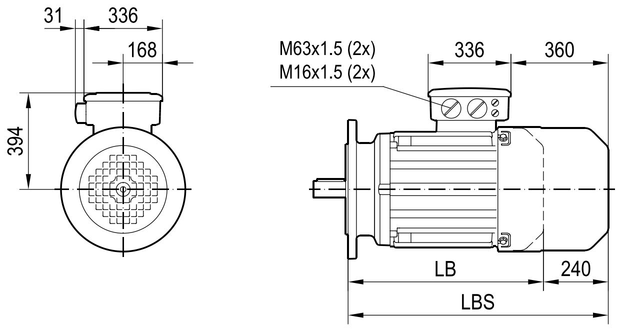
DRN225-315 **/RS** **08 599 02 14**
4(4)

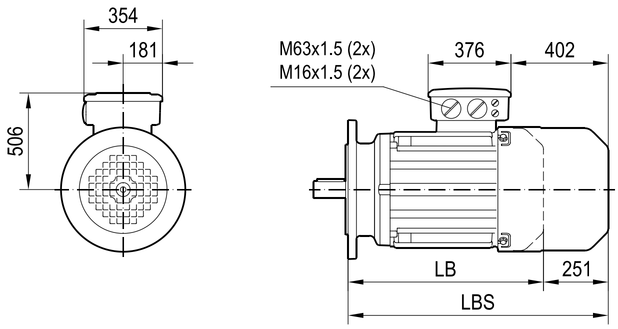
DRN225..RS



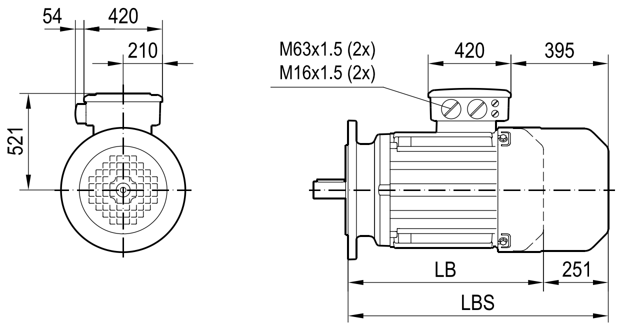
DRN250-280..RS



DRN315S/M/ME..RS



DRN315L/H..RS



(→ 📖)	225S	225M	250M	250ME	280S	315S	315M	315ME	315L	315H
LBS (B5/B14)	822	822	992	992	992	1192	1192	1322	1322	1322
LBS (B3)	819	819	990	990	990	1190	1190	1320	1320	1320

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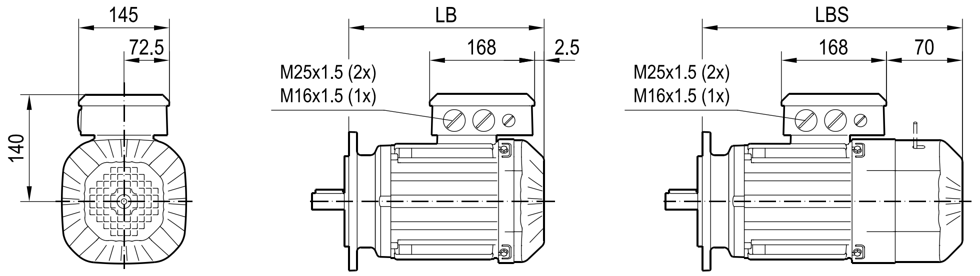
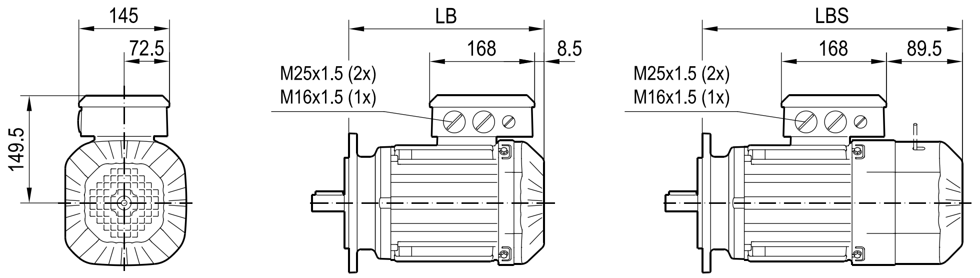
6.5 Dimension sheets for DRN.., DR2S.. with gray cast iron terminal box

DRN71-100 **/KLK GG** **08 600 02 14**
DR2.71-80 **1(3)**

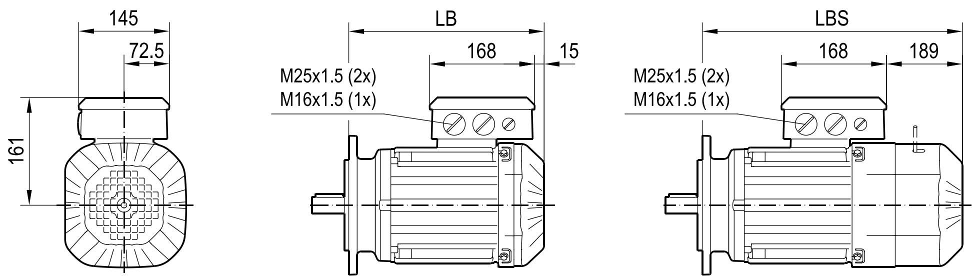
DRN71.. **DRN71..BE**
DR2.71.. **DR2.71..BE**



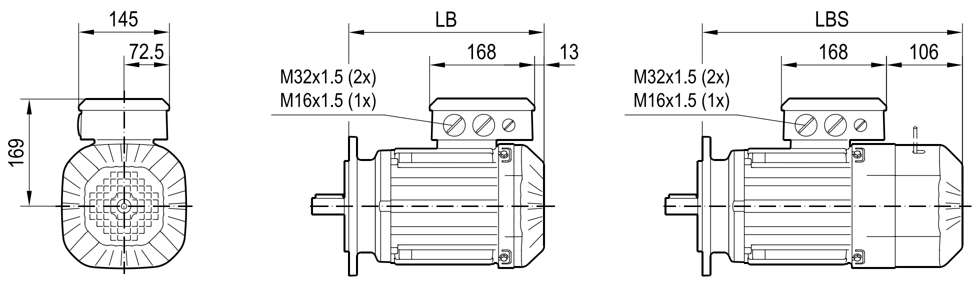
DRN80.. **DRN80..BE**
DR2.80.. **DR2.80..BE**



DRN90.. **DRN90..BE**



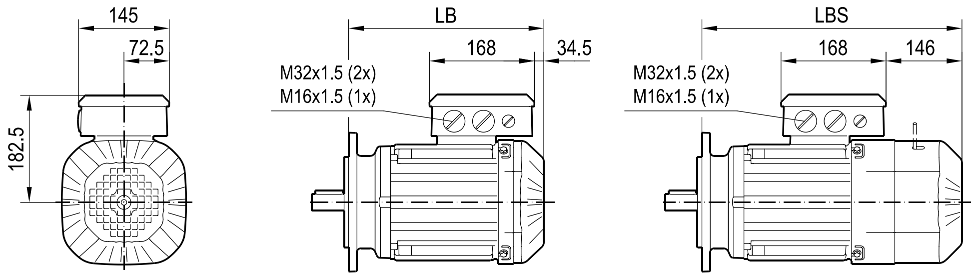
DRN100.. **DRN100..BE**



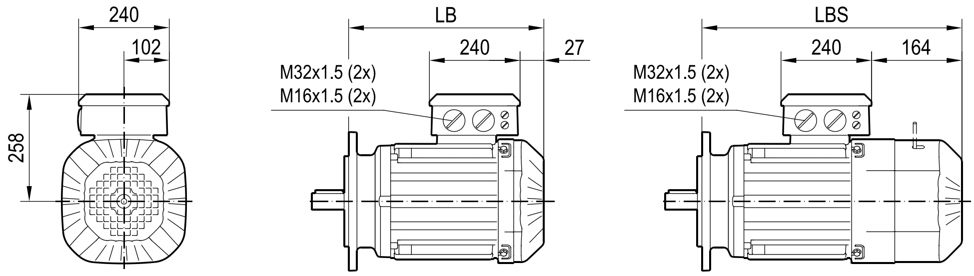
(→ 📖)	71MS	71M	80MK	80MS	80M	90S(R)	90L	100LS	100LM	100L
LB (B5/B14)	202	222	241	259	287	281	313	309	359	359
LB (B3)	200	220	239	257	285	279	311	307	357	357
LBS (B5/B14)	269	289	322	340	368	375	407	402	452	452
LBS (B3)	267	287	320	338	366	373	405	400	450	450

DRN112-180 /KLK GG 08 600 02 14
2(3)

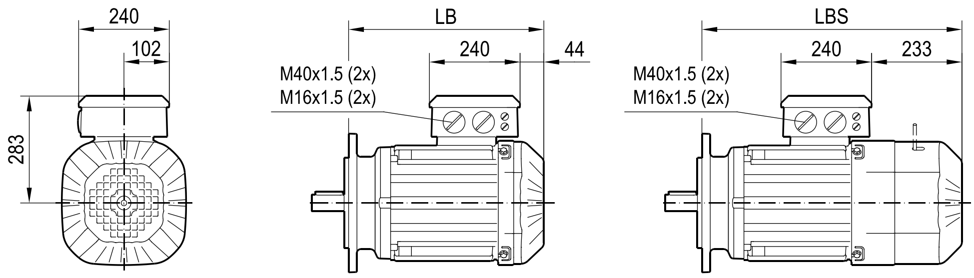
DRN112-132S.. **DRN112-132S..BE**



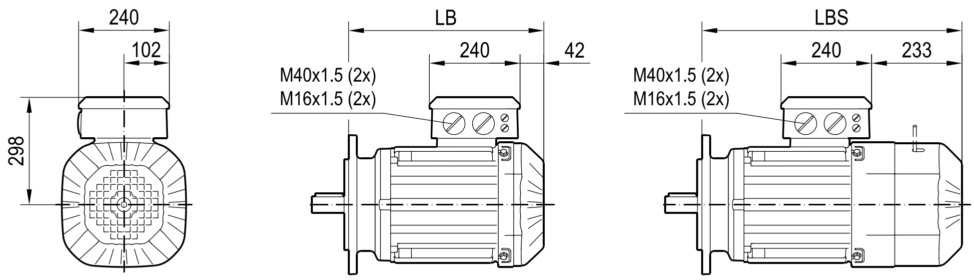
DRN132M/L.. **DRN132M/L..BE**



DRN160.. **DRN160..BE**



DRN180.. **DRN180..BE**



(→ 📖)	112M(B)	132S	132M	132L	160M	160L	180M	180L
LB (B5/B14)	387	437	439	464	532	532	555	555
LB (B3)	385	435	437	462	529	529	554	554
LBS (B5/B14)	499	549	576	601	721	721	748	748
LBS (B3)	497	547	574	599	718	718	745	745

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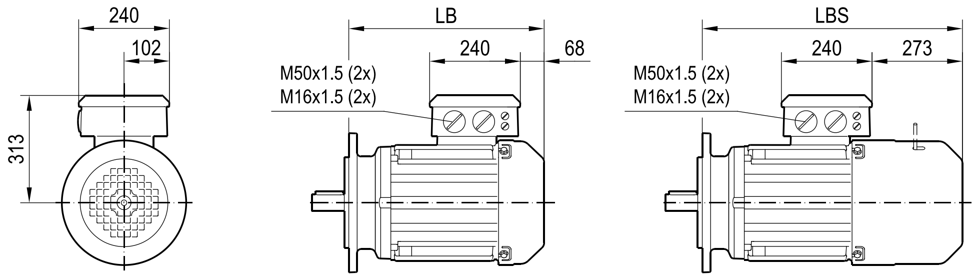
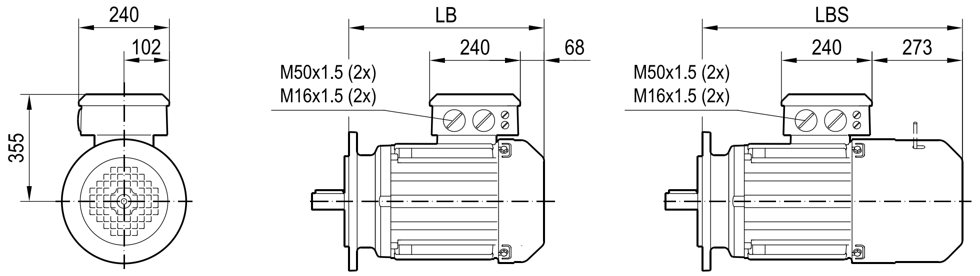
DRN200-225 /KLK GG **08 600 02 14**
3(3)

DRN200.. **DRN200..BE**



DRN225.. **DRN225..BE**



(→ 📖)	200L	225S	225M					
LB (B5/B14)	649	617	617					
LB (B3)	646	614	614					
LBS (B5/B14)	854	822	822					
LBS (B3)	851	819	819					

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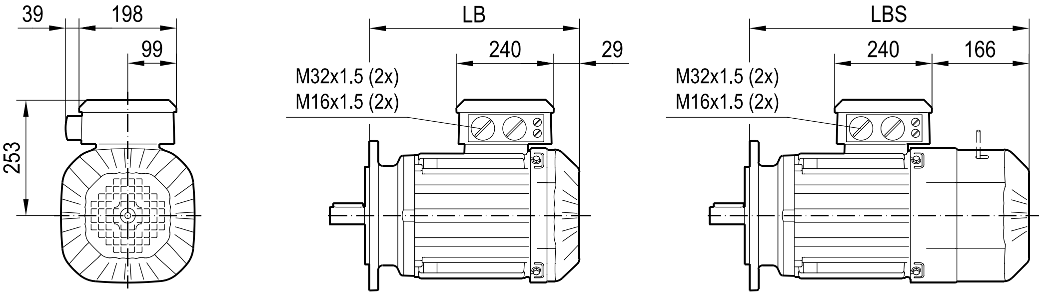
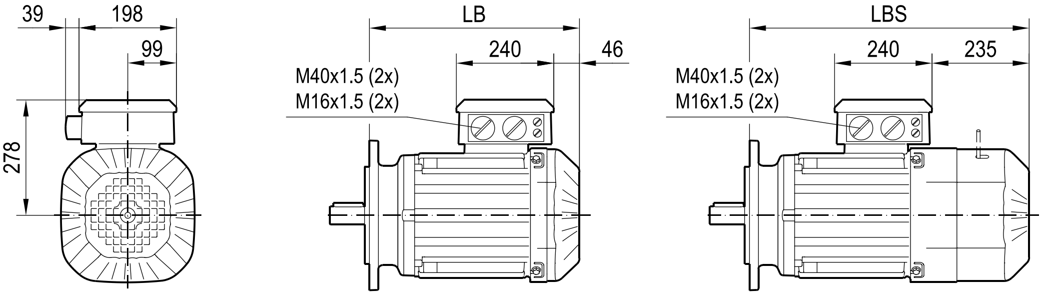
DRN132M-200 /KLK-AS GG 08 151 00 19

1(2)

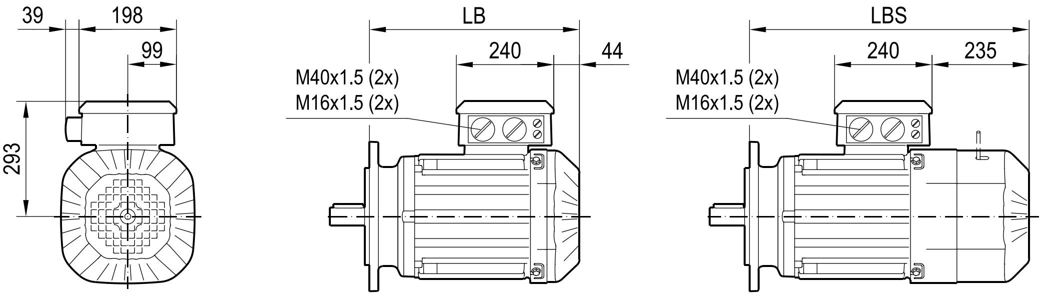
DRN132M/L.. DRN132M/L..BE



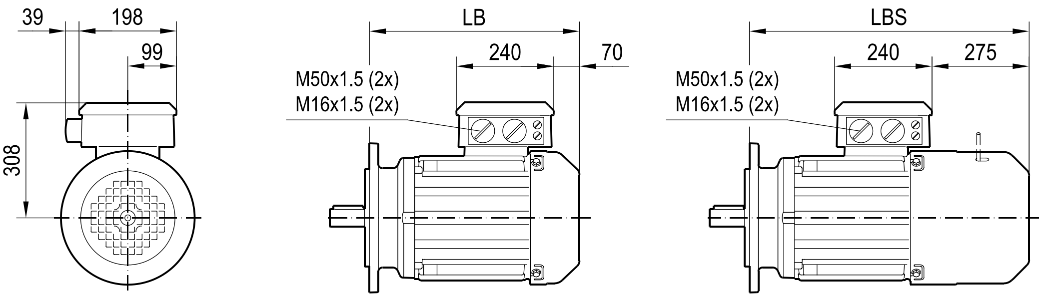
DRN160.. DRN160..BE



DRN180.. DRN180..BE



DRN200.. DRN200..BE



(→ 📖)	132M	132L	160M	160L	180M	180L	200L	
LB (B5/B14)	439	464	532	532	555	555	649	
LB (B3)	437	462	529	529	554	554	646	
LBS (B5/B14)	576	601	721	721	748	748	854	
LBS (B3)	574	599	718	718	745	745	851	

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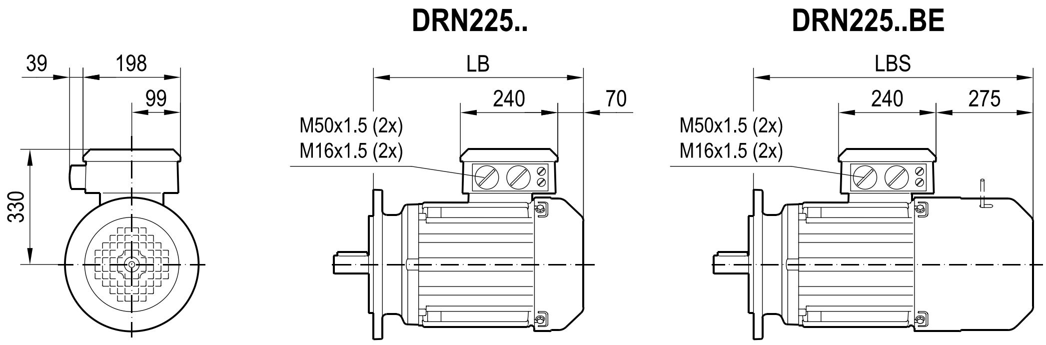
DRN225 **/KLK-AS GG** **08 151 00 19**
2(2)



(→ 📖)	225S	225M						
LB (B5/B14)	617	617						
LB (B3)	614	614						
LBS (B5/B14)	822	822						
LBS (B3)	819	819						

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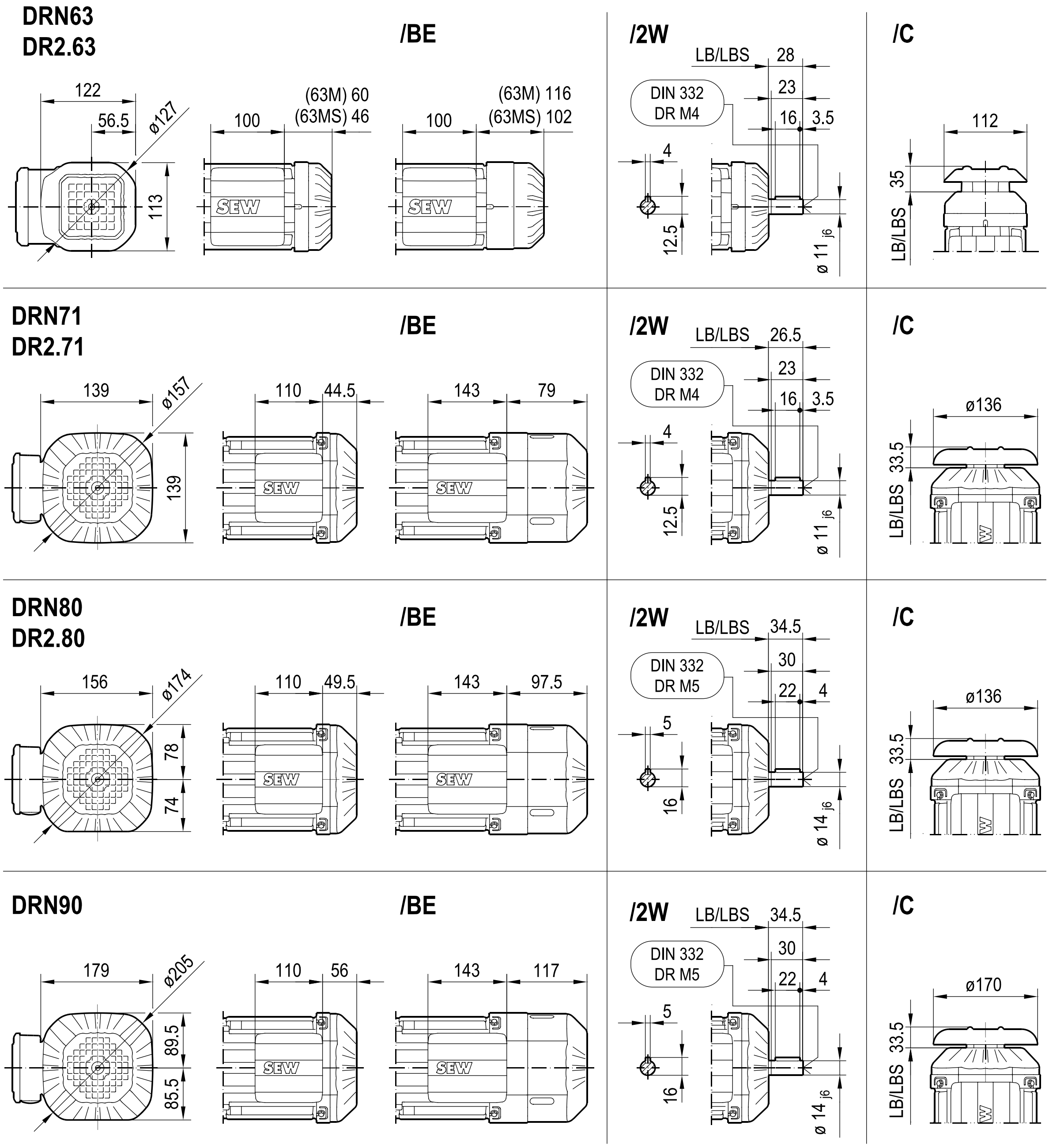
6.6 Dimension sheet for DRN.., DR2S.. with metal fan guard

DRN63-90
DR2.63-80

08 141 02 19
1(1)



(→ 📖)	63MS	63M	71MS(A)	71M	80MK(A)	80MS	80M	90S	90L
LB (B5/B14)	182	196	200	220	239	257	285	279	311
LB (B3)	180	194	198	218	237	255	283	277	309
LBS (B5/B14)	238	252	268	288	320	338	366	373	405
LBS (B3)	236	250	266	286	318	336	364	371	403

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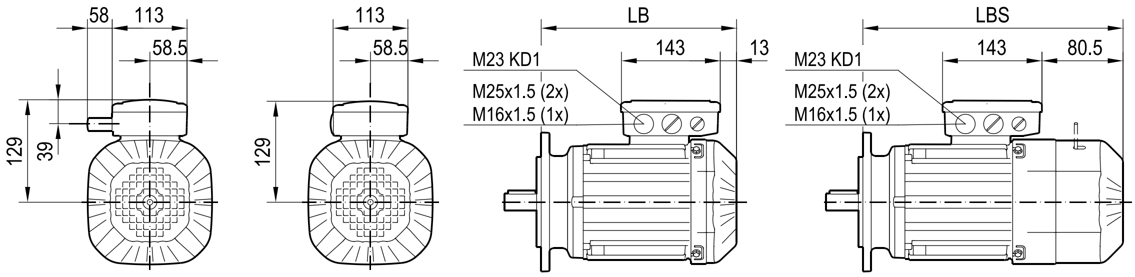
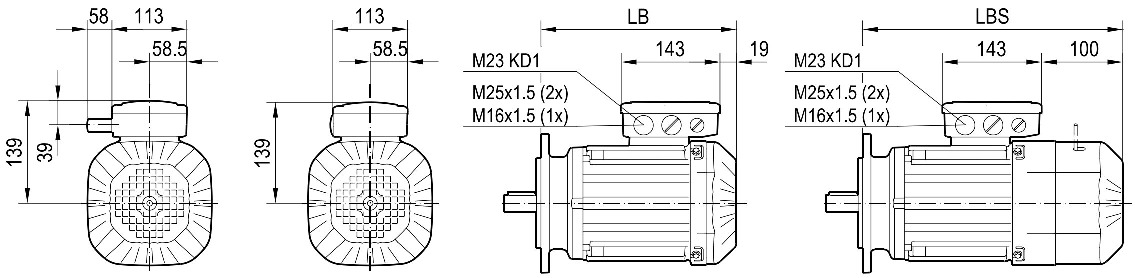
6.7 Dimension sheets of DRN.. with terminal box for MOVILINK® DDI

DRN71-90 **/DI** **08 152 01 19**
DR2.71-80 **1(3)**

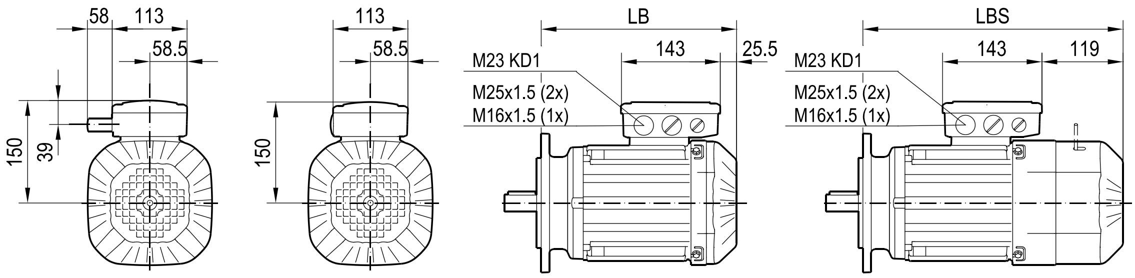
KD1 **KD** **DRN71..** **DR2.71..** **DRN71..BE** **DR2.71..BE**



KD1 **KD** **DRN80..** **DR2.80..** **DRN80..BE** **DR2.80..BE**



KD1 **KD** **DRN90..** **DRN90..BE**



(→ 📖)	71MS	71M	80MK	80MS	80M	90S(R)	90L	
LB (B5/B14)	202	222	241	259	287	281	313	
LB (B3)	200	220	239	257	285	279	311	
LBS (B5/B14)	269	289	322	340	368	375	407	
LBS (B3)	267	287	320	338	366	373	405	

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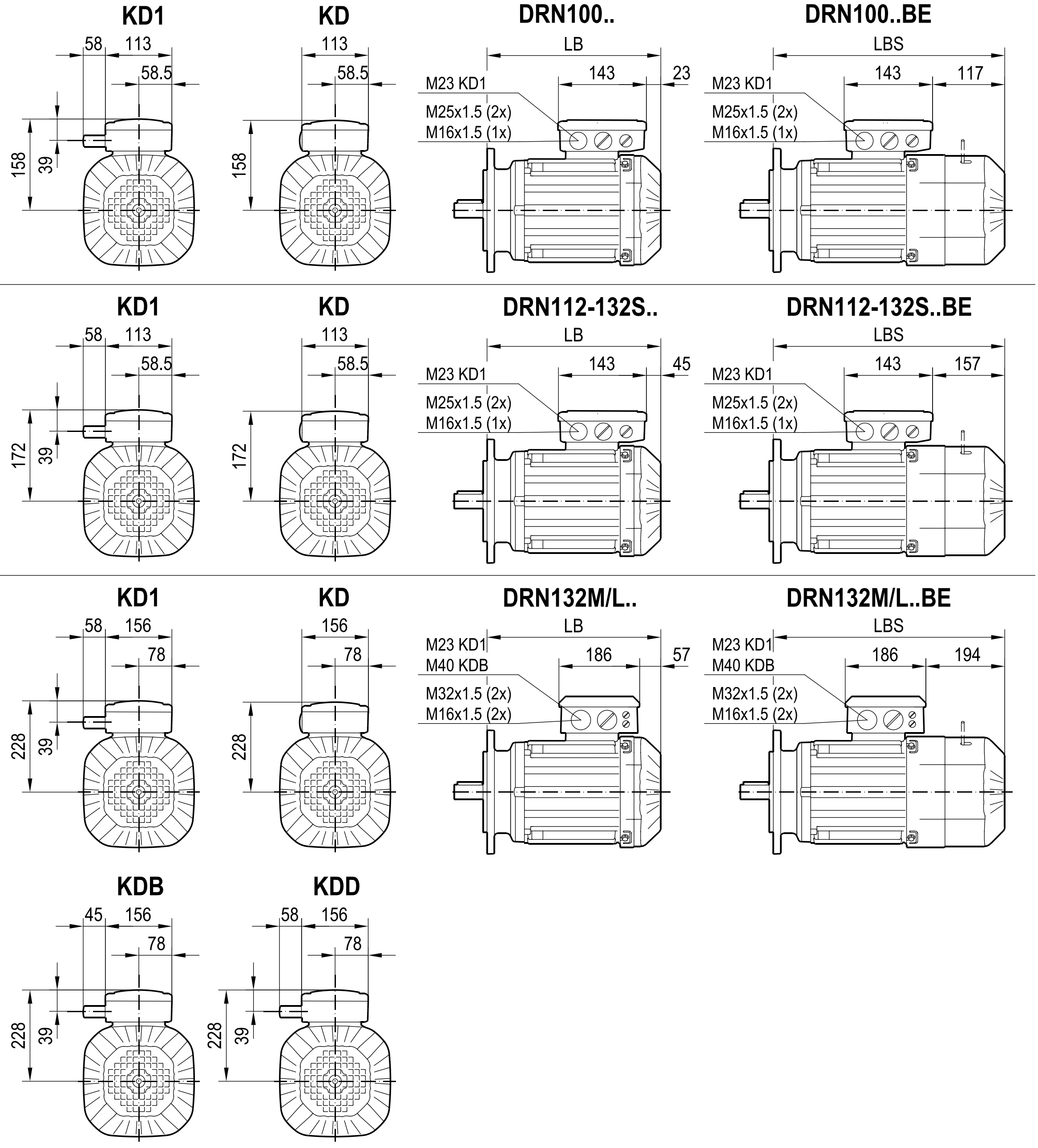
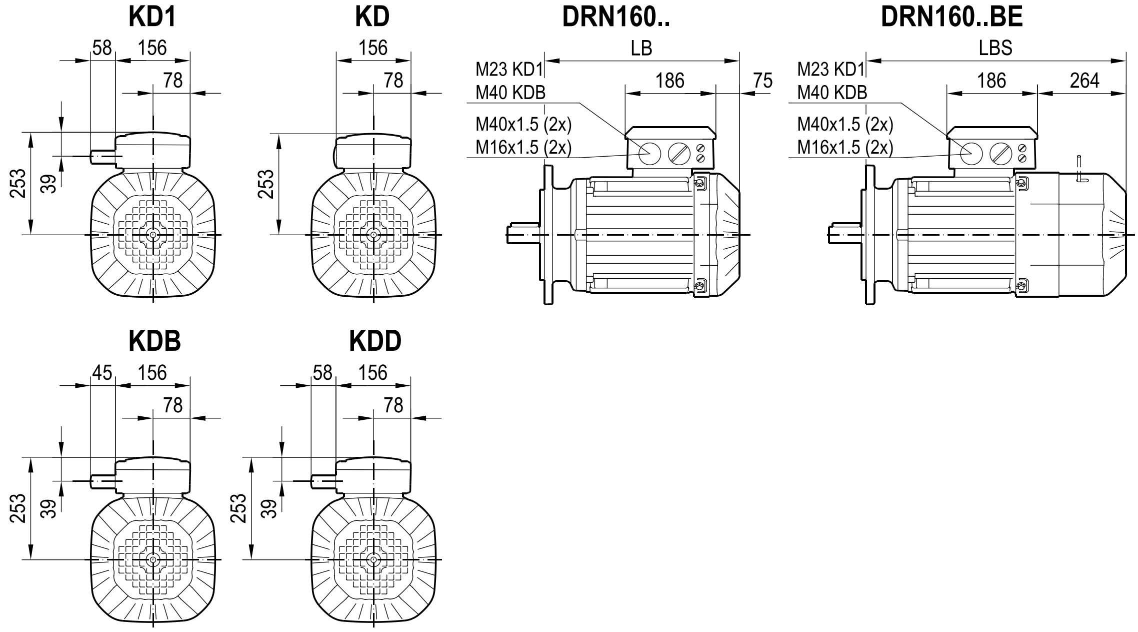
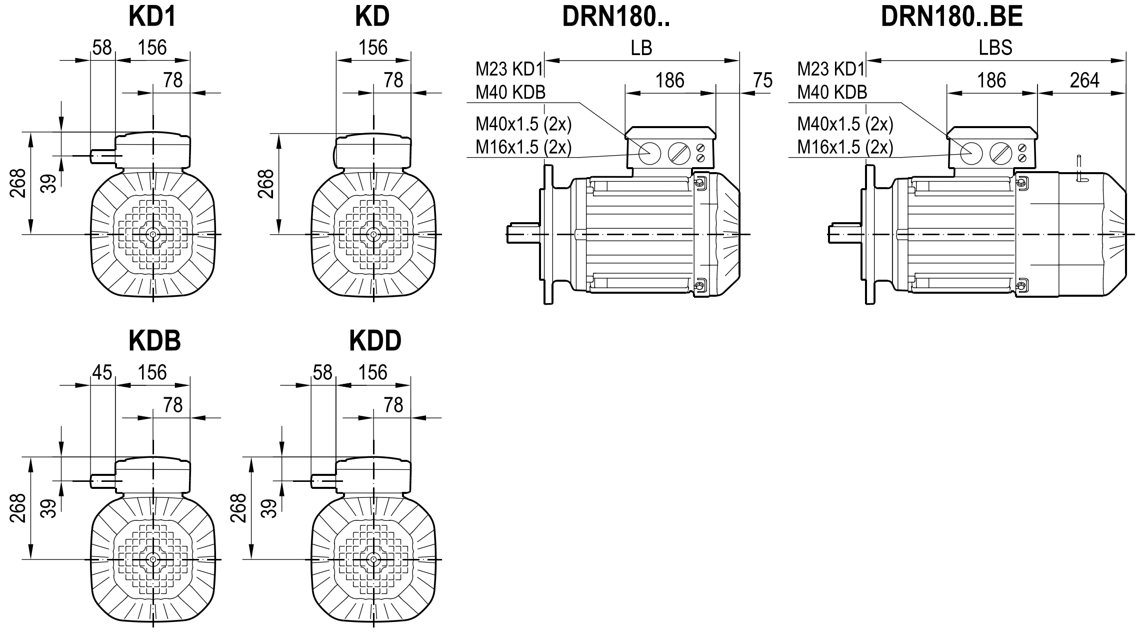
DRN100-132 /DI **08 152 01 19**
2(3)



(→ 📖)	100LS	100LM	100L(R)	112M	132S	132M	132L	
LB (B5/B14)	309	359	359	387	437	439	464	
LB (B3)	307	357	357	385	435	437	462	
LBS (B5/B14)	402	452	452	499	549	576	601	
LBS (B3)	400	450	450	497	547	574	599	

DRN160-180 /DI **08 152 01 19**
3(3)





(→ 🕮)	160M	160L	180M	180L				
LB (B5/B14)	532	532	555	555				
LB (B3)	529	529	554	554				
LBS (B5/B14)	721	721	748	748				
LBS (B3)	718	718	745	745				

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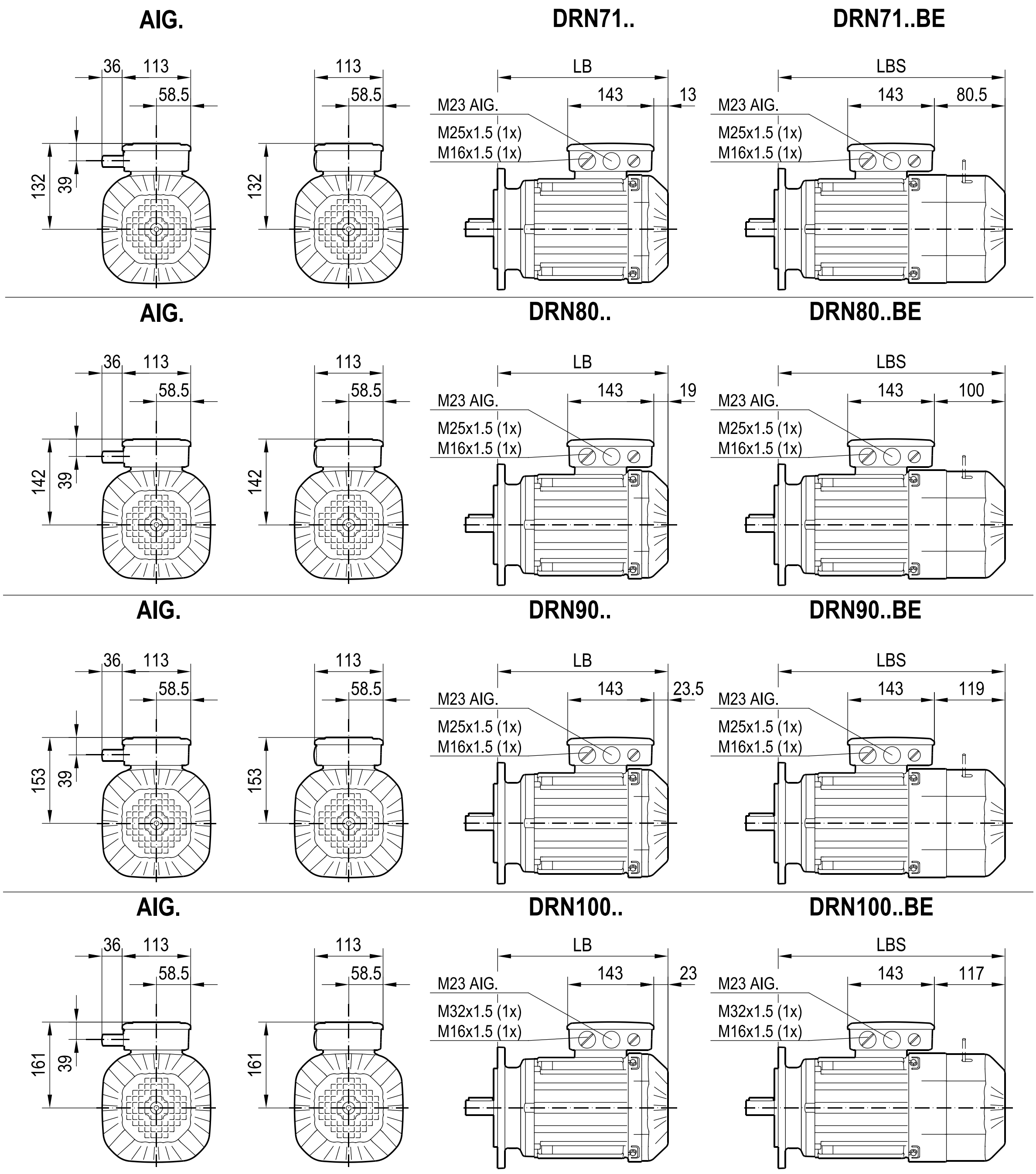
6.8 Dimension sheets for DRN.. with EI8. encoder

DRN71-100 /EI8. **08 162 00 19**
1(2)



(→ 📖)	71MS	71M	80MK	80MS	80M	90S(R)	90L	100LS	100LM	100L
LB (B5/B14)	202	222	241	259	287	281	313	309	359	359
LB (B3)	200	220	239	257	285	279	311	307	357	357
LBS (B5/B14)	269	289	322	340	368	375	407	402	452	452
LBS (B3)	267	287	320	338	366	373	405	400	450	450

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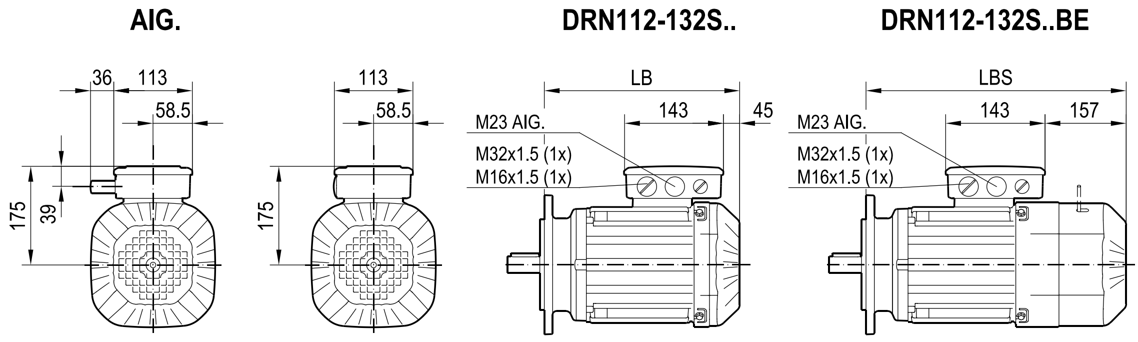
DRN112-132S /EI8. **08 162 00 19**
2(2)



(→ 📖)	112M(B)	132S						
LB (B5/B14)	387	437						
LB (B3)	385	435						
LBS (B5/B14)	499	549						
LBS (B3)	497	547						

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7 Brake

On request, SEW-EURODRIVE motors can be supplied with an integrated mechanical brake or backstop.

The BE.. brake is part of SEW-EURODRIVE's modular brake system. You can choose from up to 4 different brake sizes for mounting to the motor. Various braking torque steps are available for each brake size. This means that a wide range of braking torque steps is available for each motor size.

Furthermore, the brakes can be equipped with additional options such as manual brake release or function and wear monitoring system.

AC motors from SEW-EURODRIVE can be equipped with a backstop /RS instead of a BE.. brake. It is used in applications where a fixed main direction of rotation of the drive is necessary and where unintended movements in the opposite direction of rotation in the event of a current failure or in a switched off state have to be avoided. It must not be used as a safeguard against the incorrect direction of rotation that occurs as a result of switching against a lock.

For further information on the backstop /RS, refer to chapter "Mechanical backstop" (→ 🗎 609).

7.1 BE.. brake from SEW-EURODRIVE

BE.. brakes from SEW-EURODRIVE are DC-operated electromagnetic disk brakes. They open electrically and brake using spring force. The brake is installed on the B-side and integrated into the motor. The advantage is that brakemotors from SEW-EURODRIVE are very short and robust. Furthermore, SEW-EURODRIVE brakemotors are especially low-noise. This means they are especially suited for environments sensitive to noise.

The brake coil is available in various connection voltages. It is powered via a brake control which is either placed in the terminal box of the motor or in the control cabinet.

The brake is applied in case of a power failure. It is therefore suited for basic safety requirements in horizontal and vertical applications (e.g. according to EN 115).

Due to the high overload capacity during emergency stops, the BE.. brake is ideally suited as a holding brake in controlled applications. The working capacity is available for emergency stop braking operations.

Refer to -40 °C to +100 °C for the ambient temperature range at which motors with BE.. brake can be operated. They can be delivered in degrees of protection IP54, IP55, IP65, and IP66.

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7.1.1 With optional manual brake release

The brake can also be released without voltage supply if equipped with a manual brake release. This enables, for example, manual lowering of hoists or "weathervane" mode for cranes.

Two options are available for manual brake release:

1. With automatic manual brake release (option designation /HR), a hand lever is included in the delivery.
2. For the lockable manual brake release (option designation /HF), a set screw is included in the delivery.

7.1.2 With patented two-coil system

The BE.. brake is a DC-operated electromagnetic spring-loaded brake. It is equipped with the patented two-coil system from SEW-EURODRIVE. It works particularly rapid and wear-free in supply system startup in combination with brake controls from SEW-EURODRIVE with acceleration function.

When using the two-coil system, BE.. brakes are suitable for high switching frequencies as they are required for fast cycle applications for example.

While operation of the brake is also possible without acceleration function or with a direct DC voltage supply without SEW-EURODRIVE brake control for sizes up to BE2, all brakes of sizes BE5 and higher are optimized for using the two-coil system.

This allows for particularly energy-efficient operation as the power loss can be reduced in stop state. For brakes without two-coil system, the magnetic circuit has to be dimensioned larger for implementing the same braking torque and wear distance.

7.1.3 With SEW-EURODRIVE brake control in the terminal box or control cabinet

Usually, the brake is controlled by a brake control that is installed in either the motor terminal box or the control cabinet. You can choose from a wide range of brake controls. In addition to various connection voltages, brake controls for specific application requirements are available as well:

- With acceleration function for high switching frequency (by using the patented two-coil system, e.g. BGE../BME../BSG..)
- With rapid cut-off function for high stopping accuracy (with integrated or additional high-speed relays, e.g. BMP../BSR../BUR..)
- With integrated heating function (BMH..)
- With additional DC 24 V control inputs for PLC or inverter (e.g. BMK.. or BMV..)
- As safety-related component for functionally safe interruption of the energy supply to the brake (e.g. BST.., SBM..)
- BG1Z integrated brake control with condition monitoring of the brake wear (measurement of the lining reserve) and AC 200 – 500 V wide range voltage supply in connection with MOVILINK® DDI

Brakes up to BE2 can optionally also be delivered for operation at an external DC voltage source without additional brake control.

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7.1.4 Available as safety brake according to EN ISO 13849

BE.. brakes are also available as safety brakes according to EN ISO 13849 for safety-relevant applications.

The use of a safety brake allows for safety functions which force the motor to stop and hold it safely in its position:

- SBA (Safe Brake Actuation) – Safe deceleration
- SBH (Safe Brake Hold) – Safe hold

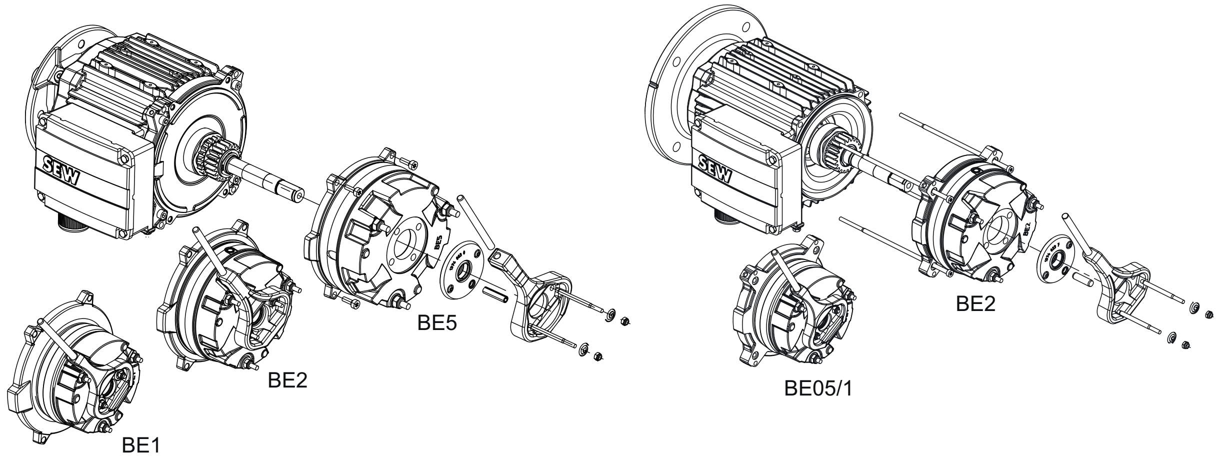
A suitable integration into a safe brake system (SBS) allows for all performance levels (up to PL e).

7.1.5 Maintenance-friendly and suitable for condition monitoring

A difference is made between integral and modular design when BE.. brakes and motors from SEW-EURODRIVE are connected.

- Integrated design of the brake for motors of size 56 – 80 with BE02 – BE2 brake means the B-side endshield of the motor is an integral part of the brake with a friction surface.
- The modular design of the BE03 brake for motors of sizes 63 – 71 and all BE.. brakes for motors from size 90 means the brake has a separate friction disk. The complete bearing of the motor is maintained even when the brake is removed.

The modular design allows for mounting of up to 4 brake sizes to one motor, especially for motors of size 90 and higher. The B-side endshield is to be regarded like a connecting flange, which accommodates the BE.. brake pre-mounted on a friction disk. When it comes to maintenance of the drive, the modular structure has the particular advantage that the brake can be removed without having to remove the entire drive from the system or disassembling it.



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Adjustability

Brakes from BE05 upward allow you to adjust the working air gap quickly and easily as standard. This makes it possible to use the asbestos-free brake linings over a long period of time, even in wear-intensive applications.

In contrast, the BE02 and BE03 brakes cannot be adjusted. However, they are equipped with a considerably higher wear limit and thus provide a long service life, even without adjustment.

Internal brake plug connector from BE20 – BE122

Brakemotors from SEW-EURODRIVE equipped with a brake of size BE20 or higher have an internal brake plug connector. The plug connector makes it possible to maintain the brake without having to loosen the wiring in the terminal box of the motor.

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Optional with air gap monitoring

For predictive planning of the service intervals, BE1 – BE122 brakes on motors of sizes 80 – 315 can optionally be designed with air gap monitoring.

The diagnostic unit /DUE (Diagnostic Unit Eddy Current) is used for monitoring the working air gap. The diagnostic unit /DUE consists of the following components:

- An evaluation unit in the motor terminal box that is supplied via a DC 24 V voltage.
- A sensor, integrated in the magnet body of the brake

The diagnostic unit /DUE monitors the switching status of the brake and the wear on the basis of the current air gap. This information is output as digital or analog signals.

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7.1.6 Accessories overview brake/motor

Depending on the demands placed on the brake, different brake mounting sizes with different braking torque steps are available for mounting to the respective motor.

The following tables show the possible combinations of motor and brake as well as the braking torque steps for each brake to achieve the desired nominal braking torque:

	Motors											
Brake	**56**	**63**	**71**	**80**	**90**	**100**	**112 132S**	**132M/L**	**160 180**	**200 225**	**250 280**	**315**
BE02[1]												
BE03												
BE05												
BE1												
BE2												
BE5												
BE11												
BE20												
BE30												
BE32												
BE60[1]												
BE62[1]												
BE120[1]												
BE122[1]												

1) Not available as BE.. safety brake.

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7.1.7 Braking torque graduations

Depending on the demands placed on the brake, different braking torque graduations are available depending on the brake sizes.

The following table shows the available braking torque graduations depending on the brake size:

Braking torque (M_B) in Nm	BE02	BE03	BE05	BE1	BE2	BE5	BE11	BE20
0.8[1]	■							
0.9		■						
1.2[1]	■							
1.3		■						
1.7		■						
1.8[1]			■					
2.1		■						
2.5[1]			■					
2.7		■						
3.4		■						
3.5			■					
5			■	■	■			
7				■	■			
10				■	■			
14					■	■		
20					■	■	■	
28						■	■	
40						■	■	■
55						■	■	■
80							■	■
110							■	■
150								■
200								■

1) Not available for BE.. safety brakes.

Braking torque (M_B) in Nm	BE30	BE32	BE60	BE62	BE120	BE122
75	■					
100	■	■				
150	■	■				
200	■	■	■			
300	■	■	■			
400		■	■	■	■	
500		■	■			
600		■	■	■	■	
800[1]				■	■	■
1000[1]				■	■	
1200[1]				■		■
1600[1]						■
2000[1]						■

1) Not available for BE.. safety brakes.

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INFORMATION

Note that there may be limitations for the braking torques M_B to be selected depending on the motor design, especially for:

- AC motors for ambient temperatures above +60 °C.
- AC motors with BE safety brake in combination with the manual brake release option.

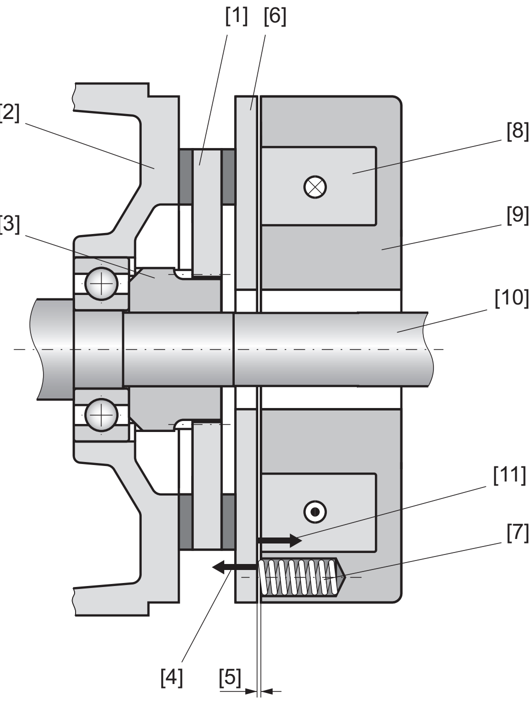
→ Consult SEW-EURODRIVE in these cases.

7.2 Technical details

7.2.1 Basic design and functional principle

The essential parts of the brake system are the mobile pressure plate [6], the brake springs [7], the brake lining carrier [1], the brake endshield [2] and the brake coil [8] (accelerator coil BS + coil section TS = holding coil HS). The magnet body consists of the magnet body housing [9] with cast winding and a tapping.

The pressure plate is forced against the brake disk by the brake springs when the electromagnet is de-energized. The brake is applied to the motor. The number and type of brake springs determine the braking torque. When the brake coil is connected to the corresponding DC voltage, the force of the brake springs [4] is overcome by magnetic force [11], thereby bringing the pressure plate into contact with the magnet body. The brake lining carrier moves clear and the rotor can turn.



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[1]	Brake lining carrier	[7]	Brake spring
[2]	Brake endshield	[8]	Brake coil
[3]	Driver	[9]	Magnet body housing
[4]	Spring force	[10]	Motor shaft
[5]	Working air gap	[11]	Electromagnetic force
[6]	Pressure plate		

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7.2.2 Braking torque definition

The braking torques of the BE.. brakes are defined on the basis of DIN VDE 0580. A distinction is made between the following braking torques here:

Abbreviation according to DIN VDE 0580	Designation	Description
M_1	Dynamic braking torque	Torque acting upon the motor shaft with a slipping brake (brake safely disconnected). The torque depends on the current operating temperature and the current friction speed/motor speed.
M_2	Virtually static braking torque (= nominal braking torque M_B)	Braking torque with slowly slipping brake (relative speed between the friction components: 1 m/s) at 20 °C
M_4	Static braking torque	Breakaway torque that is necessary to rotate the motor shaft from an idle state with the brake closed.

The nominal braking torque M_B of the brakes is subjected to 100% final testing in the factory at SEW-EURODRIVE within the scope of quality control and is within a tolerance range of -10% and +50% in the delivery state.

This nominal value M_B is used both during brake selection and also during project planning. The differences between M_1 (dynamic braking torque) and M_4 (static braking torque) and the nominal braking torque are taken into account by SEW-EURODRIVE with the formulas and the calculation coefficients that are used when doing this.

The characteristic values M_1 and M_4 are therefore not relevant within the scope of the project planning and selection of the brake.

INFORMATION

The characteristic values M_1 and M_4 can differ significantly from the nominal braking torque M_B depending on the wear and operating state of the brake in some cases, and can particularly be outside the above-mentioned tolerance range for M_B.

Should specific requirements of the application require more precise knowledge, please contact SEW-EURODRIVE.

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7.2.3 Use as a working or holding brake

BE.. brakes are suitable for both line-operated motors (non-controlled applications) and inverter-operated motors (controlled applications).

Working brake

With line-operated motors, the brake is used for stopping the motor during normal operation. Brake application from the operating speed is the normal case here.

Holding brake

On the other hand, when it comes to inverter-operated motors, it is assumed that the brake will primarily be used for holding when at an idle state. In this context, we refer to the brake as a "holding brake". Brake application from a speed only takes place in the event of emergency stop braking (non-controlled stopping of the drive, comparable with stop category 0 in accordance with EN 60204-1). Normally, the brake is activated after controlled stopping (stop category 1 in accordance with EN 60204-1) at speeds of < 20 min^{-1}.

The type of use must be taken into consideration during the selection and configuration of the brake, see chapter "Selection and project planning" (→ 🗎 400).

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7.2.4 Supply voltage

Brake voltage

BE.. brakes are available in various voltage types.

As standard, the brake voltage is assigned as follows:

- Fixed voltage AC 230 V: DRN63 – DRN132S, DR2.56 – DR2.132S
- Fixed voltage AC 400 V: DRN132M – DRN315, DR2.132M - DR2.315

The brakes are also available with other windings on request so that they are suitable for operation on the respective DC and AC voltage sources.

For example, if a motor in a certain voltage range is delivered in combination with a global motor, then the brake voltage is also confirmed as voltage range.

Design	Motor sizes and brake sizes	
	DRN63 – DRN180 DR2.56 – DR2.180	DRN180 – DRN315 DR2.180-DRS.315
	BE02 – BE20	BE30 – BE122
Fixed voltage	AC 230 V	
	AC 400 V	
	DC 24 V	–
50 Hz voltage range	AC 220 – 242 V	
	AC 380 – 420 V	
50/60 Hz voltage range	AC 220 – 277 V	
	AC 380 – 480 V	

INFORMATION

Continuous operation of the brake on a global motor in the 60 Hz voltage range is only permitted when the global motor is operated in direct line operation. Otherwise, the brake cooling cannot be ensured.

When the motor is operated on an inverter, the effective cyclic duration factor (cdf) of the brake must be limited to 40%, or the motor must be equipped with a forced cooling fan.

INFORMATION

In some cases, extra-low voltages cannot be avoided due to safety regulations. But extra-low voltages result in higher costs and efforts for cables, switching devices, transformers, rectifiers, and overvoltage protection (e.g., in case of direct DC 24 V voltage supply) than brakes that are operated at an AC voltage system using a brake control by SEW-EURODRIVE, see chapter "Cable selection" (→ 🗎 410).

Brake voltage supply

The supply voltage for brakes with a brake rectifier for operation on AC voltage is either supplied separately or picked up from the supply system of the motor in the terminal box. Only motors with a fixed speed may be supplied by the motor supply voltage from the terminal board of the motor. For motors with variable speed, the supply voltage for the brake must be provided separately.

Furthermore, bear in mind that the brake response is delayed by the remanence voltage of the motor if the brake is powered by the motor terminal board. In hoists and hoist-like applications, this type of voltage supply is only permitted with an additional current relay (BSR control), which ensures the application of the brake also when the hoist is moving downward. The brake application time $t_{2,I}$ for cut-off in the AC circuit, specified in the brake's technical data, applies to a separate voltage supply to the brake only.

If the brake is directly supplied from the motor terminal board, the brake application times may extend to a multiple of the value $t_{2,\,I}$, depending on the application and the remanence voltage of the motor.

INFORMATION

In variable-speed motors, the brake voltage must not be picked up at the terminal board because the voltage there is not steady and constant.

This includes:

- Pole-changing motors
- Motors operated on an inverter

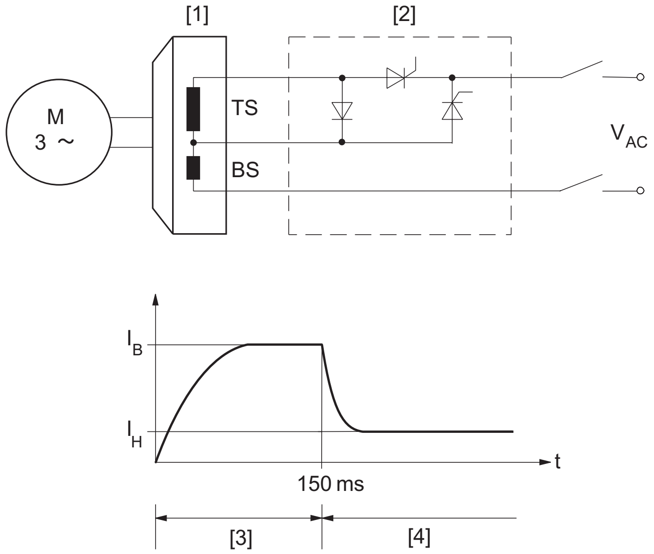
INFORMATION

Motors with a fixed speed are often operated on soft-start devices that work with phase angle controls, for example. In these cases, the brake must not be supplied from the terminal board as the voltage present at the terminal board is not constant.

7.2.5 Two-coil system and brake controls

Particularly short response times at switch-on

BE.. brakes are equipped with the two-coil system patented by SEW-EURODRIVE. When using special brake control systems from SEW-EURODRIVE with acceleration function, the brake control ensures that only the accelerator coil is switched on first, followed by the holding coil (entire coil). The powerful impulse magnetization (high acceleration current) of the accelerator coil results in a very short response time, particularly in large brakes, without reaching the saturation limit. The brake lining carrier moves clear very swiftly and the motor starts up with hardly any braking losses.



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BS Accelerator coil
TS Coil section
[1] Brake
[2] Brake control
[3] Acceleration
[4] Hold
I_B Acceleration current
I_H Holding current
BS + TS = Holding coil HS

The particularly short response times of the BE.. brakes from SEW-EURODRIVE have the following advantages:

- Reduced run-up time of the drive
- Minimum heating of the motor during start-up and thus energy savings with negligible brake wear during start-up, see the following figure
- High switching frequency
- Long operating life of the brake lining and thus long maintenance intervals

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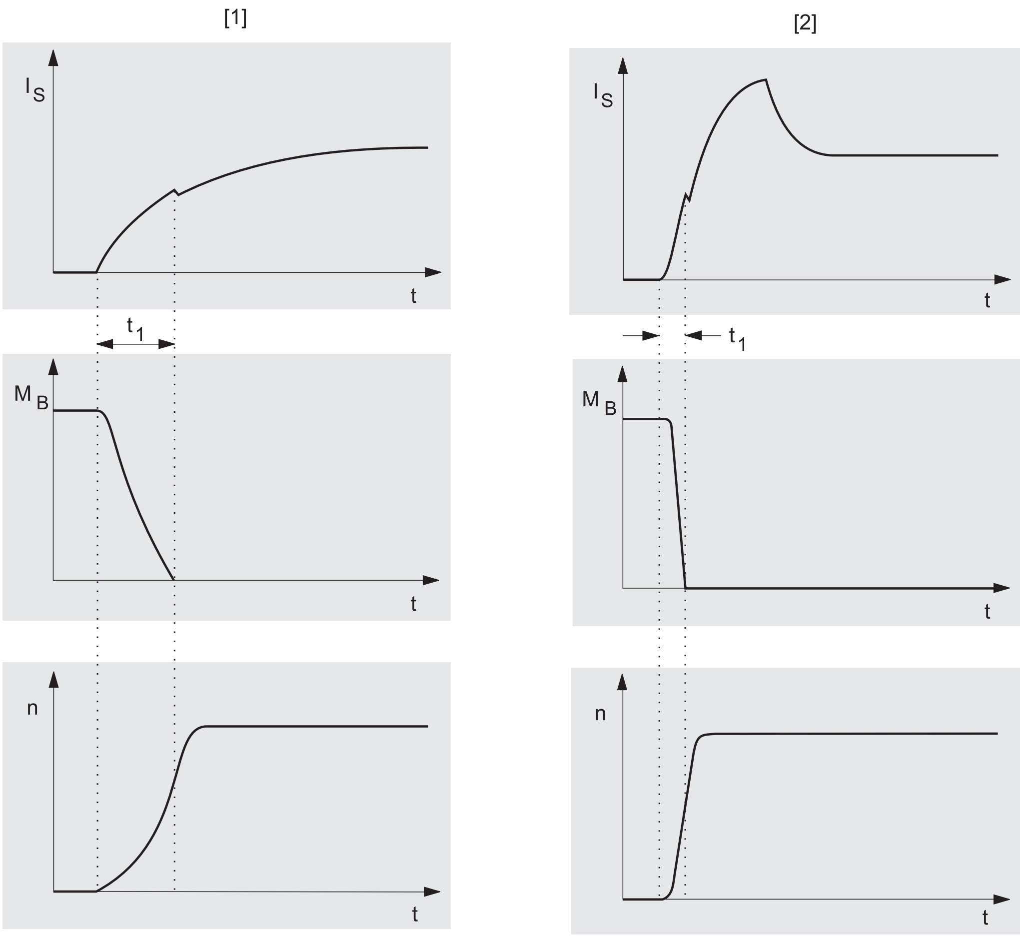

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[1] Switch-on procedure for operation with rectifier without switching electronics, e.g. BG..
[2] Switch-on procedure for operation with rectifier from SEW-EURODRIVE with switching electronics, e.g. BGE.. (standard as of brakes BE5)
I_S Coil current
M_B Braking torque
n Speed
t_1 Brake response time

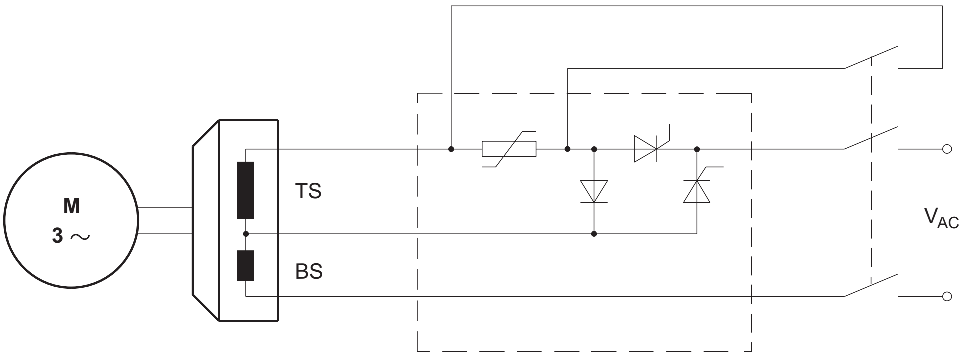
The system switches to the holding coil electronically as soon as the BE.. brake has released. The braking magnet is now only magnetized to such an extent (weak holding current) as to ensure that the pressure plate is held open with a sufficient degree of safety and minimum brake heating and the drive can turn freely.

Particularly short response time at switch-off

The response time when the brake is applied also depends on how quickly the energy stored in the brake coil is dissipated when the power supply is switched off. In the case of "cut-off in the AC circuit", a freewheeling diode is used to dissipate the energy. The current decreases at an exponential rate.

The current dissipates much more rapidly via a varistor when the DC and AC circuits are cut-off at the same time as the coil's DC circuit. The response time is considerably reduced. In conventional cases, the DC and AC disconnection is performed with an additional contact of the brake contactor (suitable for inductive load).

Under certain conditions, you can use the SR.. electronic current relays or UR voltage relays for interrupting the DC circuit, see the following section.



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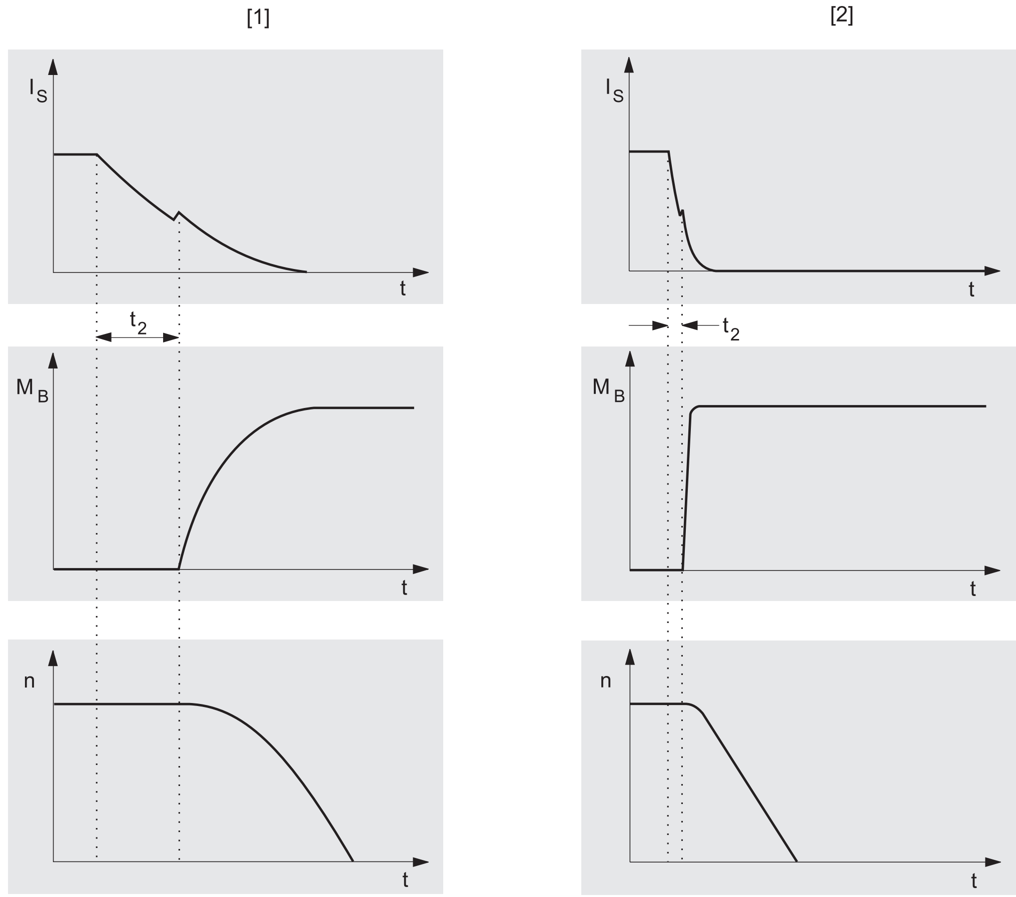

[1]	Brake application to cut-off in the AC circuit
[2]	Brake application to cut-off in the AC and DC circuits
I_S	Coil current
M_B	Braking torque
n	Speed
t_2	Brake application time

Due to their mechanical principle, the degree of wear on the linings, and on-site basic physical conditions, brakemotors are subject to an empirically determined repetition accuracy of the braking distance of ±12%. The shorter the response times, the smaller the absolute value of the braking distance variation.

Cut-off in the DC and AC circuits makes it possible to shorten the brake application time t_2 considerably.

Cut-off in the DC and AC circuits is enabled by the following:

- A separate electromechanical switch contact, see chapter "Brake control block diagrams" (→ 🗎 427).
- The selection of a BMP.. or BMK.. brake control with integrated voltage relay for control cabinet installation, see chapter "Installation in control cabinet" (→ 🗎 406).
- Wear-free electronic relays in the terminal box
  - Current relay (BSR..) for motors with fixed speed
  - Voltage relay (BUR..) for adjustable-speed motors

Relay retrofitting options suited to the motor and voltage are provided in the chapters "Installation in control cabinet" (→ 🗎 406) and "Installation in the motor terminal box" (→ 🗎 402). Refer to the operating instructions for the part numbers.

Influence of low and fluctuating ambient temperatures

In case of low and fluctuating ambient temperatures, motors are exposed to the risk of condensation and icing. Functional limitations of the brake due to corrosion and ice can be prevented by using the BMH.. brake control with the additional "anti-condensation heating" function.

The "heating" function is activated externally. As soon as the brake has been applied and the heating function switched on during lengthy breaks, both coil sections of the brake control system are supplied with reduced voltage in an inverse-parallel connection by a thyristor operating at a reduced control factor setting. On the one hand, this practically eliminates the induction effect (brake does not release). On the other hand, it results in heating in the coil system, increasing the temperature by approx. 25 K in relation to the ambient temperature.

The heating function must be ended before the brake resumes its normal switching function following a heating period (see brake control "BMH, K1 contactor" (→ 🗎 437)).

Increased ambient temperature or restricted ventilation

In addition to the functional considerations, increased ambient temperature, insufficient supply of cooling air and/or the dimensioning of the motor according to thermal class 180 (H) are valid reasons for installing the brake control system in the control cabinet.

For marginal conditions of this type, SEW-EURODRIVE always recommends using brake controls with electronic switching.

This is mandatory especially for brakemotors for increased ambient temperatures above +40 °C.

DC 24 V control input

The control input with DC 24 V is advantageous, especially for controlled applications where the brake control is to be switched, e.g. via a higher-level controller or an inverter.

The available BMK.., BMKB.. and BMV.. brake controls are only intended for control cabinet installation.

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Safe brake control

The safe brake module can be used to control the brake in a device in a functional and safety-related manner.

The safe brake module replaces the conventional brake controls. The brake can be functionally switched with the DC 24 V control input e.g. via a higher-level controller or an inverter. The brake can be switched in a safety-related manner with the functionally safe DC 24 V control input e.g. via a higher-level safety relay.

The electronic structure of the safe brake module without mechanical switching elements has its advantages for high switching cycles as well as in the safety-related overall evaluation. The usual calculation of the theoretical failure probability $MTTF_D$ and the monitoring of the switch contacts is omitted. The separate voltage supply for the brake control is also omitted because the power supply is provided directly from the DC link of the inverter.

The safe brake module fulfills the following safety requirement:

- Performance level d according to EN ISO 13849-1

The available safe brake control BST.. and SBM.. brake controls are only intended for control cabinet installation.

IP degree of protection, corrosion protection and ambient temperature range

BE.. brakes can be designed according to application-related ambient conditions.

IP degree of protection

Standard design BE.. brakes have degree of protection IP54. As an alternative, they can be ordered in degrees of protection IP55, IP56, IP65 and IP66 depending on the motor design.

Corrosion protection

As standard, BE.. brakes are designed with a resistant corrosion protection.

As an option, they can be ordered with the surface protection option without restrictions depending on the motor design, see chapter "Surface protection" (→ 🗎 612).

Ambient temperature range

Standard design BE.. brakes are suitable for operation at ambient temperatures between -20 to +40 °C.

- If the two-coil system and a brake control in the control cabinet are used, the brake can be operated at ambient temperatures up to -40 °C. In this temperature range, the use of the heating function is recommended when using the BMH.. brake control.
- AC motors with BE.. brake can also be designed for increased ambient temperatures of up to +100 °C. Note that the availability of individual braking torque steps may be restricted, see chapter "Braking torque graduations" (→ 🗎 374). In case of questions, contact SEW-EURODRIVE.

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7.2.6 Design available as safety brake

Brakes of sizes up to BE32 can be ordered as safety brake according to EN ISO 13849 if required.

By adding a BE.. safety brake into a safe overall system, safety functions can be implemented which force the motor to stop (safe braking) and hold the motor in its position (safe holding).

General

When implementing safety functions in machines, the components have to be evaluated regarding their suitability for implementing a safety function.

When using a safety brake from SEW-EURODRIVE, the following safety-related requirements, e.g. according to EN ISO 13849 – parts 1 and 2, are already considered:

- Application of basic safety principles
- Application of proven safety principles
- Information on the characteristic safety value B_{10d}
- Common Cause Failure (CCF)
- Notice of influences and ambient conditions
- Determination of the category (Cat.)
- Retraceability by the unique motor assignment
- Production monitoring with 100% final inspection
- Compliance with normative requirements regarding documentation

For safety brakes, SEW-EURODRIVE has already solved this safety-related requirement as an advantage for the machine designer. The machine designer can rely on the manufacturer confirmation (e.g., through product documentation or TÜV certificate) in his safety-related overall evaluation and considerably reduce own efforts for evaluation and documentation of a brake.

If other components (standard components) are used for implementing safety functions, the machine designer has to evaluate the safety-related requirements.

Underlying standards

The safety assessment is based on the following standard and safety class:

Safety brakes	
Safety class/underlying standards	Category (Cat.) according to EN ISO 13849-1

Safety class PL e can be achieved if a functionally safe motor option is suitably integrated into a safety system. The requirements (e.g. on the system architecture, required diagnostics and failure probabilities) are to be implemented according to the normative specifications and to the document in hand. If the safety system is to be evaluated according to SIL, the necessary verification must be provided by the customer.

TÜV certification

The following certificate is available for the described safety brakes:

- Certificate of the TÜV NORD Systems GmbH & Co. KG

The TÜV certificate is available from SEW-EURODRIVE on request.

Safety functions of the safety brake

The implementation of a safety function with brakes requires that the brake be applied on request. The safety function is activated when the brake is applied. The brake coil has to be de-energized and the energy stored in the brake coil reduced.

By adding a safety brake to a safe overall system, the following safety functions can be implemented:

- SBA (Safe Brake Actuation)
- SBH (Safe Brake Hold)

INFORMATION

Safety functions SBA and SBH are defined by SEW-EURODRIVE based on the standard EN 61800-5-2.

The implementation of the SBA and SBH safety functions additionally require the safety functions SBC (Safe Brake Control) and STO (Safe Torque Off) in the overall system. For safety-related requests of the brake, SBC and STO ensure that the brake applies and that the drive does not generate a torque against the applied brake.

The SBC and STO safety functions are not part of the brake and have to be additionally implemented in the overall safety system. The performance level (PL) of the SBC and STO safety functions must at least meet the required performance level (PLr) of the application.

SEW-EURODRIVE recommends to stop the drive using the stop category 1 according to EN 60204-1 prior to activating the SBC and STO safety functions.

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Performance levels that can be achieved

The brake complements a safe braking system consisting of several system components.

The achievable performance level of the resulting safe braking system according to EN ISO 13849-1 is mainly determined by:

- The selected safety structure, category (Cat.)
- Reliability of the used system components (PL, B_{10D}, $MTTF_D$, etc.)

  The $MTTF_D$ value is calculated specifically for the application based on the B_{10D} value for the brake and the switching frequency of the application.
- Diagnostic coverage (DC_{avg})

  The diagnostic coverage is fulfilled with a brake test.
- The common cause failure (CCF) with categories 2, 3, and 4.

The achieved performance level must be determined for the selected safe braking system based on an overall evaluation of the system. Observe the characteristic safety values necessary for the brake.

For the characteristic safety values of the SEW-EURODRIVE components, refer to the product-related documentation as well as the library for the SISTEMA software available for download at www.sew-eurodrive.com.

BE.. brake compared to the BE.. safety brake

Depending on the use of the BE.. brake, conditions and restrictions exist both for the brake itself as well as for the other drive components. Observe these points when configuring and ordering the overall drive.

For a list of conditions and restrictions, refer to the manual "Project Planning for BE.. Brakes – DR.., DRN.., DR2.., EDR.., EDRN.. AC Motors – Standard Brake/Safety Brake".

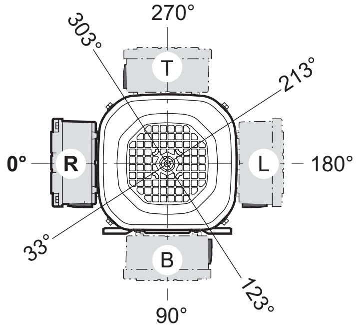
7.3 Options

7.3.1 Manual brake release

The BE.. brake can be released manually with a manual brake release. Two designs are available for manual brake release:

- Lockable manual brake release for brakes BE03 to BE122
- Manual brake release with automatic re-engaging function for brakes BE02 to BE62

If no information is given about the position of the manual brake release, it rotates together with the terminal box. The manual brake release can be turned by 4 × 90°.



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Observe the following information:

- DR2.56/BE02: The manual brake release is always aligned with the terminal box.
- Motors DR2.63 – 71 and DRN63 – 71 with brake BE03 can be set to a position of 303° (default position) or 123° (as viewed from the terminal box).
- All other types: 303° default position, 33°, 123° and 213° are possible.

INFORMATION

Depending on the alignment selected for motors with a foot-mounted design, the hand lever may extend into the mounting plane of the motor. In these cases, please check to ensure the installation space permits proper use of the manual brake release option.

Lockable manual brake release /HF

For the lockable manual brake release /HF, a set screw is included in the delivery to permanently open the brake mechanically.

Avoid the lockable /HF type of manual brake release for hoists and other statically stressed applications as it can lead to severe incidents when activated by accident.

INFORMATION

Please note that the manual brake release /HF cannot be combined with the safety brakes.

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Manual brake release with automatic re-engaging function /HR

With automatic manual brake release /HR, a hand lever is included in the delivery. The screw-in hand lever serves for manually opening the brake for a short period of time. The mechanical components are pretensioned in such a way that the brake is applied automatically without hand pressure.

Manual brake release /HR is available for brakes up to size BE62. If you require BE120 – 122 with /HR option, contact SEW-EURODRIVE.

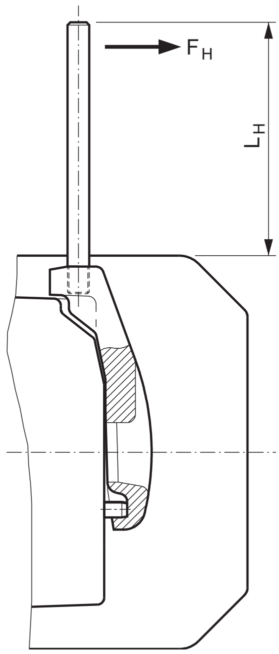
INFORMATION

For safety brakes up to size BE32, the combinations with /HR option can be limited for some cases.

Technical details

Actuating forces manual brake release

In brakemotors with the /HR option "Manual brake release with automatic reengaging function", you can release the brake manually using the lever supplied. The following table shows the actuating force required on the lever at maximum braking torque to release the brake manually. It is assumed that the lever at the upper end is operated. In addition, the length of the hand lever protruding from the fan guard is specified.



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Nominal actuation force F_H for manual brake release /HR

Brake	Nominal actuation force F_H in N
BE02	30
BE03	30
BE05	20
BE1	40
BE2	80
BE5	215
BE11	300
BE20	375
BE30 BE32	400
BE60 BE62	500

Lever protrusion L_H

Motors	BE02	BE03	BE05	BE1	BE2	BE5	BE11	BE20	BE30 BE32	BE60 BE62
	Lever protrusion L_H in mm									
DR..56M	32	–	–	–	–	–	–	–	–	–
DR..63	–	34	–	–	–	–	–	–	–	–
DR..71	–	16	81	81	–	–	–	–	–	–
DR..80	–	–	71	71	82	–	–	–	–	–
DR..90	–	–	57	57	68	90	–	–	–	–
DR..100	–	–	–	54	65	87	–	–	–	–
DR..112 DR..132S	–	–	–	–	–	70	139	–	–	–
DR..132M DR..132L	–	–	–	–	–	–	121	189	–	–
DR..160	–	–	–	–	–	–	–	150	235	–
DR..180	–	–	–	–	–	–	–	139	224	–
DR..200	–	–	–	–	–	–	–	–	216	416
DR..225	–	–	–	–	–	–	–	–	176	376
DR..250 DR..280	–	–	–	–	–	–	–	–	–	358

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7.3.2 Function and wear monitoring DUE brake

The option diagnostic unit /DUE (Diagnostic Unit Eddy Current) is a contactless measuring system for function and wear monitoring of the BE.. brake.

This option is designed for industrial environments and is used to monitor the function and the maximum working air gap of the BE.. brakes from SEW-EURODRIVE.

The diagnostic unit /DUE comprises the following parts:

- An evaluation unit in the motor terminal box that is supplied via a DC 24 V voltage.
- A sensor, installed in the magnet body of brakes BE1 to BE122.

Retrofitting options

Brakemotors from SEW-EURODRIVE can be retrofitted with the diagnostic unit /DUE. However, the drive combination has to be checked to determine all necessary conversion parts. Contact SEW-EURODRIVE if you would like to retrofit an existing drive with the diagnostic unit /DUE.

Technical details

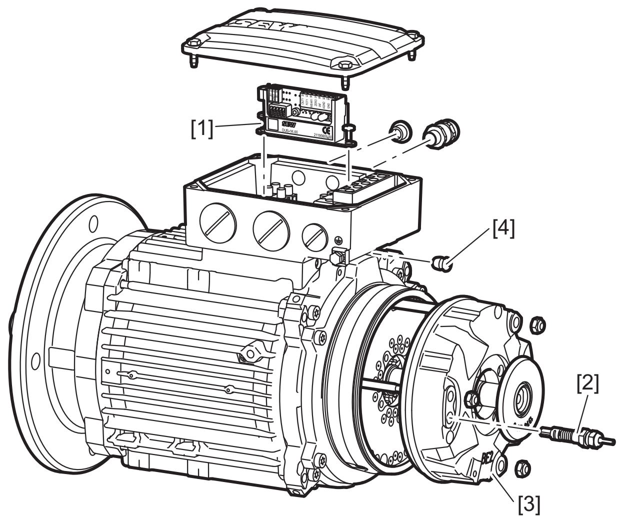
Structure

The bore required to insert the eddy current sensor is sealed by a cable gland when the /DUE diagnostic unit is installed.

The sensor is connected to the evaluation unit (installed in the terminal box and pre-calibrated at delivery) via a shielded twisted-pair cable.

The sensor diameter varies depending on the brake size.

Sensor diameter	Brakes
6 mm	BE1 – BE5
8 mm	BE11 – BE122



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[1]	Evaluation unit	[3]	Brake
[2]	Sensor	[4]	Grommet

Functional description

It is a contactless measuring system, based on the current eddy principle. High-frequency alternating current flows through the sensor. The electromagnetic field induces eddy currents in the pressure plate that change the alternating current resistance of the sensor. The evaluation unit converts this change in impedance into an electrical signal (4 to 20 mA) that is proportional to the working air gap of the brake.

The function monitoring of the brake is realized via a digital signal (NO contact). A digital output (NC contact) signals if the wear limit was reached. Further, a current output allows for continuous monitoring of the brake wear. In addition to the outputs, LEDs at the evaluation unit indicate the function and the wear of the brake.

- The red LED indicates the state of wear of the brake.
- The green LED indicates the function of the brake.

Further diagnosis can also be carried out using the various light codes of the LEDs. For the exact meaning of the light codes, refer to the "AC Motors DRN63 – 315, DR2S56 – 80" operating instructions.

If the brake is ordered in combination with the diagnostic unit /DUE, it leaves the factory with function monitoring and wear monitoring already installed, calibrated and set to the permitted wear limit for the brake.

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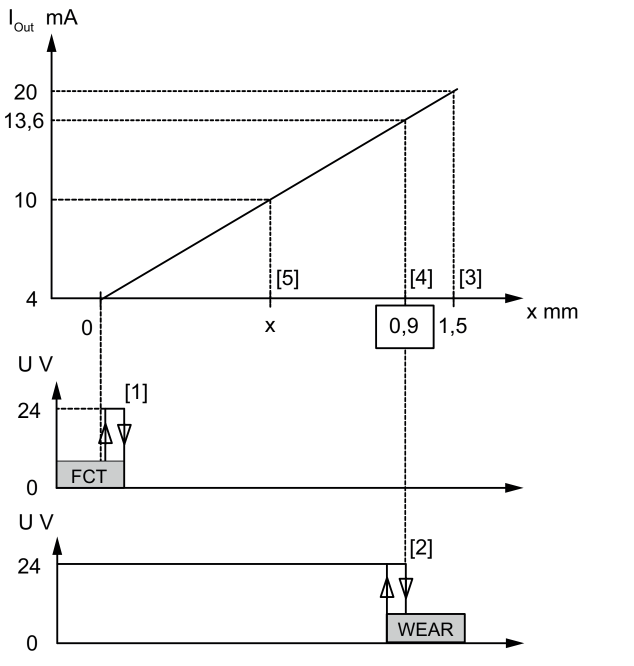
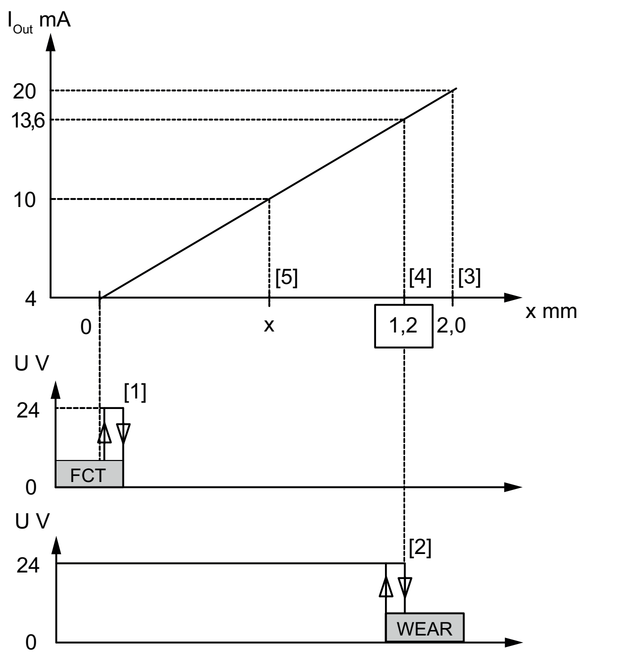
Output signals for function and wear monitoring

The evaluation unit has the following signals for brake monitoring:

- 2 digital output signals. Signal FCT for brake function monitoring (brake released) and signal WEAR that is sent if the defined maximum permitted working air gap is reached.
- An analog output signal (range 4 mA – 20 mA) for continuous monitoring of the air gap.

The illustration shows the switching states of the diagnostic unit /DUE depending on the brake size and/or the sensor diameter as well as the current strength depending on the air gap.

DUE-d6 (6 mm)	DUE-d8 (8 mm)
 9007213922832139	 9007214476468491

[1] FCT: Digital output function (DC 24 V, DIN EN 61131-2)
[2] WEAR: Digital output wear (DC 24 V, DIN EN 61131-2)
[3] Measuring range of the sensor
[4] Maximum working air gap of the brake (exemplary)
[5] Currently measured working air gap (exemplary)

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Connecting the evaluation unit

The maximum permitted cable cross section at terminals "k" of the evaluation unit is 1.5 mm^2 with conductor end sleeve without plastic collar, 0.75 mm^2 with plastic collar. The recommended cable cross section at terminals "k" is 0.5 mm^2 with conductor end sleeve with plastic collar.

INFORMATION

Use shielded cables to wire the evaluation unit. Connect the shield to the GND potential, or use the shield plate at the user's signal evaluation.

SEW-EURODRIVE recommends routing the power cable of the drive and the cable of the diagnostic unit separately.

- Unless they are shielded, sensor cables must always be routed separately from other power cables with phased currents.
- Provide the appropriate equipotential bonding between drive and control cabinet.

Important characteristics of the cable to be used are:

- Total shielding (outer shield) of the cable
- 100 m maximum length for fixed installation
- 50 m maximum length for cable carrier installation

The required number of cores depends on the type of function/signals that are to be transferred to the higher-level controller and then processed.

At the factory, the diagnostic unit /DUE is pre-installed, calibrated and set to the wear limit permitted for the brake. The diagnostic unit has to be calibrated again after service or maintenance work such as sensor replacement or replacement of the evaluation electronics. The calibration can be performed directly at the evaluation electronics (at the terminal box) or alternatively via the higher-level controller. In the second case, the required signals for calibration have to be routed to the higher-level controller.

The reference ground GND and the reference ground analog output AGND have the same potential. In case this potential is not treated separately in the application, AGND is not necessary.

Number of required cores	Function	Abbreviation
3	Voltage supply	DC 24 V
	Reference ground	GND
	Digital output function	FCT
3	Voltage supply	DC 24 V
	Reference ground	GND
	Digital output wear	WEAR
4	Voltage supply	DC 24 V
	Reference ground	GND
	Digital output function	FCT
	Digital output wear	WEAR

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Number of required cores	Function	Abbreviation
4	Voltage supply	DC 24 V
	Reference ground	GND
	Analog output current air gap	OUT
	Reference ground analog output	AGND
6	Voltage supply	DC 24 V
	Reference ground	GND
	Digital output function	FCT
	Digital output wear	WEAR
	Analog output current air gap	OUT
	Reference ground analog output	AGND
8	Voltage supply	DC 24 V
	Reference ground	GND
	Digital output function	FCT
	Digital output wear	WEAR
	Analog output current air gap	OUT
	Reference ground analog output	AGND
	Calibration zero value	ZERO
	Calibration of infinite value	INF

INFORMATION

If the calibration inputs ZERO and/or INF are routed to the outside to a PLC or a controller, they have to be continuously connected to AGND in normal operation to avoid EMC interferences in the calibration cables.

INFORMATION

Signal outputs of the evaluation unit /DUE that are switched may not be used as voltage supply for other evaluation units /DUE or comparable systems. Each evaluation unit /DUE has to be supplied with voltage separately.

Technical data

			DUE-1K-00	
Assembly in			BE1 – BE5	BE11 – BE122
Channels			1	
Sensor			DUE-d6	DUE-d8
Sensor diameter		mm	6	8
Measuring range		mm	1.5	2.0
Limit frequency			100 Hz (-3 dB)	
Temperature			Sensor and cable: -50 to +150 °C Evaluation unit: -40 to +105 °C	
Protection class			Sensor: up to IP66 Evaluation unit: IP20 (in the closed terminal box up to IP66)	
Signal outputs			OUT1: 4 – 20 mA FCT1: DC 24 V (150 mA) WEAR1: DC 24 V (150 mA)	
Calibration outputs			ZERO: DC 24 V INF: DC 24 V	
Supply voltage			DC 24 V (±15%)	
Current consumption	max.[1]	mA	190	
	min.[2]	mA	40	
Electromagnetic compatibility			EN 61800-3, environment 1	

1) All outputs are fully loaded with 150 mA each externally by relays, for example.
2) Only internal supply with current output at maximum gain.

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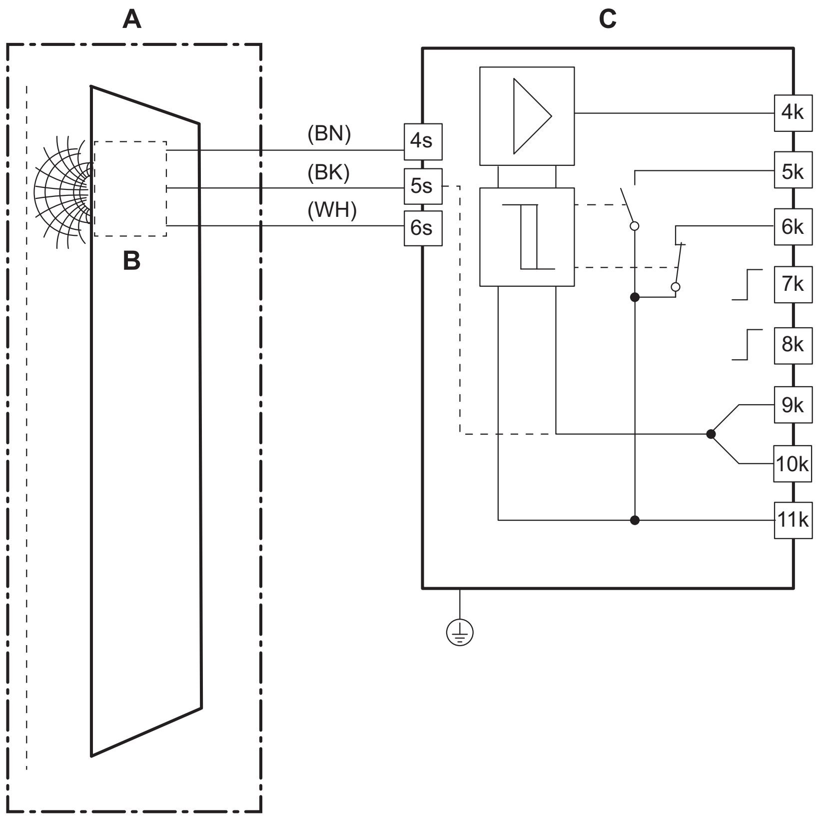
Wiring diagram



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[A]	Brake	[4k]	Analog output wear 1 (air gap)
[B]	Eddy current sensor	[5k]	Digital output function 1 (NO contact)
[C]	Evaluation unit	[6k]	Digital output wear 1 (NC contact)
[4s]	Connection sensor A1 (brown cable)	[7k]	Input calibration zero value
[5s]	Connection sensor GND 1 (black cable)	[8k]	Input calibration infinite value
[6s]	Connection sensor B1 (white cable)	[9k]	Signal ground AGND
		[10k]	Ground potential GND
		[11k]	DC 24 V supply

The evaluation unit is supplied with DC 24 V via the terminals GND [10k] and DC 24 V [11k].

Order information

Type designation /DUE

Available for brakes BE1 – BE122

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7.4 Selection and project planning

The focus of the following sections is the preselection of the brake regarding the mountability and selection of designs and options.

In addition, extensive information is provided regarding the dimensioning of the surrounding structure so that a brakemotor from SEW-EURODRIVE can be installed into the system without difficulties.

For the necessary calculation steps and notes as well as characteristic values needed for the correct dimensioning of the brake according to the SEW-EURODRIVE specifications, refer to the following documents:

- "Project Planning for BE.. Brakes" manual – DR.., DRN.., DR2.., EDR.., EDRN.. AC Motors – Standard Brake/Safety Brake"
- Addendum to the operating instructions "Safety Encoders and Safety Brakes, AC Motors DR.., DRN.., DR2.., EDR.., EDRN.. – Functional Safety"

7.4.1 Procedure for selecting brakes and accessories

Both the brakemotor as well as its electrical connections have to be dimensioned according to the conditions of the application.

The following aspects must be taken into account:

Activity	Chapter
Selecting the brake or braking torque	"Pre-selecting the brake size and braking torque" (→ 🗎 401)
Determining the brake control	"Selecting the brake voltage and brake control"
Selecting the brake control system and connection type	"Selecting the brake control" (→ 🗎 402)
Dimensioning and routing the cable	"Cable selection" (→ 🗎 410)
Selecting the braking contactor	"Selecting the braking contactor" (→ 🗎 411)
Motor protection switch if necessary (protection of the brake coil)	"Motor overload circuit breaker" (→ 🗎 415)
Selecting the diagnostic unit	"Function and wear monitoring DUE brake" (→ 🗎 393)

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7.4.2 Pre-selecting the brake size and braking torque

Basic specifica-tion	Link/supplement/comment
motor	Brake/brake control
Braking torque [1)]	Brake springs (internal effect)
Brake application time	Connection type of the brake control (important for creation of wiring diagrams)
Braking time Braking distance Deceleration Braking accuracy	The required data can only be observed if the aforementioned parameters meet the requirements.
Braking work Brake service life	Integral time (important for planning service intervals)

1) The braking torque is determined from the requirements of the application with regard to the maximum deceleration and the maximum permitted distance or time.

For detailed information on selecting the size of the brakemotor and calculating the braking data, refer to the manual "Project Planning for BE.. Brakes – DR.., DRN.., DR2.., EDR.., EDRN.. AC Motors – Standard Brake/Safety Brake".

7.4.3 Selecting the brake connection voltage

The brake voltage should always be selected on the basis of the available line voltage or the rated motor voltage.

The standard brake voltage corresponds to the specifications in chapter "Supply voltage" (→ 🖹 379). Different brake voltages according to chapter "Operating currents" (→ 🖹 421) can be selected on request.

With multi-voltage motors, the connection voltage of the brake should preferably be specified to the low motor voltage (e.g. motor design 230⅄/460⅄ results in a brake voltage of AC 230 V). For grid operation, the brake can be supplied directly by the motor terminal board independent of the line voltage.

7.4.4 Selecting the brake control

Installation in the motor terminal box

The following tables list the technical data of brake control systems for installation in the wiring space of the motor as well as the assignments to the brake sizes.

Series	Function	Voltage	Nominal output current I_L	Type
BG..	Half-wave rectifier without electronic switching.	AC 90 – 500 V	DC 1.2 A	BG1.2
		AC 230 – 575 V	DC 1.0 A	BG1.4
		AC 150 – 500 V	DC 1.5 A	BG1.5
		AC 24 – 90 V	DC 2.4 A	BG2.4
		AC 24 – 500 V	DC 2.8 A	BG3
BGE..	Half-wave rectifier with electronic switching.	AC 230 – 575 V	DC 1.0 A	BGE1.4
		AC 150 – 500 V	DC 1.5 A	BGE1.5
		AC 42 – 150 V	DC 2.8 A	BGE3
BS..	Terminal block with varistor protection circuit	DC 24 V	DC 5.0 A	BS24
BSG..	Brake control unit with electronic switching and rapid stop	DC 24 V	DC 5.0 A	BSG
BMP..	Half-wave rectifier with electronic switching, integrated voltage relay for cut-off in the DC circuit.	AC 230 – 575 V	DC 2.8 A	BMP3.1

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Assignments of brake size and brake control

	BE02 – BE03	BE05 – BE2	BE5 – BE20	BE30 – BE32	BE60 – BE62	BE120 – BE122
BG..			–	–	–	–
BGE..	1)					–
BS..	1)		–	–	–	–
BSG..	1)			–	–	–
BMP3.1	–	–	–	–	2)	

	Approved
1)	BGE.., BS.., BSG.. with BE03 available for DRN71 and DR2S71
2)	Available with DRN250 – DRN280
–	Not permitted

BG.. and BGE.. are always supplied wired up in the terminal box for cut-off in the AC circuit.

INFORMATION

Brake control systems for installation in the motor terminal box can be combined with most plug connectors and with cage clamps /KCC. There might be space restrictions when using the /KC1 option and customer-specific plug connectors.

There might also be restrictions in combinations with further electrical additional options (such as motor protection, strip heater, built-in encoder), or a larger terminal box might have to be used.

Additional switching relay for installation on the motor terminal box

The following tables list the technical data of available current relays and voltage relays (SR.. and UR..). These relays are available for implementing cut-off in the DC circuit and in the AC circuit in the drive, see chapter "Particularly short response time at switch-off" (→ 🗎 383).

The two relays are optionally available for BE03 – BE32 brakes for brake control BGE 1.5 and BGE 3. For DRN63.. motors, the two relays can only be used with brake control BG1.2 and BG2.4. The relays are provided for mounting to the motor terminal box.

INFORMATION

When using drives with the BSR.. option, the terminal box contour or size might be different after having mounted the relay.

The option designation is BSR.. (BGE.. with SR..) and BUR.. (BGE.. with UR..). The two options differ in the design and in the assignment rules.

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BSR.. brake control combination

A combination of brake control and SR.. current relay can be used for motors with the following features:

- Line operation
- Single-speed
- Constant voltage at the terminal board of the motor, see chapter "Brake voltage supply" (→ 🗎 379).

The supply voltage for the brake is tapped directly from the motor terminal board. Consequently, no separate cables are required for the voltage supply of the brake.

The relay is wired in such a way that it monitors the current in the motor winding. The current decreases when the motor is switched off. The relay disconnects the DC circuit of the brake virtually without delay.

The brake voltage usually corresponds to the phase-to-neutral voltage of the motor. For a motor with a nominal voltage of 230 V△/400 V⅄, the brake coil is equipped with a winding for operation at 230 V. As an option, the brake coil can also be configured for phase-to-phase voltage (e.g. motor 400 V, brake 400 V).

BUR.. brake control combination

A combination of brake control and UR.. voltage relay can be used for motors with the following features:

- Pole-changing
- Inverter controlled
- No constant voltage over time present at the motor terminal board

The combination can also be used for grid-operated, single-speed motors. If the brake is supplied with voltage from the terminal board, the remanence voltage of the motor would result in a delayed application of the brake after switching off.

With the BUR.. design, the supply voltage for the brake must be supplied using a separate supply cable. The relay is wired in such a way that it monitors the AC circuit voltage at the input terminals of the BG../BGE.. brake control system. The relay disconnects the DC circuit of the brake virtually without delay due to the voltage dip that occurs when switching off the brake supply.

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Assignment of brake sizes and connection voltages

The maximum switchable nominal holding current of the brake is DC 1 A (corresponds to about AC 0.77 A for BE.. brakes).

Based on this limit value, the following table lists possible combinations of the various brake sizes depending on common line voltages:

Voltage	Brake sizes			
AC V	**BE03 – BE5**	**BE11 – BE20**	**BE30 – BE32**	**BE60 – BE122**
120		–	–	–
230			–	–
400				–
460				–
500				–
575	–	–	–	–

SEW-EURODRIVE permanently assigns the BG../BGE.. brake control and the SR.. current relay or UR.. voltage relay depending on the selected combination of brake and motor and connection voltage:

- BG../BGE.. brake control is assigned based on the connection voltage of the brake, see above section.
- The SR.. current relay is assigned depending on the motor size and the rated motor current for ⅄ connection.
- UR.. voltage relays are permanently assigned to BG../BGE.. brake control systems. They are assigned by means of the connection voltage of the brake. UR15 is always assigned to BG1.2/BGE1.5, and UR11 is assigned to BG2.4/BGE3.

Motors	Rated motor current I_N in ⅄ connection	Assigned SR.. current relay
	A	
DRN63 – DRN132S DR2S63 – DR2S132S	0.075 – 0.6	SR10
	0.6 – 10	SR11
	10 – 50	SR15
DRN132M – DRN225 DR2S132M – DR2S225	10 – 30	SR15
	30 – 90	SR19

Installation in control cabinet

The following table lists the technical data of brake control systems for installation in the control cabinet as well as the assignments to the brake sizes.

Series	Function	Nominal voltage	Nominal output current I_L	Type
BMS..	Half-wave rectifier without electronic switching.	AC 230 – 575 V	DC 1.0 A	BMS1.4
		AC 150 – 500 V	DC 1.5 A	BMS1.5
		AC 24 – 150 V	DC 3.0 A	BMS3.0
BME..	Half-wave rectifier with electronic switching.	AC 230 – 575 V	DC 1.0 A	BME1.4
		AC 150 – 500 V	DC 1.5 A	BME1.5
		AC 42 – 150 V	DC 3.0 A	BME3.0
BMH..	Half-wave rectifier with electronic switching and heating function	AC 230 – 575 V	DC 1.0 A	BMH1.4
		AC 150 – 500 V	DC 1.5 A	BMH1.5
		AC 42 – 150 V	DC 3.0 A	BMH3.0
BMP..	Half-wave rectifier with electronic switching, integrated voltage relay for cut-off in the DC circuit	AC 230 – 575 V	DC 1.0 A	BMP1.4
		AC 150 – 500 V	DC 1.5 A	BMP1.5
		AC 230 – 575 V	DC 2.8 A	BMP3.1
		AC 42 – 150 V	DC 3.0 A	BMP3.0
BMK..	Half-wave rectifier with electronic switching, control input (DC 24 V) and cut-off in the DC circuit	AC 230 – 575 V	DC 1.0 A	BMK1.4
		AC 150 – 500 V	DC 1.5 A	BMK1.5
		AC 42 – 150 V	DC 3.0 A	BMK3.0
BMKB..	Half-wave rectifier with electronic switching, control input (DC 24 V), rapid stop, and LED status display	AC 150 – 500 V	DC 1.5 A	BMKB1.5
BMV..	Brake control unit with electronic switching, control input (DC 24 V), and rapid stop	DC 24 V	DC 5.0 A	BMV5

INFORMATION

Brake control systems for installation in the control cabinet with all standard motor plug connectors and cage clamp options.

Assignment of motor size and connection technology

	BE03 – BE2	BE5 – BE20	BE30 – BE32	BE60 – BE62	BE120 – BE122
BMS..		–	–	–	–
BME..					–
BMH..				–	–
BMP..				–	–
BMP3.1	–	–	–		
BMK..				–	–
BMV..			–	–	–

	Approved
–	Not permitted

Safe brake modules

The following table lists the technical data of safe brake control systems for installation in the control cabinet as well as the assignments to the brake sizes.

Series	Function	Nominal voltage DC link supply	Nominal voltage of the brake (BST, SBM output voltage)	Nominal output current I_L	Type
BST..-00	Safe brake control with electronic switching, control input (DC 24 V), and safe control input (DC 24 V). Supply via the DC link of the inverter.	DC 350 – 750 V	AC 460 V (DC 171 – 209 V)	DC 0.6 A	BST 0.6S-460V-00
		DC 350 – 750 V	AC 400 V (DC 150 – 184 V)	DC 0.7 A	BST 0.7S-400V-00
		DC 350 – 750 V	AC 230 V (DC 86 – 106 V)	DC 1.2 A	BST 1.2S-230V-00
BST..-0B	Safe brake control with electronic switching, control input (DC 24 V), and safe control input (DC 24 V). Supply via the DC link of the inverter. With additional TF/TH terminal.	DC 350 – 750 V	AC 460 V(DC 171 – 209 V)	DC 0.6 A	BST 0.6S-460V-0B
		DC 350 – 750 V	AC 400 V(DC 150 – 184 V)	DC 0.7 A	BST 0.7S-400V-0B
		DC 350 – 750 V	AC 230 V(DC 86 – 106 V)	DC 1.2 A	BST 1.2S-230V-0B
SBM.. (size 1)	Safe brake control with electronic switching, control input (DC 24 V), safe control input (DC 24 V), and status feedback (DC 24 V). Supply via the DC link of the inverter.	DC 250 – 800 V	AC 460 V (DC 181 – 194 V)	DC 0.62 A	SBM S-460-120-00
		DC 250 – 800 V	AC 400 V (DC 158 – 170 V)	DC 0.73 A	SBM S-400-120-00
		DC 250 – 800 V	AC 230 V (DC 90 – 98 V)	DC 1.28 A	SBM S-230-120-00
SBM.. (size 2)	Safe brake control with electronic switching, control input (DC 24 V), safe control input (DC 24 V), and status feedback (DC 24 V). Supply via the DC link of the inverter.	DC 250 – 800 V	AC 460 V(DC 181 – 194 V)	DC 1.33 A	SBM S-460-250-00
		DC 250 – 800 V	AC 400 V(DC 158 – 170 V)	DC 1.52 A	SBM S-400-250-00
		DC 250 – 800 V	AC 230 V(DC 90 – 98 V)	DC 2.66 A	SBM S-230-250-00

Assignments of brake size and safe brake control

	Brake voltage	BE02 – BE20	BE30 – BE32	BE60 – BE62	BE120 – BE122
BST..-00	AC 460 V	X	X	–	–
	AC 400 V	X	X	–	–
	AC 230 V	X	X	–	–

	Brake voltage	BE02 – BE20	BE30 – BE32	BE60 – BE62	BE120 – BE122
BST..-0B	AC 460 V	X	X	–	–
	AC 400 V	X	X	–	–
	AC 230 V	X	X	–	–
SBM.. (size 1)	AC 460 V	X	X	X	X
	AC 400 V	X	X	X	X
	AC 230 V	X	–	X	X
SBM.. (size 2)	AC 460 V	0	0	X	X
	AC 400 V	0	0	X	X
	AC 230 V	0	X	X	X

X	permitted (recommended)
0	permitted (optional)
–	Not permitted

7.4.5 Dimensioning the periphery

Voltage supply/connection type

Connection type

Maintaining certain brake application times can be relevant to safety. The decision to implement cut-off in the AC circuit or cut-off in the DC and AC circuits must be documented clearly and unambiguously and must be adhered to during installation and startup.

The specified brake application times must be observed in particular during project planning (see also the manual "Project Planning for BE.. Brakes – DR.., DRN.., DR2.., EDR.., EDRN.. AC Motors – Standard Brake/Safety Brake").

Cable selection

Dimensioning and routing of the cable

Bear in mind the inrush current of the brake when dimensioning the cross section of the brake cable. When taking into account the voltage drop due to the inrush current, the value must not drop below 90% of the nominal brake voltage. Refer to the "Operating currents" (→ 🗎 421) tables for information about possible connection voltages and the resulting operating currents.

Refer to the table below for dimensioning the cable cross sections with regard to the acceleration currents for cable lengths ≤ 50 m.

BE02 – BE122

<table>
<tr><th rowspan="3">Brake</th><th colspan="6">Minimum cable cross section of the brake cables in mm² for cable lengths ≤ 50 m and brake voltage</th></tr>
<tr><th>24</th><th>60</th><th>111 – 123</th><th>174 – 193</th><th>194 – 217</th><th>218 – 575</th></tr>
<tr><th>AC V</th><th>DC 24 V</th><th>AC V</th><th>AC V</th><th>AC V</th><th>AC V</th></tr>
<tr><td>BE02</td><td rowspan="5">10</td><td rowspan="4">1.5</td><td rowspan="6">1.5</td><td rowspan="9">1.5</td><td rowspan="10">1.5</td><td rowspan="11">1.5</td></tr>
<tr><td>BE03</td></tr>
<tr><td>BE05</td></tr>
<tr><td>BE1</td></tr>
<tr><td>BE2</td><td>2.5</td></tr>
<tr><td>BE5</td><td rowspan="6">1)</td><td>4</td></tr>
<tr><td>BE11</td><td rowspan="2">10</td><td rowspan="3">2.5</td></tr>
<tr><td>BE20</td></tr>
<tr><td>BE30/32</td><td rowspan="3">1)</td></tr>
<tr><td>BE60/62</td><td rowspan="2">1)</td><td>2.5</td></tr>
<tr><td>BE120/122</td><td>1)</td><td>1)</td></tr>
</table>

1) Connection voltage not available for this brake size.

Cable cross sections of max. 2.5 mm² can be connected to the terminals of the brake control systems. Intermediate terminals must be used if the cross sections are larger.

Brake cables must always be routed separately from other power cables with phased currents unless they are shielded, see chapter "Brakemotor operation with inverter" (→ 🗎 162).

Provide for a suitable equipotential bonding between drive and control cabinet.

Power cables with phased currents include:

- Output cables from inverters, soft start units and brake units
- Supply cables to braking resistors.

Selection and protection circuit of switching elements

Selecting the braking contactor

The high electrical load during switching of the brake (inductive load) requires suitable contactors/switch contacts to have the brake function properly.

Depending on the type and design of the brake, the switch contacts for the voltage supply of the brake must meet the following utilization categories:

- Switch contacts for the supply voltage for operation with AC voltage: AC-3 according to EN 60947-4-1, or AC-15 according to EN 60947-5-1.
- Switch contact for the supply voltage for operation with DC voltage: Preferably AC-3 or DC-3 according to EN 60947-4-1. As an alternative, contacts in utilization category DC-13 according to EN 60947-5-1 are also permitted.

For using the faster cut-off in the AC and DC circuits, also the DC circuit of the brake must be switched. The following applies:

- Switch contacts for optional cut-off in the DC circuit: AC-3 according to EN 60947-4-1.

INFORMATION

Semi-conductor relays with RC protection circuits are not suitable for switching brake rectifiers with the exception of BG.. and BMS..

When applications require cut-off in the DC and AC circuits of the brake, electronic switching devices from SEW-EURODRIVE can be used instead of separate switch contacts.

1. The brake rectifiers BMP.., BMV.. and BMK.., which perform the cut-off in the DC circuit internally, have been specially designed for installation in the control cabinet.
2. The additional relays SR.. and UR.. have been installed for mounting to the terminal box in combination with brake control.

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Advantages of brake control systems from SEW-EURODRIVE with integrated cut-off in the DC circuit

Switching devices from SEW-EURODRIVE offer the following advantages:

- No special contactors with four AC 3 contacts required
- For the above mentioned reasons, the contact for cut-off in the DC circuit is subject to high loads and, therefore, a high level of wear. In contrast, the electronic switches from SEW-EURODRIVE operate without any wear at all.
- No additional wiring work for the customer The current and voltage relays are wired at the factory. Only the power supply and brake coil have to be connected for the BMP.. and BMK.. rectifiers.
- Saving 2 additional cores between motor and control cabinet
- No additional interference emission in the control cabinet from contact bounce when the brake is cut-off in the DC circuit

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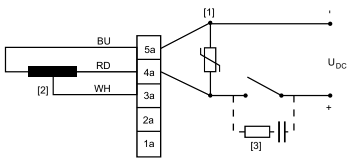
Varistor overvoltage protection with direct DC voltage supply

Brakes of sizes up to BE2 can instead be operated with direct DC voltage supply without brake control.

In this case, a suitable overvoltage protection in the form of a varistor must be installed by the customer to protect the switch contacts and the brake coil. The varistor must be connected in parallel to the coil according to the below diagram.

The following figure shows a varistor for protecting the brake coil.



5463392779

[1]	Varistor	WH	white
[2]	Brake coil	RD	Red
[3]	RC element	BU	Blue

The required varistor is not included in the delivery, which means it has to be selected and dimensioned by the customer.

INFORMATION

Using a freewheeling diode as overvoltage protection instead of a varistor is not permitted, as this can significantly extend brake application times.

If there are still problems with EMC interference in the voltage supply line despite the varistor overvoltage protection, then a suitable RC element can also be connected in parallel to the switch contact.

INFORMATION

SEW-EURODRIVE always recommends using a BS.., BSG.. or BMV.. brake control for brakes with DC 24 V supply. This brake control has a wear-free, electronic switch which prevents in particular contact-breaking sparks when switching off the brake which could lead to EMC interference. BMV.. controls also have a powerful overvoltage protection for the switch contacts and the brake coil.

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Multi-motor operation of brakemotors

In many applications, several motors are used at the same time to implement a technical function. This is generally also possible for brakemotors. Bear in mind that in the event of a brake failure, all other brakes that are operated at the same time also have to apply to prevent damage to the drive components and the system. In this case, it is advantageous if each brake is operated on its own brake control.

INFORMATION

In general, the following applies: In the event of a brake malfunction, all brakes must be switched off by disconnecting the supply voltage.

Simultaneous switching can also be achieved by connecting several brakes in parallel to a shared brake control. In this case, the following conditions apply:

- The sum of all operating currents of the brakes ("Operating currents" (→ 🗎 421)) must not exceed 0.75 times of the nominal current of the brake control "Selecting the brake control" (→ 🗎 402).
- It is recommended to connect only brakes of the same size in parallel.
- The faster cut-off in the AC and DC circuits (AC/DC) cannot be implemented in a reliable manner because of the interaction of the brake coils connected in parallel. The relevant switching times for cut-off purely in the AC circuit must be taken into account during project planning.
- Only the requirements of the associated documentation apply to the safe BST and SBM brake controls.

INFORMATION

As cut-off in the AC and DC circuits cannot be performed reliably when several brakes are connected in parallel to the same brake control, this operating mode is neither suited for hoists or hoist-like applications nor for functional safety applications with BE.. safety brakes.

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7.4.6 Fusing the voltage supply

Like any other electrical operating resource, also a spring-loaded brake must be protected from overvoltage and short circuit. For brakes that are operated with a brake control from SEW-EURODRIVE at an AC voltage system, SEW-EURODRIVE recommends using a motor circuit breaker as protection.

Motor overload circuit breaker

A motor circuit breaker prevents the destruction of the brake coil in the event of the brake coil being connected incorrectly or the brake rectifier being defective.

Electromagnetic motor circuit breakers such as ABB type M25-TM are suitable as short-circuit protection for the brake rectifier and as thermal protection for the brake coil.

INFORMATION

Electronic motor circuit breakers are not suitable for protecting brake rectifiers and brake coils due to their working principle (measuring the effective current value via a current transformer). Contact SEW-EURODRIVE.

The motor circuit breaker must be selected and set based on the nominal holding current of the brake. For holding currents, refer to chapter "Operating currents" (→ 🗎 421).

The following applies to the setting values:

- Brakes with a fixed connection voltage or a 50 Hz voltage range: Setting to 1.1 times the nominal holding current
- Brakes with a combined voltage range of 50/60 Hz: Setting to 1.25 times the nominal holding current

Motor circuit breakers are suitable for all brake rectifiers in the control cabinet and in the terminal box with separate voltage supply.

INFORMATION

Special conditions must be taken into account when using motor circuit breakers in combination with BMH.. brake control because of the heating current. Consult SEW-EURODRIVE in this case.

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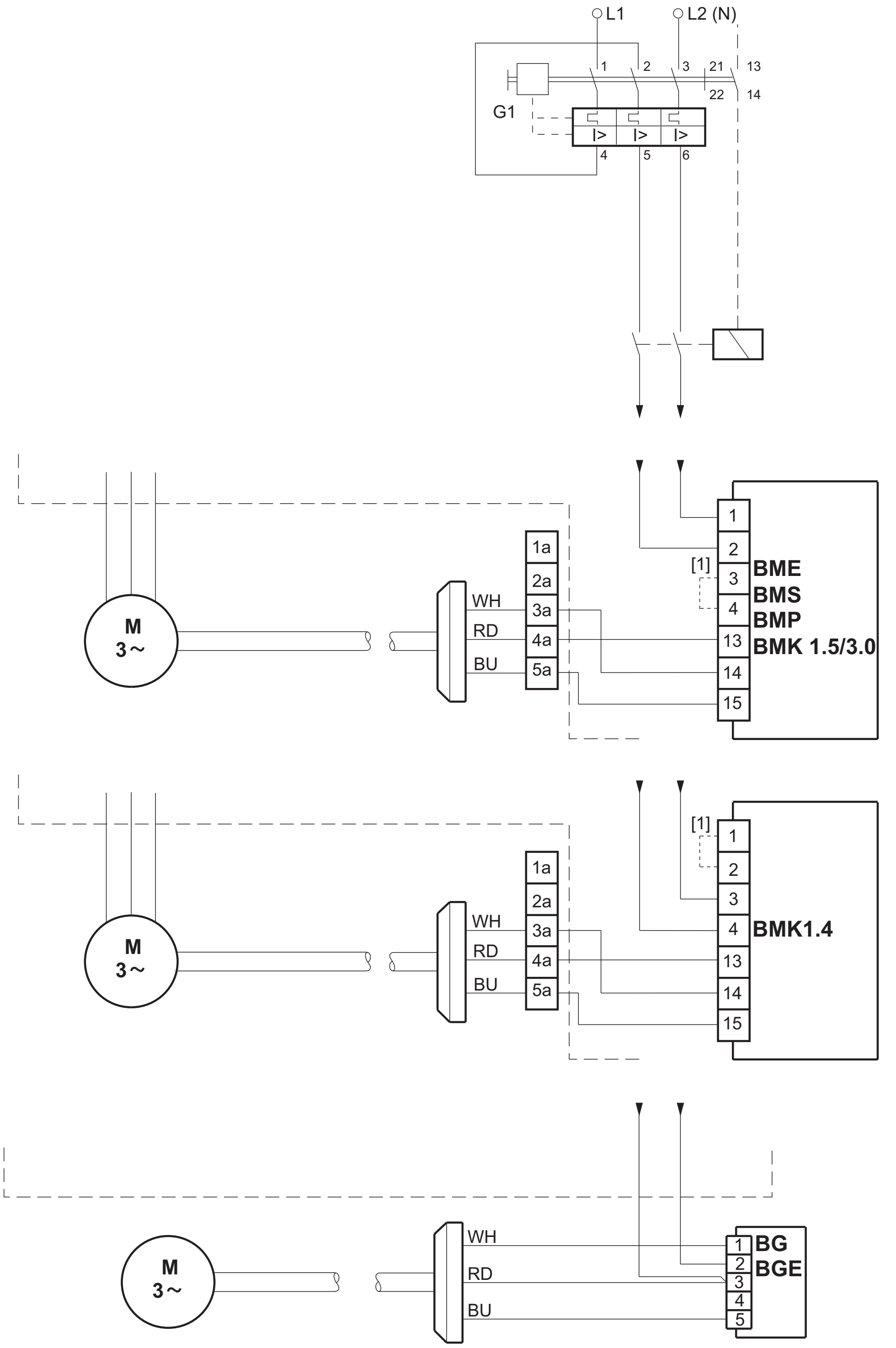

9007203240537227

WH White
RD Red
BU Blue
[1] Customers must connect terminals 3 and 4 according to the relevant wiring diagram.

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7.4.7 Brake test

In applications with brakes, the braking torque represents an important criterion for the functional and performance capability of the brake. If the braking torque is reduced or lost, the functionality of the application, the safety of the machine, and/or personal safety can be limited. To check the functional and performance capability of a brake, you can integrate a brake test into the overall system.

Especially for safety-related applications in which the brake performs a safety function, a brake test for the brake may be required by one or more standards, e.g. by EN ISO 13849-1. The brake test is not an independent safety function but supplements a higher-level safety system for brake testing which is required by the standards. The overall system must meet the diagnostic coverage (DC) required by the standards.

A brake test provides you with information about the functional and performance capability of the brake. Potential faults or functional limitations can be detected at an early stage, allowing the necessary maintenance and repair work to be initiated. In a brake system with multiple brakes, each brake must be tested separately. This ensures that the safety function is maintained even if one brake fails.

Diagnostic unit /DUE

The diagnostic unit /DUE for function and wear monitoring of the BE.. brake detects the switching status of the brake and its wear status by means of continuous measurement of the air gap. The diagnostic unit /DUE detects whether the magnetic circuit of the brake - including the brake control - essentially works (brake opens and closes). Furthermore, the /DUE option makes it possible to detect a change to the air gap of the brake via a continuous air gap measurement. In this manner, wear-related function restrictions can be detected and rectified by means of maintenance.

INFORMATION

The diagnostic unit /DUE detects the switching status and the degree of wear of the brake by interpreting the air gap. However, the /DUE option cannot determine the available braking torque. Additional applicative measures may be needed to check the braking torque.

Brake test by SEW-EURODRIVE

SEW-EURODRIVE offers various types of brake tests. These tests allow safety functions to be implemented with brakes in horizontal and vertical applications up to the most demanding requirement PL e.

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Avoiding erroneous test results

In order to avoid erroneous test results, particular attention must be paid to the following:

- Before starting a static brake test, SEW-EURODRIVE recommends moving the axes that are to be tested slightly, for example, by moving a short distance forward or moving to a specific position at which the brake test will be performed. The motion ensures that the axis being tested can move freely and that the devices involved in the test are available and functioning properly. The motion can be performed by the machine's automation system or as part of the brake test.
- A software-based brake test usually cannot directly determine the braking torque that is present at the brake. In addition to the braking torque, a torque determined by the test also includes applicative torques, such as friction. Measuring tolerances of the measuring equipment that is used and a temperature-dependent torque characteristic of the motor can also lead to significant measurement deviations.
- Because of possible measurement deviations and the different meaning of the braking torque, brake slippage can and may occur, even significantly outside the tolerance range for the nominal braking torque M_B.

For the above mentioned reasons, the determination of the test torque to be selected must always be based on the planning requirements. These are requirements such as maximum static load torque of the application and safety factors, where applicable.

INFORMATION

Performing a brake test with a damaged brake or brake control unit can lead to undesirable movement of the unit. During the implementation and performance of these kinds of diagnostics, always ensure that the safety of persons and the system is guaranteed during this process.

In order to perform a static brake test, attention must be paid to the following in addition to the above-mentioned notes:

- In systems with more than one brake, e.g. a group drive or motor brake in combination with another brake in the system, each brake must be tested separately in accordance with the standards. Any mechanical stress during the separate test must be taken into consideration in the design of the machine or must be avoided using suitable automation.
- The brake test must be carried out with the machine in a test position that avoids injuries to persons and damage to the system in the event of possible movement, e.g. in the event of brake slippage.

If you have any questions with regard to the selection, parameterization, and use of brake tests, contact SEW-EURODRIVE.

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7.4.8 Activating the friction surfaces

When a brake is used as a holding brake, the brake is not usually subjected to dynamic loading. This can cause a gradual reduction in the static friction torque M_4. As compensation, the friction surfaces can be reactivated by a targeted dynamic load. The activation procedure regenerates the top layer of the friction lining in order to compensate for the drop in the static friction torque M_4 caused by a lack of dynamic strain.

SEW-EURODRIVE recommends paying attention to the following during activation procedures such as this:

- Activating the friction surfaces causes wear on the brake. Perform friction surface activation as infrequently as possible in order not to reduce the service life of the lining too much.
- The friction surfaces should preferably be activated using a dynamic brake application at a significantly reduced motor speed (<750 min^{-1}).
- Activation of the friction surfaces by means of controlled start-up of the motor against the closed brake is only permissible if the motor speed does not exceed a value of 100 min^{-1} and the activation time does not exceed 5 seconds.

In case of questions with regard to the design of activation of the friction surfaces, contact SEW-EURODRIVE.

INFORMATION

Working brakes on line-operated motors (non-controlled operation) do not need activation, since they are sufficiently loaded by the operational braking procedures.

7.5 Technical data

INFORMATION

For information on the torque-dependent spring pack of BE.. brakes, refer to the operating instructions for AC motors.

Information	Source
Operating currents of the brake	"Operating currents" (→ 🗎 421)
Resistance values of brake coils	Operating instructions
Switching times	"Project Planning for BE.. Brakes" manual – DR.., DRN.., DR2.., EDR.., EDRN.. AC Motors – Standard Brake/Safety Brake"
Permitted braking work per cycle	"Project Planning for BE.. Brakes" manual – DR.., DRN.., DR2.., EDR.., EDRN.. AC Motors – Standard Brake/Safety Brake"
Permitted braking work until maintenance	"Project Planning for BE.. Brakes" manual – DR.., DRN.., DR2.., EDR.., EDRN.. AC Motors – Standard Brake/Safety Brake"
Permitted working air gaps	Operating instructions
Spring pack tables	Operating instructions
Characteristic safety values B_{10D}	"Characteristic safety values" (→ 🗎 425)
Block diagrams	"Brake control block diagrams" (→ 🗎 427)
Dimension sheets brake controls	"Dimension drawings" (→ 🗎 444)

7.5.1 Operating currents

General information on determining operating currents

The tables in this chapter list the operating currents of BE.. brakes at different voltages.

The acceleration current I_B (= inrush current) flows only for a short time (approx. 160 ms for BE02 – BE62, 400 ms for BE60 – BE122 with BMP3.1 brake control) when the brake is released. No increased inrush current occurs when using BG.., BS24 or BMS.. brake control and direct DC voltage supply without control unit (only possible with brake size BE02 – BE2).

The values for the holding currents I_H are rms values. Only use current measurement units that are designed to measure rms values.

INFORMATION

The following operating currents and power consumption values are nominal values. They refer to a coil temperature of +20 °C.

Operating currents and power consumption usually decrease during normal operation due to heating of the brake coil.

Note that the actual operating currents can be higher by up to 25% depending on the ambient temperature and with coil temperatures below +20 °C.

Legend

The following tables list the operating currents of the brakes at different voltages.

The following values are specified:

P_B	Nominal value of the electric power consumption in the brake coil in watt
U_N	Nominal voltage (rated voltage range) of the brake in V (AC or DC)
I_H	Nominal holding current in A (AC). Effective value of the braking current in the supply cable to the SEW-EURODRIVE brake control
I_G	Nominal holding current in A (DC) in the brake cable with direct DC voltage supply or Nominal holding current in A (DC) in the brake cable with DC 24 V supply via BS24, BSG, or BMV
I_B	Acceleration current in A (AC or DC) when operated with SEW-EURODRIVE brake control for high-speed excitation
I_B/I_H	Inrush current ratio ESV
I_B/I_G	Inrush current ratio ESV for DC 24 V supply with BSG or BMV

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BE02, BE03, BE05, BE1, BE2 brakes

	BE02	BE03	BE05, BE1	BE2
Nominal power brake coil in W	25	25	30	41
Inrush current ratio ESV	4	4	4	4

Nominal voltage (rated voltage range) V_N		BE02		BE03		BE05, BE1		BE2	
		I_H	I_{DC}	I_H	I_{DC}	I_H	I_{DC}	I_H	I_{DC}
AC V	DC V	AC A	DC A	AC A	DC A	AC A	DC A	AC A	DC A
24 (23–26)	10	-	–	2.20	2.55	2.25	2.90	2.95	3.80
60 (57-63)	24	-	0.72	0.87	1.02	0.90	1.17	1.18	1.53
120 (111-123)	48	-	–	0.44	0.51	0.45	0.59	0.59	0.77
184 (174-193)	80	-	–	0.28	0.32	0.29	0.37	0.38	0.49
208 (194-217)	90	-	–	0.25	0.29	0.26	0.33	0.34	0.43
230 (218-243)	96	0.14	0.18	0.22	0.26	0.23	0.30	0.30	0.39
254 (244-273)	110	-	–	0.19	0.23	0.20	0.27	0.27	0.35
290 (274-306)	125	-	–	0.17	0.21	0.18	0.24	0.24	0.31
330 (307-343)	140	-	–	0.15	0.18	0.16	0.21	0.21	0.28
360 (344-379)	160	-	–	0.14	0.16	0.14	0.19	0.19	0.25
400 (380-431)	180	0.08	0.1	0.12	0.14	0.13	0.17	0.17	0.22
460 (432-484)	200	0.07	0.09	0.11	0.13	0.11	0.15	0.15	0.19
500 (485-542)	220	-	–	0.10	0.11	0.10	0.13	0.14	0.18
575 (543-600)	250	-	–	0.09	0.10	0.09	0.12	0.12	0.16

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Brakes BE5, BE11, BE20, BE30, BE32, BE60, BE62

	BE5	BE11	BE20	BE30, BE32	BE60, BE62
Nominal power brake coil in W	50	70	95	120	195
Inrush current ratio ESV	5.9	6.6	7.5	8.5	9.2

Nominal voltage (rated voltage range) V_N		BE5	BE11	BE20	BE30, BE32	BE60, BE62
		I_H	I_H	I_H	I_H	I_H
AC V	DC V	AC A	AC A	AC A	AC A	AC A
60 (57 – 63)	24	1.28	2.05	2.55	–	–
120 (111 – 123)	–	0.64	1.04	1.28	1.66	–
184 (174 – 193)	–	0.41	0.66	0.81	1.05	–
208 (194 – 217)	–	0.37	0.59	0.72	0.94	1.50
230 (218 – 243)	–	0.33	0.52	0.65	0.84	1.35
254 (244 – 273)	–	0.29	0.47	0.58	0.75	1.20
290 (274 – 306)	–	0.26	0.42	0.51	0.67	1.12
330 (307 – 343)	–	0.23	0.37	0.46	0.59	0.97
360 (344 – 379)	–	0.21	0.33	0.41	0.53	0.86
400 (380 – 431)	–	0.18	0.30	0.37	0.47	0.77
460 (432 – 484)	–	0.16	0.27	0.33	0.42	0.68
500 (485 – 542)	–	0.15	0.24	0.29	0.38	0.60
575 (543 – 600)	–	0.13	0.22	0.26	0.34	0.54

Brake BE120, BE122

	BE120, BE122
Nominal power brake coil in W	220
Inrush current ratio ESV	6

Nominal voltage (rated voltage range) V_N	BE120, BE122
	I_H
AC V	AC A
230 (218 – 243)	1.45
254 (244 – 273)	1.30
290 (274 – 306)	1.16
360 (344 – 379)	0.92
400 (380 – 431)	0.82
460 (432 – 484)	0.73
500 (485 – 542)	0.65
575 (543 – 600)	0.58

7.5.2 Characteristic safety values

Characteristic safety values for BE.. brakes

The values specified in the following table apply to BE.. brakes in standard applications.

	Characteristic safety values according to EN ISO 13849-1	
Classification	Category B	
System structure	1-channel (Cat. B)	
MTTF$_d$ value	Calculation via B_{10D} value	
B_{10D} value	BE02	1.5×10^6
	BE03	20×10^6
	BE05	16×10^6
	BE1	12×10^6
	BE2	8×10^6
	BE5	6×10^6
	BE11	3×10^6
	BE20	2×10^6
	BE30	1.5×10^6
	BE32	1.5×10^6
	BE60	1×10^6
	BE62	1×10^6
	BE120	0.25×10^6
	BE122	0.25×10^6

SEW-EURODRIVE offers BE03 to BE32 brakes also as safety brakes. For more information, consult the addendum to the operating instructions "Safety Encoders and Safety Brakes – AC Motors DR.., DRN.., DRU.., DR2.., EDR.., EDRN.. – Functional Safety".

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Characteristic safety values for BE.. safety brakes

	Characteristic safety values in accordance with EN ISO 13849-1	
Classification	Category 1	
System structure	1-channel (Cat. 1)	
Operating mode	High demand	
Safe state	The brake is applied	
Safety functions	Safe brake actuation (SBA) Safe brake hold (SBH)	
Service life	20 years, or T_{10D} value (depending on which value applies first)	
T_{10D} value	$0.1 \times MTTF_D$	
$MTTF_d$ value	Calculation via B_{10D} value	
B_{10D} value	BE03	24×10^6
	BE05	20×10^6
	BE1	16×10^6
	BE2	12×10^6
	BE5	10×10^6
	BE11	8×10^6
	BE20	5×10^6
	BE30	3×10^6
	BE32	3×10^6

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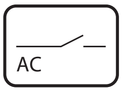
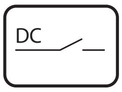
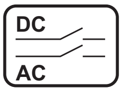
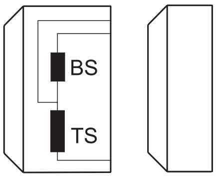
7.5.3 Brake control block diagrams

Legend

	Cut-off in the AC circuit (standard application of the brake)
	Cut-off in the DC circuit (fast application of the brake)
	Cut-off in the DC and AC circuits (fast application of the brake)
	Brake BS = Accelerator coil TS = Coil section
	Auxiliary terminal strip in terminal box
	Motor with delta connection
	Motor with star connection
	Control cabinet limit
WH	White
RD	Red
BU	Blue
BN	Brown
BK	Black

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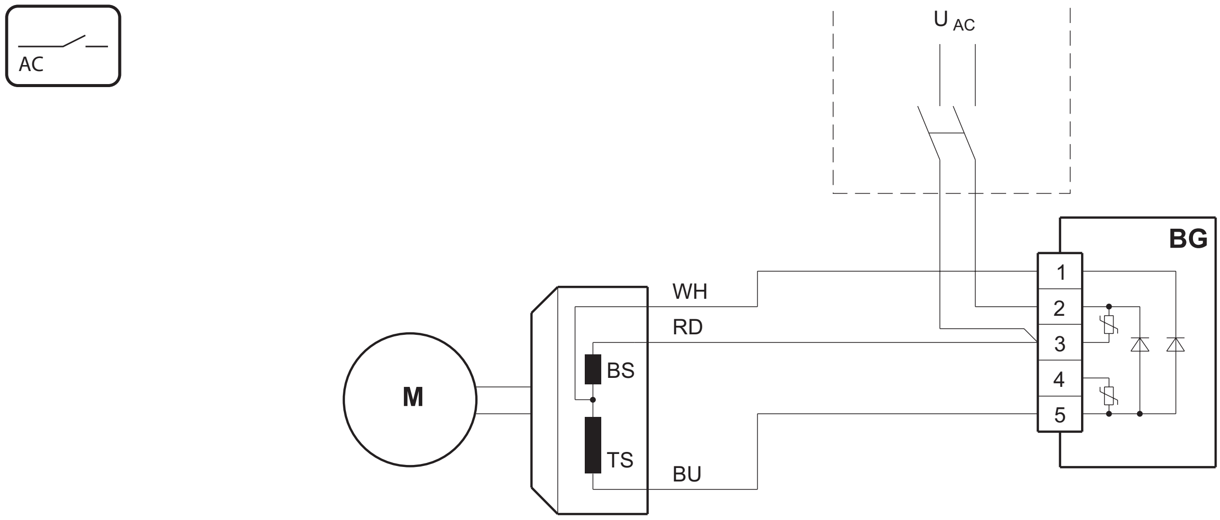
BG.. brake control



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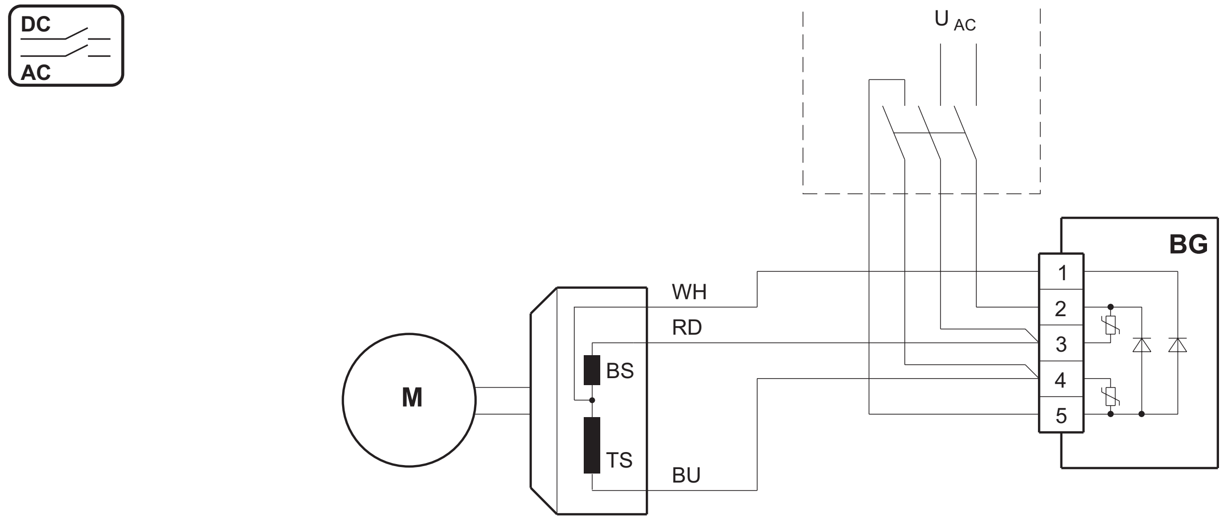

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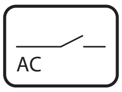
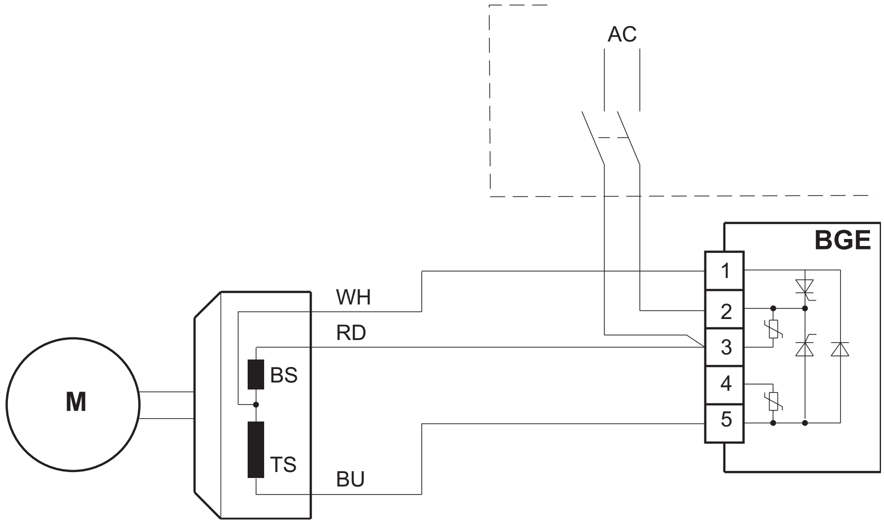
BGE.. brake control





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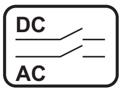
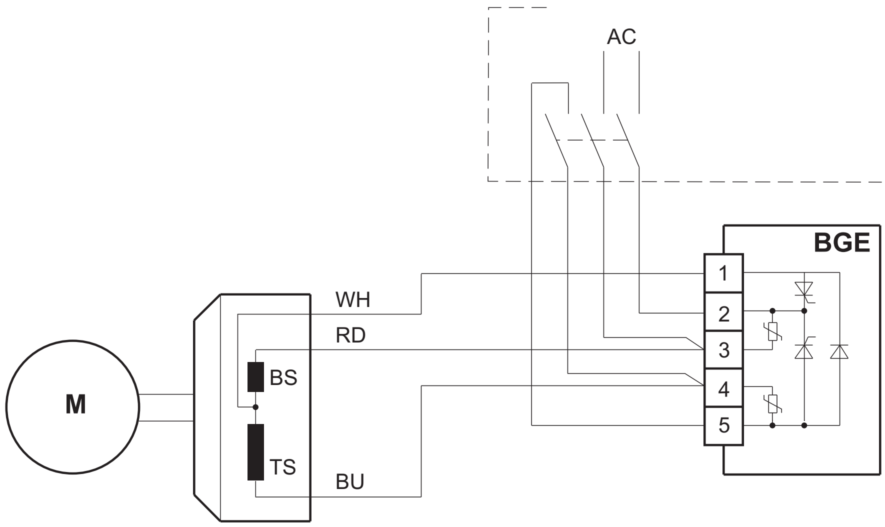
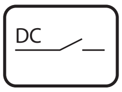
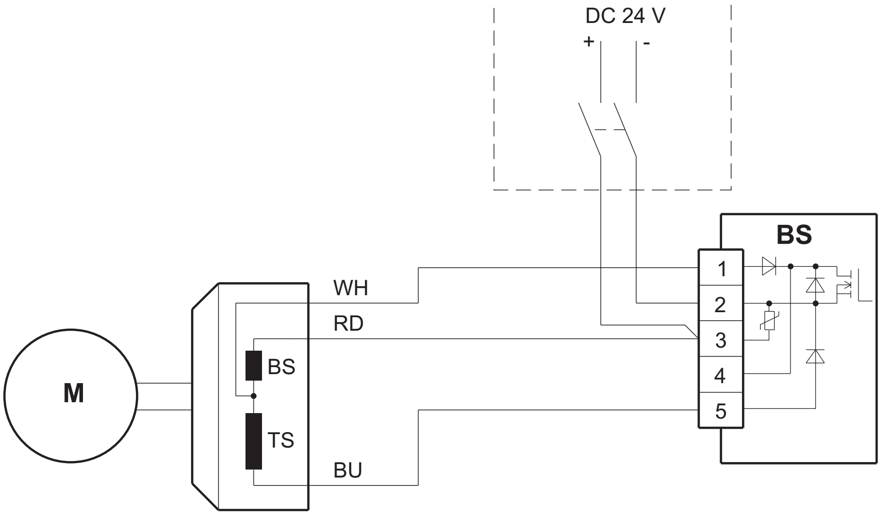




3985852555

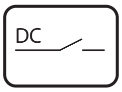
BS.. brake control

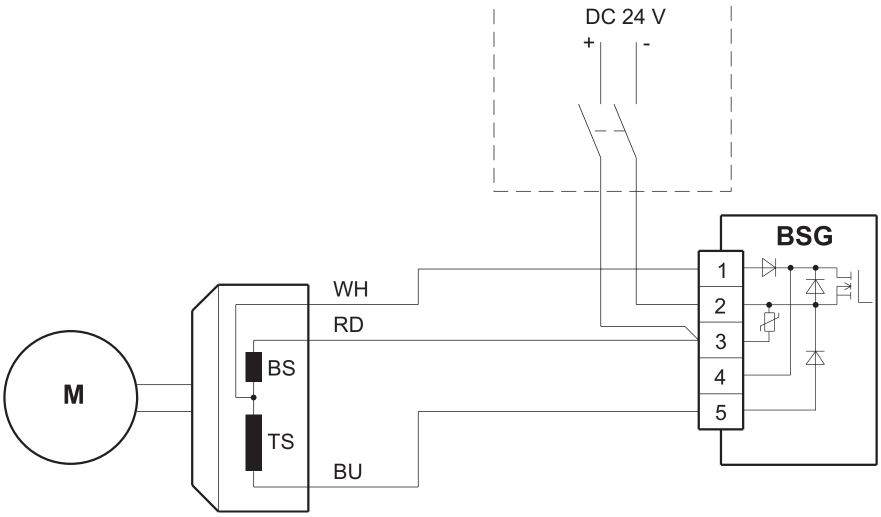




5465000459

BSG.. brake control





3985870219

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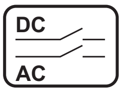
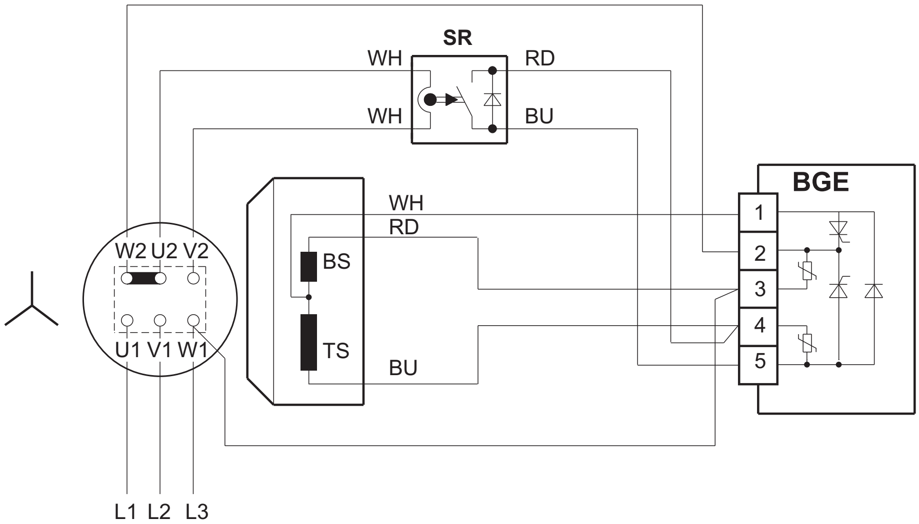
BSR.. brake control

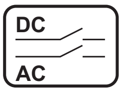


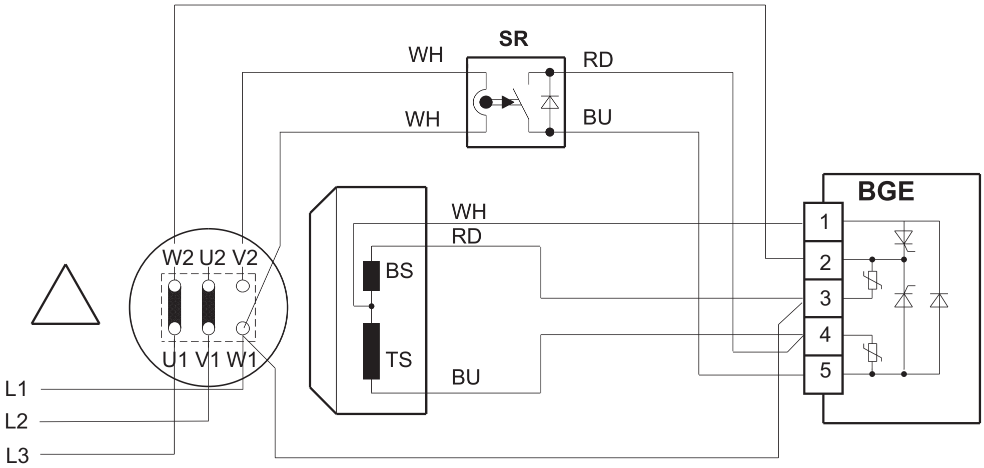
Brake voltage = phase-to-neutral voltage



Example: Motor 230 V △/400 V ⅄, brake AC 230 V

3985860747





Example: Motor 400 V △/690 V ⅄ , brake: AC 400 V

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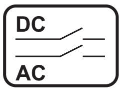
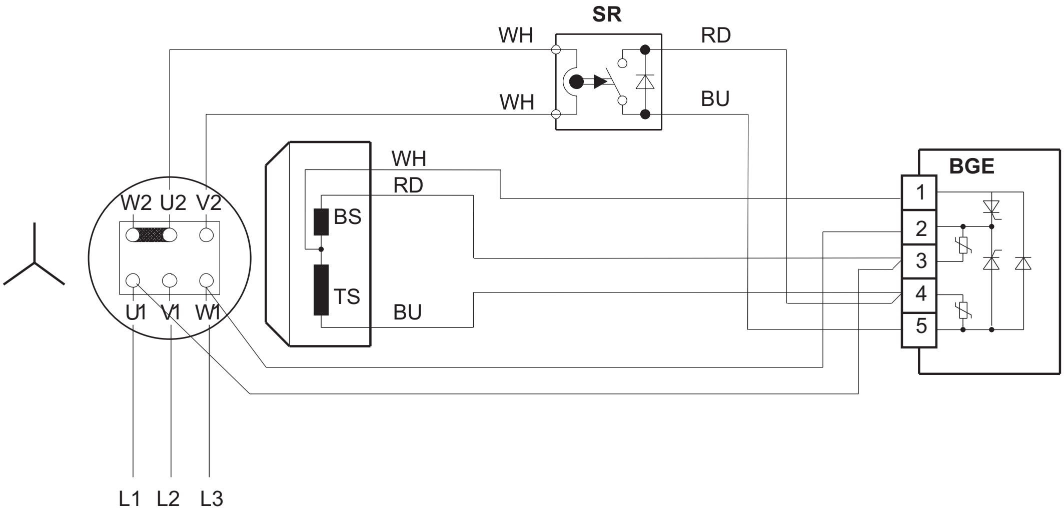
Brake voltage = phase-to-phase voltage

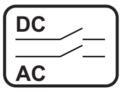


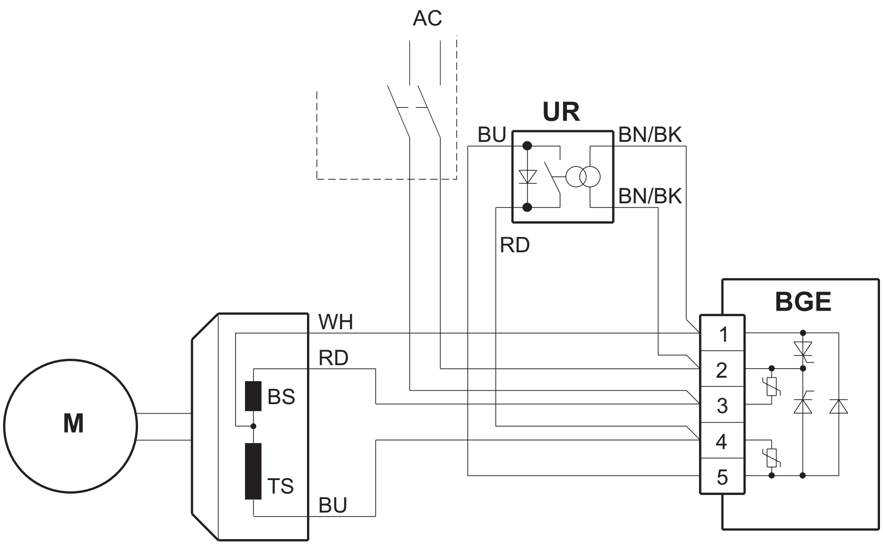


9007203240605067

The input voltage of the brake rectifier corresponds to the phase-to-phase voltage of the motor, e.g. motor: 400 V ⅄, brake: AC 400 V

BUR.. brake control





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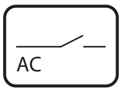
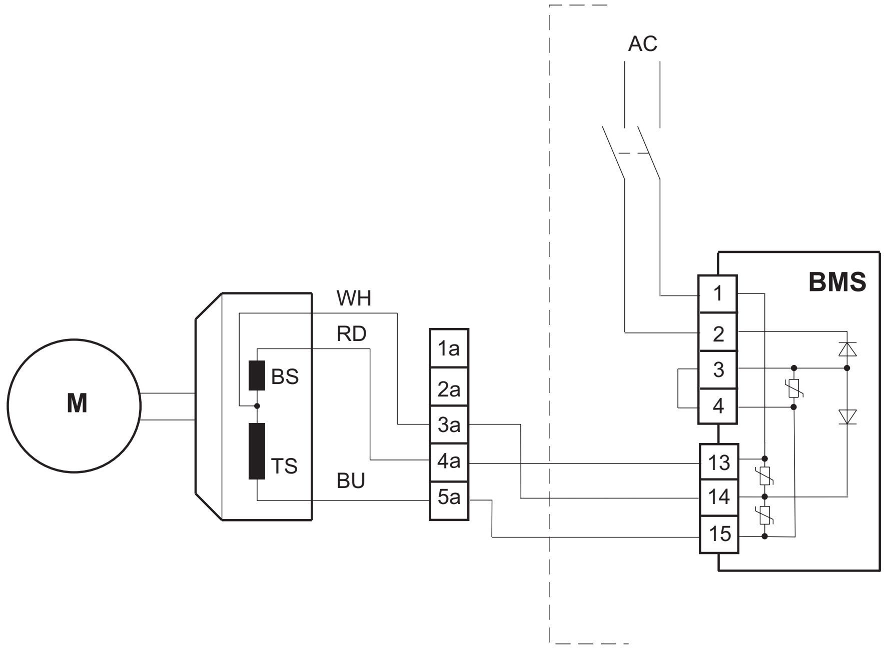
BMS.. brake control





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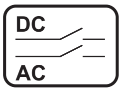
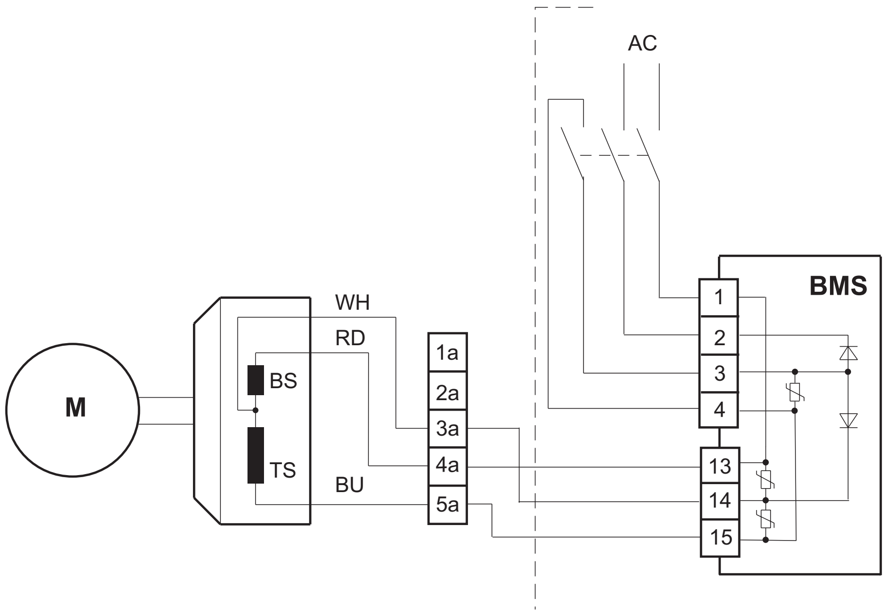
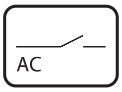
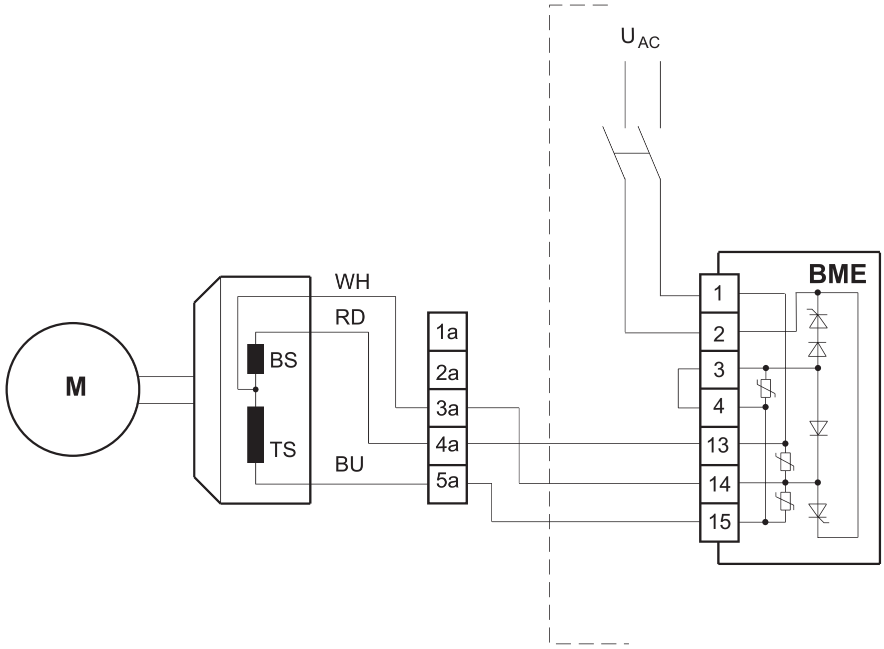




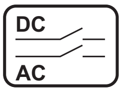
3985847435

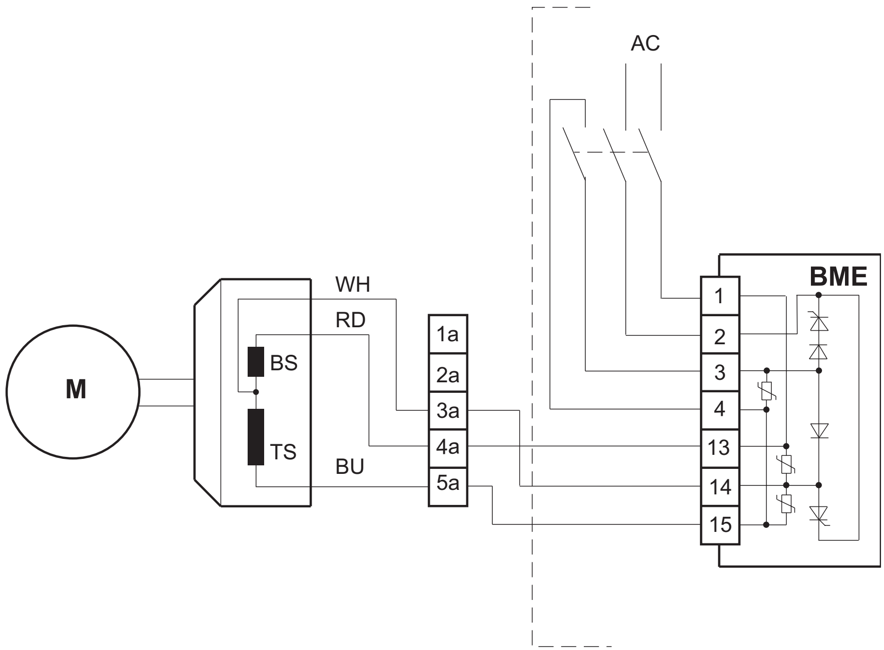
BME.. brake control





3985855627





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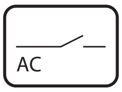
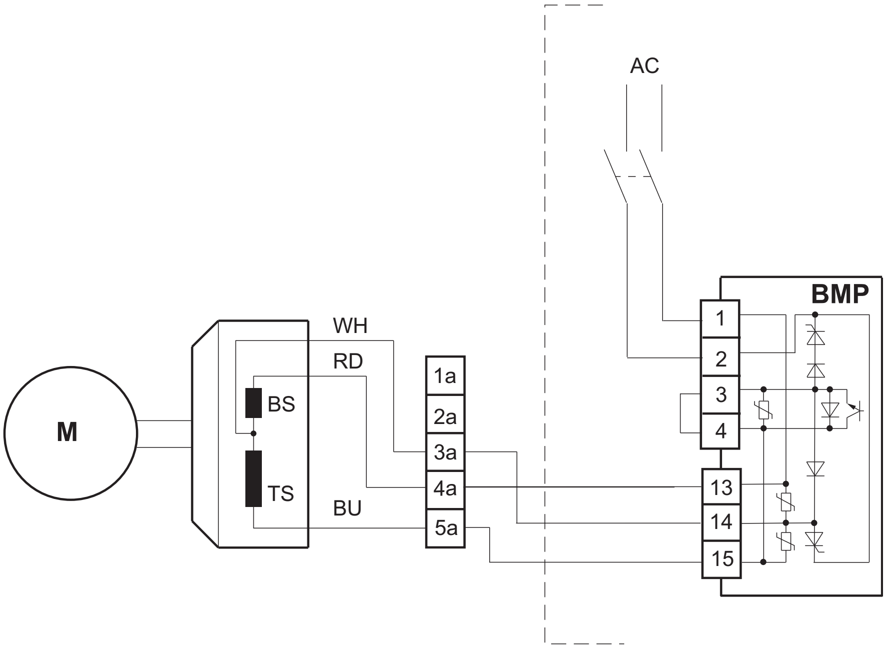
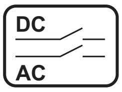
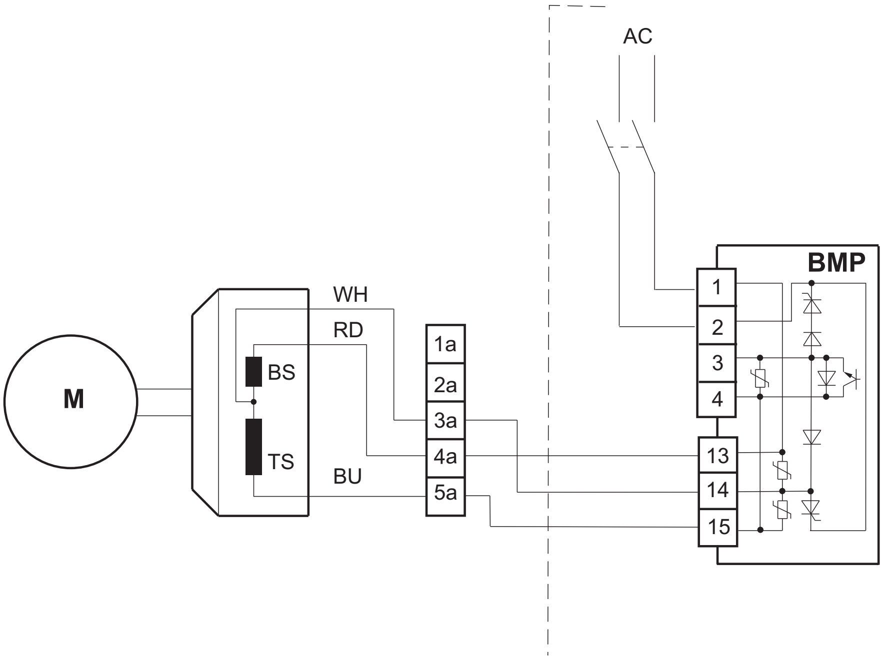
BMP.. brake control





3985873291





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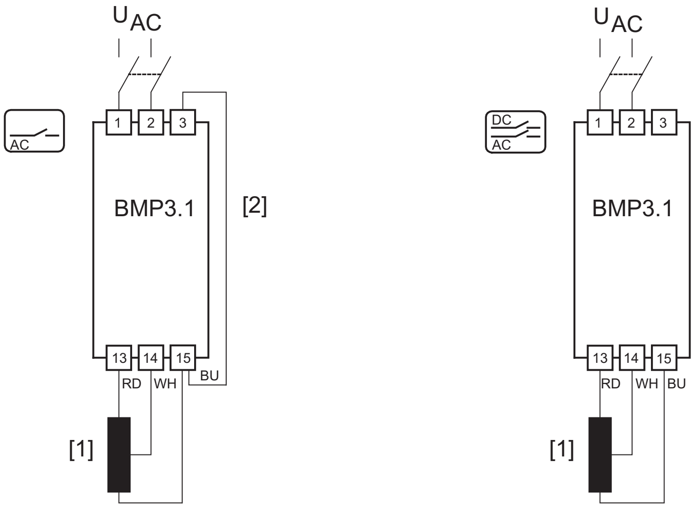
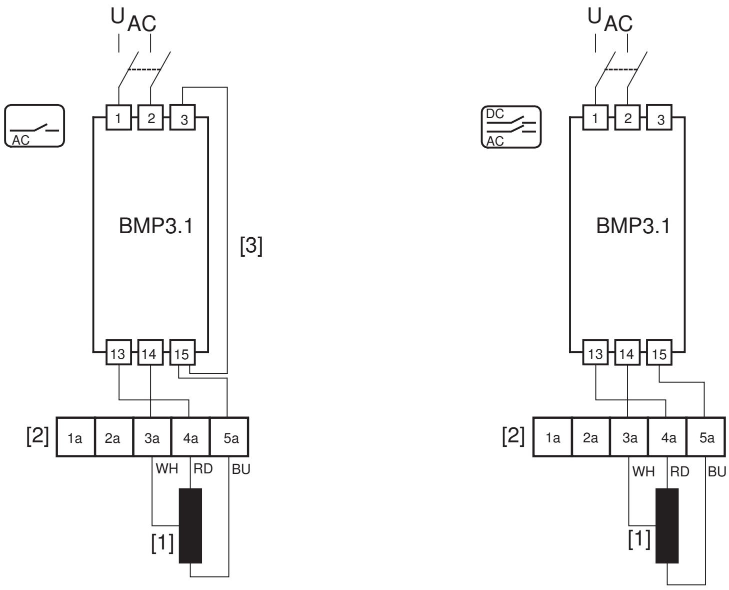
BMP 3.1 brake control (installation in terminal box)



18014402495360011

[1] Brake coil
[2] Wire jumper

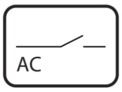
BMP 3.1 brake control (installation in control cabinet)

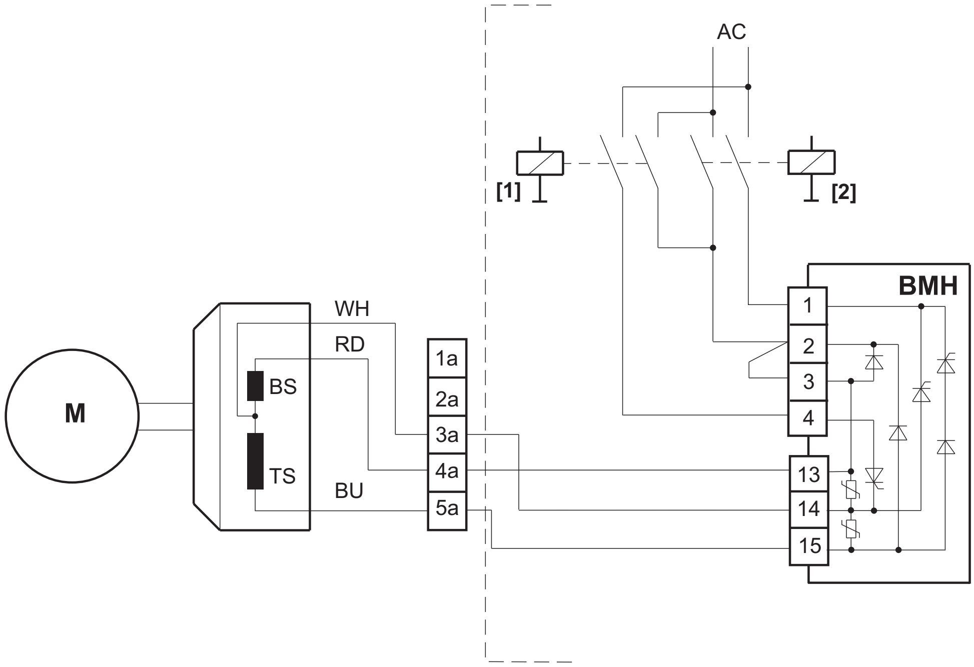


18014402495362699

[1] Brake coil
[2] Terminal strip
[3] Wire jumper

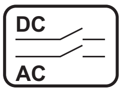
BMH.. brake control

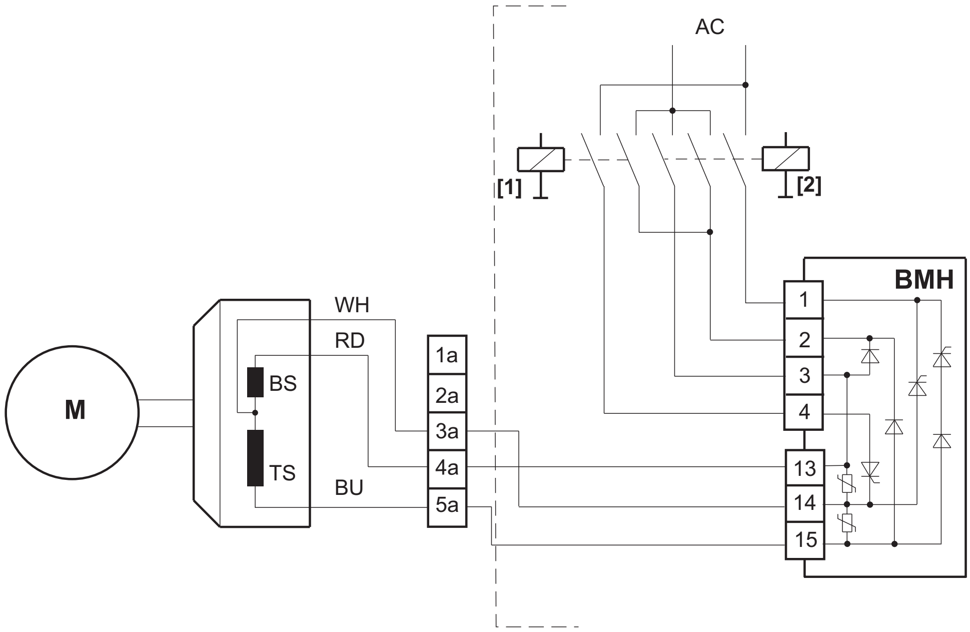




3985883787

[1] Heating
[2] Releasing





3985885835

[1] Heating
[2] Releasing

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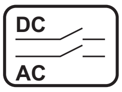
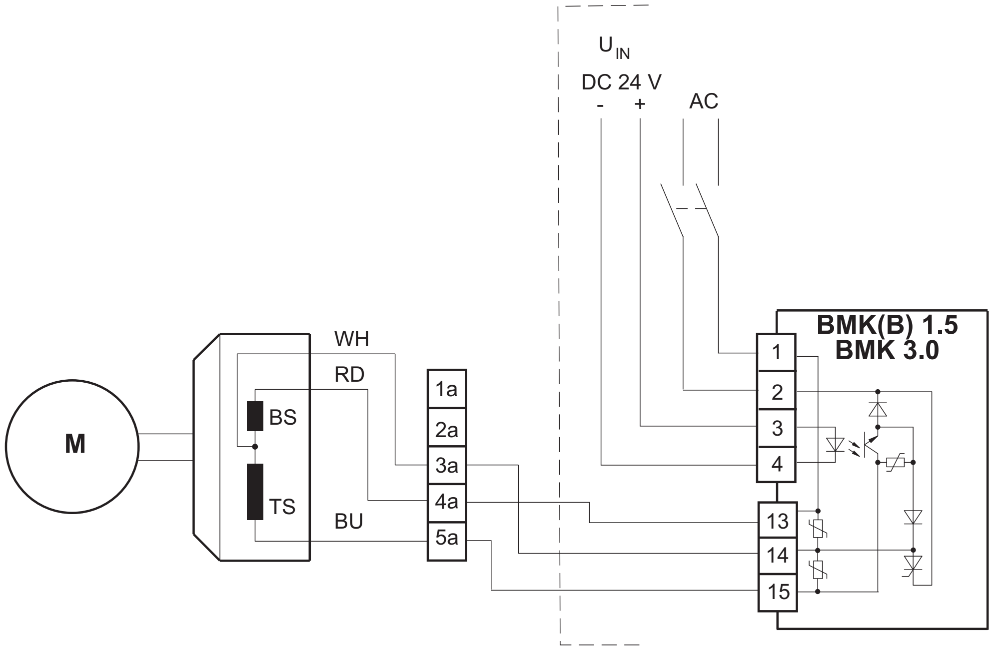
BMK.., BMKB.. brake control





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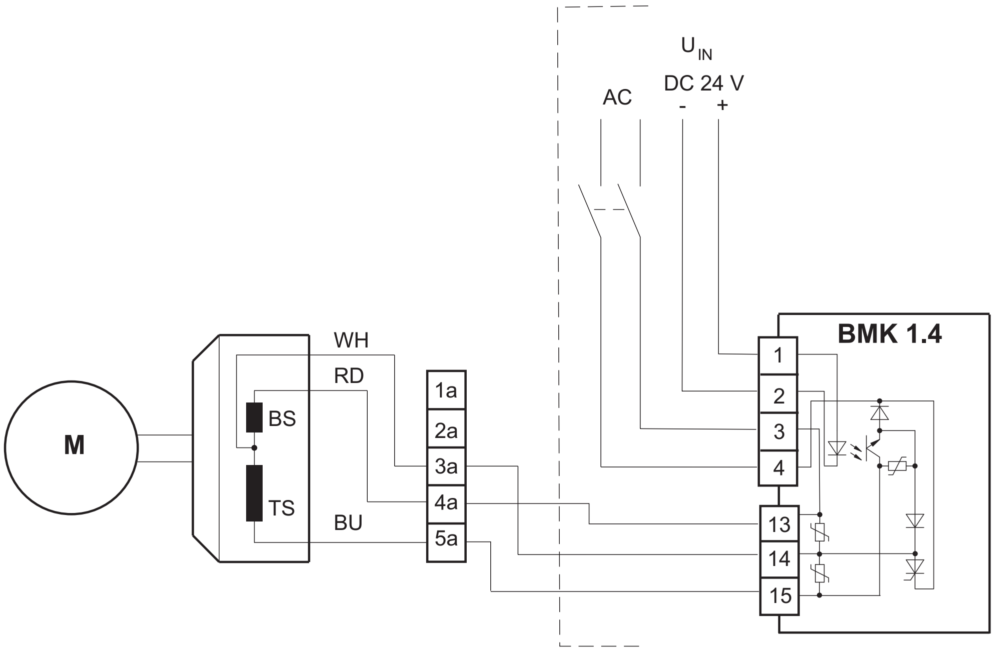
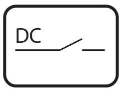
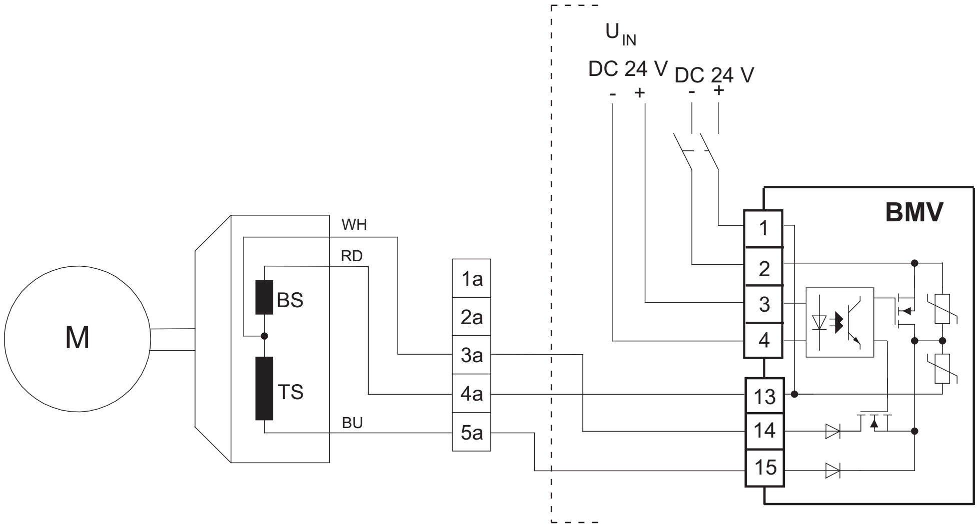


30788147339

BMV.. brake control





3985891979

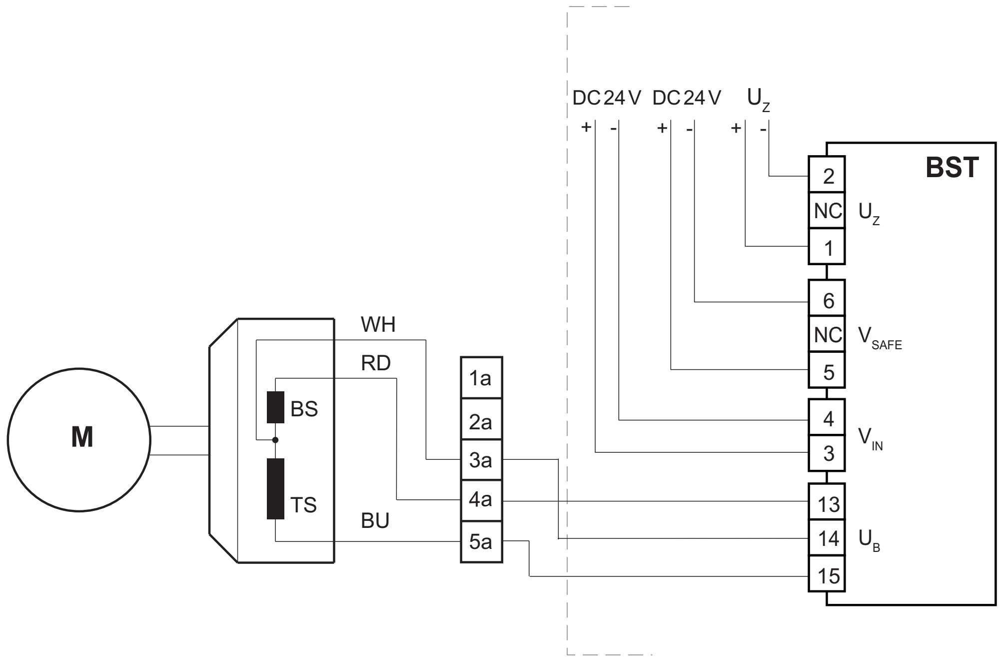
V_{IN} Control signal

BST.. safe brake control

Separate control

With functional control of the brake via V_{IN} or V_{SAFE}.

When designing the brake system, the worst-case response time must be taken into account for the limit values in the safety system, especially for functional safety.



Separate control of the brake via a functional and a functionally safe control voltage.

18014419429788555

Joint control

With functional control of the brake via V_{IN} and V_{SAFE}.

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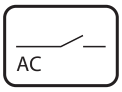
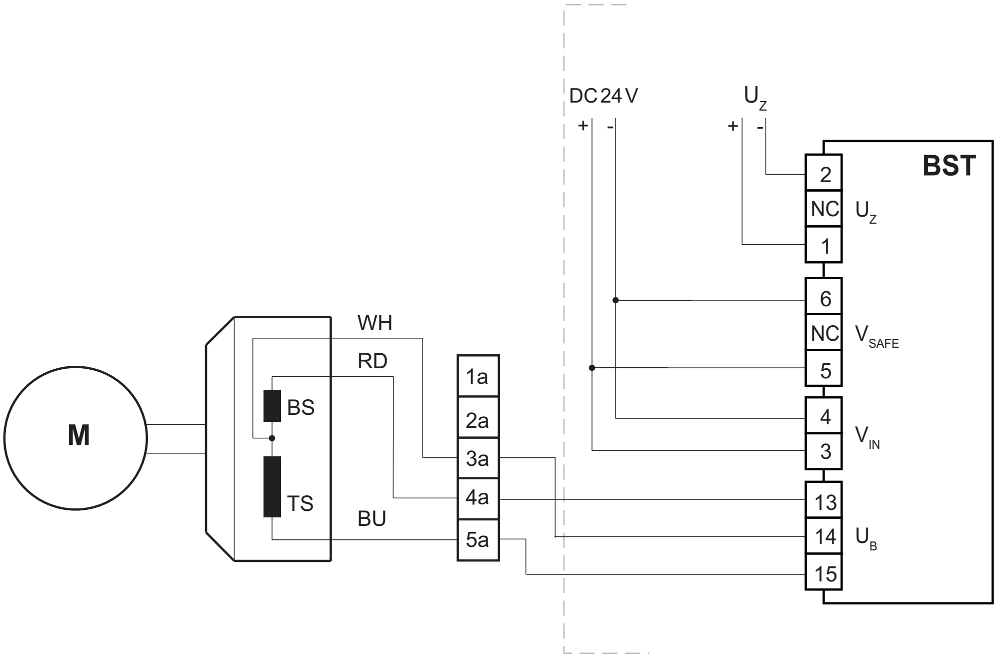


With functionally safe control of the brake via V_{IN} and V_{SAFE}.

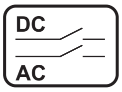


Joint control of the brake via a functional or a functionally safe control voltage.

25673344139

SBM.. safe brake control

Common control (delivery state)



The following block diagram applies identically to both SBM sizes.

When controlling the brake via digital inputs DB00 and/or SBC.

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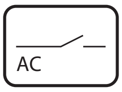
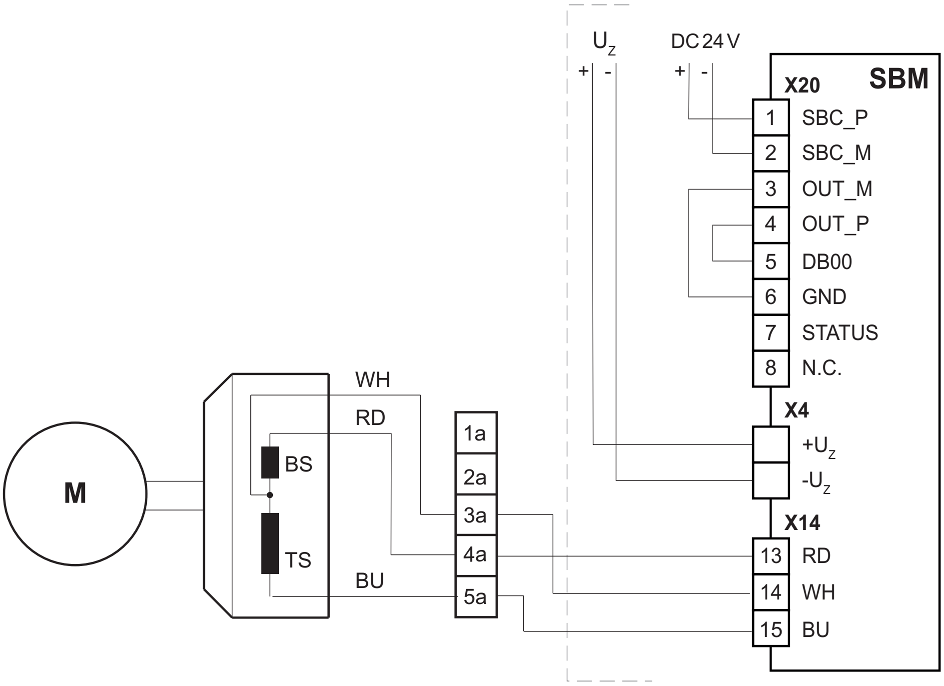


When designing the brake system, the worst-case response time must be taken into account for the limit values in the safety system, especially for functional safety.

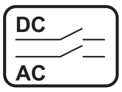


Shared control of the brake via a functional or a functionally safe control voltage.

36566474507

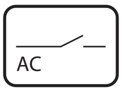
Control is performed jointly via a DC 24 V control voltage. The jumpers between OUT and DB00 are inserted. Optionally, the STATUS feedback signal (X20:7) can be evaluated.

Separate control

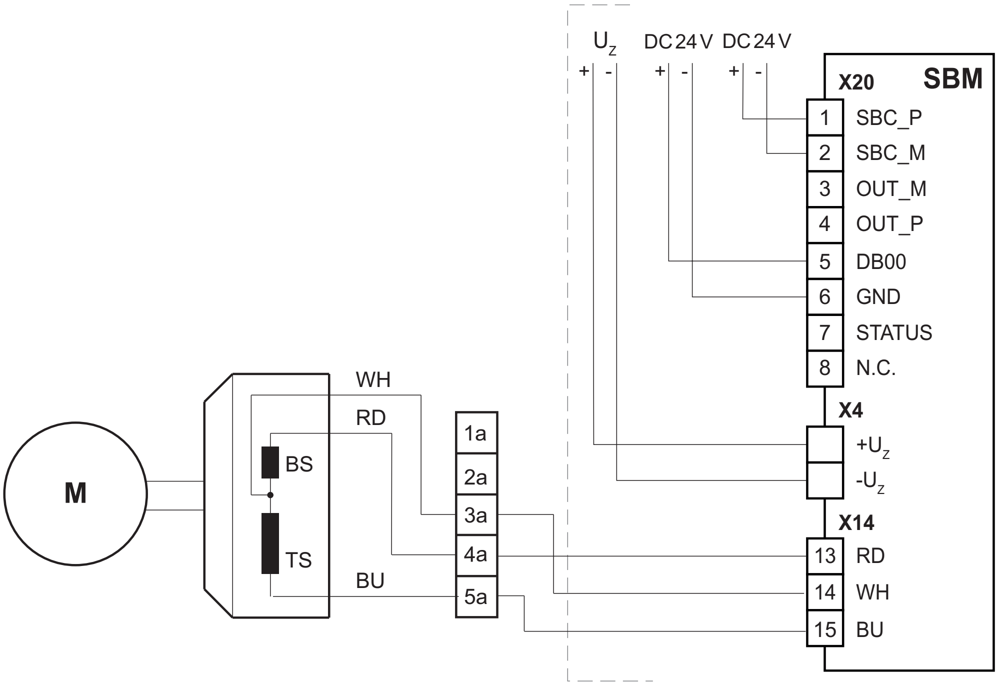


The following block diagram applies identically to both SBM sizes.

When controlling the brake via digital inputs DB00 and/or SBC.



When designing the brake system, the worst-case response time must be taken into account for the limit values in the safety system, especially for functional safety.



Separate control of the brake via a functional and a functionally safe control voltage.

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Control is performed jointly via a DC 24 V control voltage. The jumpers between OUT and DB00 are inserted. Optionally, the STATUS feedback signal (X20:7) can be evaluated.

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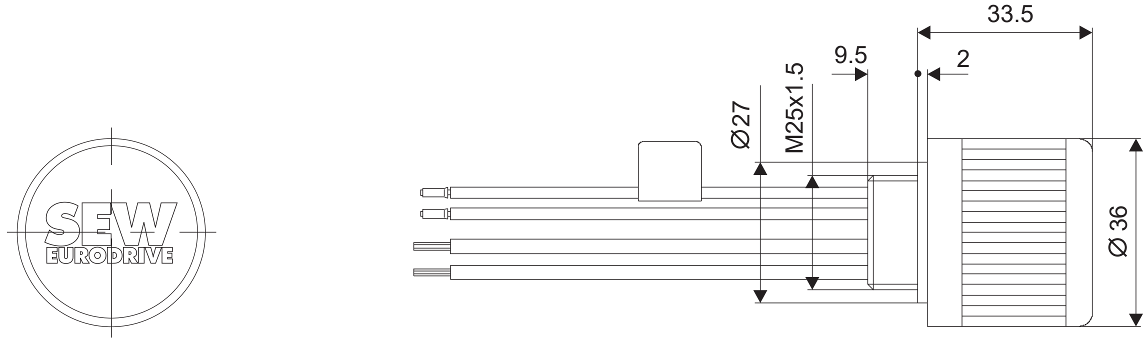
7.5.4 Dimension drawings

Dimension sheets brake controls

SR10, SR11, SR15, UR11, UR15



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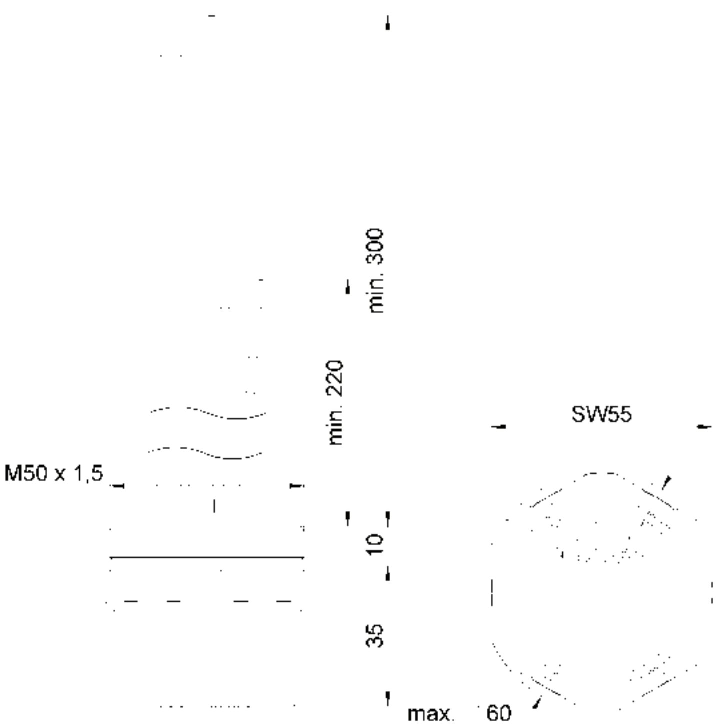
SR19



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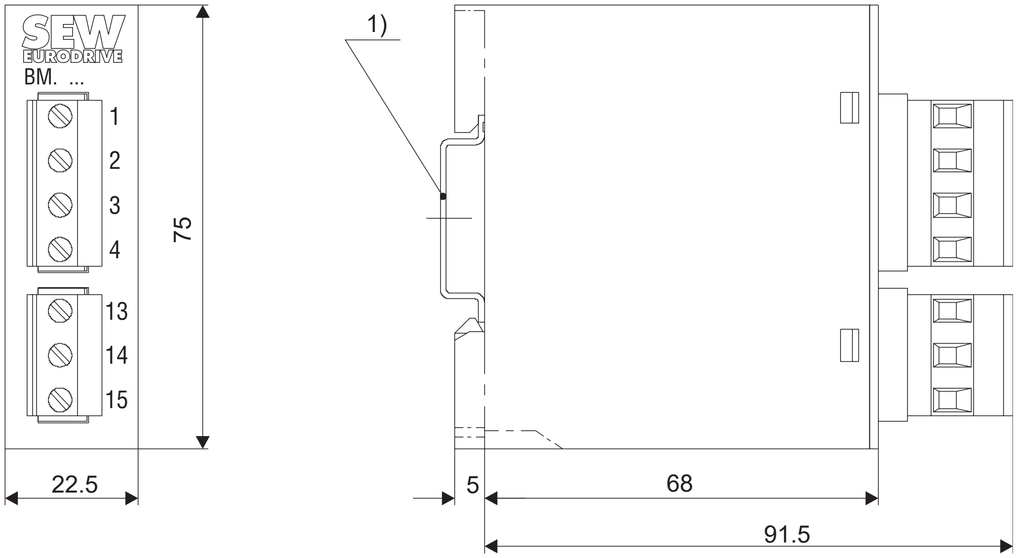
BMS.., BME.., BMH.., BMP.., BMK.., BMKB.., BMV..



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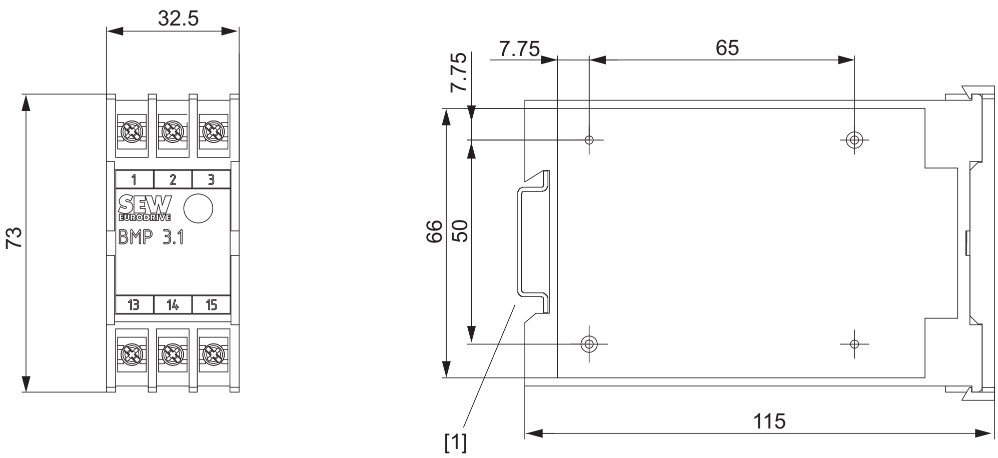
[1] Support rail mounting EN 50022-35-7.5

BMP3.1



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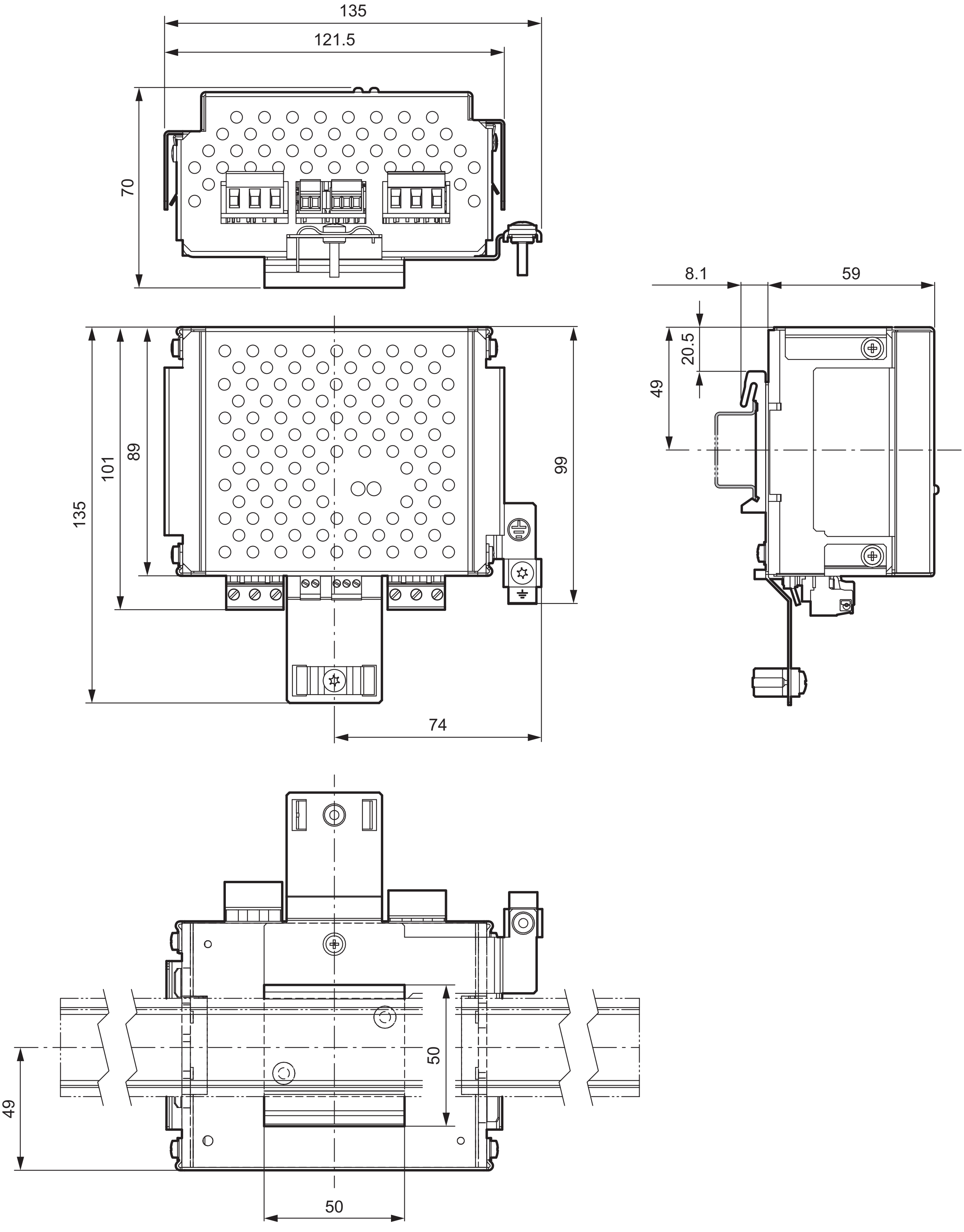
BST..



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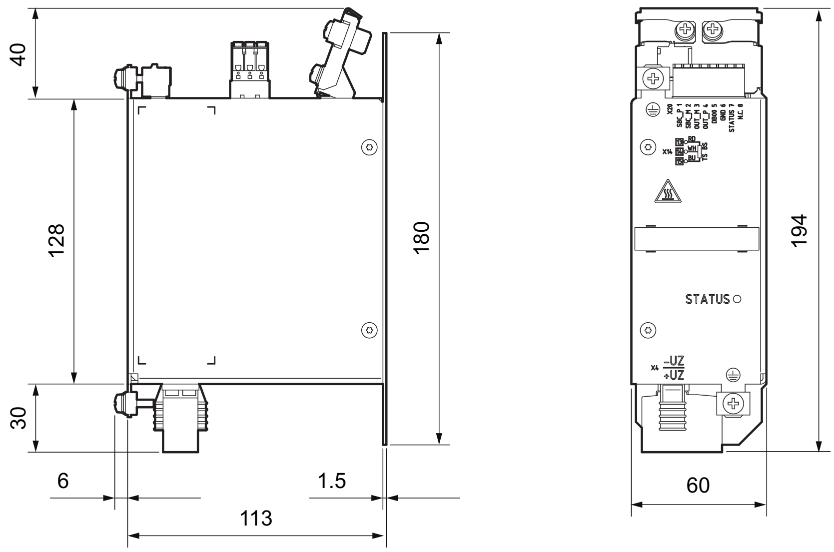
SBM size 1



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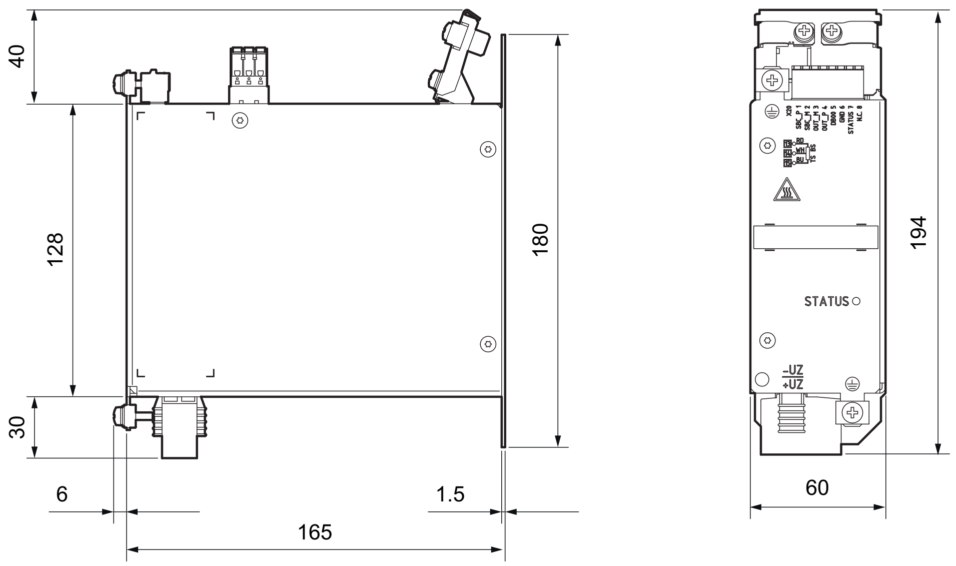
SBM size 2



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8 Encoders

8.1 General information

Encoder technology

The task of an encoder is to detect the angular position of the motor shaft or the change of the angular position, and to pass on this information to a unit that evaluates this data, such as a PLC or frequency inverter.

This information is used to determine the rotational speed and angular acceleration. The evaluating unit (inverter, encoder card) can then monitor or control the speed and position the drive system accordingly.

Encoder in closed loop system

Encoders are connected to the inverter and allow for further improved motor control.

- The motor can be operated in positioning control or for a simple positioning.
- The quality of torque control can be improved significantly.
- The quality of speed control can be improved significantly.

Encoder design

Encoders are available in various designs:

- Incremental encoders, single-turn absolute encoders, multi-turn absolute encoders
- Built-in encoders integrated in the motor and add-on encoders mounted to the motor
- Different mechanical connections of the motor shaft with the encoder.
- Different electrical connection options, such as terminal strip or plug connector.
- Different output signals: sin/cos, HTL, TTL, SSI, RS485 + sin/cos, HIPERFACE®, MOVILINK® DDI, resolvers.
- With or without electronic nameplate for startup on SEW-EURODRIVE inverters.
- Different resolutions and number of counted revolutions.
- Available for order ex works or mechanically prepared through mounting adapters for retrofitting.
- Various mechanical preparations for mounting encoders subsequently.
- Design as safety encoder for implementing safety functions.
- Design as encoder for use in explosion-protected areas according to ATEX/IECEx.

SEW-EURODRIVE offers a wide range of encoders for different applications and different inverters. Before selecting the encoder, check the application environment as well as the encoder interface of the inverter.

Electronic nameplate

With EI8Z, E.8S, EK8W, EK8Z, AK8H, A.8W, and AK8Z encoders, important startup data are stored in an electronic nameplate. This facilitates starting up the drive and ensures that motor parameters are set correctly in the inverter.

During startup, the engineering software checks whether an electronic nameplate is present in the encoder and suggests the use of this data.

Advantages of auto identification of the drive:

- Complete and correct identification of encoder, motor, and gear unit

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- No manual entry of data is necessary, which saves time during startup.
- Easy startup of drives that are installed in locations that are difficult to access.

Modular encoder system

The modular encoder concept is standardized and improved. The encoders of the spread shaft (.S7.), plug-in shaft (.G7.) and hollow shaft (.H7.) variants have been converted into encoder variants with a cone shaft (.K8.). You will find significant advantages of the improved encoder in the following chapters.

Built-in encoders (EI..)

- EI7. and EI8. built-in encoders.
  - This encoder is integrated in the motor in a particular compact manner without adding extra length to the motor.
  - Brake wear can be measured without removing the encoder.
  - The encoder can be retrofitted.
  - The encoder does not have its own bearing. This is why the encoder is wear-free during operation and is suited for rough operating conditions, also with frequent working brake operations.

The EI7. encoder family is currently built in its second generation by SEW-EURODRIVE. The version identification EI7. B and EI7C B is not listed in the type designation, however, and is therefore not listed in this document.

Cone shaft (.K8.)

- Encoders with cone shaft .K8.
  - The encoder type is available for sizes 63 to 355.
  - The encoders are available as safety encoders for implementing safety functions.
  - The encoders are suited for use in explosion-protected motors.
  - It is possible to measure the brake wear without removing the encoder.
  - The cone shaft connection is particularly robust and accurate.

Spread shaft (.S7.), plug-in shaft (.S7.), hollow shaft (.H7.)

The encoders with expansion, plug-in and hollow shafts are replaced by encoders with cone shaft (.K8.) and with built-in encoders (EI..). We recommend switching to the new encoder types in order to take advantage of the numerous advantages mentioned above. You can find more information on our website:

https://www.sew-eurodrive.de/produkte/motoren/drehstrommotoren/zubehoer_und_optionen/geber/geber.html .

8.1.1 Encoder capability class

Encoder systems by SEW-EURODRIVE are categorized into ability classes. The categorization into different ability classes provides an overview regarding which encoder can be used for what application. This allows for an optimal preselection.

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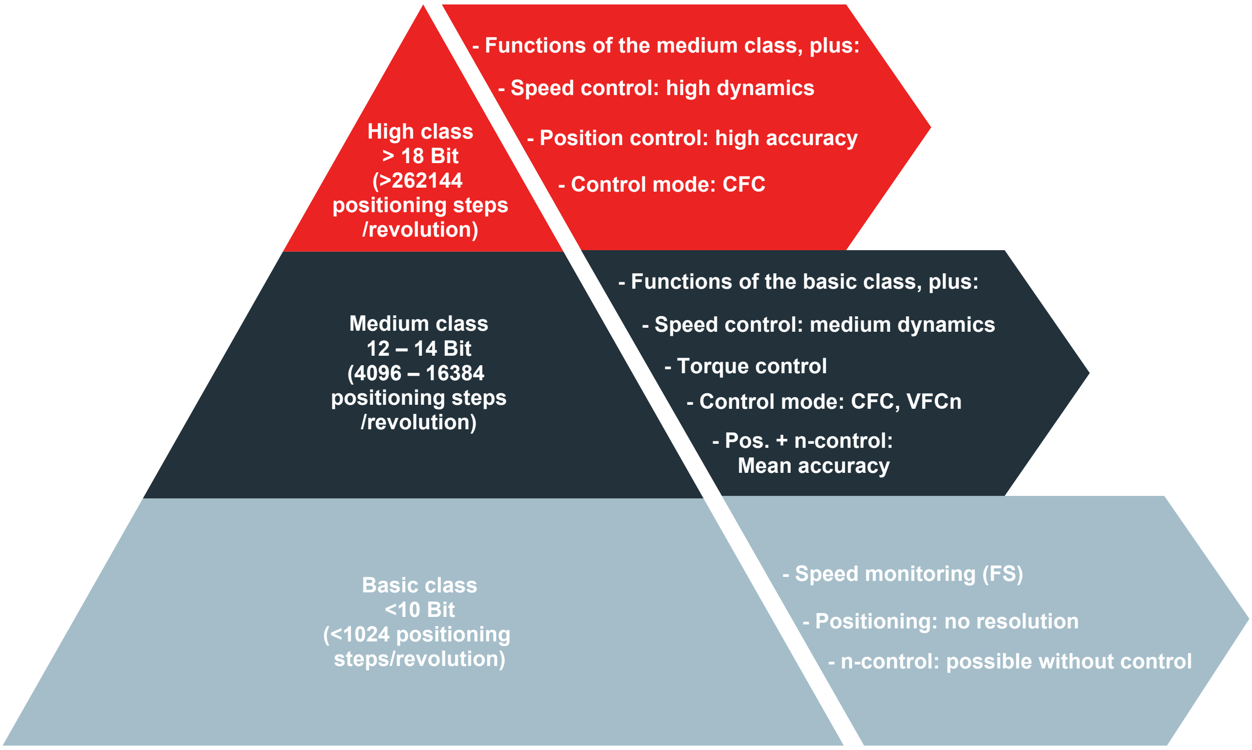
In case of special applications, SEW-EURODRIVE will gladly assist you with the selection.



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8.1.2 Assignment of encoders to capability classes

The following table lists the standard encoder systems for asynchronous motors from SEW-EURODRIVE and their assignment to the capability classes.

Ability class	Encoder type	Electrical interface	Encoder function
Basic Class	EI71	HTL	Incremental encoder
Basic Class	EI72	HTL	Incremental encoder
Basic Class	EI76	HTL	Incremental encoder
Basic Class	EI7C	HTL	Incremental encoder
Medium Class	EI8R	TTL	Incremental encoder
Medium Class	EI8C	HTL	Incremental encoder
Medium Class	EK8R/EV8R	TTL	Incremental encoder
Medium Class	EK8C/EV8C	HTL	Incremental encoder
High Class	EK8S/EV8S	SinCos	Incremental encoder
High Class	AK8W/AV8W	SinCos + RS485	Multi-turn absolute encoder
High Class	AK8Y/AV8Y	SinCos + SSI	Multi-turn absolute encoder
High Class	AK8H/AV8H	HIPERFACE®	Multi-turn absolute encoder

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8.2 Type designation for encoders from SEW-EURODRIVE

The type designation of encoders from SEW-EURODRIVE consists of 4 characters, e.g. ES7C, and is used in the type designation of the motor.

1. character: Encoder design

Identifier	Description
A	Multi-turn absolute encoder
E	Single-turn absolute encoder or incremental encoder
N	Low resolution proximity switch and incremental encoder
CW	Resolver
X	Special encoder

2. character: Tool flange to the motor

The add-on encoder is mounted to the motor on the B-side by means of various tool flanges. The interface to be used depends on the motor size or the selected option.

Identifier	Description
K	Cone shaft (shaft centered)
V	Solid shaft with coupling (flange-centered with flange cover)
H	Hollow shaft (shaft centered)
I	Built-in encoder, integrated in the motor without additional length
F	positive
L	linear

Identifier	Motors	Description
S	(E)DRN71 – 132S	Spread shaft (shaft centered)
G	(E)DRN132M – 280	Plug-in shaft (shaft centered)

3. character: Key figure for the generation of the encoder/type

Identifier	Description
9	Built-in encoders of the high class or add-on encoders of the middle and high class of the second generation
8	Built-in encoders of the middle class or add-on encoder of the middle and high class of the second generation
7	Built-in encoders of the basic class or add-on encoder of the medium and high class of the first generation
1 – 6	Various geometric variants
0	Special design

4. character: Electrical interface of the encoder

Identifier	Description
1 – 6	Signal periods per revolution

Identifier	Description
A	Design of the mounting adapter (see chapter "Encoder mounting adapter" (→ 🗎 473))
C	HTL (with or without index track) at typically UB = 9 – 30 V
H	sin/cos + RS485 HIPERFACE® (multi-turn)
L	Resolver signal
M	Resolver signal
CW	TTL (RS422) at typically U_B = 9 – 30 V
S	sin/cos + RS485 (optional)
T	TTL (RS422) at U_B = 5 V
W	Sin/cos + RS485 (single-turn or multi-turn)
Y	sin/cos or TTL(RS422) + SSI (multi-turn)
Z	MOVILINK® DDI

8.3 EI7., EI8. built-in encoder

The built-in encoders from SEW-EURODRIVE are completely integrated into the motor. This means the overall length of the drive remains unchanged. The components of the built-in encoder do not protrude beyond the contour of the drive, which means they are particularly well protected from environmental effects and damage. Built-in encoders enable a particularly compact motor design.

Area of application

EI7. built-in encoders are suited for the following applications:

- Simple positioning with up to 96 increments per revolution
- Speed monitoring
- Direction of rotation monitoring
- The EI7C encoder is also available as an EI7C FS safety encoder (not at size DR.63..).

EI8. built-in encoders are suited for the following applications:

- The EI8Z built-in encoder allows for a motor without additional length through the encoder in combination with single-cable technology and the fully digital MOVILINK® DDI interface
- Speed monitoring
- Direction of rotation monitoring
- Positioning/position control up to a resolution of 12 bits (4096 increments/revolution)
- Speed control
- Torque control

Evaluation

EI7. built-in encoders can be evaluated with the following products from SEW-EURODRIVE:

- MOVI-C®: Can be evaluated in many devices of the modular inverter system. For further information, refer to the respective inverter documentation.
- MOVITRAC® B in the technology version: Evaluation via "Simple positioning" application software.
- MOVIFIT® FC with "technology" function level.
- MOVIPRO® with encoder option.
- MOVIDRIVE® B
- MOVIAXIS®

EI7C FS safety encoder can be evaluated with the following products from SEW-EURODRIVE:

- MOVI-C®: Functional safety with MOVISAFE® CS..A safety card.
- MOVIFIT® FC: Functional safety with S12 safety option.

EI8. built-in encoders can be evaluated with the following products from SEW-EURODRIVE:

- MOVI-C®: Can be evaluated in many devices of the modular inverter system. For further information, refer to the respective inverter documentation.
- MOVIPRO® with encoder option. For further information, refer to the respective inverter documentation.
- MOVIDRIVE® B with encoder option. For further information, refer to the respective inverter documentation.
- MOVIAXIS®. For further information, refer to the respective inverter documentation.

8.3.1 Incremental encoders

Technical data

EI7., EI8.

EI7.

Encoder	Size, unit	EI71[1)]	EI72[1)]	EI76[1)]	EI7C[1)]
Signal output		HTL			
Supply voltage	V_B	DC 9 V – 30 V			
Maximum current consumption, free of load	I_{in}	120 mA			
Maximum pulse frequency	f_{pulse_max}	2.4 kHz			
Direction of rotation		A before B when looking at the motor output shaft in clockwise rotation			
Incremental tracks, periods per revolution	A, B	1, 2, 6, 24 (size 63: 24 only)			
	C	–			
Position resolution, increments per revolution	A, B	4, 8, 24, 96 (size 63: 96 only)			
Voltage output signal differential (peak-to-peak) ($A' = A - \overline{A}$; $B' = B - \overline{B}$)	U_{t_diff}	–			
Voltage output signal non-differential (peak-to-peak)	U_t	$U_{Low} \leq 3$ V $U_{High} \geq U_B$ - 3.5 V			
Signal level output, offset nominal against 0 V (A, B, C, $\overline{A}$, $\overline{B}$, $\overline{C}$)	U_{t_o}	–			
Load resistance/load current differential	R_L/I_L	60 mA			
Resistance between tracks and reference ground	R_{gnd}	–			
Load capacitance, output	C_o	–			
Voltage output signal, differential ($C' = C - \overline{C}$) (peak-to-peak)	U_{t_diff} e	–			
C track offset	g	–			
Voltage output signal, non-differential (C,$\overline{C}$) (peak-to-peak)	U_{t_C}	–			
Phase angle track C', n = constant	k, l	–			
Signal width track C	W_C	–			
Signal logic track C		–			
Pulse duty factor according to IEC 60469-1, n = constant		50% ± 20%			
Phase offset A: B; $\overline{A}$: $\overline{B}$ n = constant	d	90° ± 20°			
Incremental part accuracy		3.75° (225 ')			
Vibration resistance according to EN 60068-2-6		≤ 10 g (f > 18.5 Hz)			
Shock resistance according to EN 60068-2-27		≤ 100 g (t = 6 ms, 18 pulses)			
Maximum permissible magnetic field external to the motor (outer motor contour)		25 mT/20 kA/m			
Maximum speed	n_{max}	6000 min^{-1}			
Maximum cable length[2)]		100 m			
Duration until error message (disabled outputs)		–			

Encoder	Size, unit	EI71[1]	EI72[1]	EI76[1]	EI7C[1]
Activation time of rotary encoder internal diagnostics after switching on		–			
Degree of protection according to EN 60529		IP66			
Installation altitude	h	≤ 4000 m above sea level			
Corrosion protection, surface protection		KS, OS1 – OS4, OSG			
Connection		Size 63: M12 (8-pin) Size 71 – 132S: M12 (8- or 4-pin) or connection unit (can be pre-assembled in the field) in a terminal box			
Ambient temperature	°C	-40 to +60			
Storage temperature	°C	-15 to +70			
Maximum angular acceleration		10^4 rad/s^2			
Electronic nameplate		–			

1) See figure "HTL/TTL signals and phase relationship".

2) Observe the limitations of the motor and/or the frequency inverter.

EI8.

EI8R, EI8C

Encoder	Unit, size	EI8R[1)]	EI8C[1)]
Signal output		TTL (RS422)	HTL
Supply voltage	V_B	DC 7 V to 30 V	DC 7 V to 30 V
Maximum current consumption, free of load	I_{in}	100 mA	
Maximum pulse frequency	f_{pulse_max}	102.4 kHz	
Direction of rotation		A before B when looking at the motor output shaft in clockwise rotation.	
Incremental tracks, periods per revolution	A, B	1024 (10 bits)	
	C	1	
Position resolution, increments per revolution	A, B	4096 (12 bits)	
Voltage output signal differential (peak-to-peak) (A' = A - $\overline{A}$; B' = B - $\overline{B}$)	U_{t_diff}	–	
Voltage output signal non-differential (peak-to-peak)	U_t	$U_{Low} \leq 0.5$ V $U_{High} \geq 2.5$ V	$U_{Low} \leq 3$ V $U_{High} \geq U_B - 3.5$ V
Signal level output, offset nominal against 0 V (A, B, C, $\overline{A}$, $\overline{B}$, $\overline{C}$)	U_{t_o}	–	
Load resistance/load current differential	R_L/I_L	25 mA	60 mA
Resistance between tracks and reference ground	R_{gnd}	–	
Load capacitance, output	C_o	–	
Voltage output signal, differential (C' = C - $\overline{C}$) (peak-to-peak)	U_{t_diff} e	–	
C track offset	g	–	
Voltage output signal, non-differential (C,$\overline{C}$) (peak-to-peak)	U_{t_C}	$U_{Low} \leq 0.5$ V $U_{High} \geq 2.5$ V	$U_{Low} \leq 3$ V $U_{High} \geq U_B - 2.5$ V
Phase angle track C', n = constant	k, l	–	
Signal width track C	W_C	90° electrical	
Signal logic track C		C = log 1 when A = B = log 1	
Pulse duty factor according to IEC 60469-1, n = constant		50% ± 10 %	
Phase offset A: B; $\overline{A}$: $\overline{B}$ n = constant	d	90° ± 20°	
Incremental part accuracy		0.2 ° (720 ")	
Vibration resistance according to EN 60068-2-6		≤ 10 g (f > 18.5 Hz)	
Shock resistance according to EN 60068-2-27		≤ 100 g (t = 6 ms, 18 pulses)	
Maximum permissible external magnetic field (outer contour of motor)		25 mT/20 kA/m	
Maximum speed	n_{max}	6000 min^{-1}	
Maximum cable length[2)]		100 m	100 m
Duration until error message (disabled outputs)		–	
Activation time of the rotary encoder internal diagnostics after switching on		–	
Degree of protection according to EN 60529		IP66	

Encoder	Unit, size	EI8R[1]	EI8C[1]
Installation altitude	h	≤ 4000 m above sea level	≤ 4000 m above sea level
Corrosion protection, surface protection		KS, OS1 – OS4, OSG	
Connection		• M23 plug connector • Connection unit with terminals in the terminal box that can be assembled in the field • M12 plug connector (without negated tracks in non-differential/single-ended operation)	
Ambient temperature	°C	-30 to +60	
Storage temperature	°C	-15 to +70	
Maximum angular acceleration		10^4 rad/s^2	
Electronic nameplate		–	–

1) See figure "HTL/TTL signals and phase relationship".

2) Observe the limitations of the motor and/or the frequency inverter.

EI8Z

	Size, unit	EI8Z
Motor series		DRN/DR2S/DR2L
Motor sizes		71 – 132S
Combination of brake/brake control		With motor-integrated BG1Z brake control: BE.. With motor-external brake control: BE.., BE.. FS (functional safety [1])
Combination of motor protection/ temperature		Motor protection: TF (in development) Motor protection/motor temperature: PI (Pt1000 in stator housing and motor temperature model with MOVI-C® inverters)
Combination of forced cooling fans		[1]
Encoder type		Incremental encoder
Interface		MOVILINK® DDI, coaxial
MOVILINK® DDI type code		DI.E..
Electronic nameplate		ET2000 (MOVILINK® DDI, integrated)
Voltage supply		DC 24 V (MOVILINK® DDI, integrated)
Incremental resolution (Position steps per motor revolution)		12 bit 4096 inc
Single-turn resolution (Position resolution per motor revolution)		–
Multi-turn resolution (max. counter for complete motor revolutions)		–
Maximum permissible external magnetic field		Motor outer contour: 25 mT / 20 kA/m
Vibration resistance according to EN 60068-2-6		≤ 10 g (f > 18.5 Hz)
Shock resistance according to EN 60068-2-27		≤ 100 g (t = 6 ms, 18 pulses)
Maximum speed		6000 min^{-1}
Degree of protection according to EN 60529		IP66
Corrosion and surface protection		KS, OS1 – OS4, OSG
Installation altitude[2]		≤ 3866 m
Ambient temperature of motor[2]		With MOVI-C® control cabinet inverters and MOVIMOT® flexible decentralized inverter: -20 – +40 °C, (-40 °C – +60 °C[2]) With MOVIMOT® advanced decentralized inverters: See MOVIMOT® advanced operating instructions/manual
Cable length, maximum[3]		200 m
Connection technology		KD1: M23 hybrid connector, motor power 1.5 – 4.0 mm^2, brake power 1.0 mm^2 KDB: M40 hybrid connector, motor power 6.0 – 0.0 mm^2, brake power 1.5 mm^2 KD: Cable gland for hybrid cable KDD: Motor and brake power cable gland, M23 signal plug connector

	Size, unit	EI8Z
Explosion protection		–
Functional safety		–

1) in preparation
2) Observe the restrictions of the ambient temperature and potential derating of the respective motor/inverter when used at an increased ambient temperature and/or depending on the installation altitude.
3) Also dependent on the selected inverter type and configured PWM frequency and/or brake type; see documentation of the respective inverters.

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Increase in inertia when using EI7. built-in encoder.

motor	$J_{Mot} + J_{EI7} - J_{PA}$	Increase in inertia
	10^{-4} kgm²	%
DR..63MS	3.4	14
DR..63M	4.2	11
DR..71MS	8	48
DR..71M	9.7	36
DR..80MK	19.5	14
DR..80MS	21	14
DR..80M	27.2	10
DR..90S	64.3	19
DR..90L	77.5	15
DR..100LS	91.7	13
DR..100LM	100	11
DR..100L	121.6	9
DR..112M	192	8
DR..132S	255	6

Increase in inertia when using EI8. built-in encoder.

motor	$J_{Mot} + J_{EI7} - J_{PA}$	Increase in inertia
	10^{-4} kgm²	%
DR..71MS	5.72	6
DR..71M	7.44	4
DR..80MK	17.1	0
DR..80MS	18.5	0
DR..80M	24.7	0
DR..90S	53.9	0
DR..90L	67.1	0
DR..100LS	81.3	0
DR..100LM	89.6	0
DR..100L	111.9	0
DR..112M	179.6	1
DR..132S	242.6	1

INFORMATION

Due to the slight increase in inertia, it is not necessary to reduce the no-load starting frequency Z0.

8.3.2 Order information

Type designation /EI7.
/EI8.

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8.4 Add-on encoder

The add-on encoder is mounted to the motor on the B-side of the motor by means of various tool flanges. The standard for this is a conical shaft connection.

Electronic nameplate

With EI8Z, E.8S, EK8W, EK8Z, AK8H, A.8W, and AK8Z encoders, important startup data are stored in an electronic nameplate. This facilitates starting up the drive and ensures that motor parameters are set correctly in the inverter.

During startup, the engineering software checks whether an electronic nameplate is present in the encoder and suggests the use of this data.

Advantages of auto identification of the drive:

- Complete and correct identification of encoder, motor, and gear unit
- No manual entry of data is necessary, which saves time during startup.
- Easy startup of drives that are installed in locations that are difficult to access.

8.4.1 Incremental encoders

Technical data

EK8S, EK8R, EK8C

Encoder	Size, unit	EK8S	EK8R	EK8C
Signal output		sin/cos	TTL (RS422)	HTL/TTL
Supply voltage	V_B	DC 7 V – 30 V	DC 7 V – 30 V	DC 4.75 V – 30 V
Supply voltage for functional safety applications	U_{B_FS}	DC 7 V to 30 V	–	–
Maximum current consumption, free of load	I_{in}	100 mA (at U_B = 7 V)		
Maximum pulse frequency	f_{pulse_max}	150 kHz	120 kHz	120 kHz
Direction of rotation		A before B when looking at the motor output shaft in clockwise rotation		
Incremental tracks, periods per revolution	A, B	1024 (10 bits)		
	C	1		
Position resolution, increments per revolu- tion	A, B	4096 (12 bits)		
Voltage output signal differential (peak-to-peak) (B' = B - $\overline{B}$) (A' = A - $\overline{A}$)	U_{t_diff}	1 V ± 10%	–	–
Voltage output signal non-differential (peak-to-peak)	U_t	0.5 V ± 10%	U_{Low} ≤ 0.5 V U_{High} ≥ 2.5 V	UB ≤ 6 V: TTLULow = 0V (≤ 0.5 V)UHigh =5V (≥ 2.5 V)UB > 6 V: HTLU-Low = 0V - 3 VUHigh = (UB - 2.5 V) - UB
Signal level output, offset nominal against 0 V (A, B, C, $\overline{A}$, $\overline{B}$, $\overline{C}$)	U_{t_o}	2.5 V ± 0.3 V	–	-
Total harmonic distortion (THD)		40 dB (1%), 60 dB (0.1%) from 7th Harmonic	-	-
Load resistance/load current differential	R_L/I_L	120 Ω ± 10%	120 Ω ± 10%	U_B 6 V: 120 Ω ± 10% UB > 6 V: 1 – 3 kΩ
Resistance between tracks and reference ground	R_{gnd}	≥ 1 kΩ	–	–
Load capacitance, output	C_o	≤ 20 nF	–	–
Voltage output signal, differential (C' = C - $\overline{C}$) (peak-to-peak)	U_{t_diff} e	0.3 – 1.4 V	–	–
C track offset	g	192 mV ± 5 mV	–	–
Voltage output signal, non-differential (C, $\overline{C}$) (peak-to-peak)	U_{t_C}	–	U_{Low} ≤ 0.5 V U_{High} ≥ 2.5 V	U_B ≤ 6 V: U_{Low} ≤ 0.5 V U_{High} ≥ 2.5 V U_B > 6 V: U_{Low} ≤ 3 V U_{High} ≥ U_B - 2.5 V
Phase angle track C', n = constant	k, l	k = 180° ± 90° l = 180° ± 90°	–	–
Signal width track C	W_C	see figure	90° electrical	90° electrical
Signal logic track C		see figure	C = log 1, when A = B = log 1	C = log 1, when A = B = log 1
Pulse duty factor according to IEC 60469-1, n = constant		–	50% ± 10%	50% ± 10%
Phase offset A: B; $\overline{A}$: $\overline{B}$ n = constant	d	90° ± 2 °	90° ± 20°	90° ± 20°
Accuracy of the incremental section[1)]		0.0194° (70 ")	0,033 ° (120 ")	0,033 ° (120 ")
Vibration resistance according to EN 60068-2-6		≤ 10 g (f > 18.5 Hz)		
Shock resistance according to EN 60068-2-27		≤ 100 g (t = 6 ms, 18 pulses)		

Encoder		Size, unit	EK8S	EK8R	EK8C
Maximum permitted external magnetic field (outer contour of motor)			25 mT / 20 kA/m (on the encoder housing: 10 mT / 8 kA/m)		
Maximum speed		n_{max}	6000 min^{-1}		
Maximum cable length[2]			100 m	300 m[3]	20 - 300 m[4]
Duration until fault message[5] (deactivated outputs)			≤ 25 ms	–	–
Activation time of rotary encoder-internal diagnostics after switching on			≤ 200 ms	–	–
Degree of protection according to EN 60529			IP66		
Installation altitude		h	≤ 4000 m above sea level		
			In explosion-protected areas: Permitted external pressure 0.8 to 1.1 bar (at typical height ≤ 1800 m above sea level)		
Explosion protection mark ATEX/IECEx			ATEX equipment category 3 (3G, 3D, 3GD) IECEx EPL .c (3G-c, 3D-c, 3GD-c)		
IECEx certificate of conformity			IECEx IBE 18.0032X		
Corrosion protection, surface protection			KS, OS1 – OS4, OSG		
Connection			Integrated encoder plug connector on the fan guard (can be pre-assembled and plugged in the field), optionally with M23 plug connector		
Ambient temperature	DRN../DR2./DRU. 71-132L	°C	-30 to +80 With FS encoder: -30 to +60	-30 to +60	-30 to +60
	DRN../DR2./DRU. 160-355	°C	-30 to +60	-30 to +60	-30 to +60
	DRN../DR2./DRU. 71-225	°C	-30 to +80	-30 to +60	-30 to +60
	DRN../DR2./DRU. 250	°C	-30 to +60	-30 to +60	-30 to +60
	DRN../DR2./DRU. 280	°C	-30 to +40	-30 to +40	-30 to +40
	EDRN 71-280	°C	-30 to +60	-30 to +60	-30 to +60
	EDRN 71-280S	°C	-30 to +60	-30 to +60	-30 to +60
	EDRN 280M	°C	-30 to +40	-30 to +40	-30 to +40
Storage temperature		°C	-15 to +70		
Maximum angular acceleration			$2x10^4$ rad/s^2		
Electronic nameplate			RS485 (serial, asynchronous); 1920 bytes	–	–
Maximum degree of pollution during installation work			Degree of pollution 1 (IEC 61010-1, EN 60664-1, VDE 0110-1)		

1) Due to the stiffness of the torque bracket, you have to take into account an automatically resetting ±0.6° twist (depending of the direction of rotation) of the encoder housing compared to the encoder shaft.
2) Observe the requirements for the cables and the supply voltage.
3) Cable length 300 m: Observe the voltage drop on the encoder signal cable and the requirements of the minimum input levels of the encoder evaluation card.
4) 30 m: MOVI-C® MOVITRAC® advanced inverters from SEW-EURODRIVE with connection to the binary input terminals and 24 V supply; 300 m: Inverters from the MOVI-C® modular automation system from SEW-EURODRIVE or generation B inverters with DEU21B encoder cards, or if the maximum encoder supply is 12 V; 100 m: in all other cases.
5) Sin/cos encoders have a self-diagnostics function. If a fault is detected, the sensor reports it by deactivating the output signals to the encoder evaluation unit.

EV8.

Encoder	Size, unit	EV8S[1)]	EV8R[2)]	EV8C[2)]
Signal output		sin/cos	TTL (RS422)	HTL
Supply voltage	V_B	DC 7 V – 30 V	DC 7 V – 30 V	DC 4.75 V – 30 V
Supply voltage for functional safety applications	U_{B_FS}	DC 7 V to 30 V	–	–
Maximum current consumption, free of load	I_{in}	100 mA (at U_B = 7 V)		
Maximum pulse frequency	f_{pulse_max}	150 kHz	120 kHz	120 kHz
Direction of rotation		A before B when looking at the motor output shaft in clockwise rotation		
Incremental tracks, periods per revolution	A, B	1024 (10 bits)		
	C	1		
Position resolution, increments per revolution	A, B	4096 (12 bits)		
Voltage output signal differential (peak-to-peak) (B' = B - $\overline{B}$) (A' = A - $\overline{A}$)	U_{t_diff}	1 V ± 10%	–	–
Voltage output signal non-differential (peak-to-peak)	U_t	0.5 V ± 10%	U_{Low} ≤ 0.5 V U_{High} ≥ 2.5 V	U_B ≤ 6 V: U_{Low} ≤ 0.5 V U_{High} ≥ 2.5 V U_B > 6 V: U_{Low} ≤ 3 V U_{High} ≥ U_B - 2.5 V
Signal level output, offset nominal against 0 V (A, B, C, $\overline{A}$, $\overline{B}$, $\overline{C}$)	U_{t_o}	2.5 V ± 0.3 V	-	-
Total harmonic distortion (THD)		40 dB (1 %), 60 dB (0.1 %) from 7th Harmonic	-	-
Load resistance/load current differential	R_L/I_L	120 Ω ± 10%	120 Ω ± 10%	U_B 6 V: 120 Ω ± 10% UB > 6 V: 1 – 3 kΩ
Resistance between tracks and reference ground	R_{gnd}	≥ 1 kΩ	–	–
Load capacitance, output	C_o	≤ 20 nF	–	–
Voltage output signal, differential (C' = C - $\overline{C}$) (peak-to-peak)	U_{t_diff} e	0.3 – 1.4 V	–	–
C track offset	g	192 mV ± 5 mV	–	–
Voltage output signal, non-differential (C, $\overline{C}$) (peak-to-peak)	U_{t_C}	–	U_{Low} ≤ 0.5 V U_{High} ≥ 2.5 V	U_B ≤ 6 V: U_{Low} ≤ 0.5 V U_{High} ≥ 2.5 V U_B > 6 V: U_{Low} ≤ 3 V U_{High} ≥ U_B - 2.5 V
Phase angle track C', n = constant	k, l	k = 180° ± 90° l = 180° ± 90°	–	–
Signal width track C	W_C	see figure	90° electrical	90° electrical
Signal logic track C		see figure	C = log 1, when A = B = log 1	C = log 1, when A = B = log 1
Pulse duty factor according to IEC 60469-1, n = constant		–	50% ± 10%	50% ± 10%
Phase offset A: B; $\overline{A}$: $\overline{B}$ n = constant	d	90° ± 2 °	90° ± 20°	90° ± 20°
Accuracy of the incremental section[3)]		0.0194° (70 ")	0,033 ° (120 ")	0,033 ° (120 ")
Vibration resistance according to EN 60068-2-6		≤ 10 g (f > 18.5 Hz)		
Shock resistance according to EN 60068-2-27		≤ 100 g (t = 6 ms, 18 pulses)		
Maximum speed	n_{max}	6000 min^{-1}		
Maximum cable length[4)]		100 m	300 m[5)]	100 m[6)]

Encoder		Size, unit	EV8S[1]	EV8R[2]	EV8C[2]
Duration until fault message[5] (deactivated outputs)			≤ 25 ms	–	–
Activation time of rotary encoder-internal diagnostics after switching on			≤ 200 ms	–	–
Degree of protection according to EN 60529			IP66		
Installation altitude		h	≤ 4000 m above sea level		
			In explosion-protected areas: Permitted external pressure 0.8 to 1.1 bar (at typical height ≤ 1800 m above sea level)		
Explosion protection mark ATEX/ IECEx			ATEX equipment category 3 (3G, 3D, 3GD) IECEx EPL .c (3G-c, 3D-c, 3GD-c)		
IECEx certificate of conformity			IECEx IBE 18.0032X		
Corrosion protection, surface protection			KS, OS1 – OS4, OSG		
Connection			Integrated encoder plug connector on the fan guard (can be pre-assembled and plugged in the field), optionally with M23 plug connector		
Ambient temperature of motor	DRN 71-132L	°C	-30 to +80	-30 to +60	-30 to +60
	DRN 160-355	°C	-30 to +60	-30 to +60	-30 to +60
	DRN 71-225	°C	-30 to +80	-30 to +60	-30 to +60
	DRN 250	°C	-30 to +60	-30 to +60	-30 to +60
	DRN 280	°C	-30 to +40	-30 to +40	-30 to +40
	EDRN 71-280	°C	-30 to +60	-30 to +60	-30 to +60
	EDRN 71-280S	°C	-30 to +60	-30 to +60	-30 to +60
	EDRN 280M	°C	-30 to +40	-30 to +40	-30 to +40
Storage temperature		°C	-15 to +70		
Maximum angular acceleration			$2x10^4$ rad/s^2		
Electronic nameplate			RS485 (serial, asynchronous); 1920 bytes	–	–
Maximum degree of pollution during installation work			Degree of pollution 1 (IEC 61010-1, EN 60664-1, VDE 0110-1)		

1) See figure "Sin/cos signals and phase relationship".
2) See figure "HTL/TTL signals and phase relationship".
3) Due to the stiffness of the torque bracket, you have to take into account an automatically resetting ±0.6° twist (depending of the direction of rotation) of the encoder housing compared to the encoder shaft.
4) Observe the requirements for the cables and the supply voltage.
5) Sin/cos encoders have a self-diagnostics function. If a fault is detected, the sensor reports it by deactivating the output signals to the encoder evaluation unit.

8.4.2 Multi-turn absolute encoders

Technical data

AK8H, AK8W

Encoder	Size, unit	AK8H	AK8W[1)]
Signal output		HIPERFACE®	sin/cos + RS485
Supply voltage	V_B	DC 7 V – 12 V	DC 7 V – 30 V
Supply voltage for FS applications	U_{B_FS}	–	DC 7 V to 30 V
Maximum current consumption, free of load	I_{in}	80 mA	100 mA (at U_B = 7 V)
Maximum pulse frequency	f_{pulse_max}	200 kHz	
Direction of rotation		A before B when looking at the motor output shaft in clockwise rotation	
Incremental tracks, periods per revolution	A, B	1024 (10 bits)	2048 (11 bits)
	C	-	
Position resolution, increments per revolution	A, B	32768 (15 bits) HIPERFACE®	65536 (16 bits) (RS485)
Voltage output signal differential (peak-to-peak) (A' = A - $\overline{A}$; B' = B - $\overline{B}$	U_{t_diff}	1 V ± 10%	
Voltage output signal non-differential (peak-to-peak)	U_t	0.5 V ± 10%	
Signal level output, offset nominal against 0 V (A, B, C, $\overline{A}$, $\overline{B}$, $\overline{C}$)V	U_{t_o}	2.5 V ± 0.3 V	
Total harmonic distortion (THD)		40 dB (1%), 60 dB (0.1%) from 7th Harmonic	
Load resistance/load current differential	R_L/I_L	120 Ω ± 10%	
Resistance between track and reference ground	R_{gnd}	≥ 1 kΩ	
Load capacitance, output		≤ 20 nF	
Voltage output signal, differential (C' = C - $\overline{C}$) (peak-to-peak)	U_{t_diff} e	–	
C track offset	g	–	
Voltage output signal, non-differential (C, $\overline{C}$) (peak-to-peak)	U_{t_C}	–	
Phase angle track C', n = constant	k, l	–	
Signal width track C	W_C	-	
Signal logic track C		-	
Voltage output signal differential (peak-to-peak) (D' = D- $\overline{D}$)	U_{t_diff}	Typical: 6.6 V to 10 V (± 10%)	
Voltage output signal non-differential (peak-to-peak) (D, /D)	U_t	Typical: 3.3 V to 5 V (± 10%)	
Signal level output, offset nominal against 0 V (D, /D) V	U_{t_o}	Typical: 0 V	
Voltage input signal differential (peak-to-peak) (D' = D- $\overline{D}$)	U_{t_diff}	Typical: 6.6 V to 10 V (± 10%)	
Voltage input signal non-differential (peak-to-peak) (D, /D)	U_t	Typical: 3.3 V to 5 V (± 10%)	

Encoder	Size, unit	AK8H	AK8W[1]
Signal level input, offset nominal against 0 V (D, /D) V	U_{t_o}	Typical: 0 V	
Pulse duty factor according to IEC 60469-1, n = constant		-	
Phase offset A: B; $\overline{A}$: $\overline{B}$ n = constant		90° ± 2°	
Accuracy of the incremental section[1]		± 0.0144° (± 52 ")	0.0194 ° (70 ")
Accuracy of the absolute section		± 0.0144° (± 52 ")	±1 LSB (Least Significant Bit)
Scanning code/counting direction		–	Binary code, ascending with the direction of rotation specified above
Multi-turn resolution		4096 revolutions (12 bits)	65536 revolutions (16 bits)
Communication, interface		HIPERFACE®	RS485 (asynchronous, serial)
Communication, modules		Driver to EIA RS485	Driver to EIA RS485
Clock frequency/bandwidth		HIPERFACE®	9600 baud
Clock-pulse space period		–	–
Vibration resistance according to EN 60068-2-6		≤ 10 g (f > 18.5 Hz)	
Shock resistance according to EN 60068-2-27		≤ 100 g (t = 6 ms, 18 pulses)	
Maximum permitted external magnetic field (outer contour of motor)		25 mT / 20 kA/m (on the encoder housing: 10 mT / 8 kA/m)	
Maximum speed	n_{max}	6000 min^{-1}	
Maximum cable length[2]		100 m	
Duration until fault message (disabled outputs)[3]		HIPERFACE®	≤ 25 ms + 3/4 revolution
Activation time of the rotary encoder-internal diagnostics after switching on		HIPERFACE®	200 ms
Degree of protection according to EN 60529			
Installation altitude	h	≤ 2000 m above sea level	≤ 4000 m above sea level
Explosion protection mark ATEX/IECEx		–	ATEX equipment category 3 (3G, 3D, 3GD) IECEx EPL .c (3G-c, 3D-c, 3GD-c)
IECEx certificate of conformity		–	IECEx IBE 18.0032X
Corrosion protection, surface protection		KS, OS1 – OS4, OSG	
Connection		Integrated encoder plug connector on the fan guard (can be pre-assembled and plugged in the field)	
Storage temperature	°C	-15 to +70	
Maximum angular acceleration		10^4 rad/s^2	$2x10^4$ rad/s^2
Electronic nameplate		HIPERFACE®; 1792 bytes	RS485 (serial, asynchronous); 1920 bytes
Maximum degree of pollution during installation work		Degree of pollution 1 (IEC 61010-1, EN 60664-1, VDE 0110-1)	

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Encoder		Size, unit	AK8H	AK8W[1]
Ambient temper-ature	DRN../DR2./DRU. 71-132	°C	-30 to +60	-30 to +60
	DRN../DR2./DRU. 160-355	°C	-30 to +60	-30 to +60
	DRN../DR2./DRU. 71-250	°C	–	–
	DRN../DR2./DRU. 280	°C	–	–
	EDRN 71-355	°C	–	-30 to +60
	EDRN 71-280S	°C	–	–
	EDRN 280M	°C	–	–

1) Due to the stiffness of the torque bracket, you have to take into account an automatically resetting ±0.6° twist (depending of the direction of rotation) of the encoder housing compared to the encoder shaft.
2) Observe the requirements for the cables.
3) Absolute encoders A.8W and A.8Y have a self-diagnostics function. If a fault is detected, the sensor reports it by deactivating the output signals to the encoder evaluation unit.

AK8Y

Encoder	Size, unit	AK8Y[1)]
Signal output		sin/cos + SSI, RS422
Supply voltage	V_B	DC 7 V – 30 V
Supply voltage for FS applications	U_{B_FS}	DC 7 V to 30 V
Maximum current consumption, free of load	I_{in}	100 mA (at U_B = 7 V)
Maximum pulse frequency	f_{pulse_max}	200 kHz
Direction of rotation		A before B when looking at the motor output shaft in clockwise rotation
Incremental tracks, periods per revolution	A, B	2048 (11 bits)
	C	–
Position resolution, increments per revolution	A, B	4096 (12 bits) (SSI, RS422)
Voltage output signal differential (peak-to-peak) (A' = A - $\overline{A}$; B' = B - $\overline{B}$	U_{t_diff}	1 V ± 10%
Voltage output signal non-differential (peak-to-peak)	U_t	0.5 V ± 10%
Signal level output, offset nominal against 0 V (A, B, C, $\overline{A}$, $\overline{B}$, $\overline{C}$)V	U_{t_o}	2.5 V ± 0.3 V
Total harmonic distortion (THD)		40 dB (1%), 60 dB (0.1%) from 7th Harmonic
Load resistance/load current differential	R_L/I_L	120 Ω ± 10%
Resistance between track and reference ground	R_{gnd}	≥ 1 kΩ
Load capacitance, output		≤ 20 nF
Voltage output signal differential (peak-to-peak) (D' = D- $\overline{D}$)	U_{t_diff}	Typical: 6.6 V to 10 V (± 10%)
Voltage output signal non-differential (peak-to-peak) (D, /D)	U_t	Typical: 3.3 V to 5 V (± 10%)
Signal level output, offset nominal against 0 V (D, /D) V	U_{t_o}	Typical: 0 V
Voltage input signal differential (peak-to-peak) (D' = D- $\overline{D}$)	U_{t_diff}	Typical: 6.6 V to 10 V (± 10%)
Voltage input signal non-differential (peak-to-peak) (D, /D)	U_t	Typical: 3.3 V to 5 V (± 10%)
Signal level input, offset nominal against 0 V (D, /D) V	U_{t_o}	Typical: 0 V
Voltage output signal, differential (C' = C - $\overline{C}$) (peak-to-peak)	U_{t_diff} e	–
C track offset	g	–
Voltage output signal, non-differential (C, $\overline{C}$) (peak-to-peak)	U_{t_C}	–
Phase angle track C', n = constant	k, l	–
Signal width track C	W_C	–
Signal logic track C		–

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Encoder	Size, unit	AK8Y[1]
Pulse duty factor according to IEC 60469-1, n = constant		–
Phase offset A: B; $\overline{A}$: $\overline{B}$ n = constant		90° ± 2°
Accuracy of the incremental section[2]		0.0194 ° (70 ")
Accuracy of the absolute section		±1 LSB (Least Significant Bit)
Scanning code/counting direction		Gray code, ascending with the direction of rotation specified above
Multi-turn resolution		4096 revolutions (12 bits)
Communication, interface		SSI (synchronous, serial)
Communication, modules		Driver to EIA RS422
Clock frequency/bandwidth		100 – 800 kHz (100 m cable length with maximum 300 kHz)
Clock-pulse space period		12 – 30 µs
Vibration resistance according to EN 60068-2-6		≤ 10 g (f > 18.5 Hz)
Shock resistance according to EN 60068-2-27		≤ 100 g (t = 6 ms, 18 pulses)
Maximum permitted external magnetic field (outer contour of motor)		25 mT / 20 kA/m (on the encoder housing: 10 mT / 8 kA/m)
Maximum speed	n_{max}	6000 min^{-1}
Maximum cable length[3]		100 m
Duration until fault message (disabled outputs)[4]		≤ 25 ms + 3/4 revolution
Activation time of the rotary encoder-internal diagnostics after switching on		200 ms
Degree of protection according to EN 60529		IP66
Installation altitude	h	≤ 4000 m above sea level
		In explosion-protected areas: Permitted external pressure 0.8 – 1.1 bar (at typical height ≤ 1800 m above sea level)
Explosion protection mark ATEX/IECEx		ATEX equipment category 3 (3G, 3D, 3GD) IECEx EPL .c (3G-c, 3D-c, 3GD-c)
IECEx certificate of conformity		IECEx IBE 18.0032X
Corrosion protection, surface protection		KS, OS1 – OS4, OSG
Connection		Integrated encoder plug connector on the fan guard (can be pre-assembled and plugged in the field)
Storage temperature	°C	-15 to +70
Maximum angular acceleration		$2x10^4$ rad/s^2
Electronic nameplate		–
Maximum degree of pollution during installation work		Degree of pollution 1 (IEC 61010-1, EN 60664-1, VDE 0110-1)

Encoder		Size, unit	AK8Y[1]
Ambient temperature	DRN../DR2./DRU. 71-132	°C	-30 to +60
	DRN../DR2./DRU. 160-355	°C	-30 to +60
	DRN../DR2./DRU. 71-250	°C	–
	DRN../DR2./DRU. 280	°C	–
	EDRN 71-355	°C	-30 to +60
	EDRN 71-280S	°C	–
	EDRN 280M	°C	–

1) See figure "Sin/cos signals and phase relationship".
2) Due to the stiffness of the torque bracket, you have to take into account an automatically resetting ±0.6° twist (depending of the direction of rotation) of the encoder housing compared to the encoder shaft.
3) Observe the requirements for the cables.
4) Absolute encoders A.8W and A.8Y have a self-diagnostics function. If a fault is detected, the sensor reports it by deactivating the output signals to the encoder evaluation unit.

AV8.

Encoder	Size, unit	AV8Y	AV8W[1)]	AV8H[2)]
Signal output		sin/cos + SSI, RS422	sin/cos + RS485	HIPERFACE®
Supply voltage	V_B	DC 7 V – 30 V	DC 7 V – 30 V	DC 7 V – 12 V
Supply voltage for FS applications	U_{B_FS}	DC 7 V to 30 V	DC 7 V to 30 V	–
Maximum current consumption, free of load	I_{in}	100 mA (at U_B = 7 V)	100 mA (at U_B = 7 V)	80 mA
Maximum pulse frequency	f_{pulse_max}	200 kHz		
Direction of rotation		A before B when looking at the motor output shaft in clockwise rotation		
Incremental tracks, periods per revolution	A, B	2048 (11 bits)	2048 (11 bits)	1024 (10 bits)
	C	–		
Incremental tracks, increments per revolution	A, B	8192 (13 Bit)	8192 (13 bit)	4096 (12 bit)
Position resolution, positions per revolution, digital protocol	Digital	4096 (12 bits) (SSI, RS422)	65536 (16 bits) (RS485)	32768 (15 bits) HIPERFACE®
Voltage output signal differential (peak-to-peak) (A' = A - $\overline{A}$; B' = B - $\overline{B}$	U_{t_diff}	1 V ± 10%	1 V ± 10%	HIPERFACE®
Voltage output signal non-differential (peak-to-peak)	U_t	0.5 V ± 10%	0.5 V ± 10%	HIPERFACE®
Signal level output, offset nominal against 0 V (A, B, C, $\overline{A}$, $\overline{B}$, $\overline{C}$)V	U_{t_o}	2.5 V ± 0.3 V	2.5 V ± 0.3 V	HIPERFACE®
Total harmonic distortion (THD)		40 dB (1%), 60 dB (0.1%) from 7th Harmonic	40 dB (1%), 60 dB (0.1%) from 7th Harmonic	HIPERFACE®
Load resistance/load current differential	R_L/I_L	120 Ω ± 10%	120 Ω ± 10%	HIPERFACE®
Resistance between track and reference ground	R_{gnd}	≥ 1 kΩ	≥ 1 kΩ	HIPERFACE®
Load capacitance, output		≤ 20 nF	≤ 20 nF	HIPERFACE®
Voltage output signal, differential (C' = C - $\overline{C}$) (peak-to-peak)	U_{t_diff} e	–	–	HIPERFACE®
C track offset	g	–	–	HIPERFACE®
Voltage output signal, non-differential (C, $\overline{C}$) (peak-to-peak)	U_{t_C}	–	–	HIPERFACE®
Phase angle track C', n = constant	k, l	–	–	HIPERFACE®
Signal width track C	W_C	–		
Signal logic track C		–		
Pulse duty factor according to IEC 60469-1, n = constant		–		
Phase offset A: B; $\overline{A}$: $\overline{B}$ n = constant		90° ± 2°	90° ± 2°	HIPERFACE®
Accuracy of the incremental section[3)]		0.0194 ° (70 ")	0.0194 ° (70 ")	± 0.0144° (± 52 ")
Accuracy of the absolute section		±1 LSB (Least Significant Bit)	±1 LSB (Least Significant Bit)	± 0.0144° (± 52 ")
Scanning code/counting direction		Gray code, ascending with the direction of rotation specified above	Binary code, ascending with the direction of rotation specified above	–
Multi-turn resolution		4096 revolutions (12 bits)	65536 revolutions (16 bits)	4096 revolutions (12 bits)
Communication, interface		SSI (synchronous, serial)	RS485 (asynchronous, serial)	HIPERFACE®
Communication, modules		Driver to EIA RS422	Driver to EIA RS485	Driver to EIA RS485
Clock frequency/bandwidth		100 – 800 kHz (100 m cable length with maximum 300 kHz)	9600 baud	HIPERFACE®
Clock-pulse space period		12 – 30 µs	–	–

Encoder		Size, unit	AV8Y	AV8W[1]	AV8H[2]
Vibration resistance according to EN 60068-2-6			≤ 10 g (f > 18.5 Hz)		
Shock resistance according to EN 60068-2-27			≤ 100 g (t = 6 ms, 18 pulses)		
Maximum speed		n_{max}	6000 min^{-1}		
Maximum cable length[4]			100 m		
Duration until fault message (disabled outputs)[5]			≤ 25 ms + 3/4 revolution	≤ 25 ms + 3/4 revolution	HIPERFACE®
Activation time of the rotary encoder-internal diagnostics after switching on			200 ms	200 ms	HIPERFACE®
Degree of protection according to EN 60529			IP66		
Installation altitude		h	≤ 4000 m above sea level	≤ 4000 m above sea level	≤ 2000 m above sea level
			In explosion-protected areas: Permitted external pressure 0.8 – 1.1 bar (at typical height ≤ 1800 m above sea level)		
Explosion protection mark ATEX/IECEx			ATEX equipment category 3 (3G, 3D, 3GD) IECEx EPL .c (3G-c, 3D-c, 3GD-c)	ATEX equipment category 3 (3G, 3D, 3GD) IECEx EPL .c (3G-c, 3D-c, 3GD-c)	–
IECEx certificate of conformity			IECEx IBE 18.0032X	IECEx IBE 18.0032X	–
Corrosion protection, surface protection			KS, OS1 – OS4, OSG		
Connection			Integrated encoder plug connector on the fan guard (can be pre-assembled and plugged in the field)		
Storage temperature		°C	-15 to +70		
Maximum angular acceleration			$2x10^4$ rad/s^2	$2x10^4$ rad/s^2	10^4 rad/s^2
Electronic nameplate			–	RS485 (serial, asynchronous); 1920 bytes	HIPERFACE®; 1792 bytes
Maximum degree of pollution during installation work			Degree of pollution 1 (IEC 61010-1, EN 60664-1, VDE 0110-1)		
Ambient temperature	DRN../DR2./DRU. 71-132	°C	–	–	–
	DRN../DR2./DRU. 160-355	°C	–	–	–
	DRN../DR2./DRU. 71-250	°C	-30 to +60	-30 to +60	-30 to +60
	DRN../DR2./DRU. 280	°C	-30 to +40	-30 to +40	-30 to +40
	EDRN 71-355	°C	–	–	–
	EDRN 71-280S	°C	-30 to +60	-30 to +60	–
	EDRN 280M	°C	-30 to +40	-30 to +40	–

1) See figure "Sin/cos signals and phase relationship".
2) Observe the specification for the HIPERFACE® interface, Sick AG.
3) Due to the stiffness of the torque bracket, you have to take into account an automatically resetting ±0.6° twist (depending of the direction of rotation) of the encoder housing compared to the encoder shaft.
4) Observe the requirements for the cables.
5) Absolute encoders A.8W and A.8Y have a self-diagnostics function. If a fault is detected, the sensor reports it by deactivating the output signals to the encoder evaluation unit.

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8.5 Encoder mounting adapter

An encoder mounting adapter allows for mounting an encoder, which is not part of the standard delivery, at a later time. SEW-EURODRIVE distinguishes between 2 types of encoder mounting adapters:

- Encoder mounting adapters for encoders from SEW-EURODRIVE
- Encoder mounting adapters for encoders of other manufacturers

8.5.1 Encoder mounting adapters for encoders from SEW-EURODRIVE

For the various tool flanges (depending on the size) for an encoder mounting adapter for encoders from SEW-EURODRIVE, refer to chapter "Add-on encoder" (→ 🗎 460) and "Built-in encoder" (→ 🗎 453).

Encoder mounting adapters are available for all standard encoders from SEW-EURODRIVE:

Identifier	Description	Sizes
EI7A (in preparation)	For built-in encoders of types EI7., EI72, EI76 and EI7C	63 - 132S
EI8A (in preparation)	For built-in encoders of types EI8R and EI8C	71-132S
EK8A	For cone-shaft encoders of types .K8. (For retrofitting with integrated encoder plug connector or M23 plug connector on the encoder)	71 – 315
XV8A	For cone-shaft encoders of types .K8. in coupling add-on with fan guard with encoder mount	71 – 280 315 (on request)

Notes on selection

For dimensions of mounting adapters of SEW-EURODRIVE encoders, refer to chapter "Dimension sheets for motors/brakemotors" (→ 🗎 234).

Order information

Type designation EI7A, EI8A, EK8A, XV8A

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8.5.2 Encoder mounting adapters for XV.A encoders according to customer specifications

With this type of encoder mounting adapter, the AC motor is equipped with a mechanical interface that can be mounted to an encoder specified by the customer. This encoder is not a product of SEW-EURODRIVE and must be purchased separately. Third-party encoders are installed by SEW-EURODRIVE solely by means of special solutions. Contact SEW-EURODRIVE in such cases.

Dimensions

Refer to the following table for dimensions of XV.A encoder mounting adapters.

Mounting adapter	Design	
	Encoder shaft	Centering
XV0A	according to customer specification	
XV1A	6 mm	50 mm
XV2A	10 mm	50 mm
XV3A	12 mm	80 mm
XV4A	11 mm	85 mm
XV5A	12 mm	45 mm
XV6A	10 mm	36 mm

A fan guard with encoder mount allows the encoder to be mounted on the motor shaft. These encoders are usually attached using three conical spring washers.

The connection between the encoder shaft and the motor shaft is realized using a coupling.

The dimensions of the mounting adapters for customer-specific encoders are not listed here. Request the necessary dimension sheets from SEW-EURODRIVE, if required.

INFORMATION

The combinations with forced cooling fan require knowledge of the installation space of the encoder to be mounted. Several forced cooling fan guards with different lengths are available. Contact SEW-EURODRIVE for more information.

Order information

Type designation /XV0A, /XV1A, /XV2A, /XV3A, /XV4A, XV5A, XV6A

8.6 Safety encoders

Safety encoders from SEW-EURODRIVE are characterized by their exceptional reliability as well as electronic and mechanical load capacity.

Safety encoders allow you to improve the safety of your machines by implementing safety functions in relation to their speed, direction of rotation, idle state, relative position or absolute position. The safety encoder provides the safety-relevant signals in the intelligent interaction of sensor, control and actuator.

The safety function requires a reliable mechanical connection between encoder and motor. At SEW-EURODRIVE, this connection is dimensioned in such a way that fault exclusion is achieved.

The safety encoders cannot trigger a safe state at the machine autonomously. Therefore, they have to be monitored in the overall system. In case the encoder or the evaluation electronics detects a fault, a fault response is initiated in the overall system, such as safe state.

8.6.1 Available safety encoders

Built-in encoders

Encoder type	Interface
EI7C FS	HTL interface

Add-on encoders

Encoder type	Interface
EK8S	Sin/cos interface
AK8W	Sin/cos + RS485 interface (multi-turn)
AK8Y	Sin/cos + SSI interface (multi-turn)

8.6.2 Underlying standards for safety encoders

The safety encoders are evaluated according to the following standards and safety classes.

Encoder	Safety encoder			
	ES-7SEG7SEK8S	AS-7WAG7WAK8W	AS7Y-AG7YAK8Y	EI7C FS
IEC 61508 (SIL)	X	X	X	–
IEC 62061 (SIL)	X	X	X	–
ISO 13849 (PL)	X	X	X	X
IEC 61800-5 2	–	–	–	X

Safety class SIL 3 or PL e can be achieved if a suitable safety encoder is integrated into a safety system. The requirements (e.g. on the system architecture, the diagnostics that may possibly be required, and failure probabilities) are to be implemented according to the normative specifications and to the corresponding product documentation.

8.6.3 Safety functions of safety encoders

INFORMATION

For AK8W and AK8Y encoders, the multi-turn absolute interface is not part of the PL d/SIL 2 approval. The absolute interface may not be used solely for implementing safety functions.

Safety encoders can be used to implement the following safety functions in compliance with EN 61800-5-2 with respect to speed, direction of rotation, idle state, and relative position.

Encoder	SS1	SS2	SOS	SLA	SLS	SDI	SLI	SSR	SAR	SSM
EK8S	X	X	X	X	X	X	X	X	X	X
AK8W	X	X	X	X	X	X	X	X	X	X
AK8Y	X	X	X	X	X	X	X	X	X	X
EI7C FS	X	–	–	–	X	X	–	–	–	–

Safety encoders can be used to implement the following safety functions in compliance with EN 61800-5-2 with respect to the absolute position.

Encoder	SCA	SLP
EK8S	X	X
AK8W	X	X
AK8Y	X	X
EI7C FS	–	–

8.6.4 Technical details

Operating ambient temperature for the motor

EK8S add-on encoder:

Mounted to the motor, safety encoders may be operated at a maximum ambient operating temperature of the motor of -30 °C to +60 °C.

AK8W, AK8Y add-on encoders:

Mounted to the motor, safety encoders may be operated at a maximum ambient operating temperature of the motor of -30 °C to +60 °C.

Add-on encoders

For technical details on the functionally safe EK8S, AK8W, and AK8Y add-on encoders, see chapter "EI7., EI8. built-in encoder" (→ 🗎 453) and "Add-on encoder" (→ 🗎 460).

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EI7C FS

Encoder	Size, unit	EI7C FS
Signal output		HTL
Supply voltage	V_B	DC 19.2 V – 30 V Exclusively SEL-/PELV circuits according to DIN EN 61131-2 are permitted
Maximum current consumption, free of load	I_{in}	120 mA
Maximum output current per track	I_{in}	±30 mA
Maximum pulse frequency	f_{pulse_max}	1.44 kHz
Direction of rotation		A before B when looking at the motor output shaft in clockwise rotation
Periods per revolution	A, B	24
	C	–
Increments per revolution	A, B	96
Voltage output signal non-differential (peak-to-peak)	U_t	$U_{Low} \leq 3$ V $U_{High} \geq U_B - 3.5$ V
Pulse duty factor according to IEC 60469-1, n = constant		50% ± 20%
Phase offset A: B; $\overline{A}$: $\overline{B}$ n = constant	d	90° ± 20°
Vibration resistance according to EN 60068-2-6		≤ 10 g (5 - 2000 Hz)
Shock resistance according to EN 60068-2-27		≤ 100 g (t = 6 ms, 18 pulses)
Maximum permissible external magnetic field (outer contour of motor)		25 mT/20 kA/m
Maximum speed	n_{max}	3600 min^{-1}
Maximum angular acceleration	n_{max}	3000 rad/s^2
Maximum cable length[1)]		100 m
Duration until fault message[2)] (deactivated outputs)		min. 100 ms – max. 300 ms
Output leakage current in deactivated state (= error message)[2)]		250 µA
Activation time of encoder-internal diagnostics after switching on		300 ms (from U_B > 9V)
Degree of protection according to EN 60529		IP66
Installation altitude	h	≤ 3800 m above sea level
Corrosion protection, surface protection		KS, OS1 – OS4, OSG
Connection		M12 (8-pole)
Ambient temperature	°C	-30 to +60
Storage temperature	°C	-15 to +70
Maximum angular acceleration		10^4 rad/s^2
Electronic nameplate		–

1) Observe the limitations of the motor and/or the frequency inverter.
2) The EI7C FS built-in encoder has a self-diagnostics function. If a fault is detected, the system reports it by deactivating the output signals to the encoder evaluation unit.

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8.6.5 Characteristic safety values for safety encoder

INFORMATION

In addition to the documentation, you can also obtain the characteristic safety values of components by SEW-EURODRIVE in the SEW-EURODRIVE library for the "SISTEMA" software tool. The documentation and the library are available for download from www.sew-eurodrive.com.

Characteristic safety values for EI7C FS

	Characteristic safety values according to	
	IEC 61800-5 2	**ISO 13849-1**
Classification	SIL 2	PL d
System structure	HFT = 0	1-channel (Cat. 2)
PFH_D value[1)]	8.0 x 10^{-8} 1/h = 80 FIT (T_U ≤ 60 °C)	
$MTTF_d$ value[1)]	–	202 years (T_{amb} ≤ 60 °C)
Service life/proof test interval	20 years	
Safe fault coverage (SFF)	95%	

1) The specified values apply when the requirements for the evaluation electronics are met (see the addendum to the operating instructions "Safety Encoders and Safety Brakes").

Characteristic safety values of AK8W, AK8Y

	Characteristic safety values according to	
	IEC 62061/IEC 61508	**ISO 13849-1**
Classification	SIL 2	PL d
System structure	HFT = 1	2-channel (Cat. 3)
PFH_D value[1] (**without** mounting on the motor)	6.97×10^{-9} 1/h = 6.97 FIT ($T_{amb} \leq 45$ °C) 1.04×10^{-8} 1/h = 10.4 FIT ($T_{amb} \leq 60$ °C)	
$MTTF_d$ value[1] (**without** mounting on the motor)	–	1638 years ($T_{amb} \leq 45$ °C) 1098 years ($T_{amb} \leq 60$ °C)
PFH_d value[1] (**with** mounting on the motor; takes into account a derating due to motor reheating)	5.0×10^{-8} 1/h = 50 FIT ($T_U \leq 60$ °C)	
$MTTF_d$ value[1] (**with** mounting on the motor; takes into account a derating due to motor reheating)	–	212 years ($T_{amb} \leq 60$ °C)
Service life/proof test interval	20 years	
Motor/encoder connection (only for drives **with** FS logo)	Fault exclusion according to IEC 61800-5-2	

1) The specified values apply when the requirements for the follow-up electronics are met according to the addendum to the operating instructions "Safety Encoders and Safety Brakes for AC Motors DR.., DRN.., DR2.., EDR.., EDRN.. Functional Safety

Characteristic safety values of EK8S

	Characteristic safety values according to	
	IEC 62061/IEC 61508	**ISO 13849-1**
Classification	SIL 2	PL d
System structure	HFT = 1	2-channel (Cat. 3)
PFH_D value[1)] (**without** mounting on the motor)	7.8×10^{-9} 1/h = 7.8 FIT ($T_U \leq 45$ °C) 1.2×10^{-8} 1/h = 12 FIT ($T_U \leq 60$ °C)	
"MTTF"$_D$ value[1)] (**without** mounting on the motor)	–	1474 years ($T_{amb} \leq 45$ °C) 1030 years ($T_{amb} \leq 60$ °C)
PFH_d value[1)] (**with** mounting on the motor; takes into account a derating due to motor reheating)	5.0×10^{-8} 1/h = 50 FIT ($T_U \leq 60$ °C)	
$MTTF_d$ value[1)] (**with** mounting on the motor; takes into account a derating due to motor reheating)	–	212 years ($T_{amb} \leq 60$ °C)
Service life/proof test interval	20 years	
Motor/encoder connection (only for drives **with** FS logo)	Fault exclusion according to IEC 61800-5-2	

1) The specified values apply when the requirements for the follow-up electronics are met according to the addendum to the operating instructions "Safety Encoders and Safety Brakes for AC Motors DR.., DRN.., DR2.., EDR.., EDRN.. Functional Safety".

8.7 General information on drive selection

8.7.1 Encoders

Sensors that are mountable on the motors in series can be combined with a range of motor designs and options, such as brakes and forced cooling fans.

If you have any questions, please contact SEW-EURODRIVE.

8.7.2 Encoder connection

When connecting the encoders to the inverters, follow the operating instructions for the inverter and the wiring diagrams supplied with the encoders.

There may be differing requirements or limitations for the EI7C FS safety encoder due to the encoder evaluation unit, e.g. regarding the maximum cable lengths or the core cross sections. Observe the product documentation for the encoder evaluation unit for this.

Mechanical requirements

- For connection variants with M12 or M23 plug connector, a strain relief of the cable must be carried out by the customer in accordance with IEC 60079-14
- Note the following for connection variants with terminal strips or connection units:
  - Cables and cores must be mechanically protected against damage when they come into contact with motor components in the terminal box. Use fabric hoses.
  - Cables and cores must be electrically shielded from live parts such as Terminal boards or power terminals of the motor. Observe the required clearance and creepage distances.
  - Observe possible requirements regarding conformity with UL or CSA.For mechanical and electrical protection, use suitable glass fiber tubing with UL style, for example.

Electrical requirements

⚠ WARNING

When connecting the encoders in the terminal box, observe the electrical voltage resistance requirements from IEC 61800-5-1.

- Maximum cable length (inverter to encoder):
  - 100 m with a capacitance from conductor to shield ≤ 110 nF/km
  - 100 m with a capacitance from conductor to conductor ≤ 70 nF/km

    Output capacitance according to DIN VDE 0472 Part 504.
- Core cross section:
  - Supply cores ≥ 0.25 mm^2 for cable lengths up to 50 m
  - Supply cores ≥ 0.5 mm^2 for cable lengths up to 100 m
  - Signal cores ≥ 0.25 mm^2
- Shielded cable with twisted core pairs. Connect the shield over a wide area at both ends:
  - Encoder end: in the cable gland of the encoder connection cover, or in the terminal box, or in the encoder connector.

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  – Inverter end or evaluation unit end: to the electronics shield clamp and to the housing of the D-sub connector or another connector.
- Install the encoder cables separately from the power cables, maintaining a distance of at least 200 mm.
- Observe the technical data of the encoder when selecting the cabling, in particular with regard to the operating voltage or current.

8.7.3 Connection alternatives

The encoders are available with the following connection options:

/EK8., /AK8.

- With an integrated encoder plug connector with connection cover (motor temperature sensors must be routed separately)
- With an integrated encoder plug connector without connection cover (motor temperature sensors must be routed separately)
- With an M23 connector on the terminal box (optionally with integrated motor temperature sensor)
- With a terminal strip in the terminal box (optionally with integrated motor temperature sensor)
- With a short cable with M23 connector directly on the encoder (motor temperature sensor must be routed separately)

/EI8.

- With a terminal strip inside the terminal box (optionally with integrated motor temperature sensor)
- With an M23 connector on the terminal box (optionally with integrated motor temperature sensor)

SEW-EURODRIVE recommends to use prefabricated encoder cables.

When using prefabricated cables from SEW-EURODRIVE, you can order the encoders without a connection cover because this cover is part of the cable.

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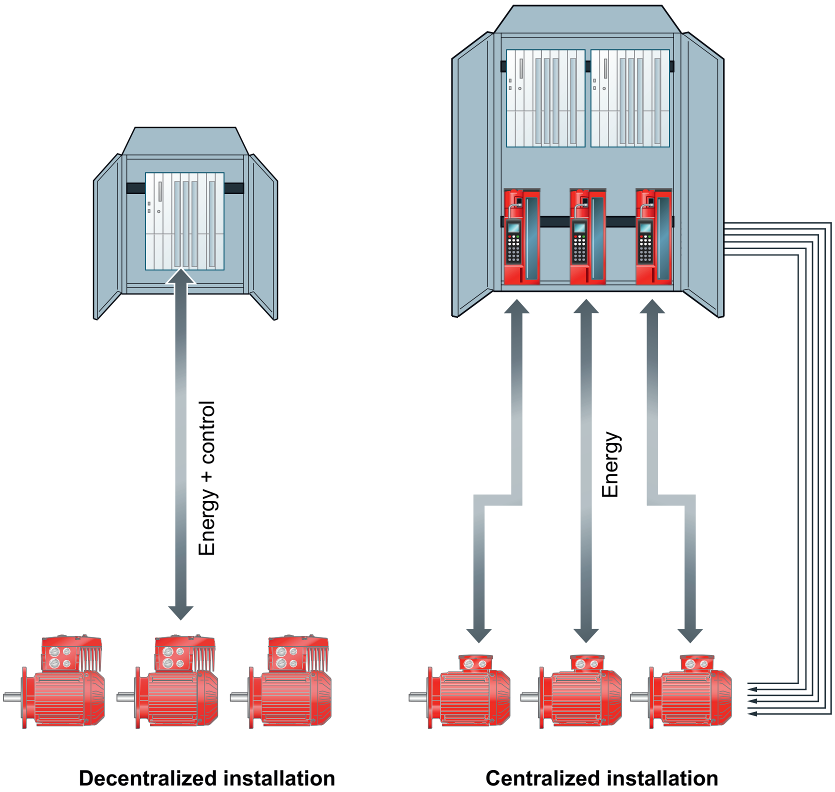
9 AC motors with decentralized technology

The purpose of decentralized installation is to minimize the installation effort for electrical drives in production plants.

The frequency inverter or motor starter of the drive is not installed in the control cabinet but in the field close to the motor. The installation of long cables for distributing power and transferring data can be reduced to a minimum. The sole remaining purpose of the control cabinet is to house control components for signal processing and diagnostics.

The latest generation of drive units is installed in the field, i.e. at specific locations in the plant where functions are implemented. These are mechatronic drive systems with integrated power and signaling electronics for monitoring, actual value acquisition and communication.

The power is distributed to the individual drives by means of specially developed cable systems with pluggable or permanently connected power outputs. A communication link is used for control and diagnosis of the decentralized drive units. Usually, this takes the form of an established fieldbus system or Ethernet-based network.



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9.1 MOVIMOT®

9.1.1 Description

MOVIMOT® is the combination of AC motor and frequency inverter in a power range from 0.37 to 4.0 kW. The frequency inverter can either be mounted directly on the motor or close to the motor (see below figure). Even with integrated frequency inverter, a MOVIMOT® drive is not much larger than a motor without integrated frequency inverter.

A MOVIMOT® inverter can be installed close to the motor using a mounting plate. The inverter is connected to the "assigned motor" using a prefabricated "hybrid cable".

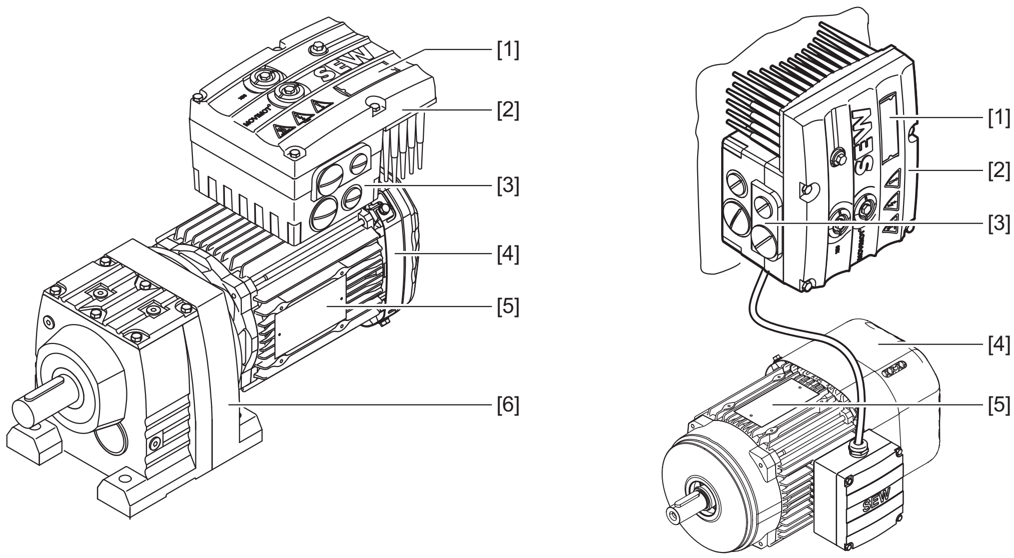
You can use the MOVIMOT® drives to equip extensive plants with a modular system or flexibly integrate them into existing plants. MOVIMOT® is also the electronic replacement for pole-changing motors or mechanical variable-speed gear units.

MOVIMOT® is available as a (gear)motor, with or without brake. Each MOVIMOT® inverter has a motor identification module (DIM module) for easy and fast startup. The DIM module is included in the delivery of the MOVIMOT® motor.

INFORMATION

This catalog provides a brief overview of MOVIMOT® drives to facilitate drive selection. For detailed descriptions, project planning information and dimension drawings, refer to the "MOVIMOT® Gearmotors" catalog.

MOVIMOT® drive with integrated inverter | MOVIMOT® drive with mounting close to the motor



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[1] MOVIMOT® inverter identification tag
[2] MOVIMOT® inverter
[3] Connection box
[4] Motor
[5] Drive nameplate
[6] Helical gear unit

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Advantages of MOVIMOT®

- Compact design
- Interference-free connection between inverter and motor
- Closed design with integrated protection functions
- Inverter cooling independent of the motor speed
- No space required in the control cabinet
- Preset parameters for expected applications
- Easy installation, startup and maintenance
- Easy to service for retrofitting and replacement

Designs

MOVIMOT® drives are available in various designs so they can be used to implement all kinds of installation topologies.

- MOVIMOT® drive **standard design** (e.g. with binary control)
  - With integrated inverter
  - Mounted close to the motor
- MOVIMOT® drive with **AS-Interface**
  - With integrated inverter
  - Mounted close to the motor

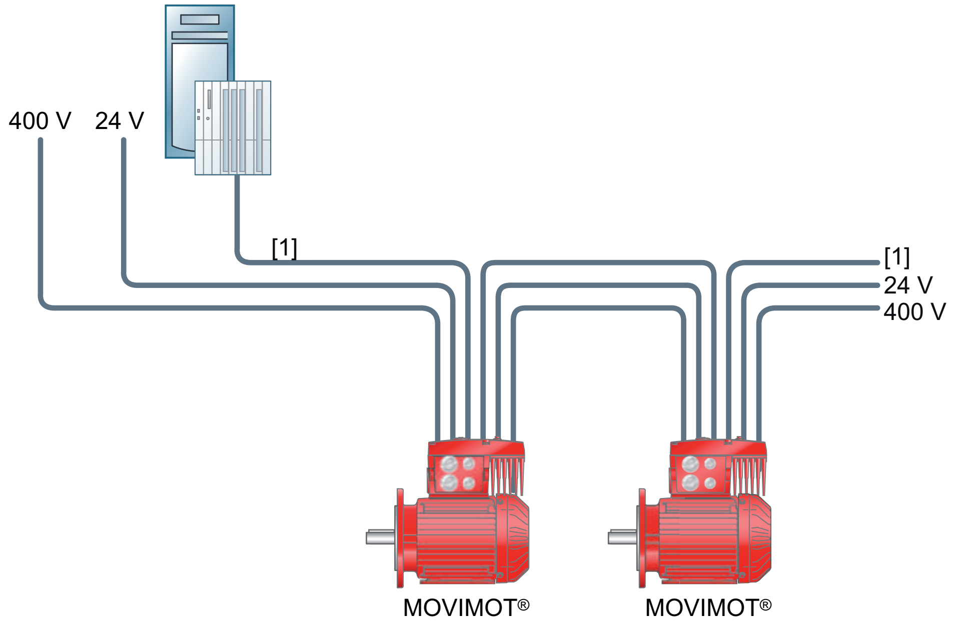
The AS-Interface option is located on the connection board in the connection box.

The following AS-Interface options are available:

- Binary slave MLK30A
- Double slave MLK31A
- Binary slave MLK32A in AB technology

MOVIMOT® installation topology

The following figure shows the basic installation topology of the MOVIMOT® drive with binary control:



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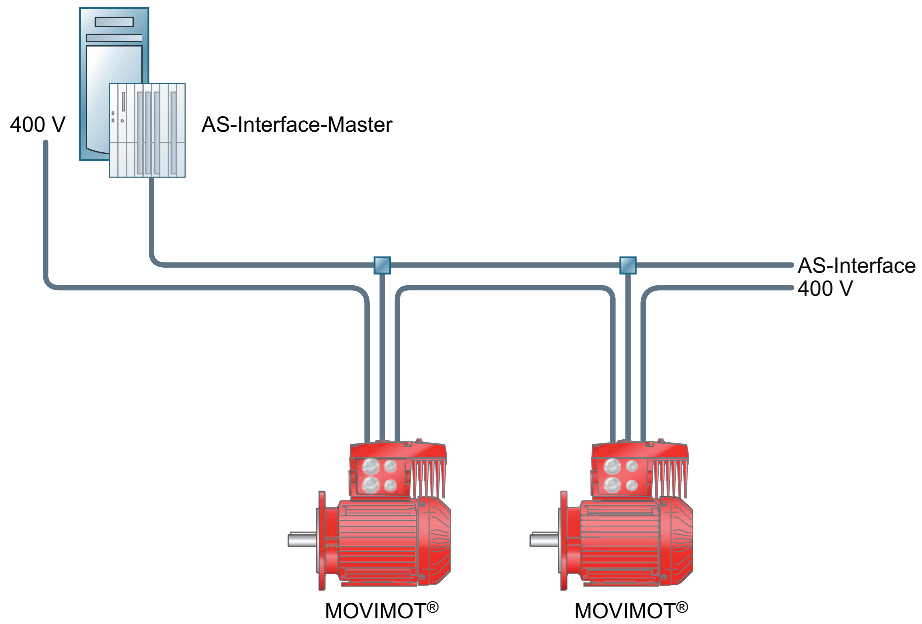
[1] Control: binary (+ RS485)

The following figure shows the basic installation topology of the MOVIMOT® drive with AS-Interface (DC 24 V supply via AS-Interface):



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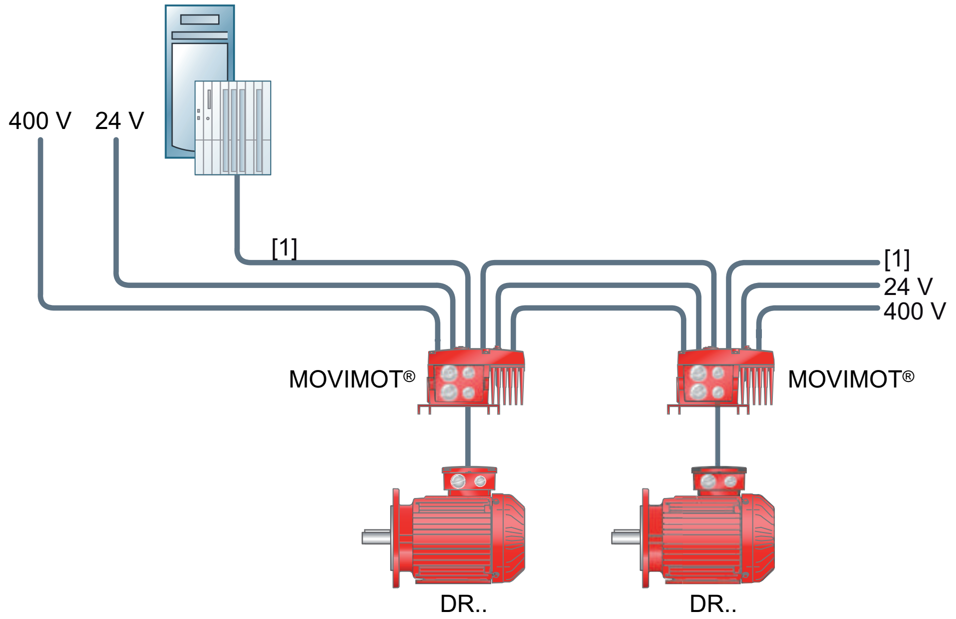
Installation topology of MOVIMOT®, mounted close to the motor

The following figure shows the basic installation topology of the MOVIMOT® drive with binary control when mounted close to the motor:



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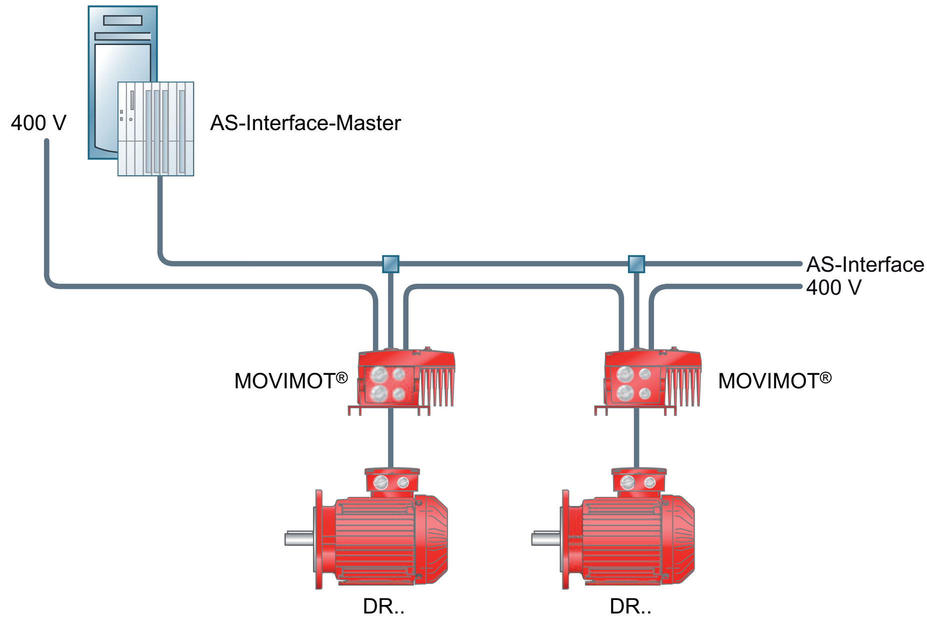
[1] Control: binary (+ RS485)

The following figure shows the basic installation topology of the MOVIMOT® drive with AS-Interface when mounted close to the motor (DC 24 V supply via AS-Interface):



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9.1.2 Technical details

MOVIMOT® device properties

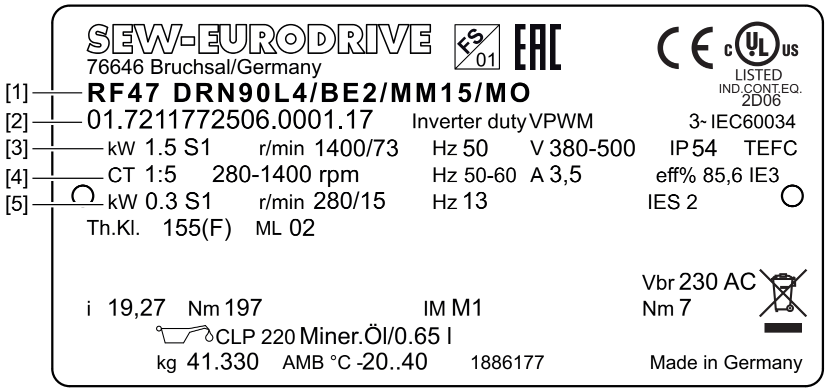
- Frequency inverter with vector-oriented control mode
- Voltage range: 3 × 380 – 500 V, (3 × 200 – 240 V)
- Power range: 0.37 – 4 kW (0.37 – 2.2 kW)
- Rated speeds: 1400, 1700, and 2900 min^{-1}
- Application-specific parameterization possible
- Pluggable parameter memory for data backup (DIM module)
- Comprehensive protection and monitoring functions
- IP65 degree of protection (when connection box is closed)
- Compliance with EMC interference emission category C2 according to EN 61800-3
- Low-noise due to PWM clock frequency of 16 kHz
- Status LED for fast diagnostics
- Diagnostics and manual operation using MOVITOOLS® MotionStudio
- 4-quadrant operation (integrated brake management):
  - For motors with a mechanical brake, the brake coil is used as the braking resistor.
  - For motors without a brake, MOVIMOT® is supplied with an internal braking resistor as standard.
- The units are controlled either via binary signals, via the serial interface RS485, or optionally via AS-Interface, or all common fieldbus interfaces (PROFIBUS, PROFINET, EtherNet/IP™, EtherCAT® INTERBUS, DeviceNet™).
- MOVIMOT® is available with UL approval on request.

Type designations

Type designation of MOVIMOT® drives in standard design

Nameplate

The following figure depicts an example nameplate of a MOVIMOT® motor with integrated inverter:



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[1] Serial number

Type designation

The following table shows an example of the type designation of the MOVIMOT® drive **RF47 DRN90L4/BE2/MM15/MO**:

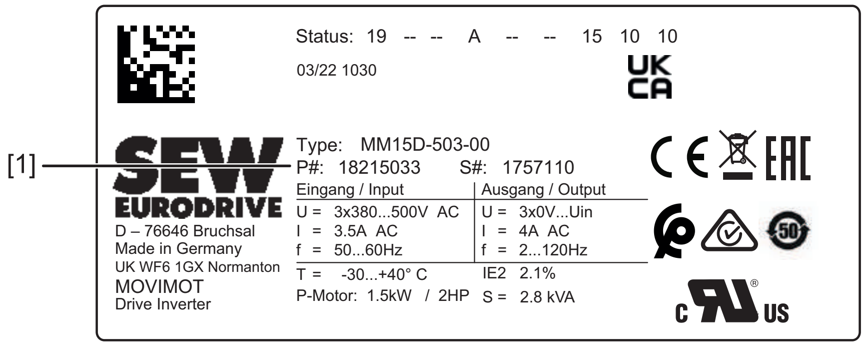
RF	**Gear unit series**	
47	**Gear unit size**	
DRN..	**Motor type**	
90L	**Motor size**	
4	**Number of motor poles**	
/		
BE	**Brake option**	
2	**Brake size**	
/		
MM	**Inverter series**	MM = MOVIMOT®
15	**Inverter power**	15 = 1.5 kW
/		
MO	**Inverter options**[1]	

1) The nameplate only displays options installed at the factory.

MOVIMOT® inverter type designation

Nameplate

The following figure provides an example of a MOVIMOT® inverter nameplate:



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[1] Part number

Type designation

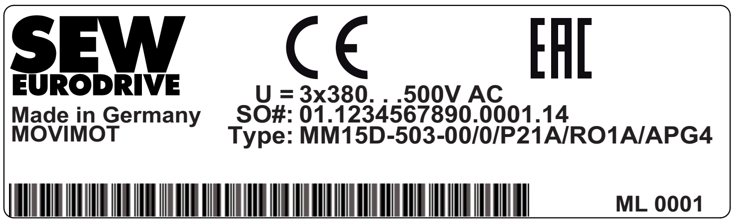
The following table shows an example of the type designation of the MOVIMOT® inverter **MM15D-503-00**:

MM	**Inverter series**	MM = MOVIMOT®
15	**Inverter power**	15 = 1.5 kW
D	**Version D**	
-		
50	**Connection voltage**	50 = AC 380 – 500 V 23 = AC 200 – 240 V
3	**Connection type**	3 = 3-phase
-		
00	**Design**	00 = Standard

Type designation of the "mounted close to the motor" design

Nameplate

The following figure provides an example of the nameplate of a MOVIMOT® inverter for mounting close to the motor:



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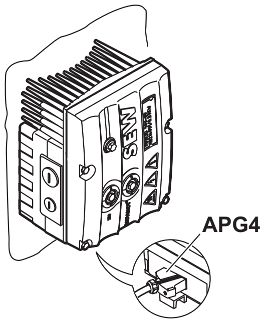
Type designation

The following table shows the type designation for the MOVIMOT® inverter **MM15D-503-00/0/P21/RO1A/APG4** for mounting close to the motor:

MM	**Inverter series**	MM = MOVIMOT®
15	**Inverter power**	15 = 1.5 kW
D	**Version D**	
-		
50	**Connection voltage**	50 = AC 380 – 500 V 23 = AC 200 – 240 V
3	**Connection type**	3 = 3-phase
-		
00	**Design**	00 = Standard
/		
0	**Connection type**	0 = ⅄ 1 = △
/		
P21A	**Adapter for mounting close to the motor**	
/		
RO1A	**Connection box design**	
/		
APG4	**Plug connector** for connection to the motor	

MOVIMOT® installed close to the motor

The following table shows the type designations of available MOVIMOT® drives with P2.A mounting plate for mounting close to the motor:

Connection to the motor	MOVIMOT® size	1)	MOVIMOT® standard design	MOVIMOT® with integrated AS-Interface
APG4 	MM03 to MM15	⅄	MM..D-503-00/0/ P21A/ RO1A/APG4	MM..D-503-00/0/ P21A/ RR3A/AVSK/ APG4/MLK
		△	MM..D-503-00/1/ P21A/ RO1A/APG4	MM..D-503-00/1/ P21A/ RR3A/AVSK/ APG4/MLK
	MM22 to MM40	⅄	MM..D-503-00/0/ P22A/ RO2A/APG4	MM..D-503-00/0/ P22A/ RR4A/AVSK/ APG4/MLK
		△	MM..D-503-00/1/ P22A/ RO2A/APG4	MM..D-503-00/1/ P22A/ RR4A/AVSK/ APG4/MLK

1) Connection type of connected motor

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Motor assignment for mounting close to DRN.. motors

Motor assignment MOVIMOT® (close to the motor) 280 – 1400 min⁻¹

Power kW	Motor (230/400 V, 50 Hz) ⅄	MOVIMOT® with option P.2A
0.25	DR**2S**63M4/TH DR**N**71MS4/TH.	MM03D-503-00/**0**/**BW1**/P21A..[1]
	DR**2S**63M4/**BE..**/TH. DR**N**71MS4/**BE.**/TH.	MM03D-503-00/**0**/P21A/..[1]
0.37	DR**2S**71MS4/TH.	MM03D-503-00/**0**/**BW1**/P21A..
	DR**N**71M4/TH.	MM05D-503-00/**0**/**BW1**/P21A..[1]
	DR**2S**71MS4/**BE.**/TH.	MM03D-503-00/**0**/P21A..
	DR**N**71M4/**BE.**/TH.	MM05D-503-00/**0**/P21A..[1]
0.55	DR**2S**71M4/TH.	MM05D-503-00/**0**/**BW1**/P21A..
	DR**N**80MK4/TH.	MM07D-503-00/**0**/**BW1**/P21A..[1]
	DR**2S**71M4/**BE.**/TH.	MM05D-503-00/**0**/P21A..
	DR**N**80MK4/**BE.**/TH.	MM07D-503-00/**0**/P21A..[1]
0.75	DR**2S**80MK4/TH.	MM07D-503-00/**0**/**BW1**/P21A..
	DR**N**80M4/TH.	MM11D-503-00/**0**/**BW1**/P21A..[1]
	DR**2S**80MK4/**BE.**/TH.	MM07D-503-00/**0**/P21A..
	DR**N**80M4/**BE.**/TH.	MM11D-503-00/**0**/P21A..[1]
1.1	DR**2S**80M4/TH.	MM11D-503-00/**0**/**BW1**/P21A..
	DR**N**90S4/TH.	MM15D-503-00/**0**/**BW1**/P21A..[1]
	DR**2S**80M4/**BE.**/TH.	MM11D-503-00/**0**/P21A..
	DR**N**90S4/**BE.**/TH.	MM15D-503-00/**0**/P21A..[1]
1.5	DR**N**90L4/TH.	MM15D-503-00/**0**/**BW1**/P21A..
		MM22D-503-00/**0**/**BW2**/P22A..[1]
	DR**N**90L4/**BE.**/TH.	MM15D-503-00/**0**/P21A..
		MM22D-503-00/**0**/P22A..[1]
2.2	DR**N**100LS4/TH.	MM22D-503-00/**0**/**BW2**/P22A..
		MM30D-503-00/**0**/**BW2**/P22A..[1]
	DR**N**100LS4/**BE.**/TH.	MM22D-503-00/**0**/P22A..
		MM30D-503-00/**0**/P22A..[1]
3.0	DR**N**100L4/TH.	MM30D-503-00/**0**/**BW2**/P22A..
		MM40D-503-00/**0**/**BW2**/P22A..[1]
	DR**N**100L4/**BE.**/TH.	MM30D-503-00/**0**/P22A..
		MM40D-503-00/**0**/P22A..[1]
4.0	DR**N**112M4/TH.	MM40D-503-00/**0**/**BW2**/P22A..
	DR**N**112M4/**BE.**/TH.	MM40D-503-00/**0**/P22A..

1) Combination with increased short-term torque

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Motor assignment MOVIMOT® (close to the motor) 290 – 2900 min^{-1}

Power kW	Motor (230/400 V, 50 Hz) △	MOVIMOT® with option P2A
0.37	DR**2S**63M4/TH	MM03D-503-00/**1**/**BW1**/P21A..
	DR**N**71MS4/TH	MM05D-503-00/**1**/**BW1**/P21A..[1]
	DR**2S**63M4/**BE..**/TH.	MM03D-503-00/**1**/P21A..
	DR**N**71MS4/**BE..**/TH.	MM05D-503-00/**1**/P21A..[1]
0.55	DR**2S**71MS4/TH.	MM05D-503-00/**1**/**BW1**/P21A..
	DR**N**71M4/TH.	MM07D-503-00/**1**/**BW1**/P21A..[1]
	DR**2S**71MS4/**BE.**/TH.	MM05D-503-00/**1**/P21A..
	DR**N**71M4/**BE.**/TH.	MM07D-503-00/**1**/P21A..[1]
0.75	DR**2S**71M4/TH.	MM07D-503-00/**1**/**BW1**/P21A..
	DR**N**80MK4/TH.	MM11D-503-00/**1**/**BW1**/P21A..[1]
	DR**2S**71M4/**BE.**/TH.	MM07D-503-00/**1**/P21A..
	DR**N**80MK4/**BE.**/TH.	MM11D-503-00/**1**/P21A..[1]
1.1	DR**2S**80MK4/TH.	MM11D-503-00/**1**/**BW1**/P21A..
	DR**N**80M4/TH.	MM15D-503-00/**1**/**BW1**/P21A..[1]
	DR**2S**80MK4/**BE.**/TH.	MM11D-503-00/**1**/P21A..
	DR**N**80M4/**BE.**/TH.	MM15D-503-00/**1**/P21A..[1]
1.5	DR**2S**80M4/**BE.**/TH.	MM15D-503-00/**1**/**BW1**/P21A..
	DR**N**90S4/TH.	MM22D-503-00/**1**/**BW2**/P22A..[1]
	DR**2S**80M4/**BE.**/TH.	MM15D-503-00/**1**/P21A..
	DR**N**90S4/**BE.**/TH.	MM22D-503-00/**1**/P22A..[1]
2.2	DR**N**90L4/TH.	MM22D-503-00/**1**/**BW2**/P22A..
		MM30D-503-00/**1**/**BW2**/P22A..[1]
	DR**N**90L4/**BE.**/TH.	MM22D-503-00/**1**/P22A..
		MM30D-503-00/**1**/P22A..[1]
3.0	DR**N**100LS4/TH.	MM30D-503-00/**1**/**BW2**/P22A..
		MM40D-503-00/**1**/**BW2**/P22A..[1]
	DR**N**100LS4/**BE.**/TH.	MM30D-503-00/**1**/P22A..
		MM40D-503-00/**1**/P22A..[1]
4.0	DR**N**100L4/TH.	MM40D-503-00/**1**/**BW2**/P22A..
	DR**N**100L4/**BE.**/TH.	MM40D-503-00/**1**/P22A..

1) Combination with increased short-term torque

Technical data of MOVIMOT® inverters with DRN.. motors

MOVIMOT® drives

280 – 1400 min⁻¹ ⅄ 3 × 380 – 500 V (400 V, 50 Hz)

IEC or UL

Type	P_N kW	M_N Nm	M_A/M_N f > 5 Hz	n_N min^{-1}	I_N A	cosφ	J_{Mot} 10^{-4} kgm^2	J_{BMot} 10^{-4} kgm^2	M_B Nm	m_{Mot} kg	m_{BMot} kg
DRN71M4/../MM03	0.37	2.5	1.5	1400	1.3	0.99	7.1	8.4	5	9.6	11.6
DRN80MK4/../MM05	0.55	3.65	1.5	1400	1.6	0.99	17.1	18.6	10	12.6	15.6
DRN80M4/../MM07	0.75	5.1	1.5	1400	1.9	0.99	24.7	26.2	10	15.6	19.6
DRN90S4/../MM11	1.1	7.5	1.5	1400	2.4	0.99	54.0	58.7	20	21.6	26.2
DRN90L4/../MM15	1.5	10.2	1.5	1400	3.5	0.99	67.2	71.9	20	24.6	29.2
DRN100LS4/../MM22	2.2	15.0	1.5	1400	5.0	0.99	81.4	87.4	28	29.3	35.2
DRN100L4/../MM30	3.0	20.5	1.5	1400	6.7	0.99	112	118	40	36.3	42.2
DRN112M4/../MM40	4.0	27.3	1.5	1400	7.3	0.99	178	183	55	48.2	55.4

290 – 2900 min⁻¹ △ 3 × 380 – 500 V (400 V, 50 Hz)

IEC or UL

Type	P_N kW	M_N Nm	M_A/M_N f > 5 Hz	n_N min^{-1}	I_N A	cosφ	J_{Mot} 10^{-4} kgm^2	J_{BMot} 10^{-4} kgm^2	M_B Nm	m_{Mot} kg	m_{BMot} kg
DRN71MS4/../MM03	0.37	1.22	1.5	2900	1.3	0.99	5.4	6.1	5	8.4	10.2
DRN71M4/../MM05	0.55	1.81	1.5	2900	1.6	0.99	7.1	8.4	5	9.6	11.6
DRN80MK4/../MM07	0.75	2.47	1.5	2900	1.9	0.99	17.1	18.6	10	12.6	15.6
DRN80M4/../MM11	1.1	3.62	1.5	2900	2.4	0.99	24.7	26.2	10	15.6	19.6
DRN90S4/../MM15	1.5	4.95	1.5	2900	3.5	0.99	54.0	58.7	20	21.6	26.2
DRN90L4/../MM22	2.2	7.25	1.5	2900	5.0	0.99	67.2	71.9	20	25.3	29.9
DRN100LS4/../MM30	3.0	9.9	1.5	2900	6.7	0.99	81.4	87.4	28	29.3	35.2
DRN100L4/../MM40	4.0	13.2	1.5	2900	7.3	0.99	112	118	40	37.2	43.1

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MOVIMOT® drives with increased short-term torque

For implementing MOVIMOT® drives with increased short-term torque, the motor is assigned a MOVIMOT® inverter with one power rating higher.

280 – 1400 min^{-1} ⅄ 3 × 380 – 500 V (400 V, 50 Hz)

IEC or UL

Type	P_N kW	M_N Nm	M_A/M_N f > 5 Hz	n_N min^{-1}	I_N A	cosφ	J_{Mot} 10^{-4} kgm^2	J_{BMot} 10^{-4} kgm^2	M_B Nm	m_{Mot} kg	m_{BMot} kg
DRN71MS4/../MM03	0.25	1.69	2.1	1400	1.0	0.99	5.42	6.72	5	8.4	10.8
DRN71M4/../MM05	0.37	2.5	2.1	1400	1.3	0.99	7.1	8.4	5	9.6	11.6
DRN80MK4/../MM07	0.55	3.65	2.1	1400	1.6	0.99	17.1	18.6	10	12.6	15.6
DRN80M4/../MM11	0.75	5.1	2.1	1400	1.9	0.99	24.7	26.2	10	15.6	19.3
DRN90S4/../MM15	1.1	7.5	2.1	1400	2.4	0.99	54.0	58.7	20	21.6	26.2
DRN90L4/../MM22	1.5	10.2	2.1	1400	3.5	0.99	67.2	71.9	20	25.3	29.9
DRN100LS4/../MM30	2.2	15.0	2.1	1400	5.0	0.99	81.4	87.4	28	29.3	35.2
DRN100L4/../MM40	3.0	20.5	2.1	1400	6.7	0.99	112	118	40	37.2	43.1

290 – 2900 min^{-1} △ 3 × 380 – 500 V (400 V, 50 Hz)

IEC or UL

Type	P_N kW	M_N Nm	M_A/M_N f > 5 Hz	n_N min^{-1}	I_N A	cosφ	J_{Mot} 10^{-4} kgm^2	J_{BMot} 10^{-4} kgm^2	M_B Nm	m_{Mot} kg	m_{BMot} kg
DRN71MS4/../MM05	0.37	1.22	2.2	2900	1.3	0.99	5.4	6.1	5	8.4	10.2
DRN71M4/../MM07	0.55	1.81	2.2	2900	1.6	0.99	7.1	8.4	5	9.6	11.6
DRN80MK4/../MM11	0.75	2.47	2.2	2900	1.9	0.99	17.1	18.6	10	12.6	15.6
DRN80M4/../MM15	1.1	3.62	2.1	2900	2.4	0.99	24.7	26.2	10	15.6	19.3
DRN90S4/../MM22	1.5	4.95	2.1	2900	3.5	0.99	54.0	58.7	20	22.3	26.9
DRN90L4/../MM30	2.2	7.25	2.1	2900	5.0	0.99	67.2	71.9	20	25.3	29.9
DRN100LS4/../MM40	3.0	9.9	2.1	2900	6.7	0.99	81.4	87.4	28	30.2	36.1

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Technical data of MOVIMOT® inverters with DR2S.. motors

MOVIMOT® drives

280 – 1400 min^{-1} ⅄ 3 × 380 – 500 V (400 V)

IEC or UL

Type	P_N kW	M_N Nm	M_A/M_N f > 5 Hz	n_N min^{-1}	I_N A	cosφ	J_{mot} 10^{-4} kgm^2	J_{BMot} 10^{-4} kgm^2	M_B Nm	m_{Mot} kg	m_{BMot} kg
DR2S71MS4/../MM03	0.37	2.6	1.5	1 400	1.3	0.99	5.42	6.72	5	8.4	10.8
DR2S71M4/../MM05	0.55	3.85	1.5	1 400	1.6	0.99	7.14	8.44	10	9.6	12.6
DR2S80MK4/../MM07	0.75	5.1	1.5	1 400	1.9	0.99	17.1	18.6	10	12.6	15.6
DR2S80M4/../MM11	1.1	7.4	1.5	1 400	2.4	0.99	24.7	29.2	14	15.6	19.6
DR2S90S4/../MM15	1.5	10.2	1.5	1 400	3.5	0.99	54	58.7	20	21.6	26.2
DR2S90L4/../MM22	2.2	15	1.5	1 400	5	0.99	67.2	71.9	28	25.3	29.9
DR2S4100LS4/../ MM30	3	20.5	1.5	1 400	6.7	0.99	81.4	87.4	40	29.3	35.3
DR2S100L4/../MM40	4	27.3	1.5	1 400	7.3	0.99	112	118	55	37.2	43.1

290 – 2900 min^{-1} △ 3 × 380 – 500 V (400 V)

IEC or UL

Type	P_N kW	M_N Nm	M_A/M_N f > 5 Hz	n_N min^{-1}	I_N A	cosφ	J_{mot} 10^{-4} kgm^2	J_{BMot} 10^{-4} kgm^2	M_B Nm	m_{Mot} kg	m_{BMot} kg
DR2S71MS4/../MM05	0.55	1.81	2	2900	1.6	0.99	5.42	6.72	5	8.4	10.8
DR2S71M4/../MM07	0.75	2.47	2	2900	1.9	0.99	7.14	8.44	10	9.6	12.6
DR2S80MK4/../MM11	1.1	3.62	2	2900	2.4	0.99	17.1	18.6	10	12.6	15.6
DR2S80M4/../MM15	1.5	4.95	1.6	2900	3.5	0.99	24.7	29.2	14	15.6	19.6
DR2S90S4/../MM22	2.2	7.25	1.6	2900	5	0.99	54	58.7	20	22.3	26.9
DR2S90L4/../MM30	3	9.9	1.6	2900	6.7	0.99	67.2	71.9	28	25.3	29.9
DR2S4100LS4/../ MM40	4	13.2	1.6	2900	7.3	0.99	81.4	87.4	40	30.2	36.1

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MOVIMOT® drives with increased short-term torque

For implementing MOVIMOT® drives with increased short-term torque, the motor is assigned a MOVIMOT® inverter with one power rating higher.

280 – 1400 min^{-1} ⅄ 3 × 380 – 500 V (400 V)

IEC or UL

Type	P_N kW	M_N Nm	M_A/M_N f > 5 Hz	n_N min^{-1}	I_N A	cosφ	J_{mot} 10^{-4} kgm^2	J_{BMot} 10^{-4} kgm^2	M_B Nm	m_{Mot} kg	m_{BMot} kg
DR2S71MS4/../MM05	0.37	2.6	2.1	1 400	1.3	0.99	5.42	6.72	5	8.4	10.8
DR2S71M4/../MM07	0.55	3.85	2.1	1 400	1.6	0.99	7.14	8.44	10	9.6	12.6
DR2S80MK4/../MM11	0.75	5.1	2.1	1 400	1.9	0.99	17.1	18.6	10	12.6	15.6
DR2S80M4/../MM15	1.1	7.4	2.1	1 400	2.4	0.99	24.7	29.2	14	15.6	19.6
DR2S90S4/../MM22	1.5	10.2	2.1	1 400	3.5	0.99	54	58.7	20	22.3	26.9
DR2S90L4/../MM30	2.2	15	2.1	1 400	5	0.99	67.2	71.9	28	25.3	29.9
DR2S4100LS4/../ MM40	3	20.5	2	1 400	6.7	0.99	81.4	87.4	40	30.2	36.1

290 – 2900 min^{-1} △ 3 × 380 – 500 V (400 V)

IEC or UL

Type	P_N kW	M_N Nm	M_A/M_N f > 5 Hz	n_N min^{-1}	I_N A	cosφ	J_{mot} 10^{-4} kgm^2	J_{BMot} 10^{-4} kgm^2	M_B Nm	m_{Mot} kg	m_{BMot} kg
DR2S71MS4/../MM07	0.55	1.81	2.4	2900	1.6	0.99	5.42	6.72	5	8.4	10.8
DR2S71M4/../MM011	0.75	2.47	2.4	2900	1.9	0.99	7.14	8.44	10	9.6	12.6
DR2S80MK4/../MM15	1.1	3.62	2.4	2900	2.4	0.99	17.1	18.6	10	12.6	15.6
DR2S80M4/../MM22	1.5	4.95	2.2	2900	3.5	0.99	24.7	29.2	14	22.3	26.3
DR2S90S4/../MM30	2.2	7.25	2.2	2900	5	0.99	54	58.7	20	22.3	26.9
DR2S90L4/../MM40	3	9.9	2	2900	6.7	0.99	67.2	71.9	28	26.2	30.8

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Designs with AS-Interface

Overview of AS-Interface options

The following table shows the main differences between the AS-Interface options:

AS-Interface option	Stations at the AS-Interface	Number of speed setpoints	Number of ramps	Can be parameterized via AS-Interface	24 V supply for MOVIMOT®
MLK30A	max. 31	2 (16[1)])	1 x t_{UP} 1 x t_{DOWN}	No	AS-Interface or AUX PWR
MLK31A	max. 31	6	3 x t_{UP} 3 x t_{DOWN}	Yes	AS-Interface or AUX PWR
MLK32A	max. 62	6	3 x t_{UP} 3 x t_{DOWN}	No	AUX PWR

1) Due to the parameterization of scaling factors, 16 fixed setpoints are available.

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MLK30A

Connected to the AS-Interface, the MLK30A slave works like a module with 4 inputs and 4 outputs.

The cyclic output bits control the MOVIMOT® inverter.

The input bits transmit the status of the drive and 2 additional sensor signals to the AS-Interface master.

The acyclic parameter bits are used to select speed scaling factors.

The MLK30A option is compatible with MOVIMOT® MM..C with integrated AS-Interface.

MLK31A

The MLK31A option works as a double slave on the AS-Interface according to AS-Interface specification 3.0.

The serial AS-Interface data transmission (analog profile) allows for MOVIMOT® parameters and display values to be written and read.

The MOVIMOT® inverter is controlled via the cyclic output bits. The coding of the data bits is specified in different function modes. The MOVIMOT® inverter interprets these bits as different control and status codes. With the acyclic parameter bits, you can switch between the function modes.

The input bits transmit the status of the drive and 2 additional sensor signals to the AS-Interface master.

MLK32A

The MLK32A option works as a slave on the AS-Interface according to AS-Interface specification 3.0.

The MOVIMOT® inverter is controlled via the cyclic output bits. The coding of the data bits is specified in different function modules. The MOVIMOT® inverter interprets these bits as different control and status codes. You can switch between the function modules using acyclic parameter bits.

The input bits transmit the status of the drive and 2 additional sensor signals to the AS-Interface master.

MOVIMOT® options

MOVIMOT® drives can be extended by various options.

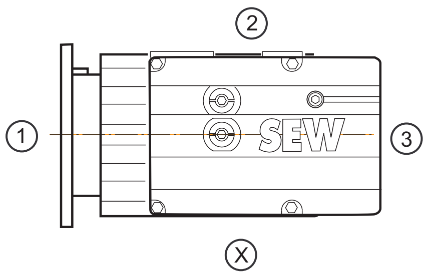
- Internal options are installed in the connection box.
- External options are installed outside the connection box.

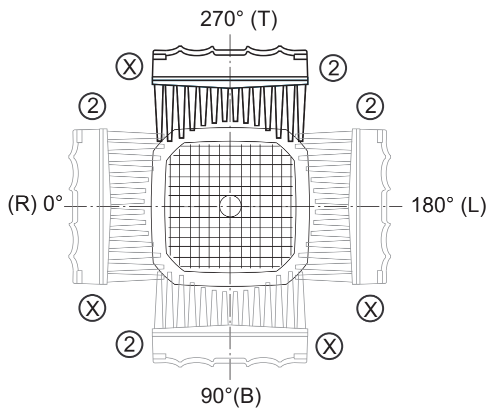
/MO

The type designation contains /MO no matter whether one or several of the following options are used.

Designation	Description of the option for MOVIMOT®	Installation
BEM	Brake control (400 V brake)	Internal
BES	Brake control (24 V brake)	
URM	Voltage relay	
MNF21A	Line filter (MM03 – MM15)	
MLU13A	DC 24 V voltage supply (380 - 500 V)	
MLU11A	DC 24 V voltage supply (380 - 500 V)	External
MLU21A	DC 24 V voltage supply (200 - 240 V)	
MLG11A	Setpoint adjuster with DC 24 V voltage supply (380 – 500 V)	
MLG21A	Setpoint adjuster with DC 24 V voltage supply (200 – 240 V)	
MBG11A	Setpoint adjuster	
MWA21A	Setpoint converter	
MF... MQ...	Fieldbus interface (PROFIBUS, PROFINET IO, EtherCAT® EtherNet/IP™, INTERBUS, DeviceNet™)	

External options can be installed in positions "2" or "X" as standard:





For more information, refer to the "MOVIMOT® Gearmotors" catalog.

Motor identification for MOVIMOT® (/MI)

When you order a motor that is suited for combining it with a MOVIMOT® inverter for mounting close to the motor, you can also order the DIM module matching the motor. The DIM module is attached in the terminal box of the motor and is indicated as /MI in the type designation of the motor.

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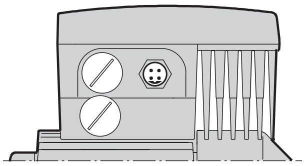
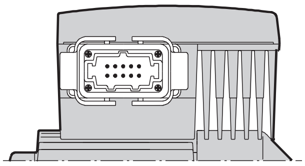
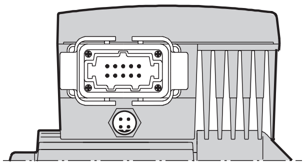
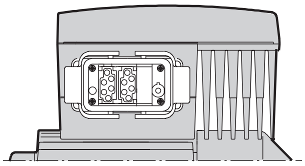
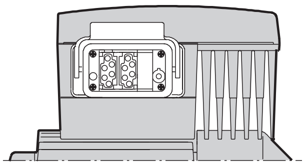
Connection technology

Connection technology of MOVIMOT® standard design

The MOVIMOT® drive is supplied without a plug connector unless otherwise specified in the order.

The following table shows the plug connector variants available for MOVIMOT® drives in standard design:

Order designation	Function	Manufacturer's designation
MM../AVT1 	• RS485	Round plug connector M12 x 1
MM../ASA3 	• Power rating	Harting Han® 10 ES pin insert (built-on housing with 2 clips)
MM../ASA3/AVT1 	• Power rating • RS485	Harting Han® 10 ES pin insert (built-on housing with 2 clips) + Round plug connector M12 x 1
MM../AMA6 	• Power/RS485	Harting Han Modular® pin insert (built-on housing with 2 clips)
MM../AMD6 	• Power/RS485	Harting Han Modular® pin insert (built-on housing with 1 clip)

Plug connectors can be installed in positions "2" or "X" as standard.

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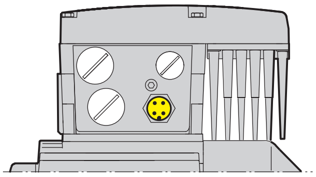
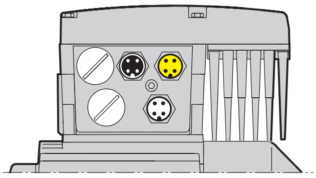
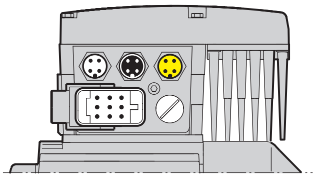
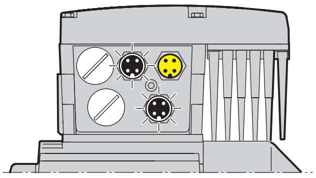
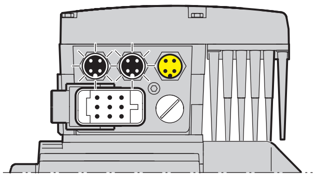
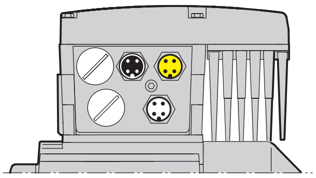
Connection technology of MOVIMOT® with integrated AS-Interface

MOVIMOT® with integrated AS-Interface is supplied with AVSK plug connector without a plug connector unless otherwise specified.

The following table shows the plug connector variants available for MOVIMOT® drives with integrated AS-Interface:

Order designation	Function	Manufacturer's designation
MM../AVSK 	• AS-Interface	1 x round plug connector M12 x 1
MM../AZSK 	• AS-Interface • AUX PWR • Sensor port	3 x round plug connector M12 x 1
MM../AND3/AZSK 	• Power rating • AS-Interface • AUX PWR • Sensor port	Harting Han® Q8/0 pin insert (built-on housing with 1 clip) + 3 x round plug connector M12 x 1
MM../AZZK 	• AS-Interface/ AUX-PWR • Sensor port • Sensor port	3 x round plug connector M12 x 1
MM../AND3/AZZK 	• Power rating • AS-Interface/ AUX-PWR • Sensor port • Sensor port	Harting Han® Q8/0 pin insert (built-on housing with 1 clip) + 3 x round plug connector M12 x 1
MM../AZFK 	• AS-Interface • 24 V supply of MOVIMOT® • Sensor port	3 x M12 plug connector

Plug connectors can be installed in positions "2" or "X" as standard.

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Functional safety

Safety-rated MOVIMOT® frequency inverter

The safety technology of the MOVIMOT® drive was developed and tested according to the following safety requirements:

- Performance level d according to EN ISO 13849-1
- SIL 2 according to IEC 61800-5-2

This was certified by TÜV Nord.

For the safety-related use of MOVIMOT®, "Safe Torque Off" is defined as a safe condition (STO safety function). This is the basis of the underlying safety concept.

Permitted SafetyDRIVE designs

Only the following combinations with MOVIMOT® are permitted for safety-relevant applications:

Permitted designs	MOVIMOT® type designation
MOVIMOT® with binary control (control via terminals)	D../MM.. – SafetyDRIVE MM..D-503-00 – SafetyDRIVE
MOVIMOT® with AS-Interface option MLK32A	
MOVIMOT® with MBG11A option	
MOVIMOT® with MWA 21A option	
MOVIMOT® with MBK11A or MBK12A option	
MOVIMOT® with BEM option	
MOVIMOT® with URM option	
MOVIMOT® with MNF21A option	
MOVIMOT® and MOVIFIT® MC with FS logo and externally switched 24 V supply (STO)	
MOVIMOT® and MOVIFIT® MC with FS logo and PROFIsafe option S11	
MOVIMOT® and MOVIFIT® MC with FS logo and safety option S12	
MOVIMOT® with field distributors Z.6, Z.7, Z.8 or Z.9	

For information on the safety function and the safety-related requirements, refer to the "MOVIMOT® MM..D – Functional Safety" manual.

Order information

INFORMATION

- The SafetyDRIVE design must be ordered explicitly. (Order note: "– SafetyDRIVE").
- In safety applications, only components may be used that were supplied by SEW-EURODRIVE in this design and that are marked with the FS logo for functional safety.

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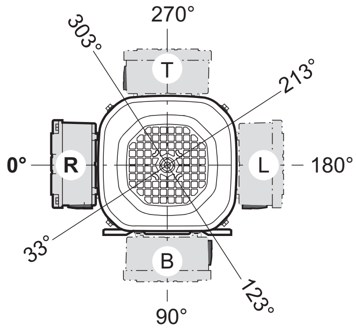
Dimension sheet information

Note the following for the dimension sheets of MOVIMOT® AC motors:

- Foot-mounted motors are available with connection box position 270° only.
- A fan guard represented by a dotted line shows the design with brake.
- Different positions are possible for the manual brake release. The 4 positions 33°, 123°, 213° or 303° are basically possible.



6024047499

- The manual brake release is located at an angle of 303° to the connection box as standard. The manual brake release can be turned by 4 × 90°. The forced cooling fan option (/V) limits the possible positions of the manual brake release.
- For brakemotors, do not forget to add the space required for removing the fan guard (= fan guard diameter).
- Leave a clearance of at least half the fan guard diameter to provide unhindered air access.
- The motor dimensions can change when installing motor options. Refer to the dimension drawings of the motor options.

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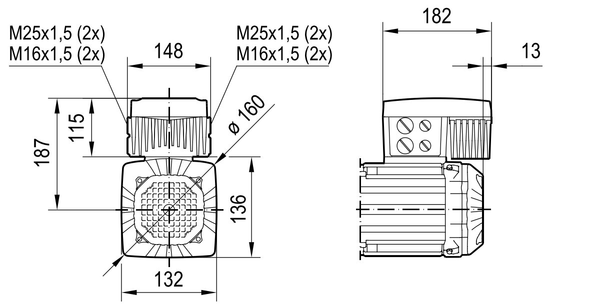
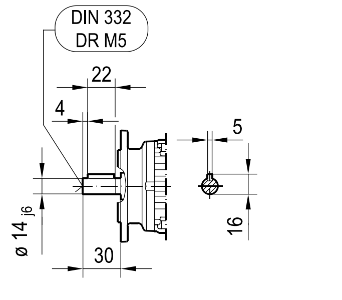
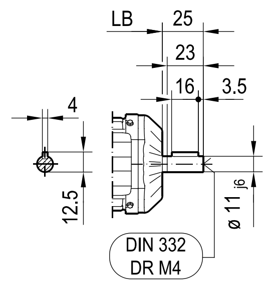
Dimension sheets for MOVIMOT® motors/brakemotors of the DRN.., DR2S.. series

DRN71MS/MM **08 098 01 18**
DR2S71MS/MM **1(2)**
DRN71M/MM

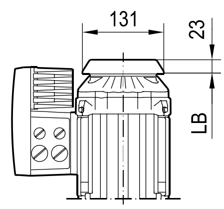




/2W



/C



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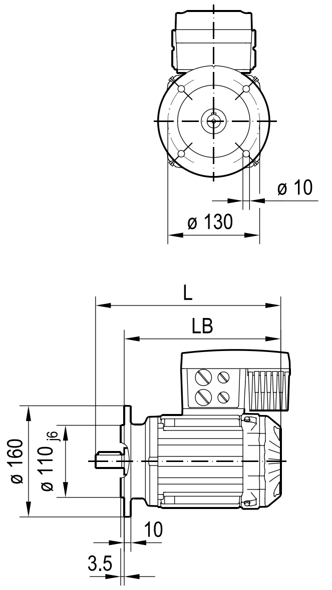
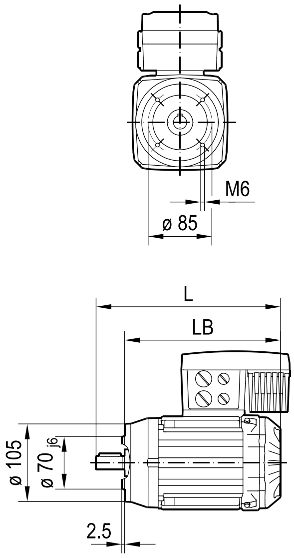
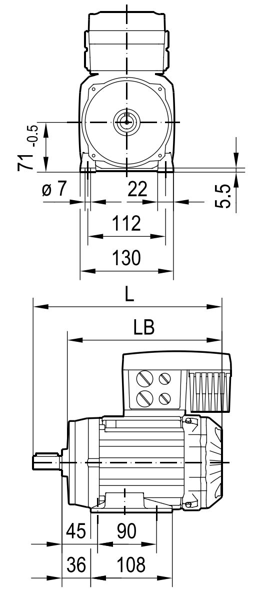


/FT (B14) FT85D105



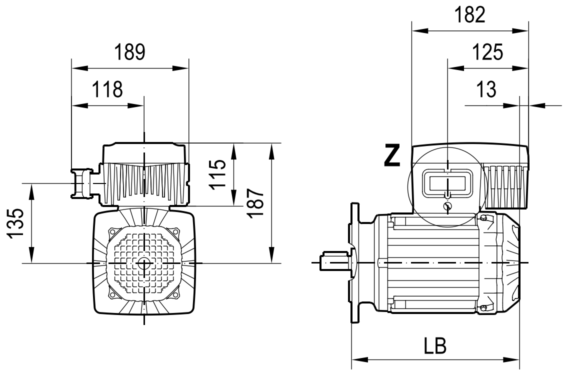
/FI (B3) FI71M

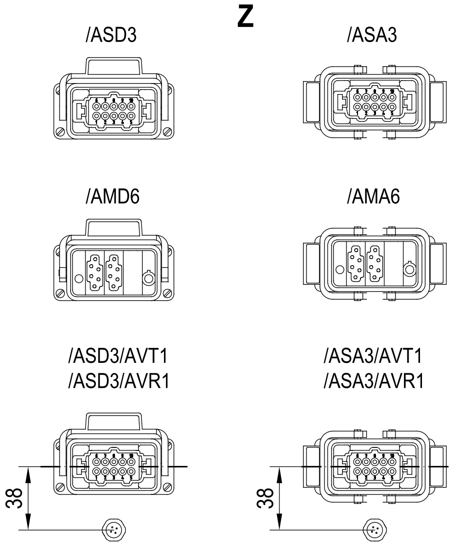


(→ 📖)	71MS	71M						
L	232	252						
LB (B5/B14)	202	222						
LB (B3)	200	220						

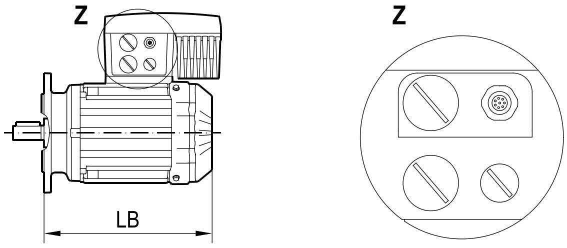
MM03-MM07/IV

08 098 01 18
2(2)

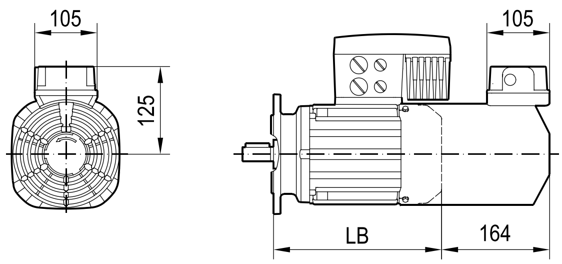




/MM-D../EI7./AV.E



/MM-D../V



(→ 📖)	71MS	71M						
L	232	252						
LB (B5/B14)	202	222						
LB (B3)	200	220						

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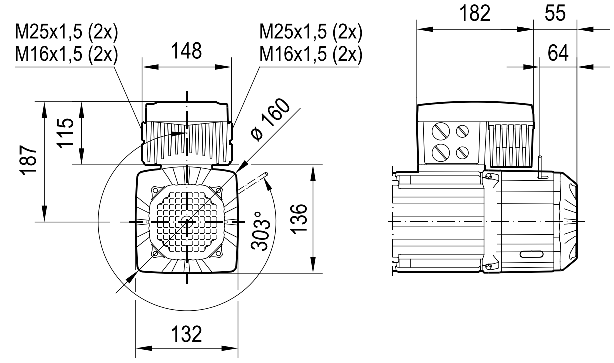
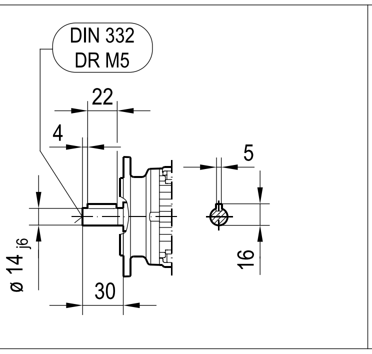
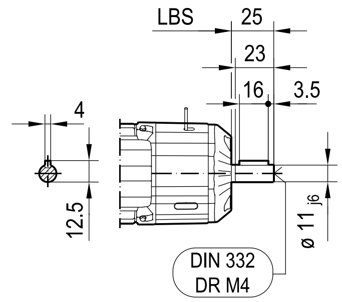
DRN71MS BE/MM
DR2S71MS BE/MM
DRN71M BE/MM

09 116 01 18
1(2)





/2W



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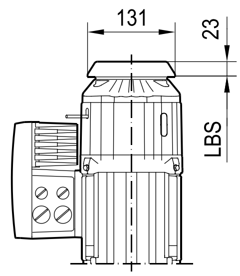
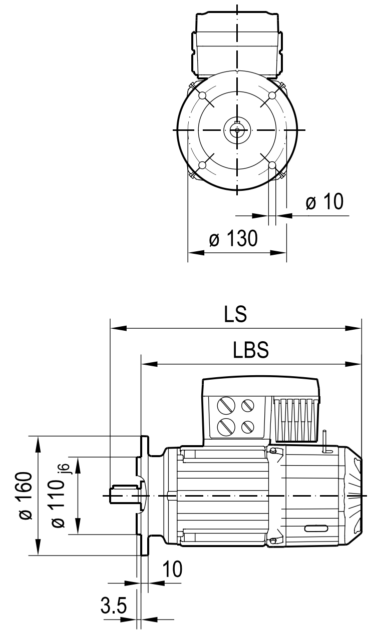


/FF (B5) FF130D160



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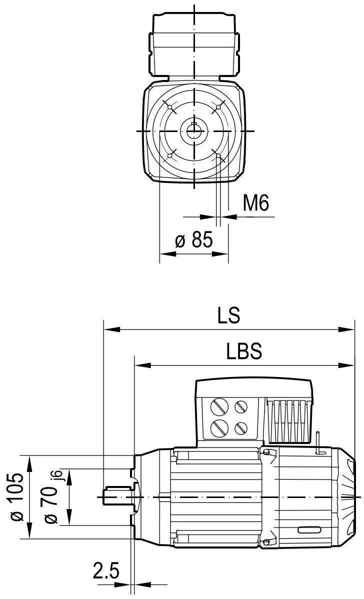
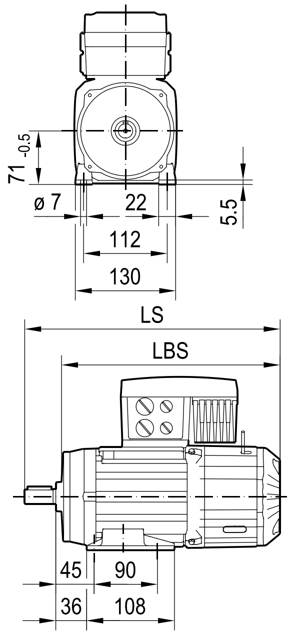


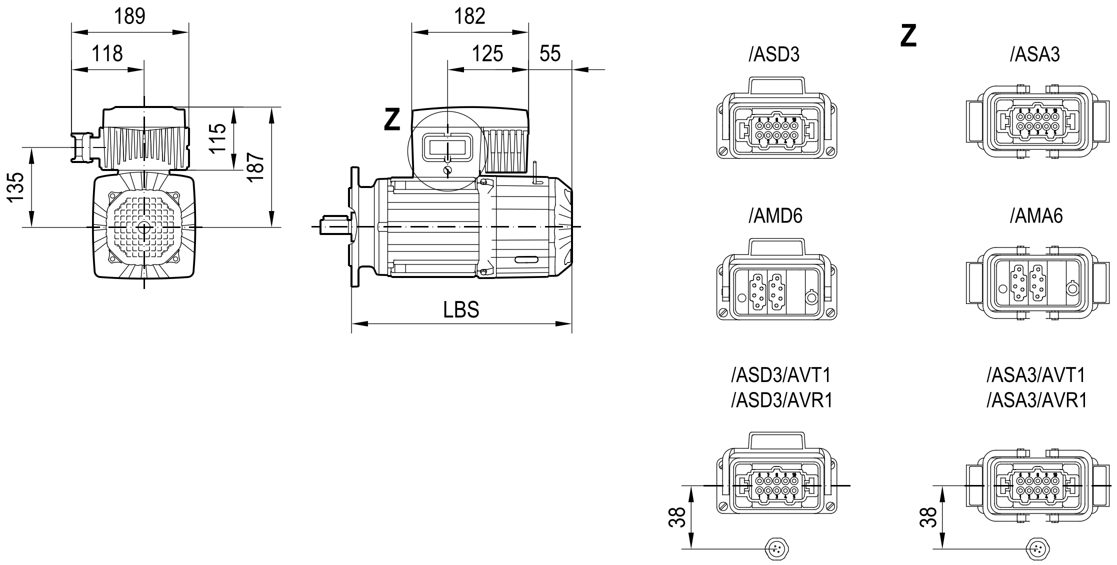
/FI (B3) FI71M



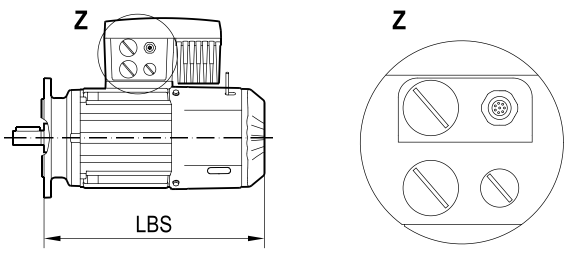
(→ 📖)	71MS	71M						
LS	299	319						
LBS (B5/B14)	269	289						
LBS (B3)	267	287						

MM03-MM07/IV

09 116 01 18
2(2)



/MM-D../EI7./AV.E



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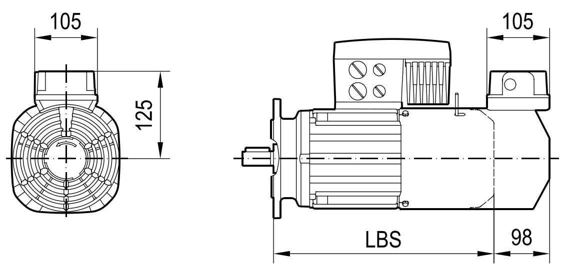

(→ 📖)	71MS	71M						
LS	299	319						
LBS (B5/B14)	269	289						
LBS (B3)	267	287						

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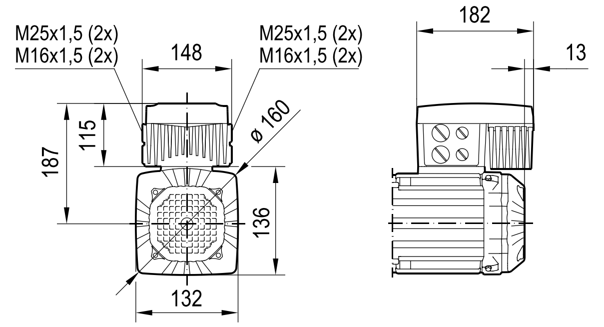
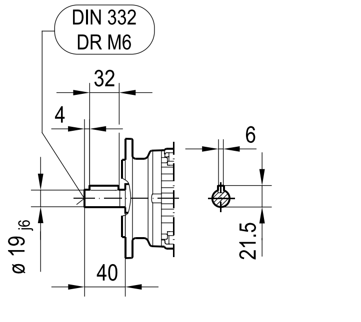
DR2S71M/MM

08 106 01 18
1(2)





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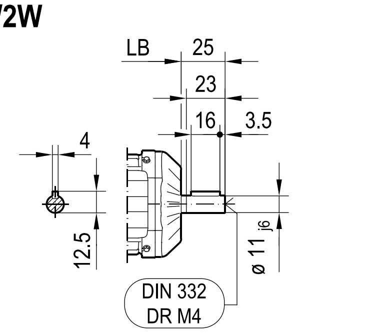

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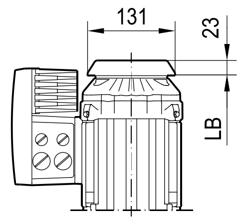

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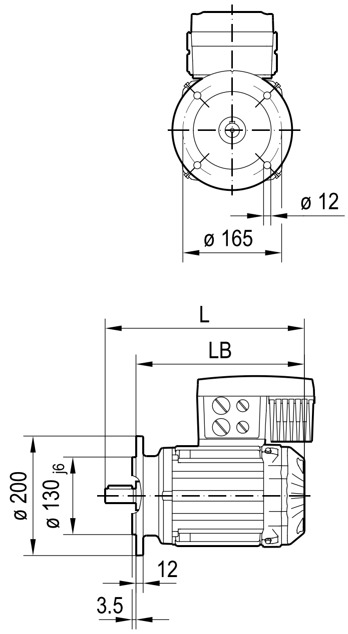
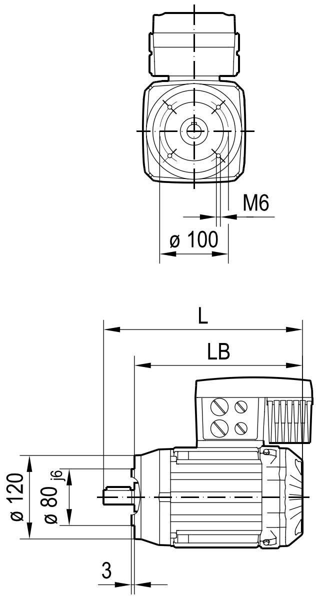
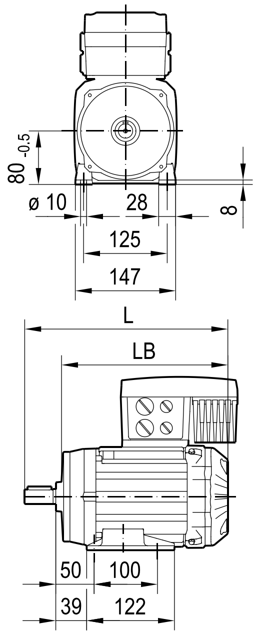


/FT (B14) FT100D120



/FI (B3) FI80M



(→ 📖)	71M							
L	262							
LB (B5/B14)	222							
LB (B3)	220							

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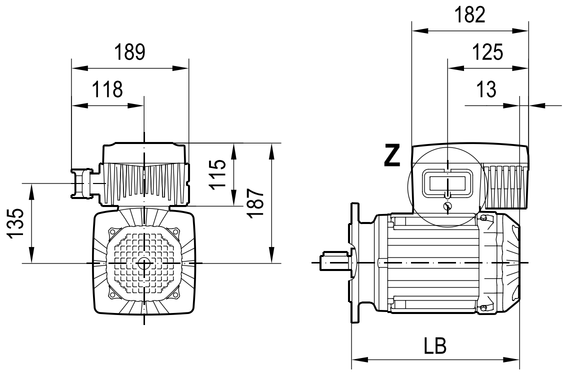
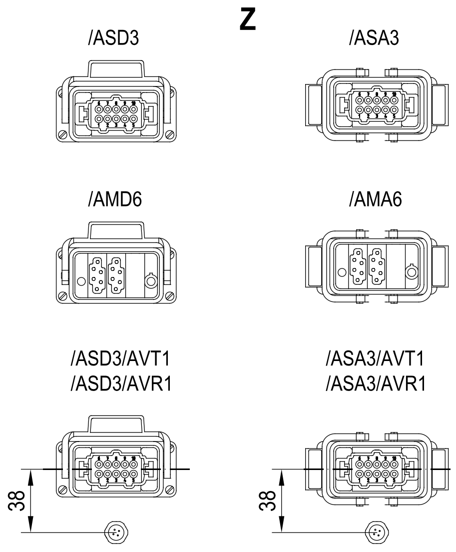
MM05-MM11/IV

08 106 01 18
2(2)





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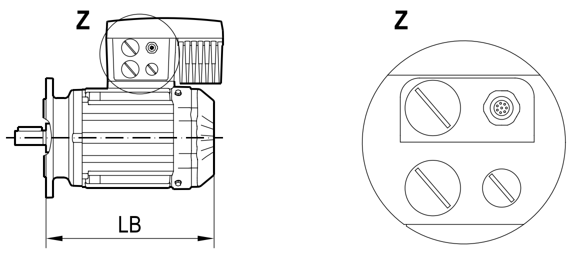

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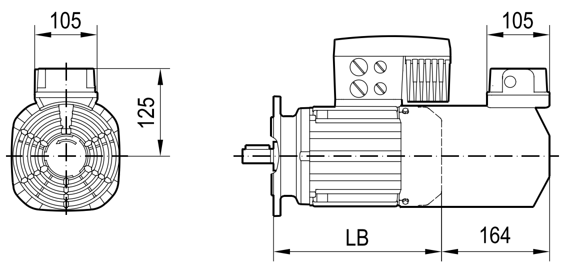
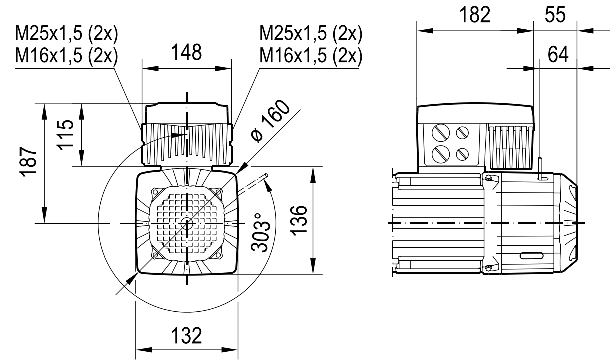
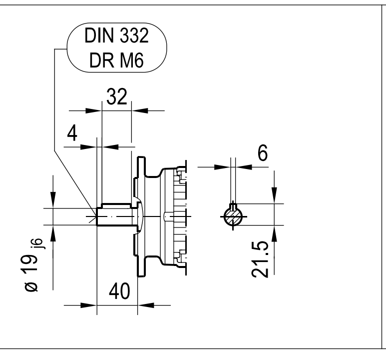


(→ 📖)	71M							
L	262							
LB (B5/B14)	222							
LB (B3)	220							

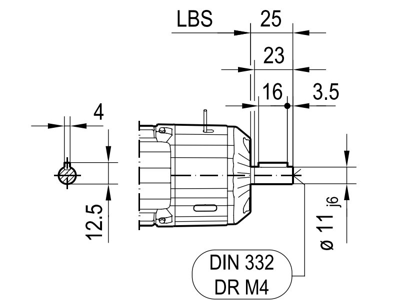
DR2S71M BE/MM

09 121 01 18
1(2)





/2W



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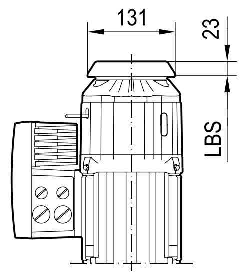
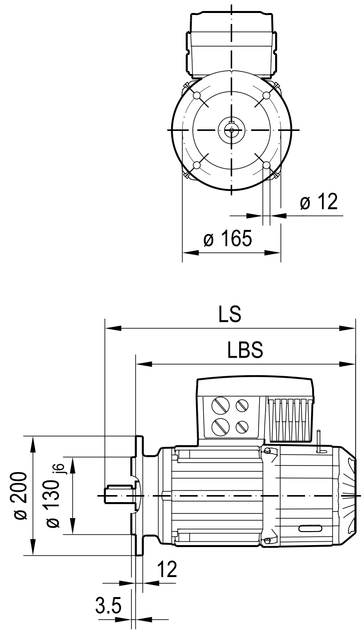


/FF (B5) FF165D200



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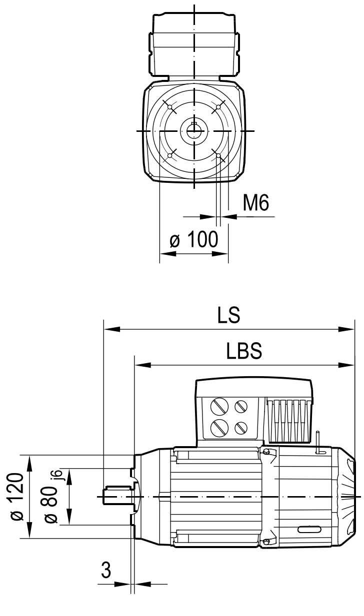
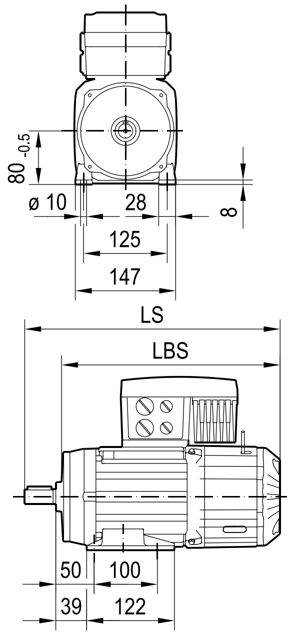


/FI (B3) FI80M



(→ 📖)	71M							
LS	329							
LBS (B5/B14)	289							
LBS (B3)	287							

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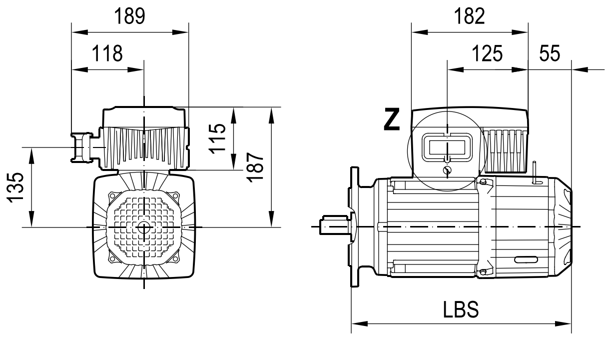
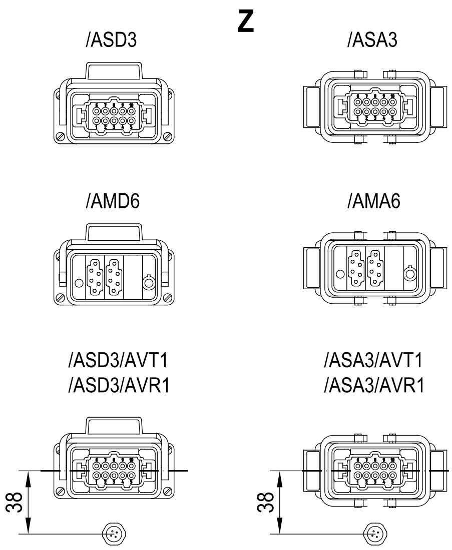
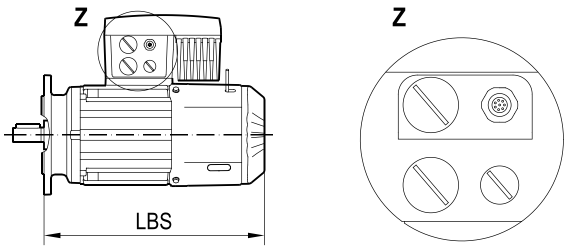
MM05-MM11/IV

09 121 01 18
2(2)

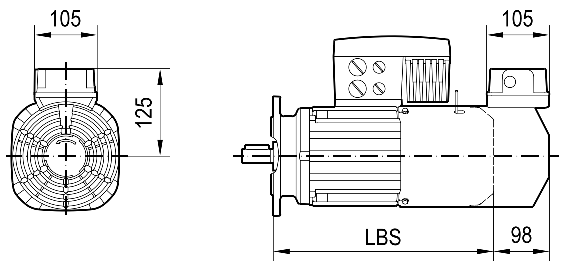




/MM-D../EI7./AV.E



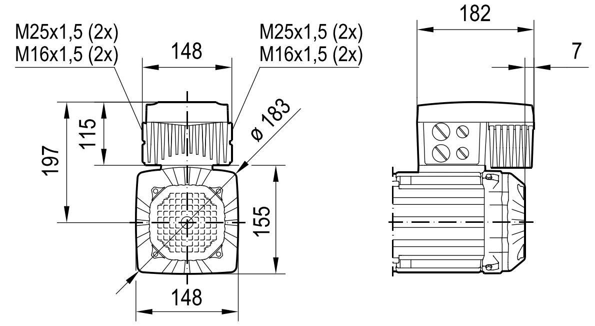
/MM-D../V

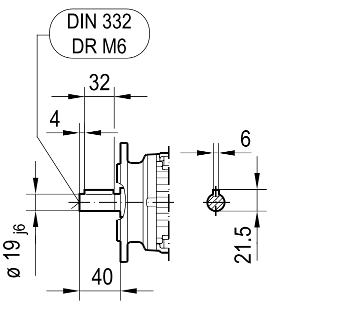


(→ 📖)	71M							
LS	329							
LBS (B5/B14)	289							
LBS (B3)	287							

DRN80MK/MM
DR2S80MK/MM
DRN80M/MM

08 099 01 18
1(2)





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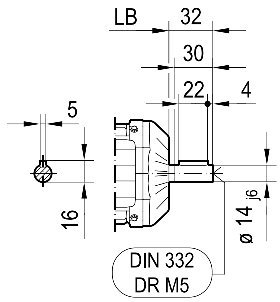

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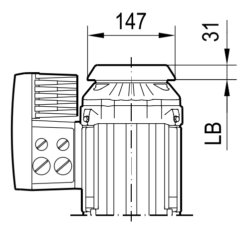

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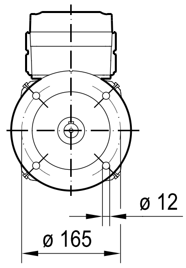

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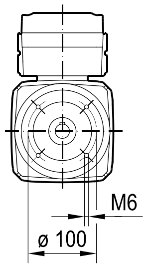

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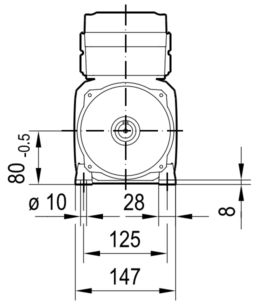

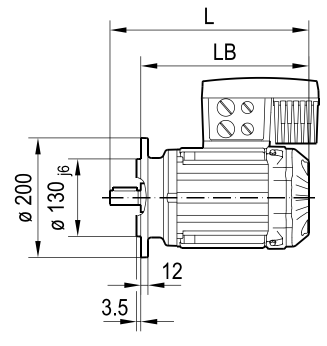

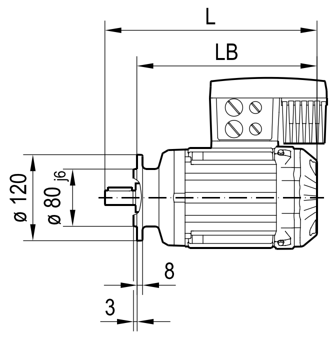

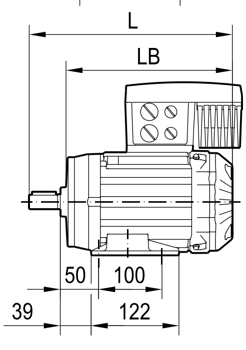

(→ 📖)	80MK	80M						
L	281	327						
LB (B5/B14)	241	287						
LB (B3)	239	285						

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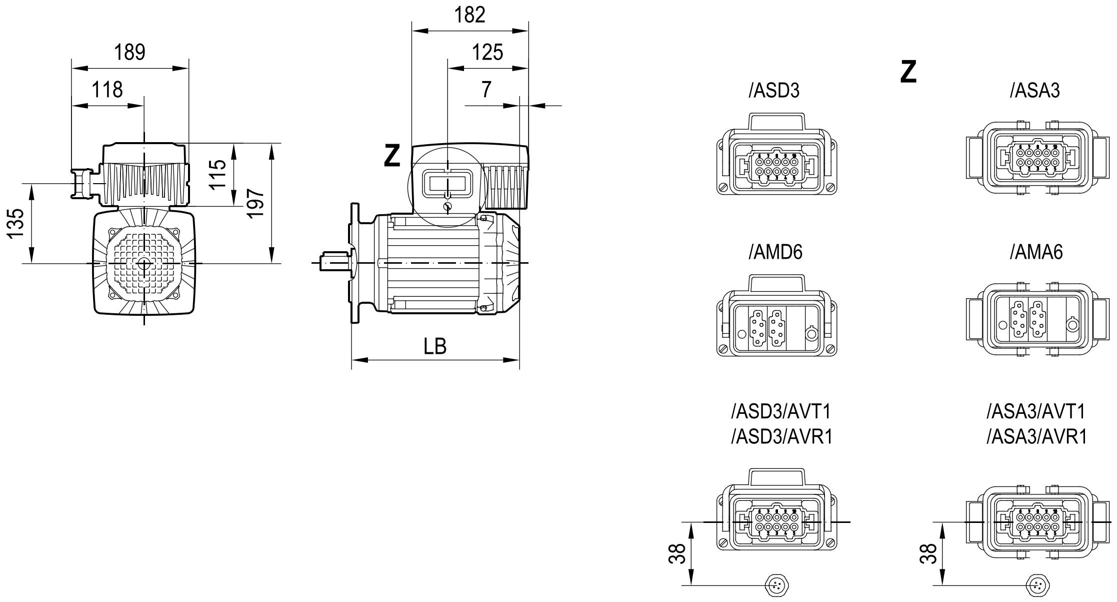
08 099 01 18
2(2)

MM05-MM15/IV



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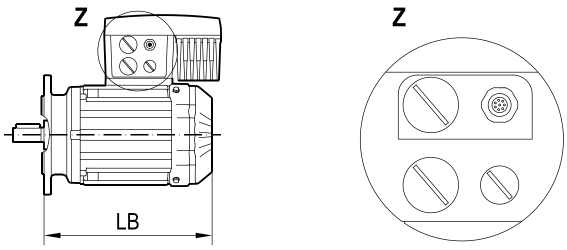

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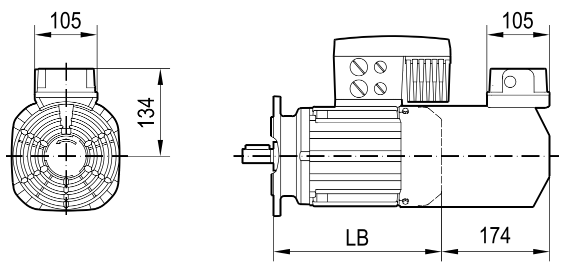
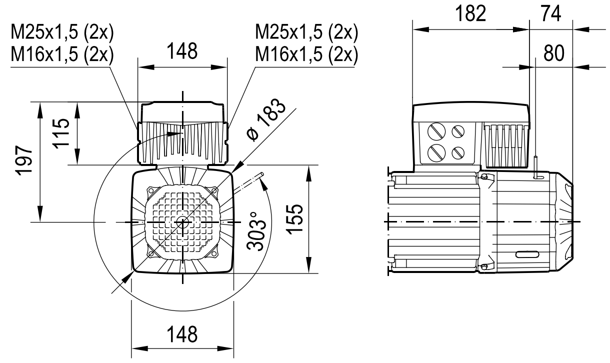
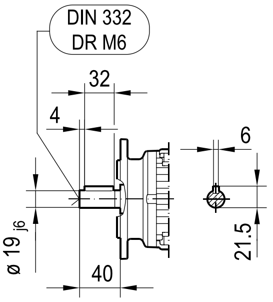


(→ 📖)	80MK	80M						
L	281	327						
LB (B5/B14)	241	287						
LB (B3)	239	285						

DRN80MK BE/MM
DR2S80MK BE/MM
DRN80M BE/MM

09 117 01 18
1(2)





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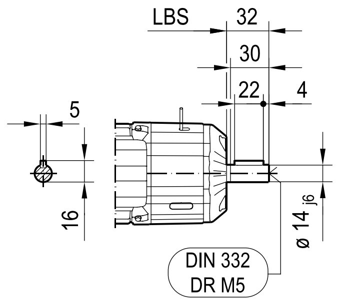

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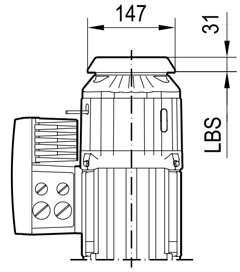

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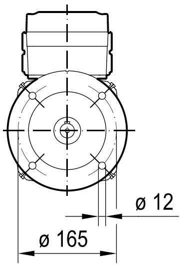

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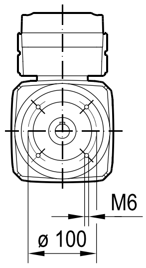

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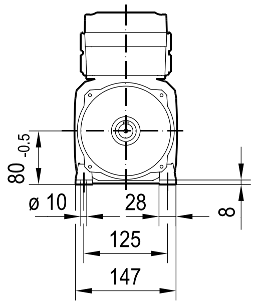

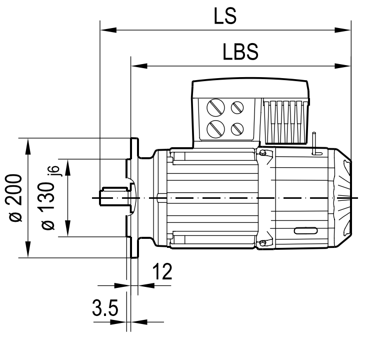

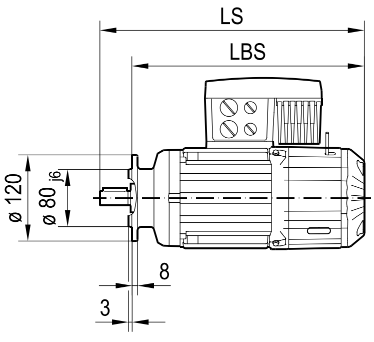

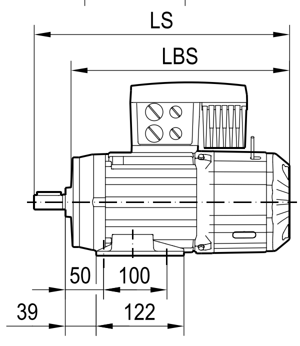

(→ 📖)	80MK	80M						
LS	362	408						
LBS (B5/B14)	322	368						
LBS (B3)	320	366						

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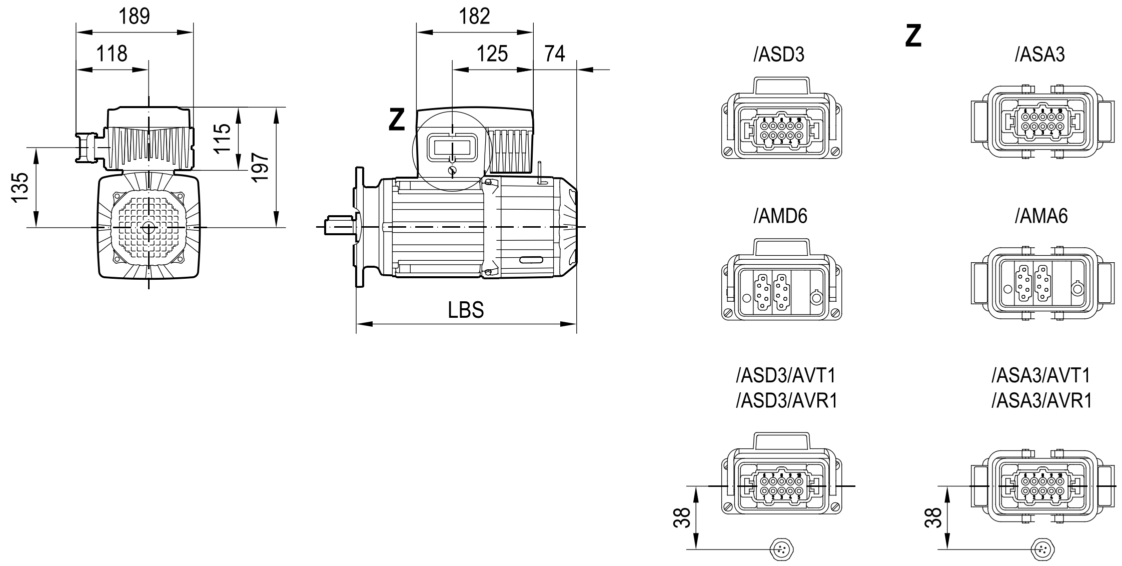
09 117 01 18
2(2)

MM05-MM15/IV



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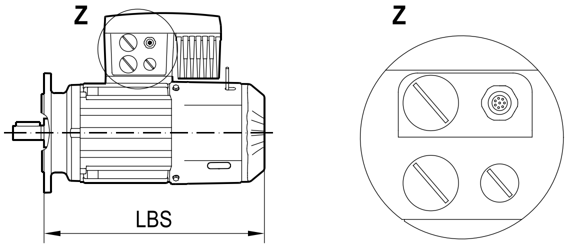

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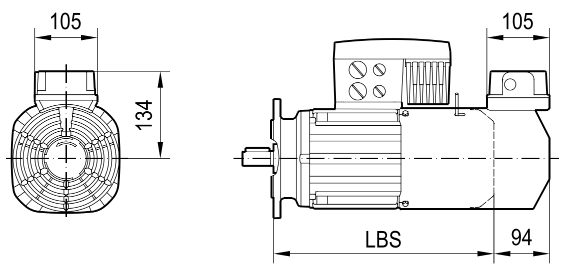
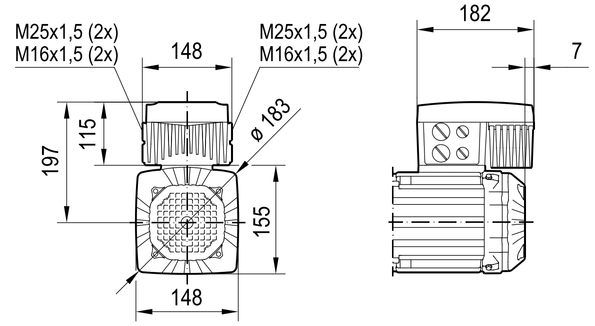
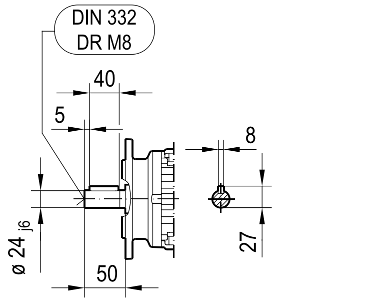


(→ 📖)	80MK	80M						
LS	362	408						
LBS (B5/B14)	322	368						
LBS (B3)	320	366						

DR2S80M/MM

08 107 01 18
1(2)





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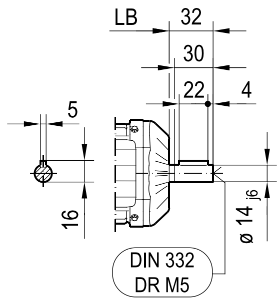

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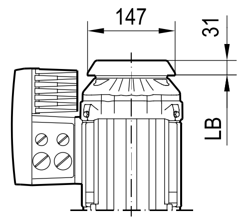

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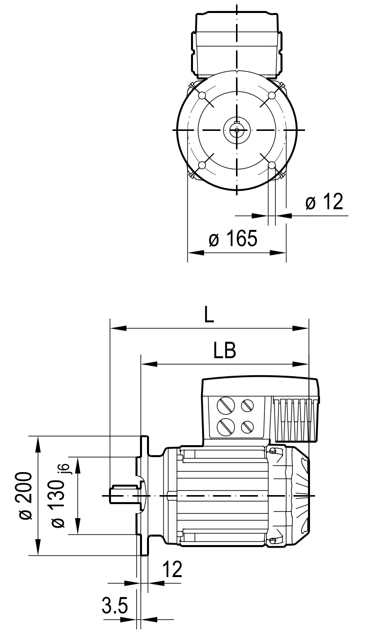

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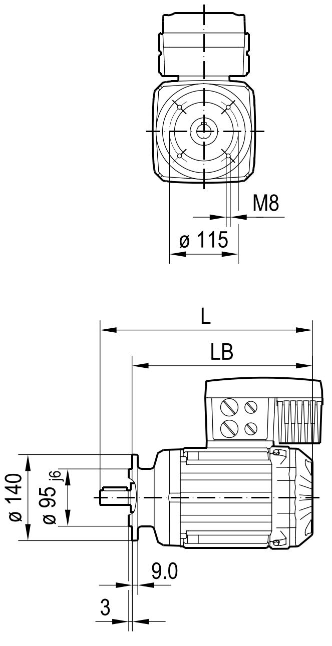

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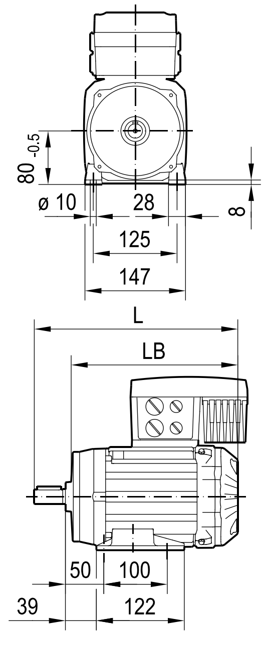
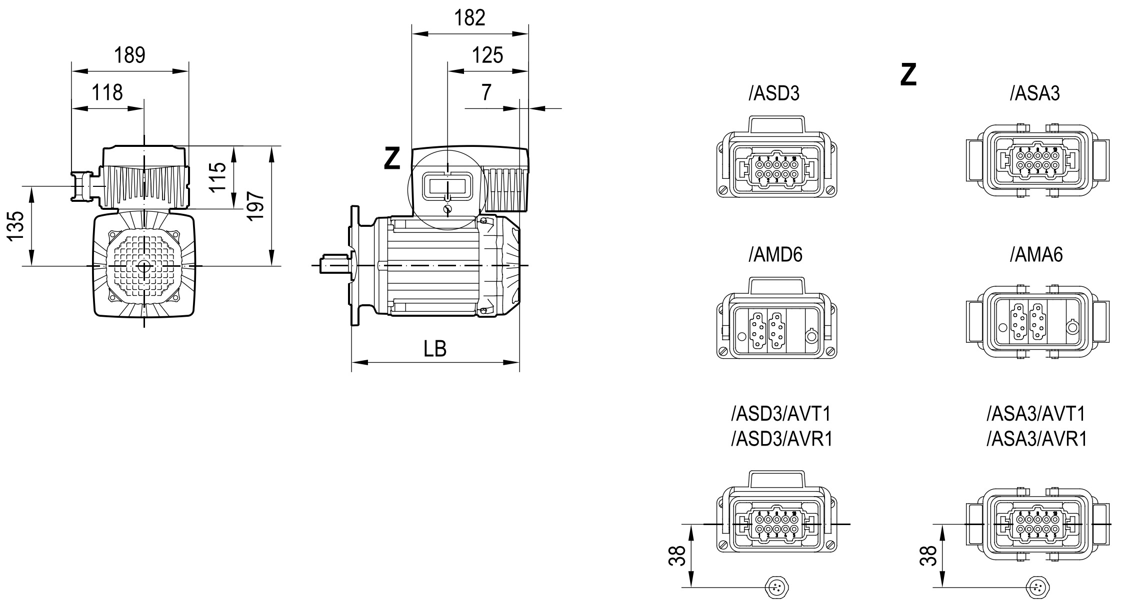


(→ 📖)	80M							
L	337							
LB (B5/B14)	287							
LB (B3)	285							

MM11-MM15/IV

08 107 01 18
2(2)



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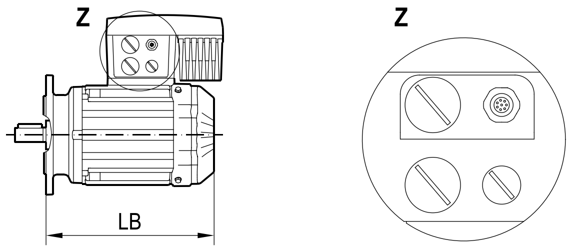

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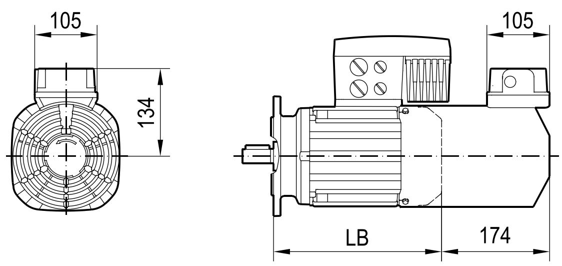

(→ 📖)	80M							
L	337							
LB (B5/B14)	287							
LB (B3)	285							

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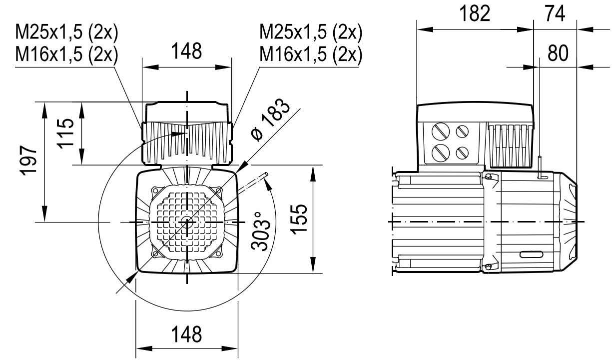
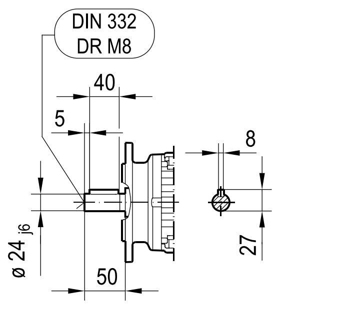
DR2S80M BE/MM

09 122 01 18
1(2)





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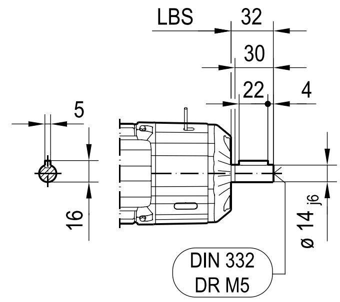

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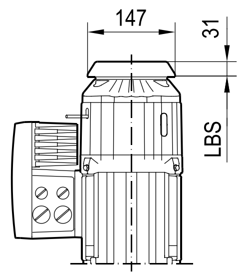

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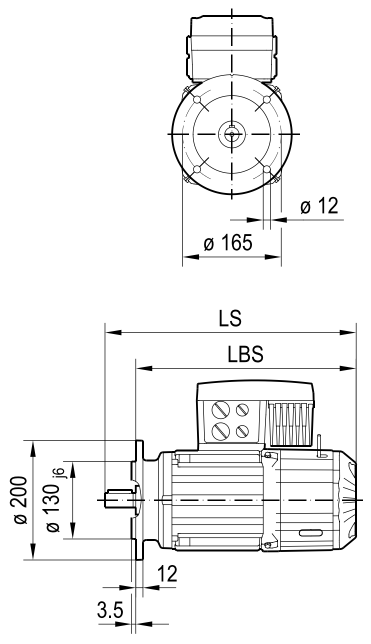

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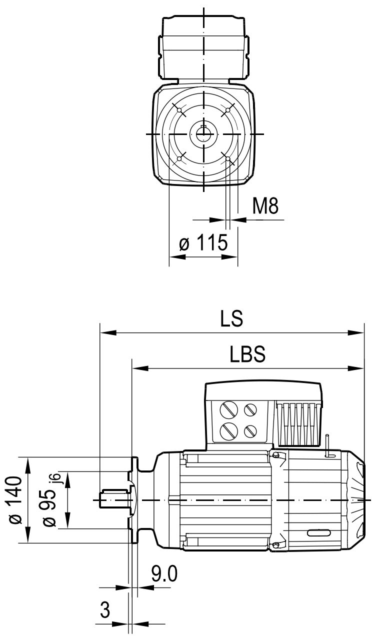

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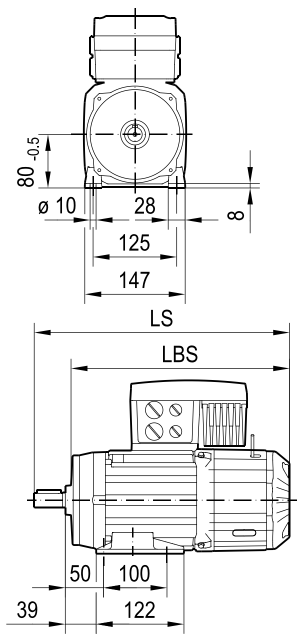

(→ 📖)	80M							
LS	418							
LBS (B5/B14)	368							
LBS (B3)	366							

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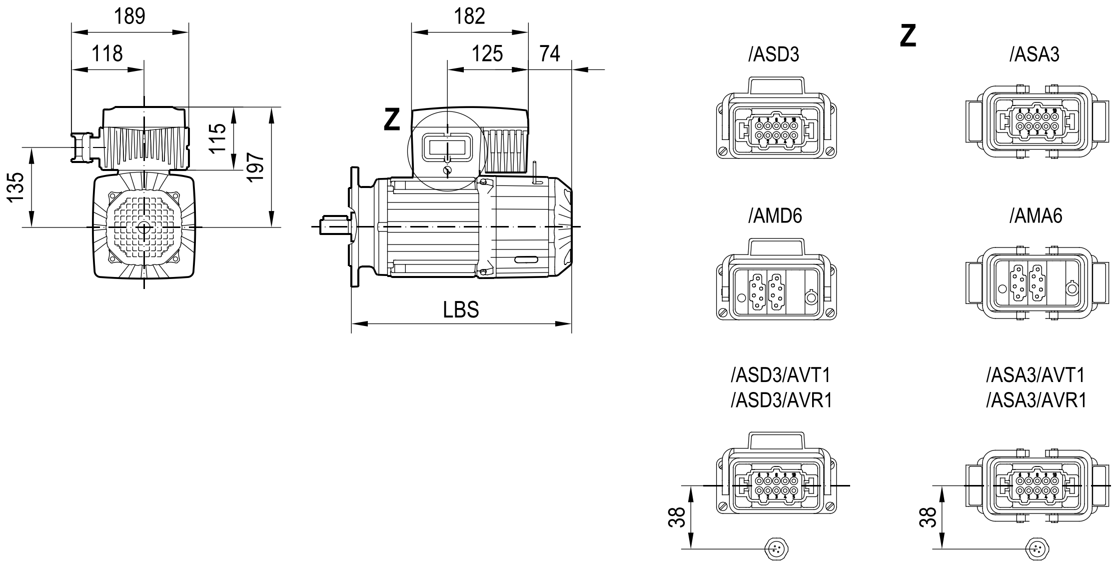
MM11-MM15/IV

09 122 01 18
2(2)



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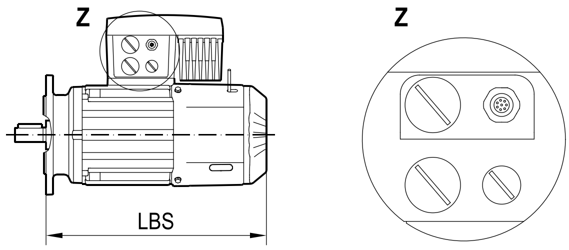

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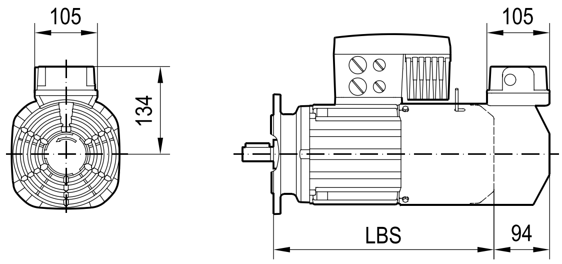
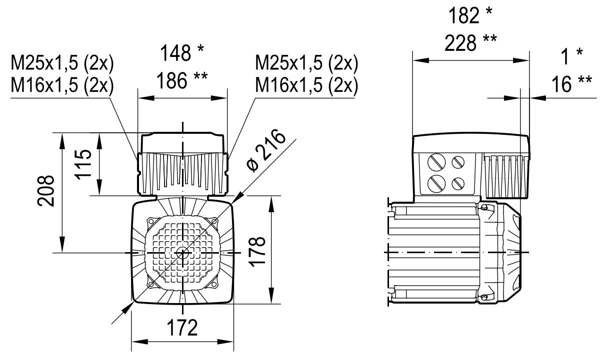
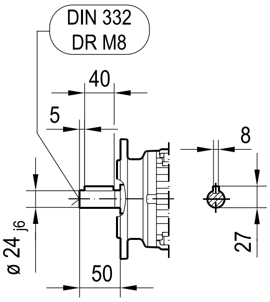


(→ 📖)	80M							
LS	418							
LBS (B5/B14)	368							
LBS (B3)	366							

DRN90S/MM
DRN90L/MM

08 640 01 15
1(2)





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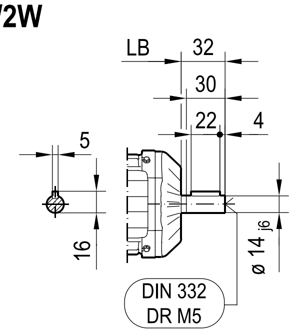

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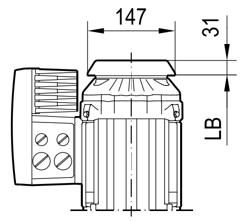

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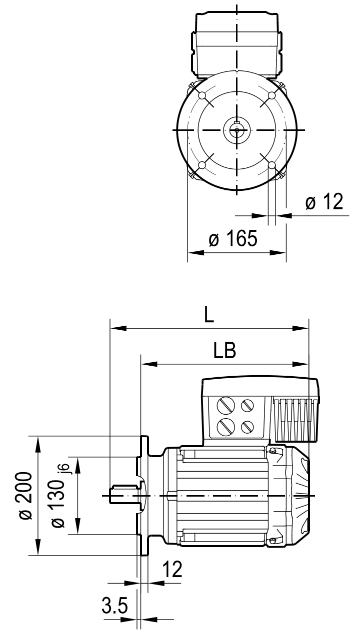

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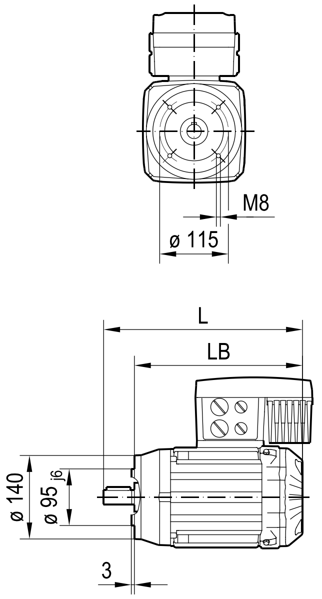

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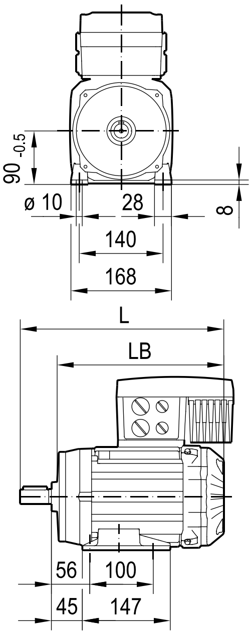

(→ 📖)	90S	90L						
L	331	363						
LB (B5/B14)	281	313						
LB (B3)	279	311						
*Typ MM	*MM11-15	*MM15						
**Typ MM	**MM22	**MM22-30						

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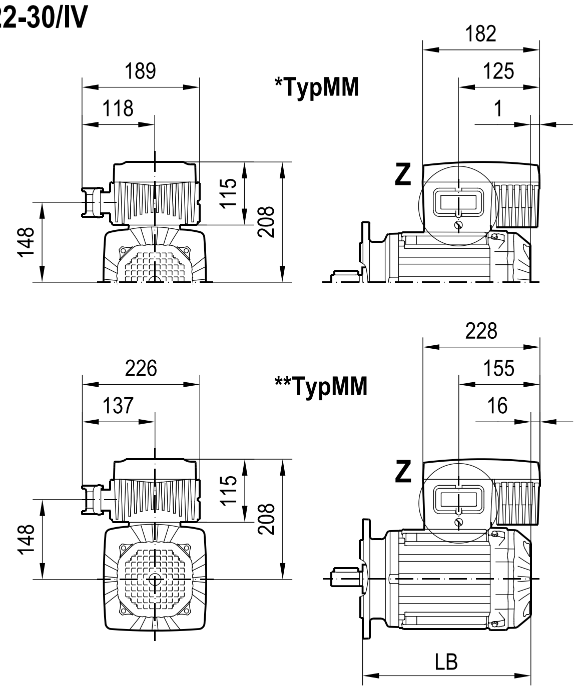
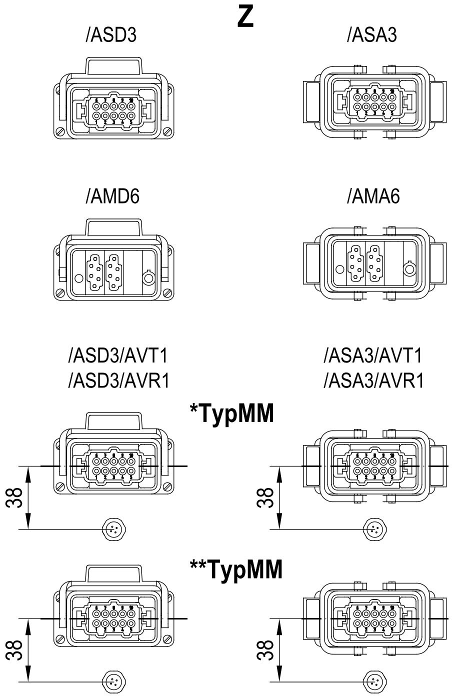
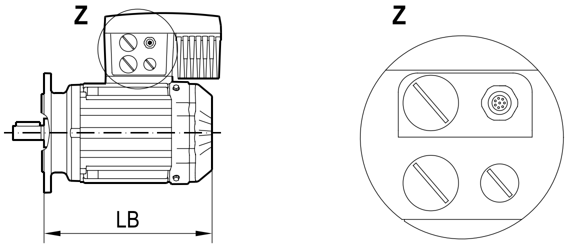
08 640 01 15
2(2)

MM11-15/IV
MM22-30/IV

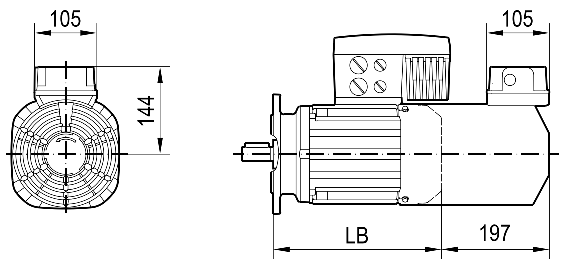




/MM-D../EI7./AV.E



/MM-D../V



(→ 📖)	90S	90L						
L	331	363						
LB (B5/B14)	281	313						
LB (B3)	279	311						
***Typ MM**	*MM11-15	*MM15						
****Typ MM**	**MM22	**MM22-30						

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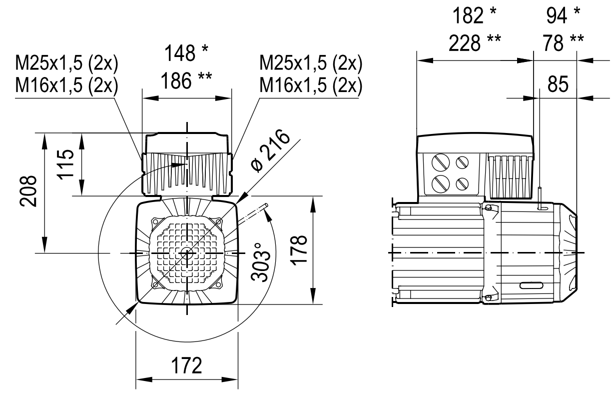
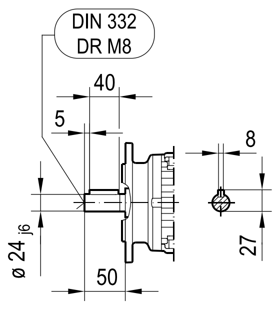
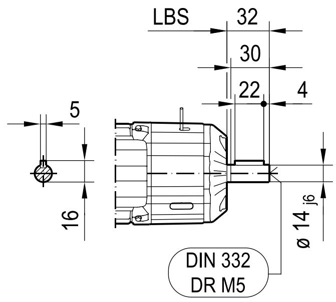
DRN90S BE/MM
DRN90L BE/MM

09 966 01 15
1(2)





/2W



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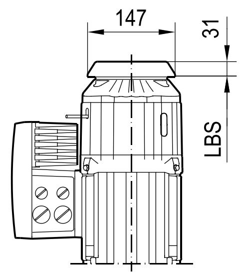

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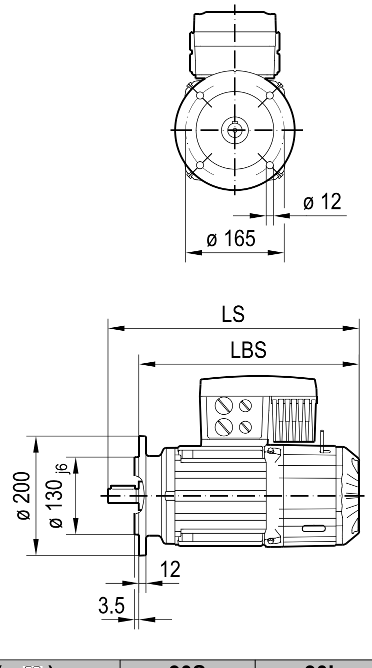

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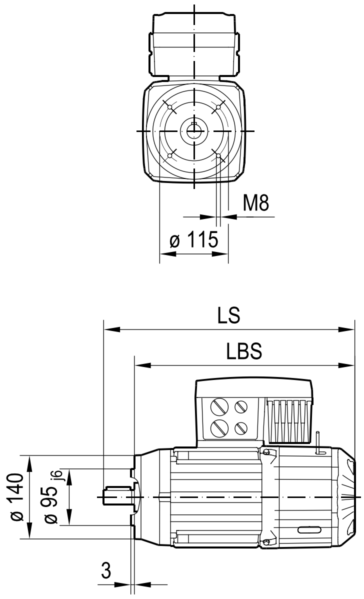

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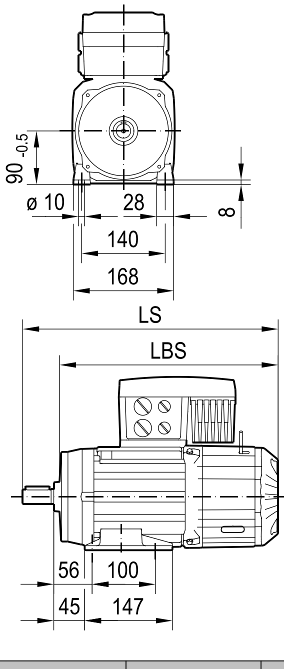
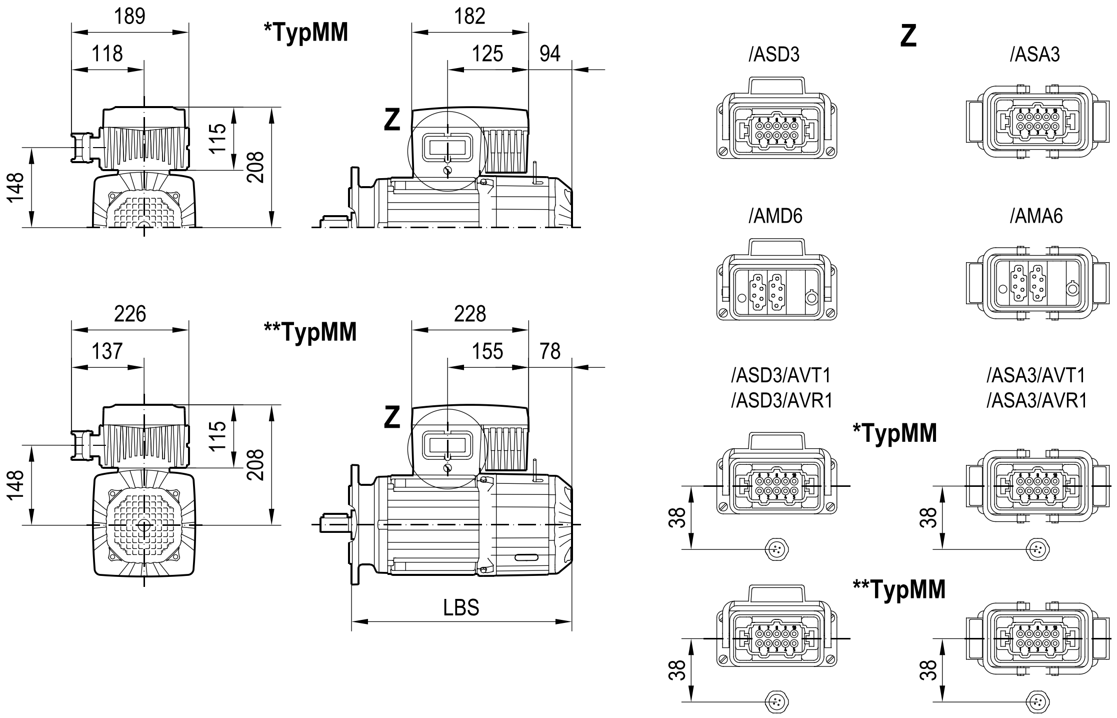


(→ 📖)	90S	90L						
LS	425	457						
LBS (B5/B14)	375	407						
LBS (B3)	373	405						
*Typ MM	*MM11-15	*MM15						
**Typ MM	**MM22	**MM22-30						

MM11-15/IV
MM22-30/IV

09 966 01 15
2(2)



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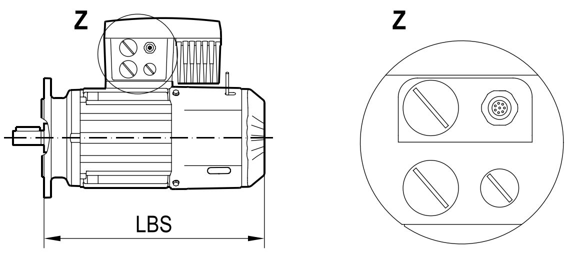

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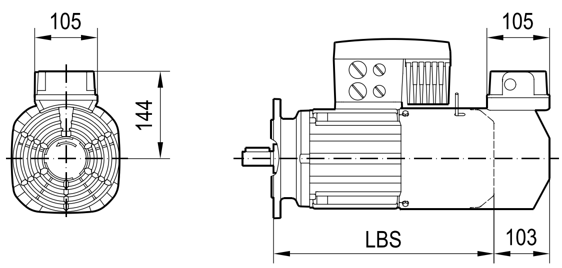
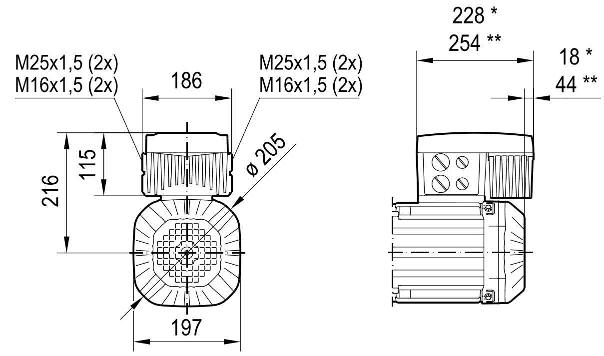
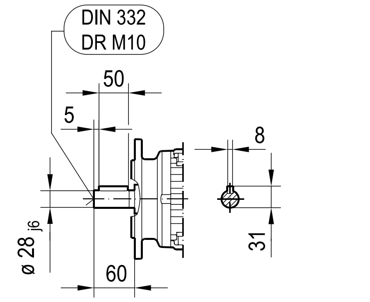


(→ 📖)	90S	90L						
LS	425	457						
LBS (B5/B14)	375	407						
LBS (B3)	373	405						
***Typ MM**	*MM11-15	*MM15						
****Typ MM**	**MM22	**MM22-30						

DRN100LS/MM
DRN100LM/MM
DRN100L/MM

08 642 01 15
1(2)





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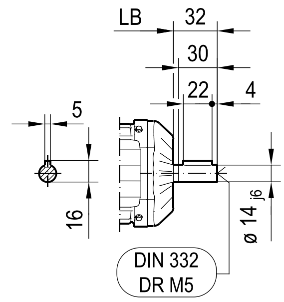

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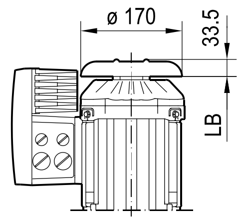

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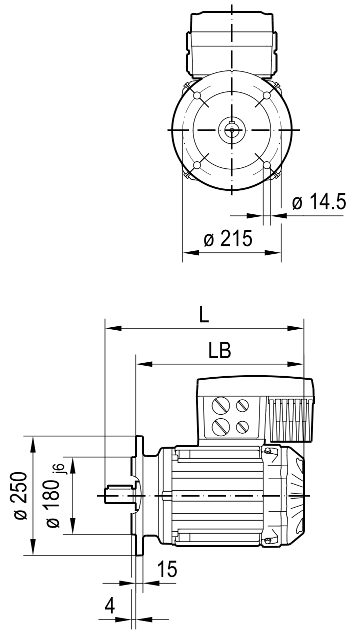

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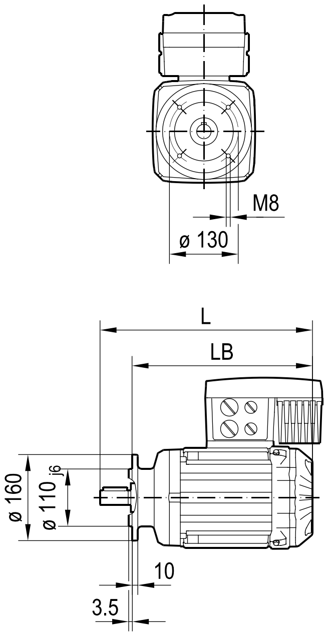

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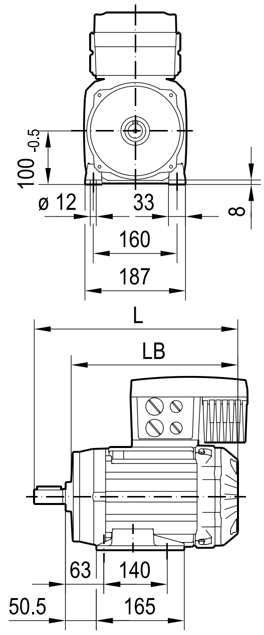

(→ 📖)	100LS	100LM	100L					
L	369	419	419					
LB (B5/B14)	309	359	359					
LB (B3)	307	357	357					
*Typ MM	*MM22-30	*MM30	*MM30					
**Typ MM	**MM40	**MM40	**MM40					

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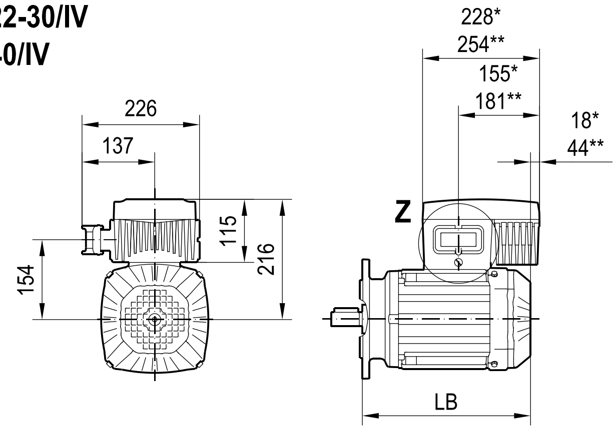
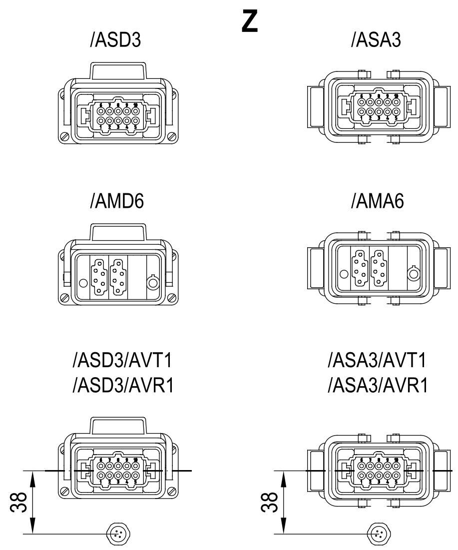
08 642 01 15
2(2)

MM22-30/IV
MM40/IV





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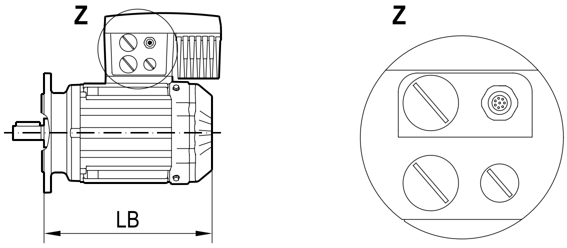

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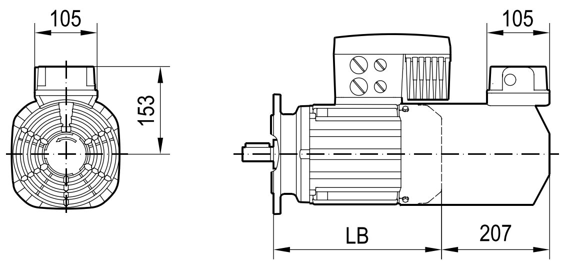

(→ 📖)	100LS	100LM	100L					
L	369	419	419					
LB (B5/B14)	309	359	359					
LB (B3)	307	357	357					
*Typ MM	*MM22-30	*MM30	*MM30					
**Typ MM	**MM40	**MM40	**MM40					

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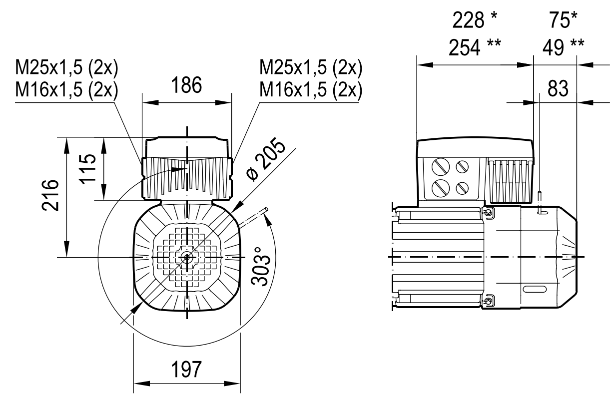
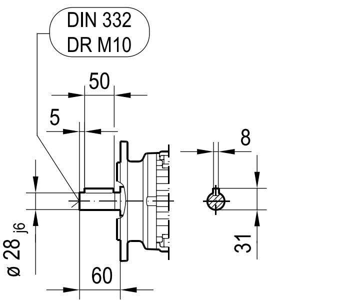
DRN100LS BE/MM
DRN100LM BE/MM
DRN100L BE/MM

09 968 01 15
1(2)





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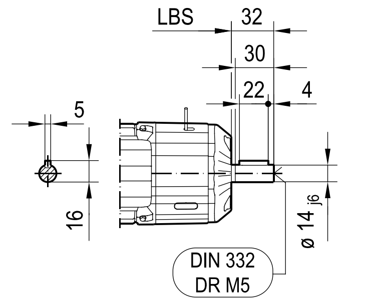

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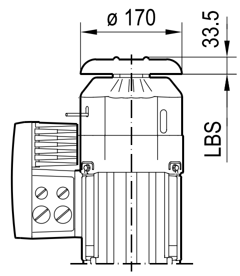

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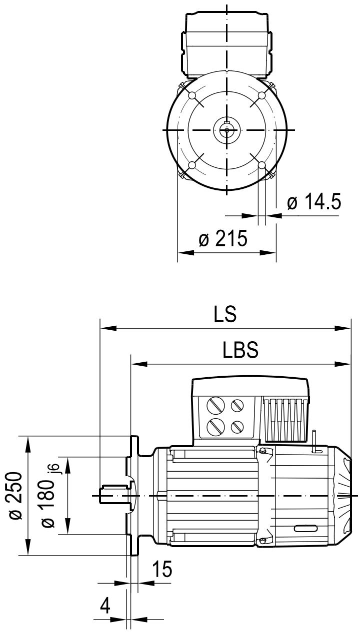

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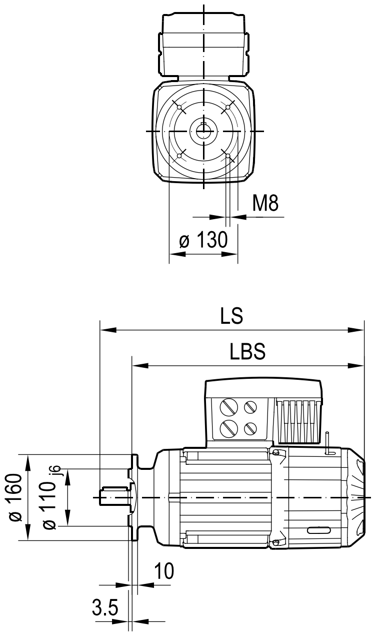

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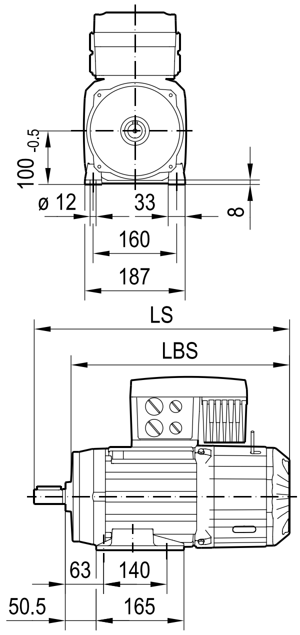

(→ 📖)	100LS	100LM	100L					
LS	462	512	512					
LBS (B5/B14)	402	452	452					
LBS (B3)	400	450	450					
*Typ MM	*MM22-30	*MM30	*MM30					
**Typ MM	**MM40	**MM40	**MM40					

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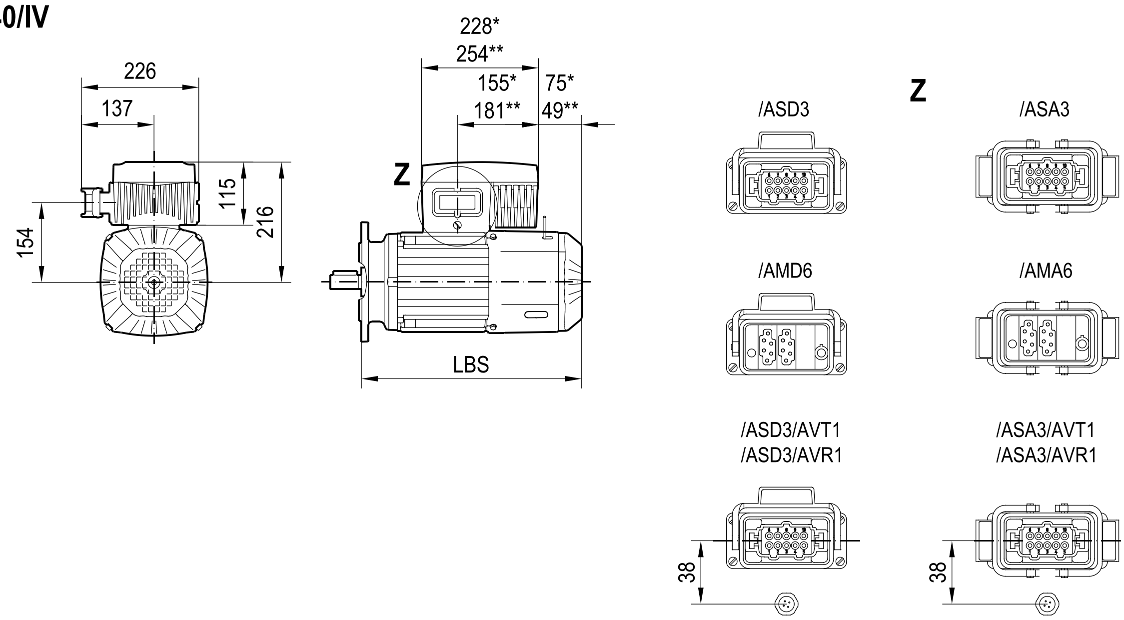
09 968 01 15
2(2)

MM22-30/IV
MM40/IV



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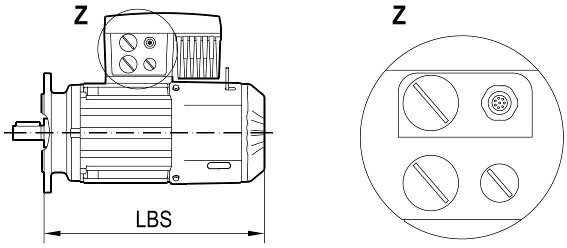

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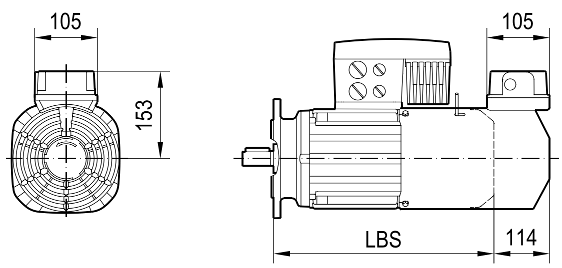

(→ 📖)	100LS	100LM	100L					
LS	462	512	512					
LBS (B5/B14)	402	452	452					
LBS (B3)	400	450	450					
*Typ MM	*MM22-30	*MM30	*MM30					
**Typ MM	**MM40	**MM40	**MM40					

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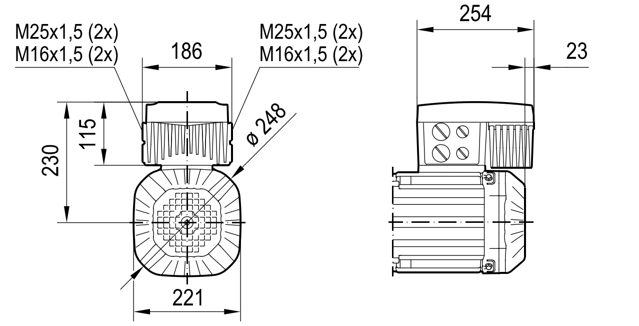
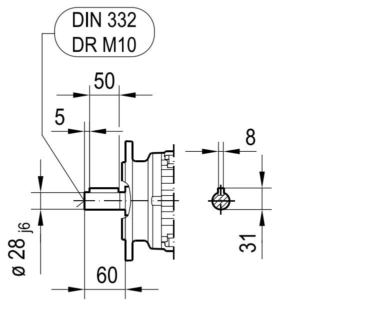
DRN112M/MM

08 644 01 15
1(2)





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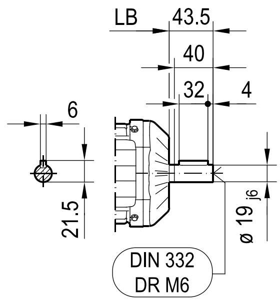

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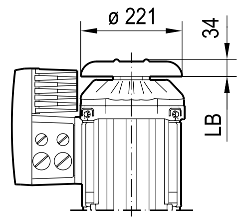

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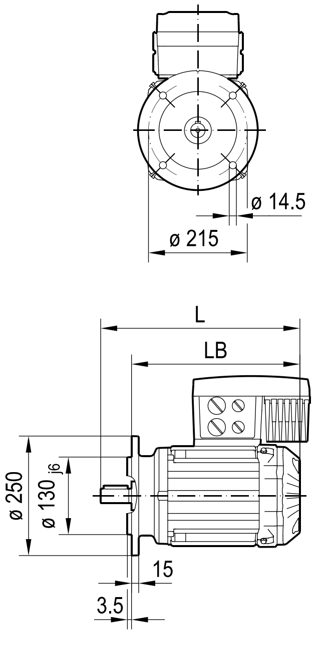

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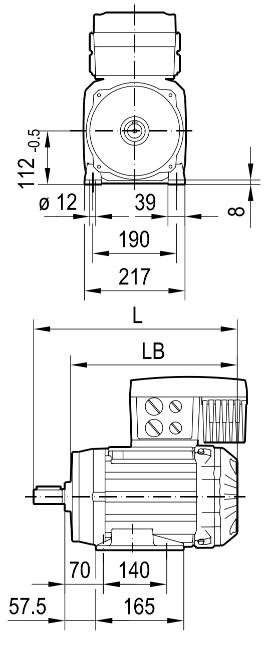

(→ 📖)	112M							
L	447							
LB (B5/B14)	387							
LB (B3)	385							

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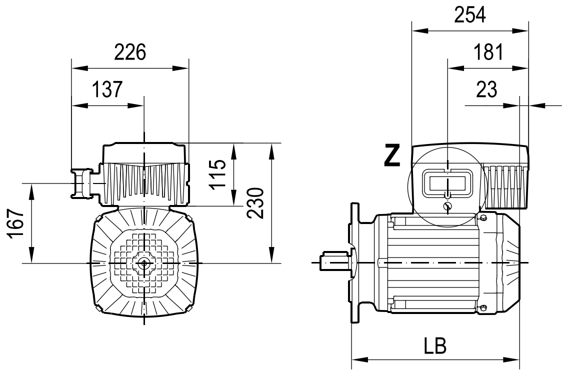
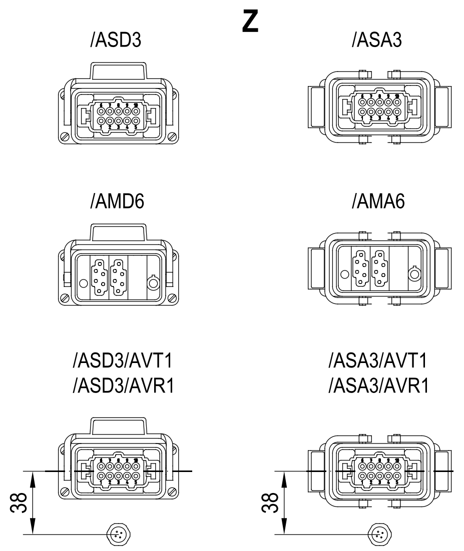
MM40/IV

08 644 01 15
2(2)





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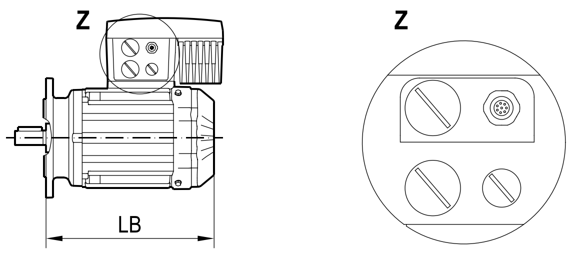

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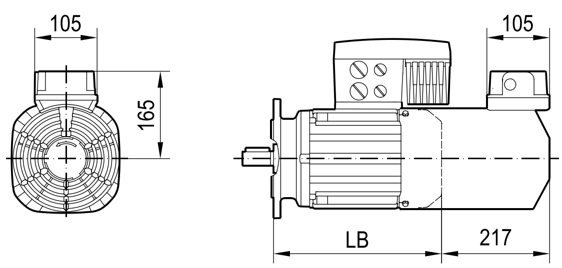

(→ 📖)	112M							
L	447							
LB (B5/B14)	387							
LB (B3)	385							

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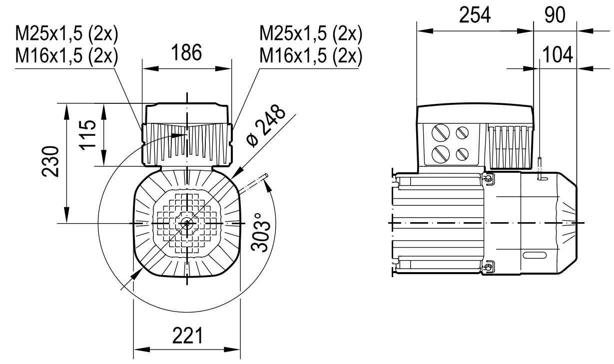
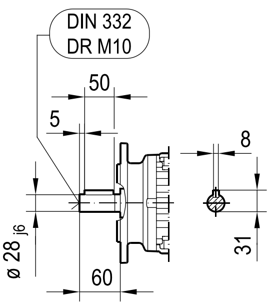
DRN112M BE/MM

09 970 01 15
1(2)





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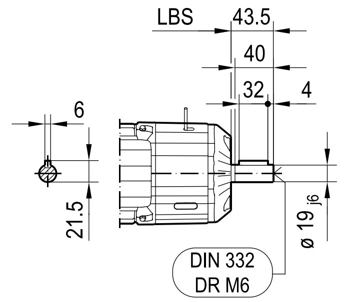

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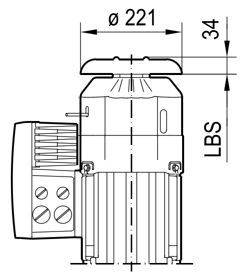

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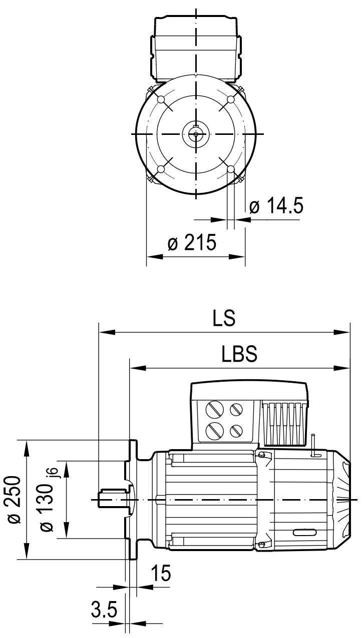

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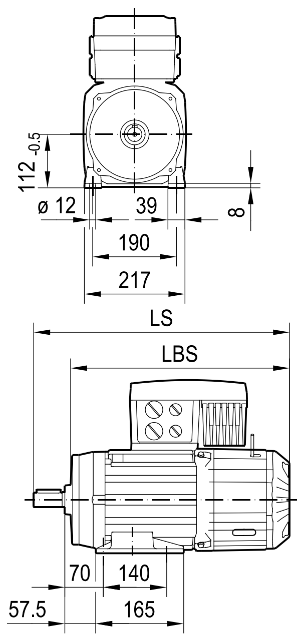

(→ 📖)	112M							
LS	559							
LBS (B5/B14)	499							
LBS (B3)	497							

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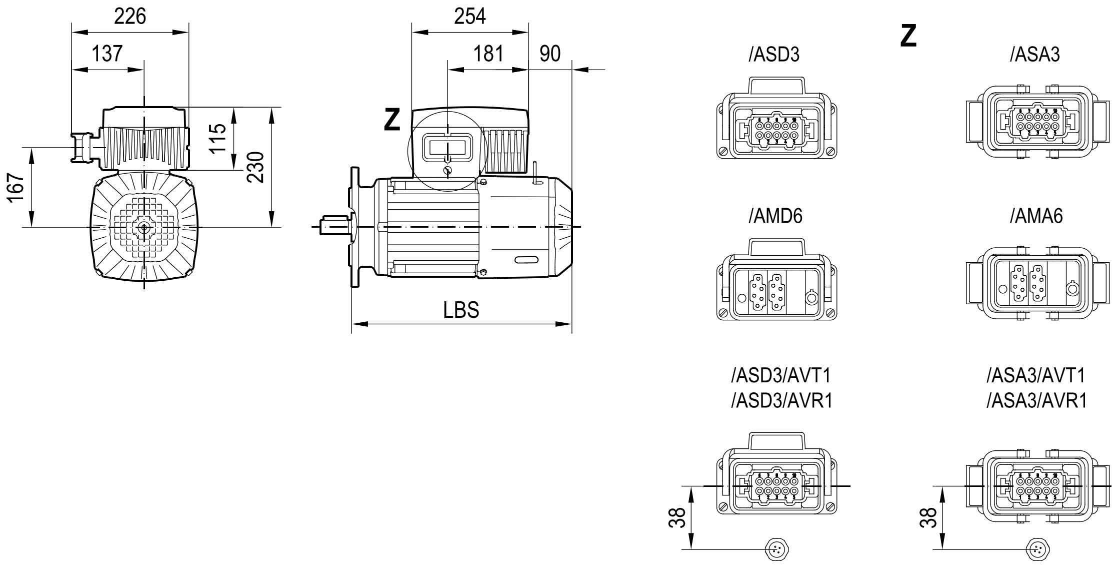
MM40/IV

09 970 01 15
2(2)



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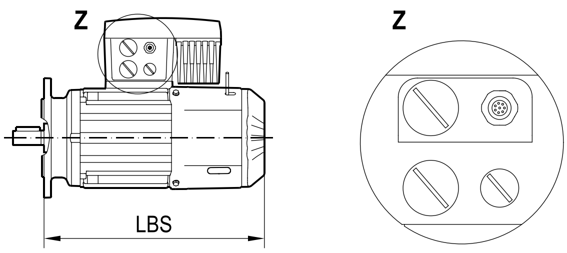

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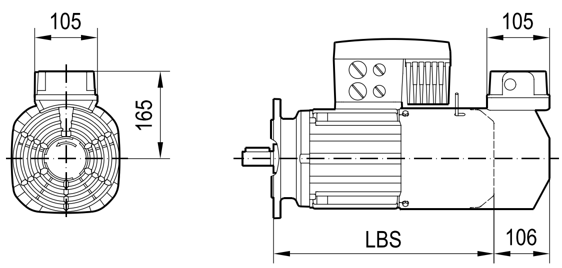

(→ 📖)	112M							
LS	559							
LBS (B5/B14)	499							
LBS (B3)	497							

9.1.3 Information about drive selection

Project planning

Note the following information for the project planning of MOVIMOT® drives:

- The suitable MOVIMOT® drive is selected with regard to the speed, power, torque, and spatial conditions of the application.

  See selection tables in the "MOVIMOT® Gearmotors" catalog.
- For detailed project planning information, technical data, and information about the communication of MOVIMOT® via fieldbus interfaces, refer to the relevant MOVIMOT® documentation and to the documentation for the associated fieldbus interfaces/field distributors.
- In the next step, the required options are specified.
- MOVIMOT® can be used for hoist applications with restrictions only.

  Please contact SEW-EURODRIVE to inquire about suitable solutions with MOVITRAC®, MOVIFIT®, MOVIPRO® or MOVIDRIVE®.

9.1.4 Order information

Motor requirements for mounting close to the motor

This chapter describes the main requirements and restrictions that apply to selecting a MOVIMOT® drive. Bear this information in mind when placing the order.

Permitted motors

The only permitted motors are those with nominal voltages of AC 3 x 230/400 V, 50 Hz. These motors are listed in the following chapters:

- Motor assignment for MOVIMOT® (close to the motor) 280 – 1400 min^{-1} (→ 🗎 494)
- Motor assignment for MOVIMOT® (close to the motor) 290 – 2900 min^{-1} (→ 🗎 495)

SEW-EURODRIVE recommends to always order the motor with **TH thermostat** (bimetallic switch). Motor protection can also be implemented in the Expert mode of the MOVIMOT® inverter.

Permitted brakes

The following assignment of motors and brakes, which differs from that for standard motors, applies to the combination with MOVIMOT® drives:

Motor type	Standard brake type	Optional brake type
DR2S63M4	BE03	-
DRN71MS4	BE03	BE05
DR2S71MS4	BE05	BE1
DRN71M4	BE05	BE1
DR2S71M4 DR2S80MK4 DRN80M4 DRN80MK4	BE1	BE05
DR2S80M4 DRN90S4	BE2	BE1
DRN90L4	BE2	BE1
DRN100LS4	BE5	BE2
DRN100L4	BE5	BE2
DRN112M4	BE5	BE11

MOVIMOT®, type	**Brake voltage**
MM..D-503, size 1 (MM03.. – MM15..)	230 V
MM..D-503, size 2 (MM22.. – MM40..)	120 V

Brake rectifier

Always order the assigned motor without brake rectifier.

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Plug connectors

Only the following plug connectors are permitted for the motors:

- ASB4 plug connector
- ISU4 plug connector

Braking resistors

For more information on braking resistors available for MOVIMOT® drives, refer to the "Drive System for Decentralized Installation" catalog.

Hybrid cables

For more information on hybrid cables available for connecting the MOVIMOT® drive with the motor, refer to the "Drive System for Decentralized Installation" catalog.

9.2 MOVI-SWITCH®

9.2.1 Description

MOVI-SWITCH® is an AC motor with integrated switching and protection functions in the power range between 0.09 and 3.0 kW. The motor starter can either be mounted directly on the motor or close to the motor. Even with integrated motor starter, a MOVI-SWITCH® drive is not much larger than a motor without integrated motor starter.

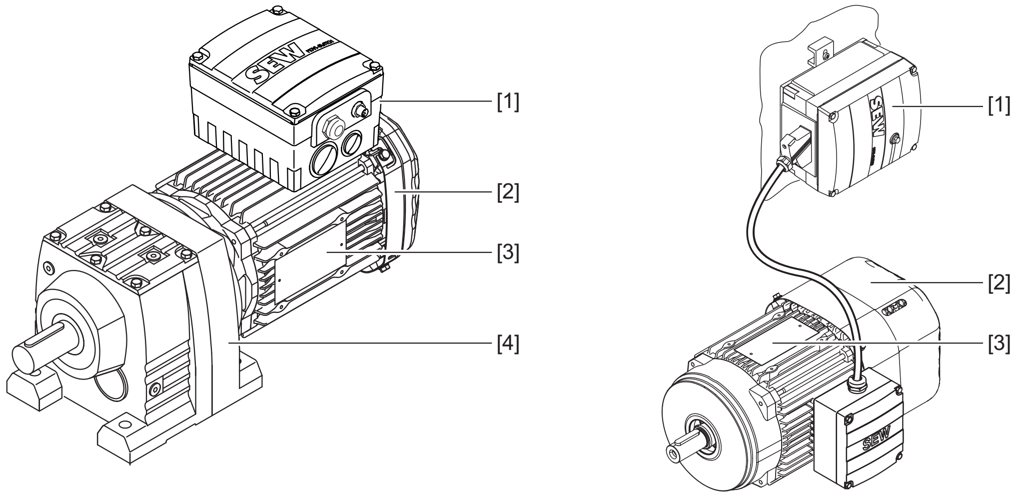
A MOVI-SWITCH® motor starter can be installed close to the motor using a mounting plate. The motor starter is connected to the "assigned motor" using a prefabricated "hybrid cable".

MOVI-SWITCH® is a particularly efficient solution for decentralization with power performance up to 3 kW. As the switching and protection functions are integrated into the motor terminal box, this compact and sturdy gearmotor does not require any additional cables.

MOVI-SWITCH® is available as a (gear)motor with or without brake.

MOVI-SWITCH® drive with integrated motor starter

MOVI-SWITCH® 2S drive with mounting close to the motor



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[1] MOVI-SWITCH® motor starter
[2] Motor
[3] Drive nameplate
[4] Helical gear unit

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Advantages of MOVI-SWITCH®

MOVI-SWITCH® offers the following advantages:

- The switching and protection functions are completely integrated, saving control cabinet space and cabling.
- Integrated mechatronic solution, robust and compact.

Designs

MOVI-SWITCH® drives are available in various designs so they can be used to implement all kinds of installation topologies.

MOVI-SWITCH® motor starters can be combined with 4-pole DRN.. motor sizes 71MS to 100L (0.25 to 3 kW).

- MOVI-SWITCH® drive **standard design** (e.g. binary control)
  - With integrated motor starter

    MOVI-SWITCH® **1E** (1 direction of rotation)

    MOVI-SWITCH® **2S** (2 directions of rotation)
  - Mounted close to the motor

    MOVI-SWITCH® **2S** (2 directions of rotation)
- MOVI-SWITCH® drive with **AS-Interface**
  - With integrated motor starter

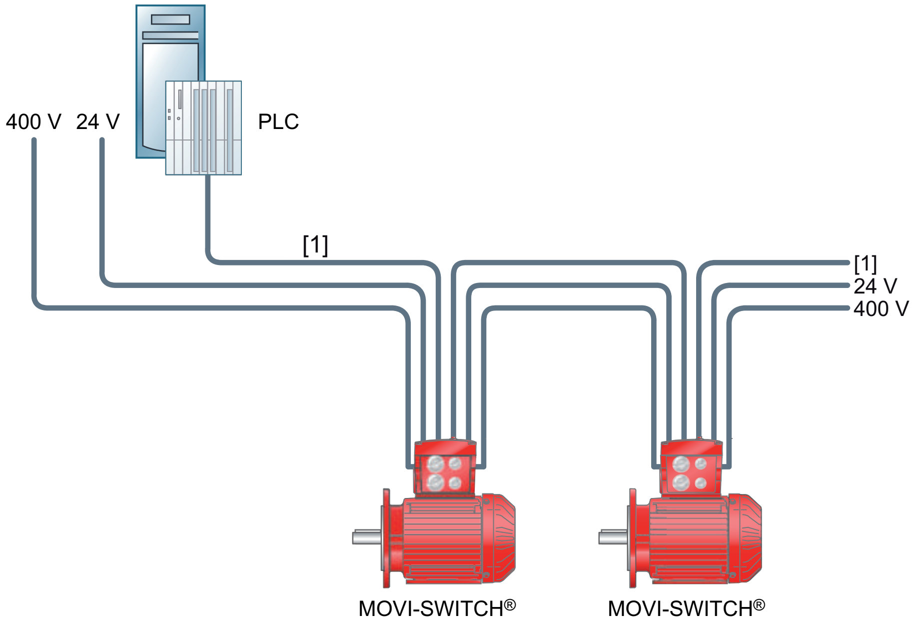
    MOVI-SWITCH® **2S** (2 directions of rotation)
  - Mounted close to the motor

    MOVI-SWITCH® **2S** (2 directions of rotation)

The AS-Interface option is located on the connection board in the connection box.

Installation topology of MOVI-SWITCH®

The following figure shows the basic installation topology of the MOVI-SWITCH® drive with binary control:



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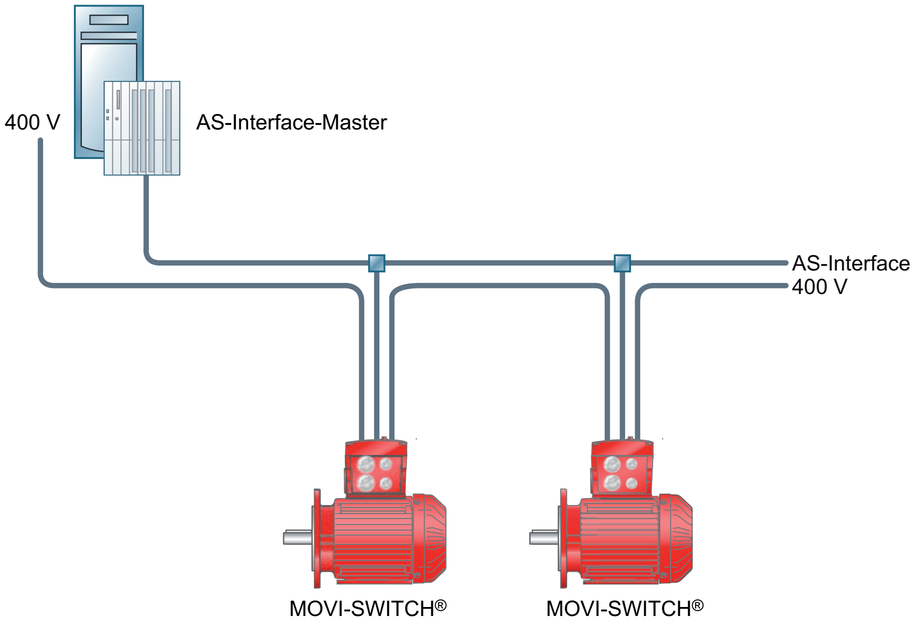
[1] Control: binary

The following figure shows the basic installation topology of the MOVI-SWITCH® drive with AS-Interface (DC 24 V supply via AS-Interface):



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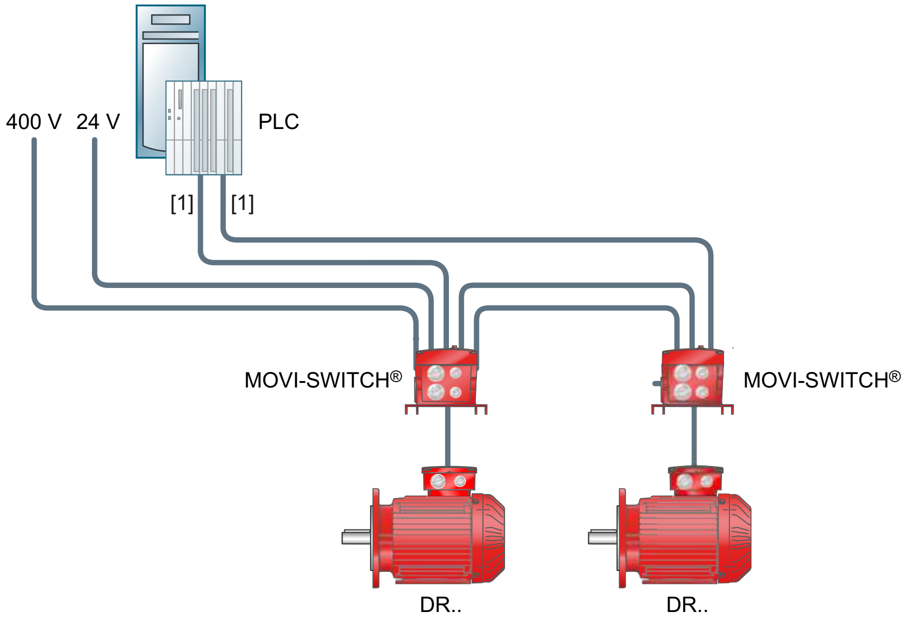
Installation topology of MOVI-SWITCH®, mounted close to the motor

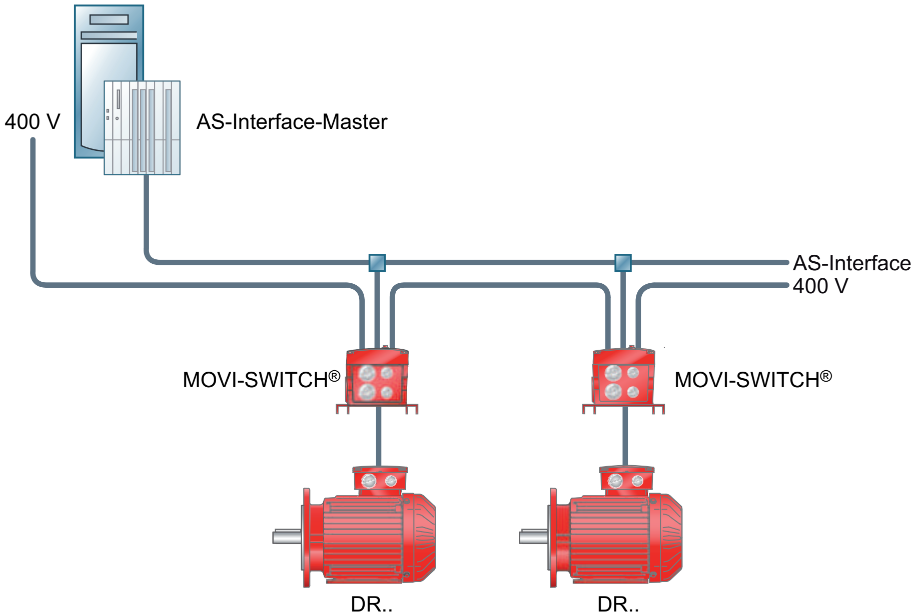
The following figure shows the basic installation topology of the MOVI-SWITCH® drive for mounting close to the motor with binary control:



5068999307

[1] Control: binary

The following figure shows the basic installation topology of the MOVI-SWITCH® drive with AS-Interface when mounted close to the motor (DC 24 V supply via AS-Interface):



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9.2.2 Technical details

Features of MOVI-SWITCH® 1E

- MOVI-SWITCH® 1E is an AC motor with integrated electronic on/off switch for one direction of rotation and integrated full motor protection.
- Switching the star point with power semiconductors connects or disconnects the current flow to the motor.
- The BGW brake control integrated as standard ensures short response times (brake voltage = motor voltage/$\sqrt{3}$, alternatively motor voltage).

Features of MOVI-SWITCH® 2S

- MOVI-SWITCH® 2S is an AC motor with integrated electronic on/off switch for two directions of rotation and integrated full motor protection.
- The direction of rotation is reversed by a reversing contactor combination with a long service life.
- MOVI-SWITCH® 2S is available in two designs:
  - C**B**0: Binary control
  - C**K**0: With integrated AS-Interface
- Supply system monitoring, brake control as well as switching and protection functions are implemented in the controller.
- The various operating states are indicated by a status LED.
- With the CB0 design (binary control), the connection assignment for clockwise direction of rotation (CW) is compatible with MOVI-SWITCH® 1E.
- With the CK0 design (with integrated AS-Interface), the connection assignment is compatible with MOVIMOT® with integrated AS-Interface.

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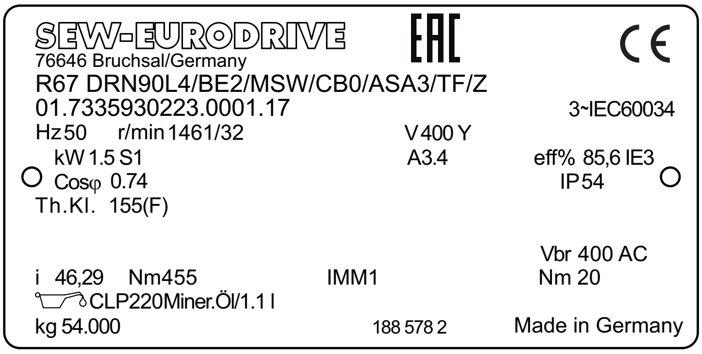
Type designations

Type designation of MOVI-SWITCH®

Nameplate

The following figure gives an example of a MOVI-SWITCH® drive nameplate:



20166492555

Type designation

The following table shows an example of the type designation of the MOVI-SWITCH® 2S drive **R67 DRN90L4/BE2/MSW/CB0/ASA3/TF/Z**:

R	**Gear unit series**	
67	**Gear unit size**	
DRN..	**Motor type**	
90L	**Motor size**	
4	**Number of motor poles**	
/		
BE	**Brake option**	
2	**Brake size**	
/		
MSW	**MOVI-SWITCH® motor starter**	
/		
C	**Control**[1)]	
B	**Signal type**[1)]	B = Binary K = AS-Interface
0	**Design**[1)]	0 = Standard
/		
ASA3	**Plug connector option**	
/		
TF	**Temperature sensor (standard)**	
/		
Z	**Motor option flywheel fan**	

1) Only for MOVI-SWITCH® 2S

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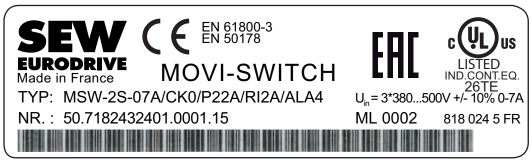
Type designation of MOVI-SWITCH®, mounted close to the motor

MOVI-SWITCH® drives with mounting plate for mounting close to the motor are only available in combination with MOVI-SWITCH® 2S.

Nameplate

The following figure gives an example of the nameplate of the MOVI-SWITCH® motor starter for mounting close to the motor:



20110181771

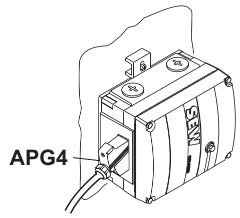
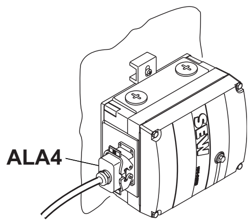
Type designation

The following table shows the type designation of the MOVI-SWITCH® motor starter **MSW-2S-07A/CK0/P22A/RI2A/ALA4** for mounting close to the motor:

MSW	**MOVI-SWITCH® motor starter**	
-		
2S	**MOVI-SWITCH® design**	
-		
07	**Rated operating current**	07 = 7.0 A
A	**Version**	
/		
C	**Control**	
K	**Signal type**	B = Binary control K = Control via AS-Interface
0	**Design**	0 = Standard
/		
P22A	**Adapter for mounting close to the motor**	
/		
RI2A	**Connection box design**	
/		
ALA4	**Plug connector** for connection to the motor	

Installation close to the motor MOVI-SWITCH®

The following table shows the type designations of available MOVI-SWITCH® drives with P2.A mounting plate for mounting close to the motor:

Connection to the motor	MOVI-SWITCH® binary control	MOVI-SWITCH® with integrated AS-Interface
APG4 	MSW-2S-07A/CB0/ P22A/RV4A/APG4	MSW-2S-07A/CK0/ P22A/RV4A/APG4
ALA4 	MSW-2S-07A/CB0/ P22A/RI2A/ALA4	MSW-2S-07A/CK0/ P22A/RI2A/ALA4

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Technical data of MOVI-SWITCH® motor starters with DRN.. motors

INFORMATION

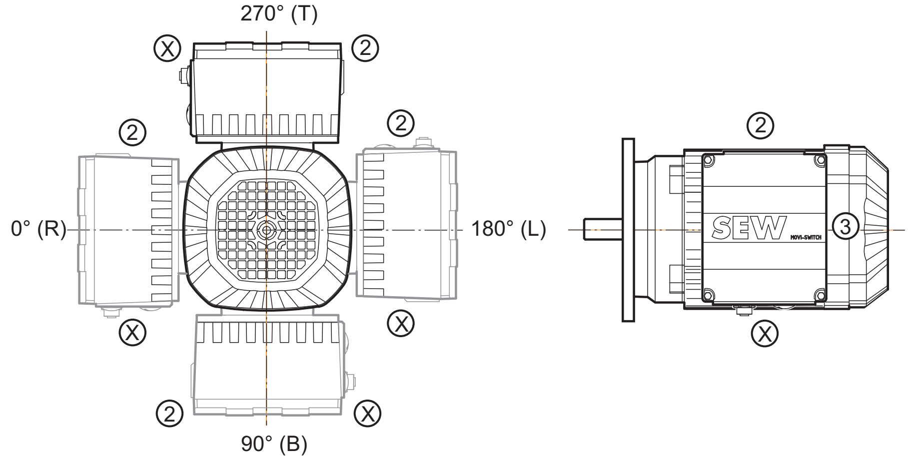
For the technical data of the motors, refer to chapter "Technical motor data".

MOVI-SWITCH® fieldbus interfaces

MOVI-SWITCH® drives can be combined with a fieldbus interface.

Designation	Description	Installation
MF...	Fieldbus interface (PROFIBUS, PROFINET IO, EtherCAT® EtherNet/IP™, DeviceNet™)	External

The fieldbus interface can be installed in positions "2" or "X" as standard.



9007200793915019

For more detailed information on fieldbus interfaces, refer to the "Drive System for Decentralized Installation" catalog.

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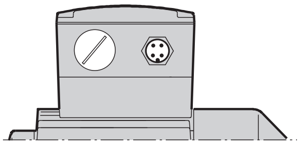
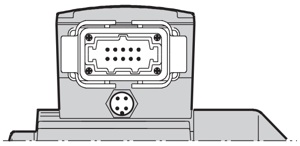
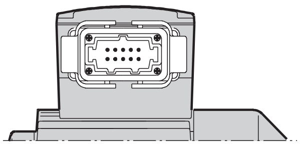
Connection technology

Connection technology of MOVI-SWITCH® 1E

Overview

MOVI-SWITCH® 1E is supplied with AVS1 plug connector for control signals unless specified otherwise in the order.

The plug connectors listed in the following table are available as standard:

Order designation	Function	Manufacturer's designation
MSW../AVS1 	Control signals	1 x round plug connector M12 x 1
MSW../AVS1/ASA3 	Control signals Power rating	1 x round plug connector M12 x 1 + Harting Han® 10 ES pin insert (built-on housing with 2 clips)
MSW../ASAW 	Connection to field distributor Z.3**W** or Z.6**W**	Harting Han® 10 ES pin insert (built-on housing with 2 clips)

For other types, please contact SEW-EURODRIVE.

Plug connectors can be installed in positions "2" or "X" as standard.

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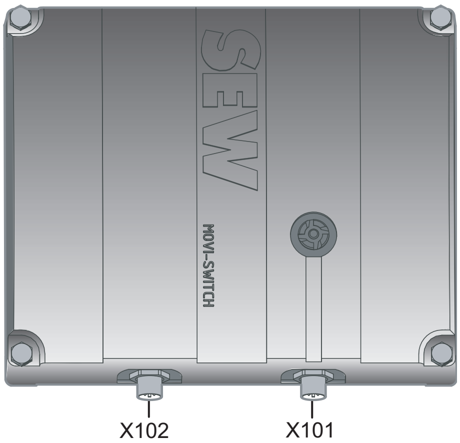
Connection technology of MOVI-SWITCH® 2S

*Connection technology of C**B**0 design (binary control)*

As standard, MOVI-SWITCH® 2S is equipped with 2 plug connectors for connecting control signals and a 24 V supply. The plug connectors are integrated in the control unit, see the following figure.

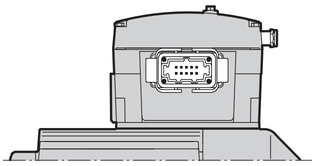
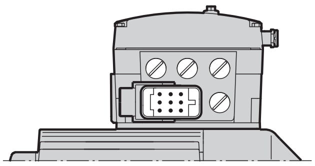
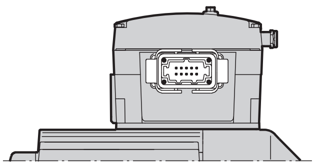
Order designation of the standard design: MSW/C**B**0/RA2A.



X102 = DC 24 V supply voltage + control signal (M12 plug connector, A-coding, male)
X101 = DC 24 V supply voltage + feedback (M12 plug connector, A-coding, male)

Optional plug connectors

The following table shows the plug connectors in the connection box that are additionally available for MOVI-SWITCH® 2S (CB0 version):

Order designation	Function	Manufacturer's designation
MSW/CB0/ASA3 	Power rating	Harting Han® 10 ES pin insert (built-on housing with 2 clips)
MSW/CB0/AND3 	Power rating	Harting Han® Q8/0 pin insert (built-on housing with 1 clip)
MSW/CB0/ASAW 	Connection to field distributor Z.3**W** or Z.6**W**	Harting Han® 10 ES pin insert (built-on housing with 2 clips)

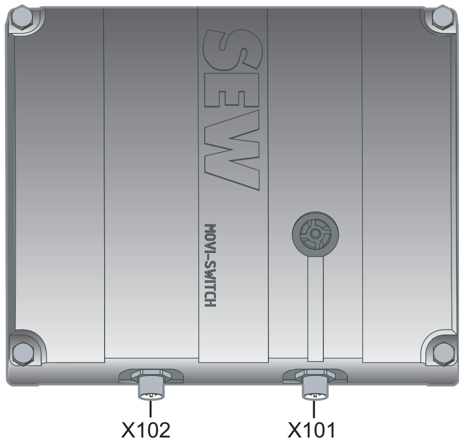
For other types, please contact SEW-EURODRIVE.

Plug connectors can be installed in positions "2" or "X" as standard.

*Connection technology of C**K**0 design (with integrated AS-Interface)*

MOVI-SWITCH® 2S is equipped with 2 plug connectors for AS-Interface and digital inputs as standard. The plug connectors are integrated in the control unit, see the following figure.

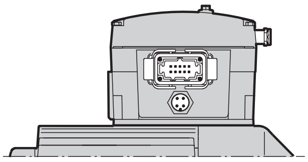
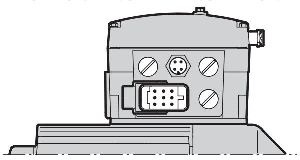
Order designation of the standard design: MSW/C**K**0/RA2A.



X102 = DC 24 V supply voltage + AS-Interface (M12 plug connector, A-coding, male)
X101 = DC 24 V supply voltage + digital inputs (M12 plug connector, A-coding, female)

Optional plug connectors

The following table shows the plug connectors in the connection box that are additionally available for MOVI-SWITCH® 2S (CK0 version):

Order designation	Function	Manufacturer's designation
MSW/CK0/ASA3/AVS0 	Power + AUX PWR	Harting Han® 10 ES pin insert (built-on housing with 2 clips) 1 x round plug connector M12 x 1
MSW/CK0/AND3/AVS0 	Power + AUX PWR	Harting Han® Q8/0 pin insert (built-on housing with 1 clip) 1 x round plug connector M12 x 1

For other types, please contact SEW-EURODRIVE.

Plug connectors can be installed in positions "2" or "X" as standard.

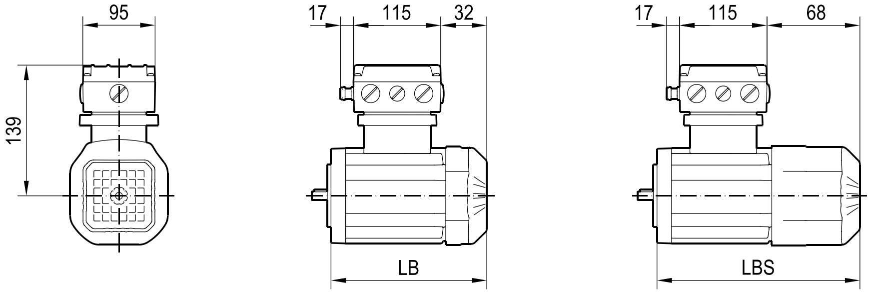
Information about dimension sheets

Observe the notes in chapter "Notes on the dimension sheets" (→ 🗎 234) regarding dimension sheets for motors/brakemotors.

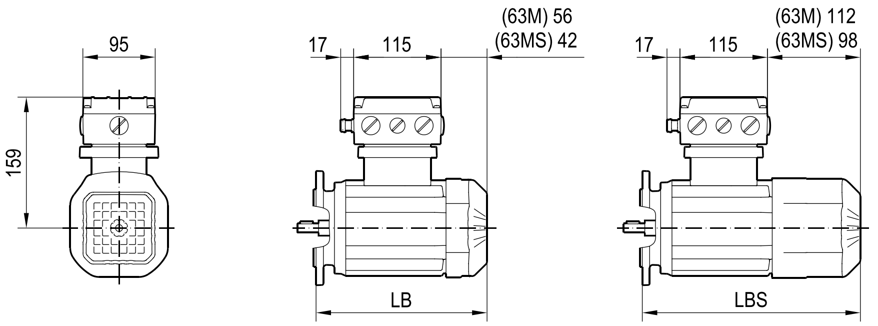
Dimension sheets for MOVI-SWITCH® motors/brakemotors of the DRN.., DR2S.. series

DRN63 **/MSW-1EM** **08 100 01 18**
DR2.56-63 **1(1)**

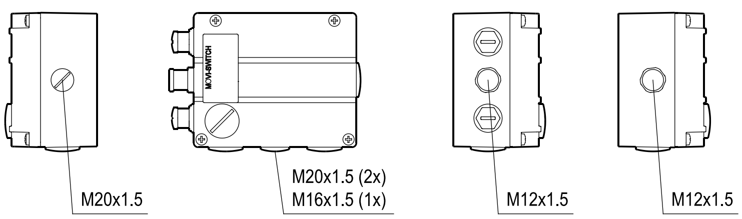
DR2.56.. **DR2.56..BE**



DRN63.. **DRN63..BE**
DR2.63.. **DR2.63..BE**



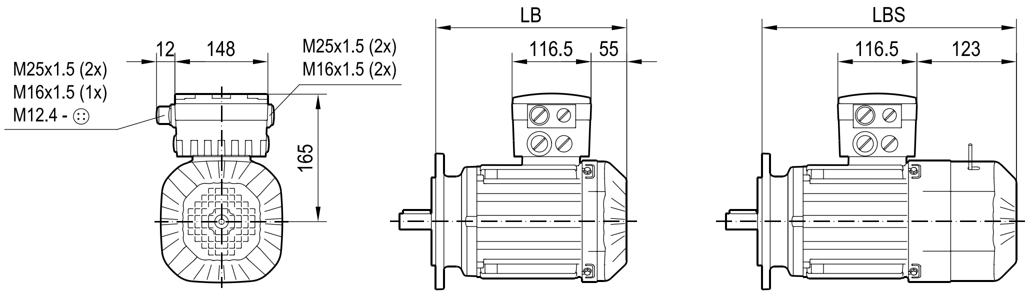
AZZK **AVS.**



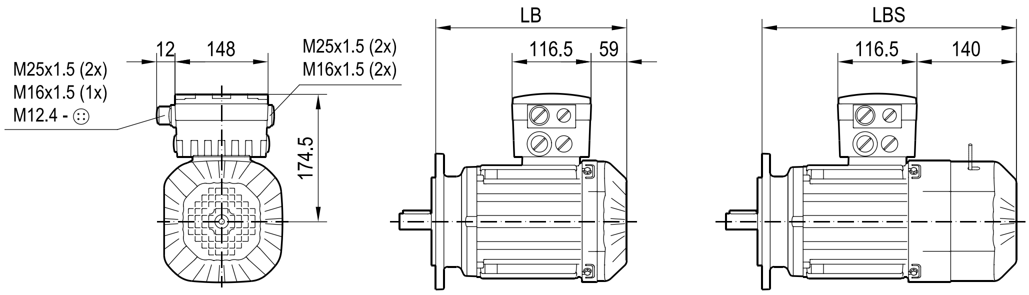
(→ 📖)	56M(R)	63MS	63M					
LB (B5/B14)	161	185	199					
LB (B3)	-	183	197					
LBS (B5/B14)	197	241	255					
LBS (B3)	-	239	253					

DRN71-90 **/MSW-1E** **08 597 02 14**
DR2.71-80 **1(2)**

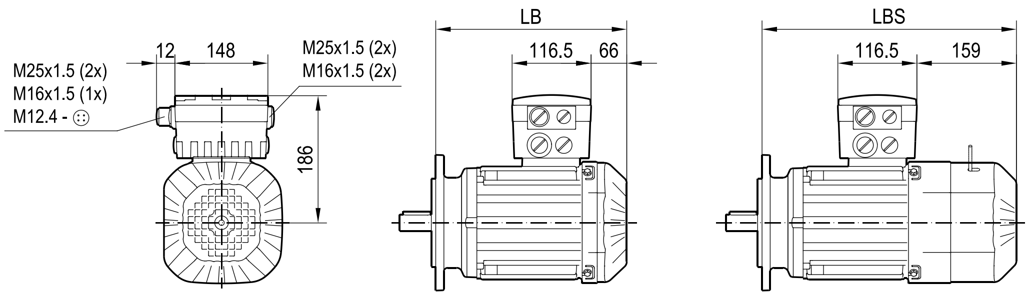
DRN71.. **DR2.71..** | **DRN71..BE** **DR2.71..BE**



DRN80.. **DR2.80..** | **DRN80..BE** **DR2.80..BE**



DRN90.. | **DRN90..BE**



(→ 📖)	71MS	71M	80MK	80MS	80M	90S(R)	90L	
LB (B5/B14)	202	222	241	259	287	281	313	
LB (B3)	200	220	239	257	285	279	311	
LBS (B5/B14)	269	289	322	340	368	375	407	
LBS (B3)	267	287	320	338	366	373	405	

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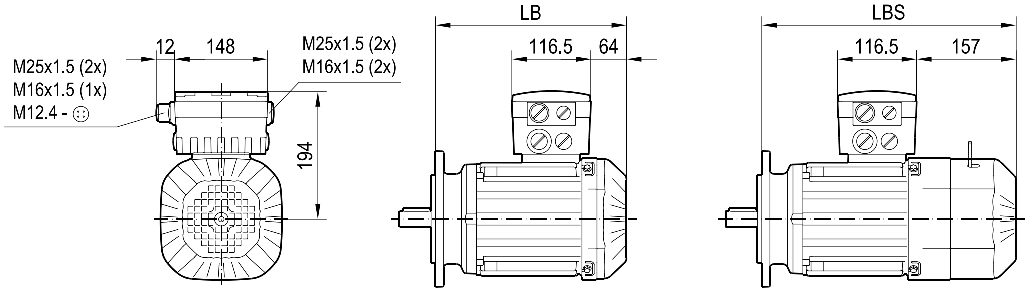
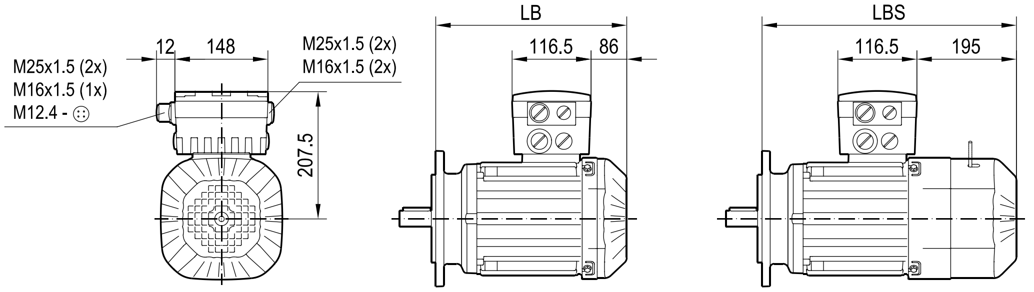
DRN100-132S **/MSW-1E** **08 597 02 14**
2(2)

DRN100.. **DRN100..BE**



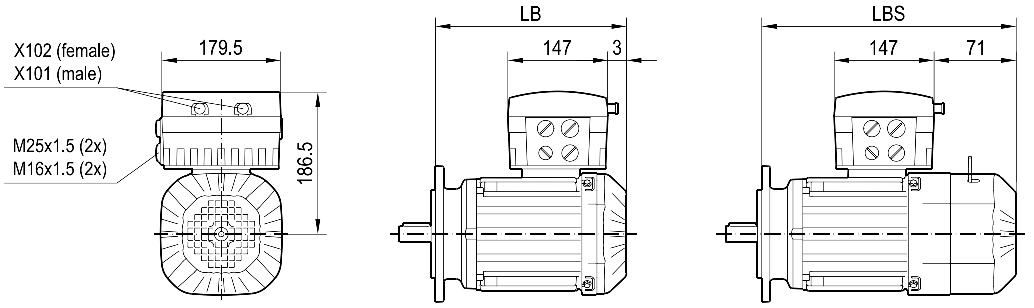
DRN112-132S.. **DRN112-132S..BE**



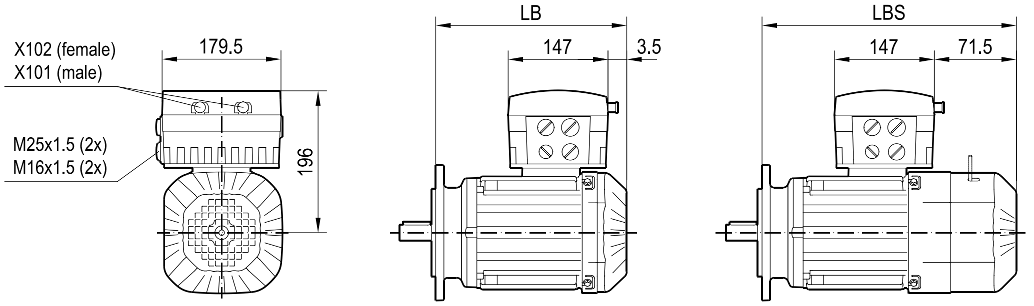
(→ 📖)	100LS	100LM	100L	112M(B)	132S			
LB (B5/B14)	309	359	359	387	437			
LB (B3)	307	357	357	385	435			
LBS (B5/B14)	402	452	452	499	549			
LBS (B3)	400	450	450	497	547			

DRN71-90 **/MSW-2S** **08 598 02 14**
DR2.71-80 **1(2)**

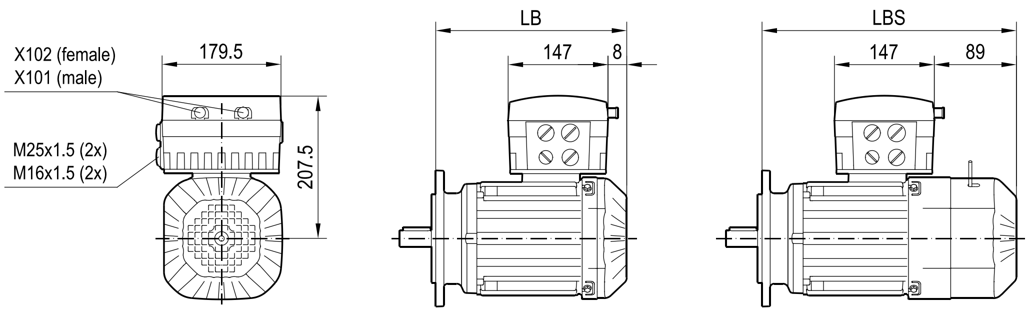
DRN71.. **DRN71..BE**
DR2.71.. **DR2.71..BE**



DRN80.. **DRN80..BE**
DR2.80.. **DR2.80..BE**



DRN90.. **DRN90..BE**



(→ 📖)	71MS	71M	80MK	80MS	80M	90S(R)	90L	
LB (B5/B14)	202	222	241	259	287	281	313	
LB (B3)	200	220	239	257	285	279	311	
LBS (B5/B14)	269	289	322	340	368	375	407	
LBS (B3)	267	287	320	338	366	373	405	

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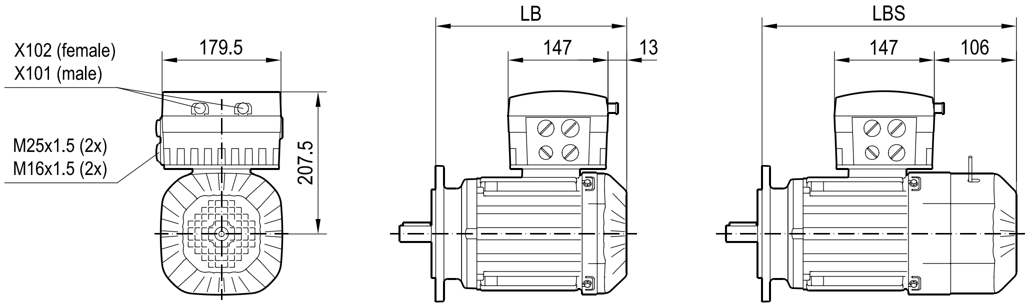
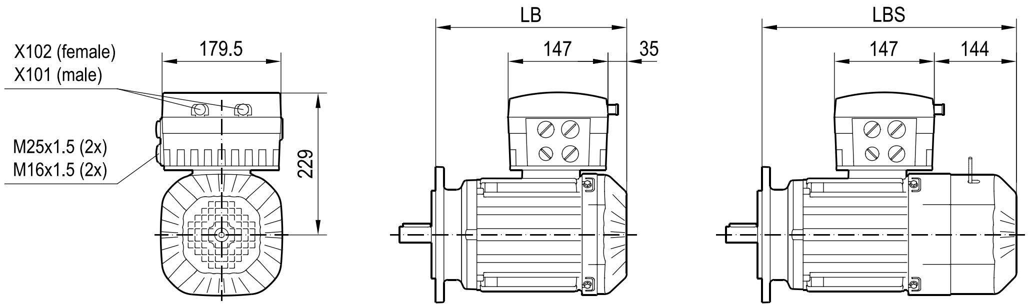
DRN100-132S **/MSW-2S** **08 598 02 14**
1(2)

DRN100.. **DRN100..BE**



DRN112-132S.. **DRN112-132S..BE**



(→ 🕮)	100LS	100LM	100L	112M(B)	132S			
LB (B5/B14)	309	359	359	387	437			
LB (B3)	307	357	357	385	435			
LBS (B5/B14)	402	452	452	499	549			
LBS (B3)	400	450	450	497	547			

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9.2.3 Information about drive selection

Project planning

Note the following information for the project planning of MOVI-SWITCH® drives:

- The suitable MOVI-SWITCH® drive is selected like an AC motor with regard to the speed, power, torque, and spatial conditions of the application.

  See the "Drive dimensioning and drive selection" chapter.
- For technical data and information on the communication of MOVI-SWITCH® via fieldbus interfaces, refer to the relevant MOVI-SWITCH® documentation and to the documentation for the associated fieldbus interfaces/field distributors.
- MOVI-SWITCH® drives can be used for typical hoist applications with restrictions only.

  Please contact SEW-EURODRIVE to inquire about suitable solutions with MOVITRAC®, MOVIFIT®, MOVIPRO® or MOVIDRIVE®.

9.2.4 Order information

Motor requirements for mounting close to the motor

This chapter describes the main requirements and restrictions that apply to selecting a MOVI-SWITCH® drive. Bear this information in mind when placing the order.

Permitted motors

Permitted are only the following motors with nominal voltages of AC 3 x 380 - 500 V, 50 Hz.

- AC motors DRN80M4 to DRN100L4

The assigned motor must always be ordered with /TF option, see chapter "PTC thermistor /TF (PTC)" (→ 🗎 573).

Permitted brakes

The brake assignment does not differ from the standard assignment, see chapter "Accessories overview brake/motor" (→ 🗎 373).

With brakemotors, the brake voltage must correspond to the voltage of the phase voltage (e.g. 400 V supply system = 400 V brake voltage).

Brake rectifier

Always order the assigned motor without brake rectifier.

Plug connectors

For MOVI-SWITCH® 2S../C.0/P22A/RV4A/**APG4**, only the following plug connectors are permitted for the motors:

- ASB4 plug connector
- APG4 plug connector
- ISU4 plug connector

For MOVI-SWITCH® 2S../C.0/P22A/RI2A/**ALA4**, only the following plug connectors are permitted for the motors:

- ASB4 plug connector

Hybrid cables

For more information on hybrid cables available for connecting the MOVI-SWITCH® motor starter with the motor, refer to the "Drive System for Decentralized Installation" catalog.

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10 Other options and design types

10.1 Output

10.1.1 Second shaft end (B-side)

The output end of the motor is optionally available with another shaft end. This so-called second shaft end is designed with a conventional keyway and key in accordance with DIN 6885 Sheet 1 (ISO 773).

A cover can be ordered for configurations that are prone to damage during transport.

For sizes and dimensions, refer to the relevant dimension sheets in chapter "Dimension sheets of the motors".

Technical details

Standard design: The standard design of the second shaft end for motors is generally smaller in dimension than described in EN 50347 for each number of poles and power.

Reinforced design: The reinforced design of the second shaft end was developed as an alternative. Unlike the standard, the selection of brake sizes might be restricted when using the reinforced design. Drives with reinforced second shaft end are not available with /RS backstop option.

DR2./DRN motors

motor	Second shaft end: Standard design	Second shaft end: Reinforced design
63MS/M	11 × 23	–
71MS	11 × 23	–
71M	11 × 23	14 × 30
80MK	14 × 30	11 × 23
80MS	14 × 30	11 × 23
80M	14 × 30	19 × 40
90S/L	14 × 30	19 × 40
100LS/LM/L	14 × 30	19 × 40
112M	19 × 40	24 × 50
132S	19 × 40	28 × 60
132M/L	28 × 60	–
160M/L	38 × 80	–
180M/L	38 × 80	–
200L	48 × 110	–
225S/M	48 × 110	–
250M/ME	55 × 110	–
280S/M	55 × 110	–
315S/M/ME/L//H	70 × 140	–

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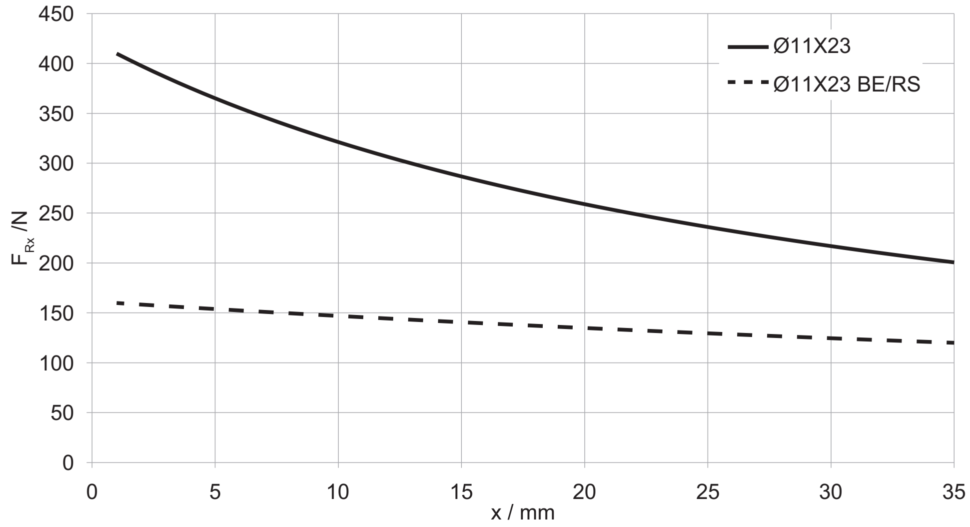
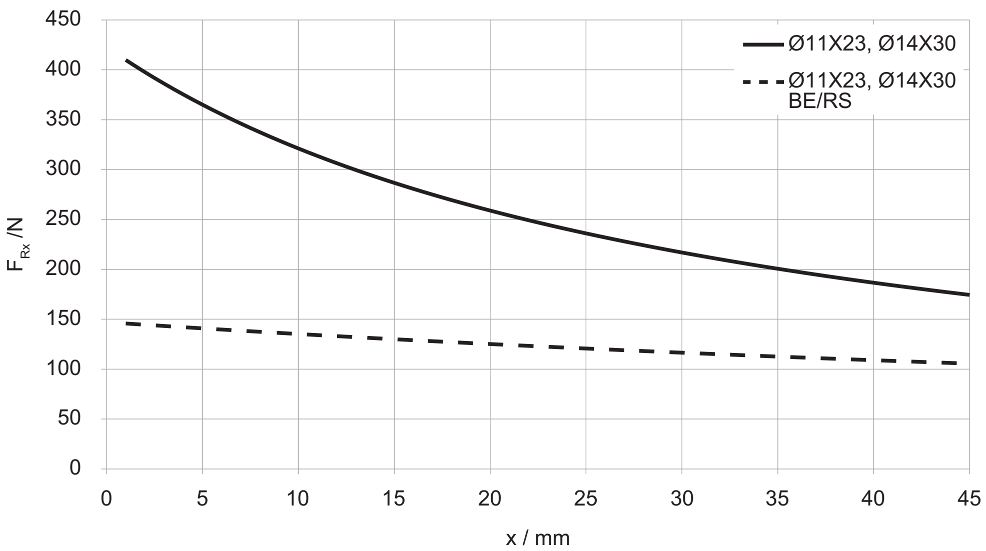
Overhung load diagrams for second shaft end option DRN../DR2S..

Overhung load diagram for DR..63 – second shaft end



9007223611897227

Overhung load diagram for DR..71 – second shaft end



9007223611902091

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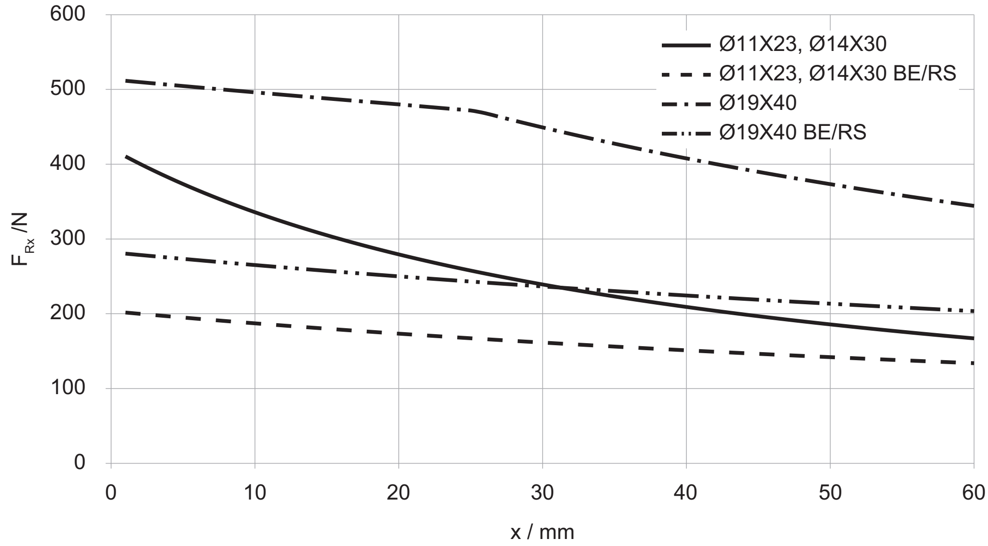
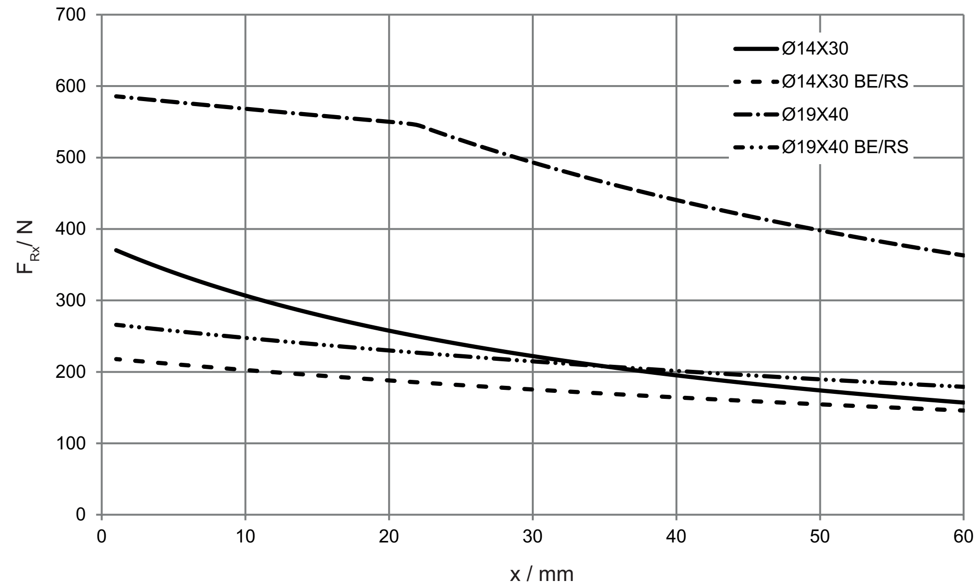
Overhung load diagram for DR..80 – second shaft end



9007223611906955

Overhung load diagram for DR..90 – second shaft end



36028810481451659

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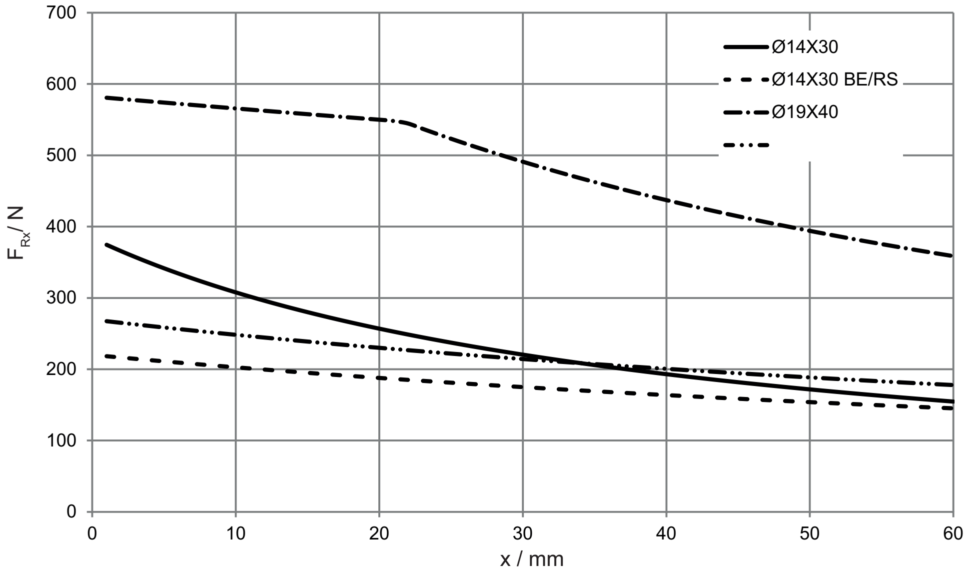
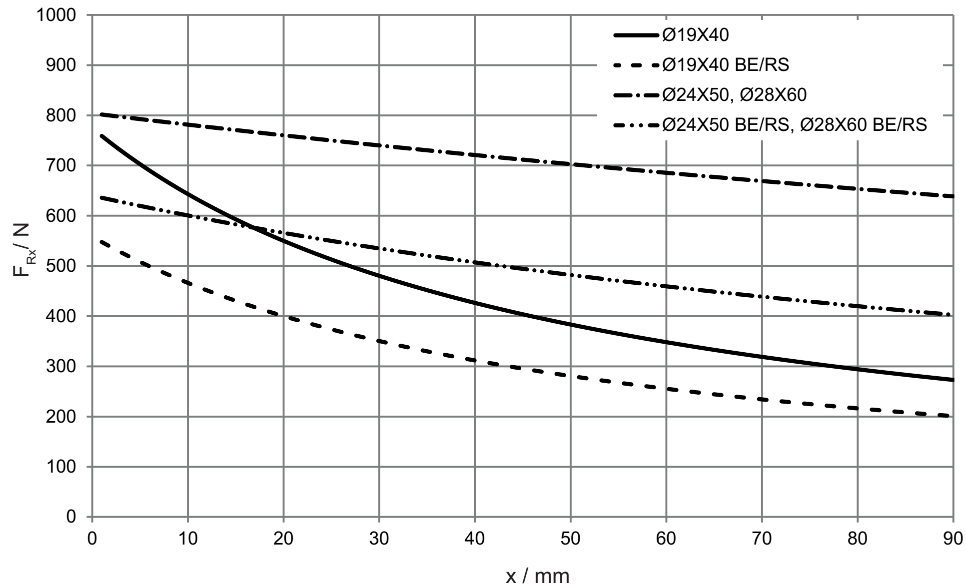
Overhung load diagram for DR..100 – second shaft end



36028810481374859

Overhung load diagram DR..112M – DR..132S – second shaft end



36028810481378699

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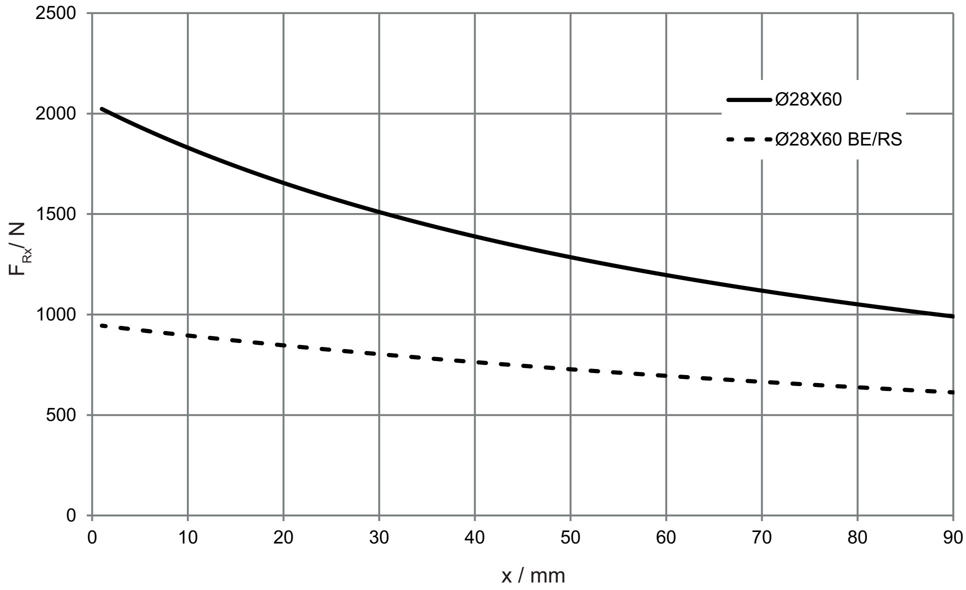
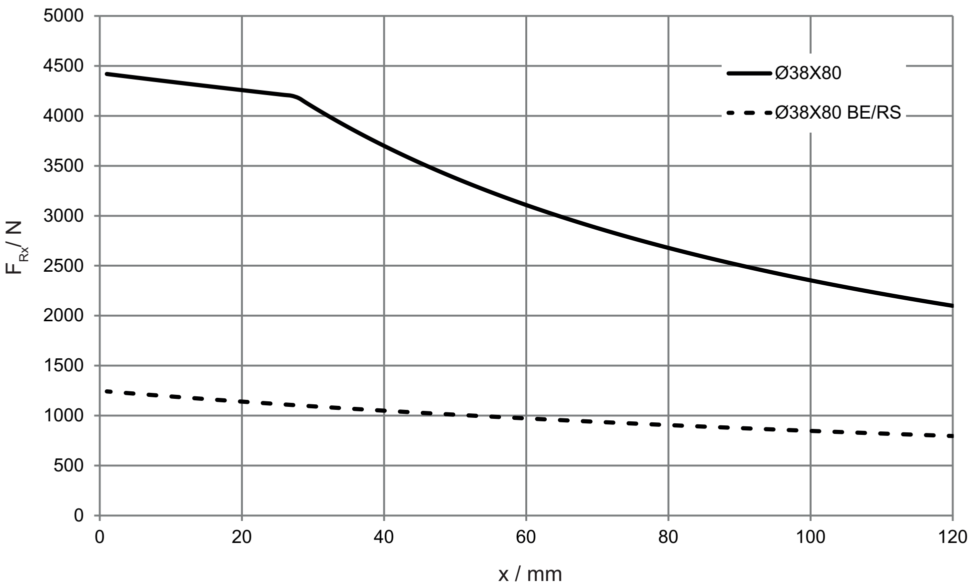
Overhung load diagram DR..132M – DR..132L – second shaft end



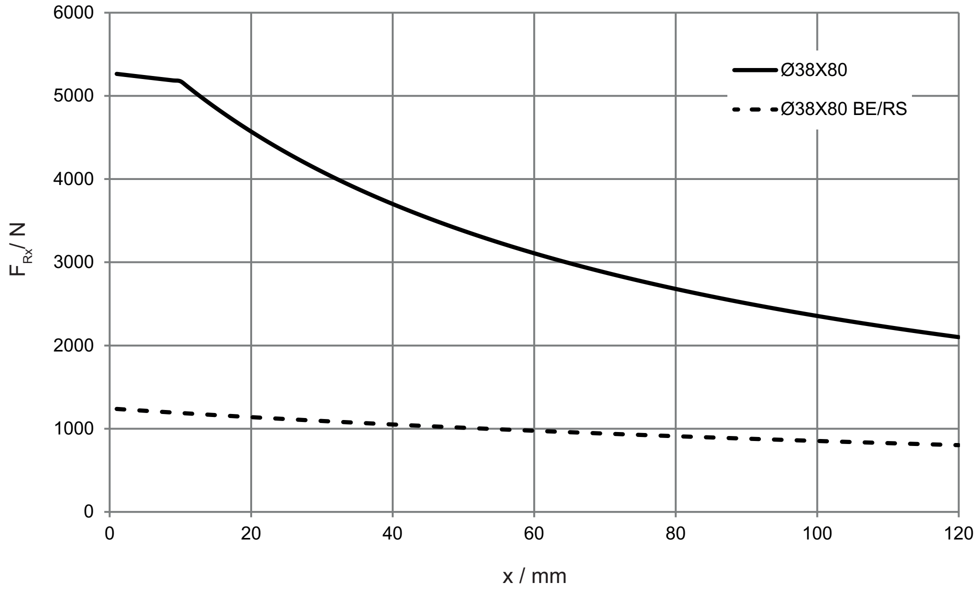
36028810481420939

Overhung load diagram for DR..160 – second shaft end



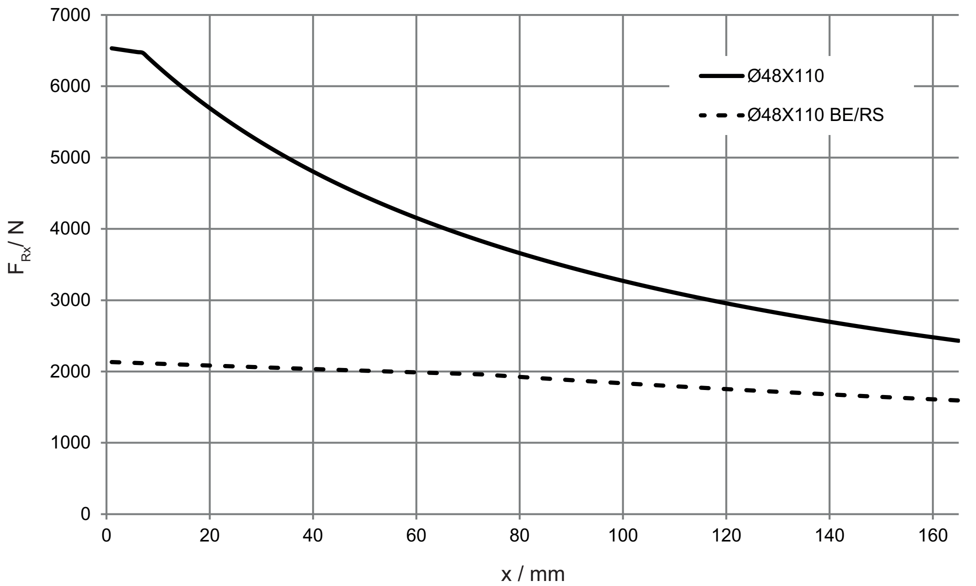
36028810481424779

Overhung load diagram for DR..180 – second shaft end



27021611226687627

Overhung load diagram for DR..200 – second shaft end



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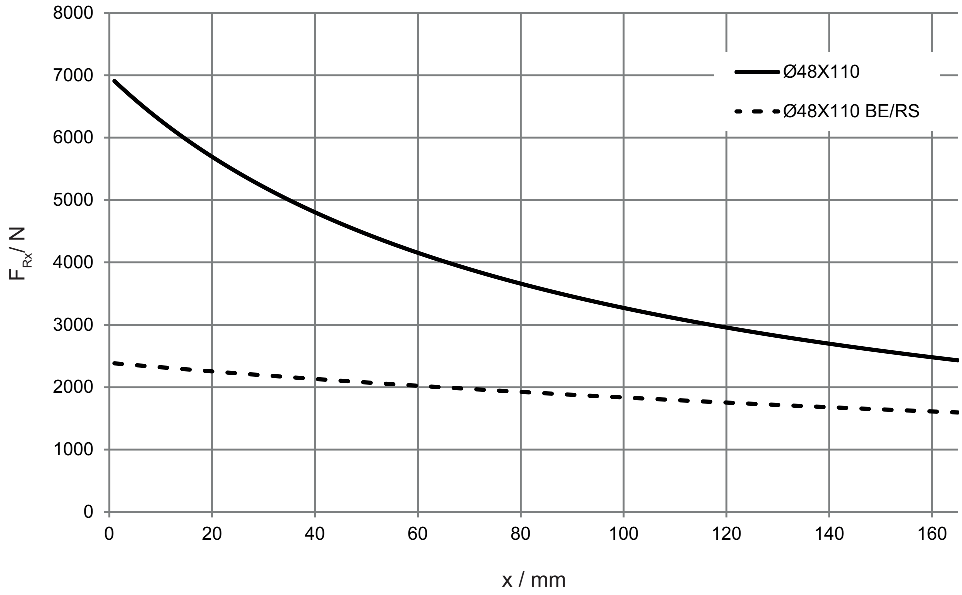
Overhung load diagram for DR..225 – second shaft end



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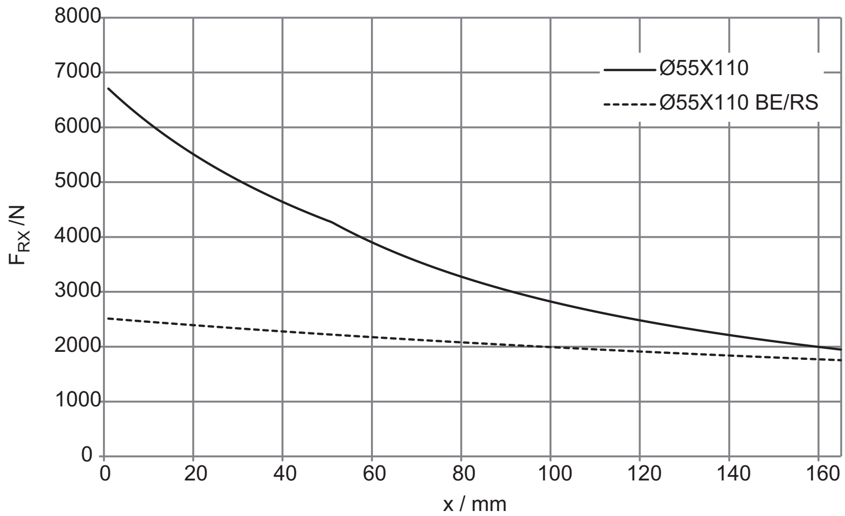
Overhung load diagram DRN250 – DRN280 – second shaft end



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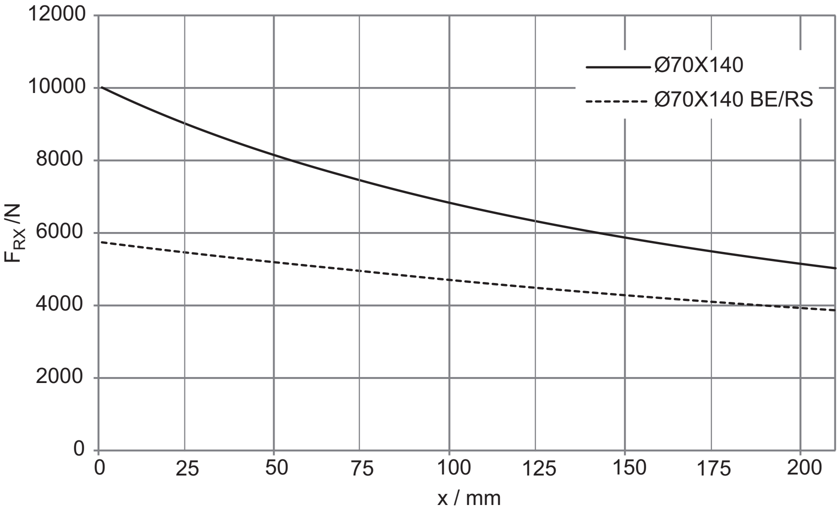
Overhung load diagram DRN315 – second shaft end



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Information about drive selection

Combination with brakes

- Fields marked with "•": Standard design and reinforced design is possible for the second shaft end.
- Fields marked with "x": Only possible with a standard design of the second shaft end.

Motors	Brakes					
	BE03	BE05	BE1	BE2	BE5	BE11
DRN63.., DR2S63..	•					
DRN71.., DR2S71..	•	•	•			
DRN80MS, DR2S80MS		•	•	•		
DRN80MK, DR2S80MK		•	•	•		
DRN80M, DR2S80M		X	X	•		
DRN90.., DR2S90..			X	X	•	
DRN100.., DR2S100..				X	•	
DRN112.., DR2S112..					X	•
DRN132.., DR2S132..					X	•

Combination with built-in encoders

Built-in encoders EI71, EI72, EI76 or EI7C can only be combined with the standard design of the second shaft end. For further information, refer to chapter "EI7., EI8. built-in encoder" (→ 🗎 453).

Order information

Type designation /2W

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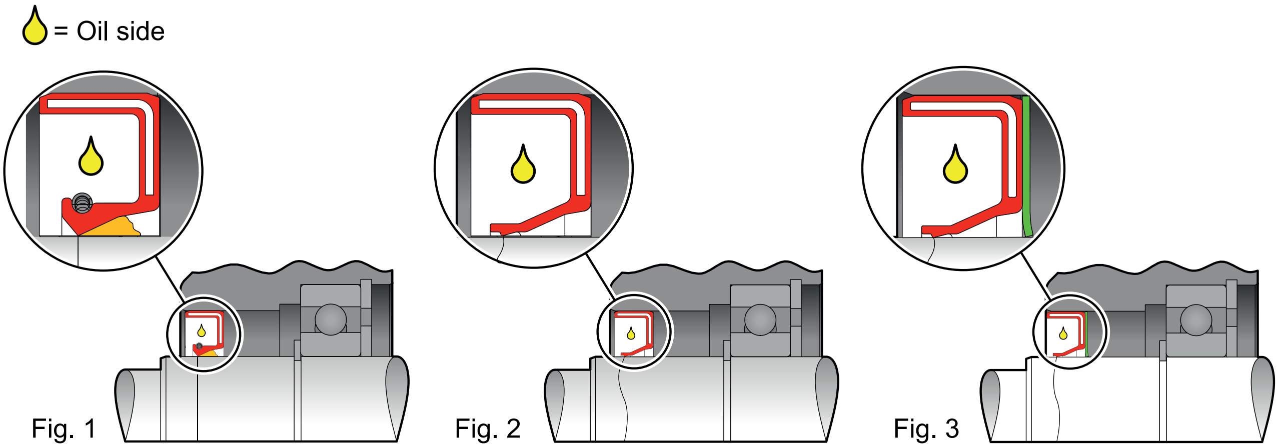
10.1.2 Input seals

Sealing system	Recommended use	Sealing system design	Recommended maintenance interval	Material
NBR Standard sealing system	• Speeds up to 1800 min^{-1} • Temperature range from -40 °C to +80 °C	Oil seal according to Fig. 1	≈ 10000 h	High-quality NBR (acrylonitrile butadiene rubber)
FKM Sealing system for increased rotational speeds and/or increased temperatures	• Speeds up to 4500 min^{-1} • Temperature range from -25 °C to +115 °C • S3 operation (high switching frequencies)	Oil seal with optimization based on Fig. 1	≈ 10000 h	High-quality FKM (fluorocarbon rubber)
Premium Sine Seal[1)] Premium sealing system for longer service life	• Speeds up to 4500 min^{-1} • Temperature range from -25 °C to +115 °C • S3 operation (high switching frequencies) • Extended maintenance interval • Especially recommended with CLP PG NSF H1 lubricants • Especially recommended with GearOil by SEW-EURODRIVE	Premium Sine Seal according to Fig. 2	≈ 20000 h	High-quality FKM (fluorocarbon rubber)
Premium Sine Seal conductive[1)] Sealing system to avoid current passage	• Speeds up to 4500 min^{-1} • Temperature range from -25 °C to +115 °C • S3 operation (high switching frequencies) • Current passage in the motor bearings • Especially recommended with GearOil by SEW-EURODRIVE	Premium Sine Seal with electrically conductive properties based on fig. 3	≈ 10000 h	High-quality FKM (fluorocarbon rubber), fleece with electrically conductive properties

1) Premium Sine Seal is designated only for the A-side of the motor. An FKM oil seal is used on the B-side.



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10.2 Bearings

10.2.1 Current-insulated rolling bearings

AC motors in size 200 and larger can be equipped with a current-insulated bearing on the B-side to prevent damage to the bearing caused by shaft currents during inverter operation.

Order information

Type designation /NIB

Current-dissipating measures are also available as an option for motor sizes 71 to 315. Contact SEW-EURODRIVE.

10.2.2 Reinforced bearings

If the expected statistical service life of the bearings cannot be achieved due to excessive loads, SEW-EURODRIVE offers a version with reinforced bearing. In this case, A-side cylindrical roller bearings are installed (/ERF design). This option is only available in combination with a relubrication device (/NS design).

Technical details

Bearing assignment in /ERF design

<table>
<tr><th rowspan="2">Sizes</th><th rowspan="2">A-side bearing</th><th colspan="2">B-side bearing</th></tr>
<tr><th>IEC motor</th><th>Gearmotor</th></tr>
<tr><td>250 – 280</td><td>NU317E-C3</td><td colspan="2">6315-C3</td></tr>
<tr><td>315S</td><td rowspan="4">NU319E</td><td rowspan="4">6319-C3</td><td rowspan="2">6319-C3</td></tr>
<tr><td>315M/ME</td></tr>
<tr><td>315L</td><td rowspan="2">6322-C3</td></tr>
<tr><td>315H</td></tr>
</table>

Order information

Type designation /ERF

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10.2.3 Relubrication device

The installation of the relubrication device is optional for motor sizes 225, 250, 280, and 315. Externally accessible grease nipples can be used to relubricate the A-side and B-side bearings. When the design"Reinforced bearings" (→ 🗎 568) is selected, the option "relubrication device" is automatically assigned and cannot be deselected.

The use of a relubrication device is recommended for the following operating conditions:

- Motors in vertical mounting position
- At continuous speeds above 1800 min^{-1}
- For ambient temperatures above 60 °C.

Technical details

The following greases are used on-site, depending on the ambient temperature.

Ambient temperature	Manufacturer	Type	DIN designation
-20 °C to +80 °C	Mobil	Polyrex EM	K2P-20
-40 °C to +60 °C	SKF	GXN	K2N-40

The greases can also be purchased separately from SEW-EURODRIVE in 400 g packaging units.

Information about drive selection

The relubrication intervals must be individually adapted to the conditions of the application. The motor generally has to be inspected and the used grease removed after 6 to 8 relubrications.

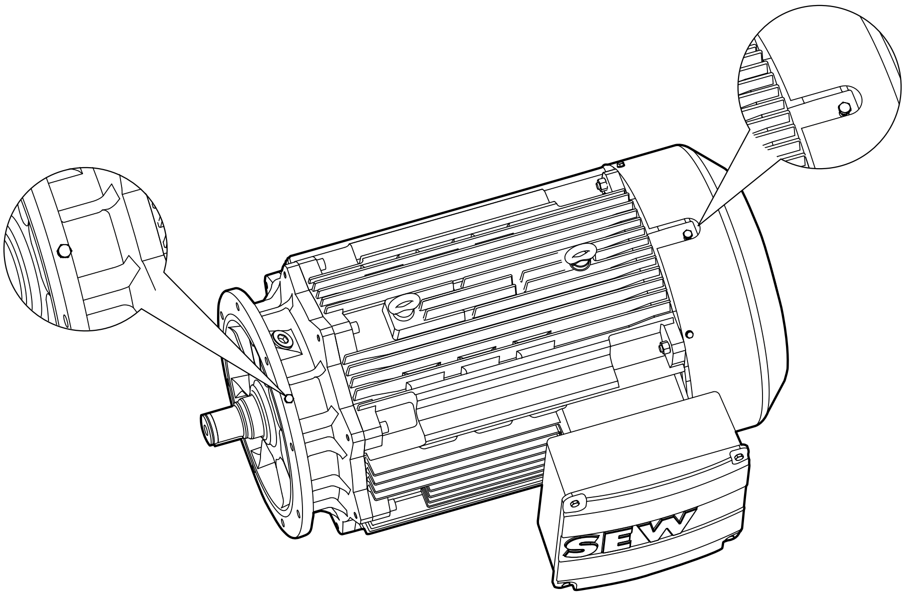
Order information

Type designation /NS

10.2.4 Preparation for accommodating SPM measuring nipples

Increased strain, e.g. caused by vibrations, can slowly lead to failure of important motor functions, such as defective bearings. Using a vibration monitoring device is a possible measure for early detection of when the wear limit is reached.

SEW-EURODRIVE offers a vibration transducer mounting adapter for sizes 132M – 315. This is realized using tapped holes for accommodating SPM measuring nipples.



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[1] Tapped hole for vibration transducer

The components of the mounting adapter are loosely included in the delivery. Vibration transducers are not included in the delivery.

Technical details

The A-side and B-side bores feature metrical threads (M8) in the flanges or covers and are closed with a closing plug. The closing plug is pregreased at the factory for easy disassembly.

Order information

Type designation None

This option is available for size 112 to 315 motors, other sizes are available on request.

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10.3 Winding

10.3.1 Reinforced winding insulation

A reinforced insulation of the copper wires provides a higher electric strength of the winding insulation.

Technical details

The motor winding with reinforced insulation can withstand the following voltage peaks:

- Phase-phase voltages $U_{PP\_pk/pk}$= 3000 V
- Phase-ground voltages $U_{PE\_pk/pk}$ = 2200 V

Also refer to chapter "AC motors on third-party inverters" (→ 🗎 173).

Order information

Type designation /RI

10.3.2 Reinforced winding insulation with increased resistance against partial discharge

If the voltage peaks exceed the threshold of $U_{PP\_pk/pk}$ = 3000, windings with higher resistance against partial discharge must be used.

To protect against these very high voltages, thicker surface insulating materials and enhanced impregnation must be used.

Technical details

The motor winding with reinforced insulation with increased resistance against partial discharge can withstand the following voltage peaks:

- Phase-phase voltages $U_{PP\_pk/pk}$ = 4100 V
- Phase-ground voltages $U_{PE\_pk/pk}$ = 3300 V

Order information

Type designation /RI2

10.3.3 Encapsulated stator winding

If the ingress of water into the motor cannot be ruled out, a drive solution with the following properties could be useful:

- Degree of protection IP56
- Combination with encapsulation
  - for the stator winding

    and
  - the terminal box opening at the stator

    and
- permanently open /DH condensation drain hole
- KS corrosion protection

  and
- surface protection, at least OS1.

This design is available for 4-pole asynchronous motors by SEW-EURODRIVE in size 63 – 132S without brake. Contact SEW-EURODRIVE for information on additional options.

Order information

Type designation	None

10.3.4 Humidity and acid protection

This option uses stators that have a resin-impregnated winding. The resins allow the motors to be used in high humidity conditions. The impregnation leads to an increased resistance to solvents and solvent vapors.

Order information

Type designation	None

10.3.5 Tropicalization

This option uses stators that are impregnated with highly hydrolysis-resistant resins. This allows the motors to be used in areas with increased air humidity, such as in tropical climate conditions.

The utilized wiring insulation materials and the impregnating resin protect the motor against termite-related damage.

Order information

Type designation	None

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10.4 Thermal motor monitoring

10.4.1 PTC thermistor /TF (PTC)

Thermal motor protection averts overheating and therefore prevents irreparable damage from being caused to the motor.

A PTC thermistor is a resistor with a resistance value that increases when the temperature rises. The resistance value grows significantly when the nominal response temperature is reached.

An evaluation unit is required for interpreting the resistance value of the PTC thermistor. When the nominal response temperature is exceeded, the controller switches off the motor. Frequency inverters of SEW-EURODRIVE are suitable for evaluating PTC thermistors.

Technical details

The thermal monitoring with /TF temperature sensor is performed via PTC thermistors installed in the winding overhang of the motor and connected in series. To achieve maximum motor protection, the trigger temperature is slightly lower than the limit value of the thermal class. Temperature sensors /TF are available for the following nominal response temperatures:

Thermal class	Nominal response temperature /TF
130 (B)	130° C
155 (F)	150° C
180 (H)	170 °C

Double design

The /TF PTC thermistors are also available in a double design, e.g. for warning 130 (B) and shutdown 155 (F). Contact SEW-EURODRIVE if you select such a design.

The PTC thermistors comply with the specifications described in DIN VDE V 0898-1-401.

Resistance measurement (measuring device with U ≤ 2.5 V or I < 1 mA):

- Standard measured values: 20 – 500 Ω
- Hot resistance: > 4000 Ω

When using the temperature sensor for thermal monitoring, the evaluation function must be activated to maintain reliable insulation of the temperature sensor circuit. The thermal protection function must become active in case of overtemperature.

INFORMATION

The temperature sensor /TF may not be subjected to voltages > 30 V.

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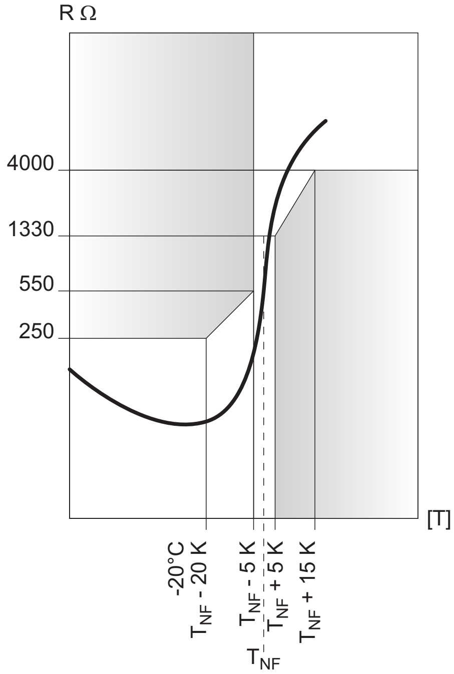
The below figure shows the characteristic curve of a temperature sensor /TF with reference to the nominal response temperature (referred to as T_{NF}).



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Order information

Type designation	/TF

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10.4.2 Temperature switch /TH

Thermal motor protection prevents overheating, therefore preventing irreparable damage to the motor.

A bimetallic switch is a switching element with contact, which opens the contact when the switching temperature is reached. A higher-level controller or a switching device then disconnects the motor from the voltage supply.

The bimetallic switch does not reengage immediately after tripping, e.g. when the nominal switching temperature is reached. The switch is only closed again after a minimum temperature difference of approximately 40 K to the nominal switching temperature is reached (reset temperature RST); only then can the AC motor be operated again.

The time it takes for the reset temperature to be reached is usually in the high double-digit minute range.

Technical details

The thermal motor protection with bimetallic switch /TH is performed via bimetallic elements installed in the winding overhang of the motor and connected in series. To achieve maximum motor protection, the trigger temperature is slightly lower than the limit value of the thermal class. Bimetallic switches /TH are available for the following nominal response temperatures:

Thermal class	Nominal switching temperature /TH
130 (B)	130 °C
155 (F)	150 °C
180 (H)	170 °C

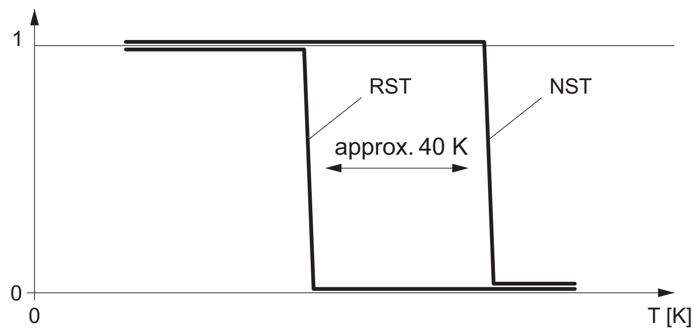
Double design

Bimetallic switches /TH are also available in double design, e.g. for warning 130 (B) and shutdown 155 (F). Contact SEW-EURODRIVE if you select such a design.

Information about drive selection

The thermostats are connected in series as standard and open when the permitted winding temperature is exceeded. They can be connected in the drive monitoring loop.

Type	AC values	DC values	
Voltage in V	250	60	24
Current in A (cosφ = 1.0)	2.5	1.0	1.6
Current in A (cosφ = 0.6)	1.6	–	–



Switching condition of a bimetallic switch "NC contact":

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RST	Reset temperature
NST	Nominal switching temperature

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Order information

Type designation	/TH

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10.4.3 Temperature sensor /PT

If the option /PT is selected, a Pt1000 platinum sensor is installed in one of the 3 motor windings. With the option 3 × Pt100, 3 sensors are distributed onto the 3 winding phases, and each connected to separate terminals.

The platinum sensor has a linear characteristic curve and a high level of accuracy. The platinum sensor can take on the function of motor protection when it is used in combination with a control unit or a frequency inverter with the thermal protection model of the motor.

The temperature sensor can also be added to a PTC thermistor or bimetallic switch.

Technical details

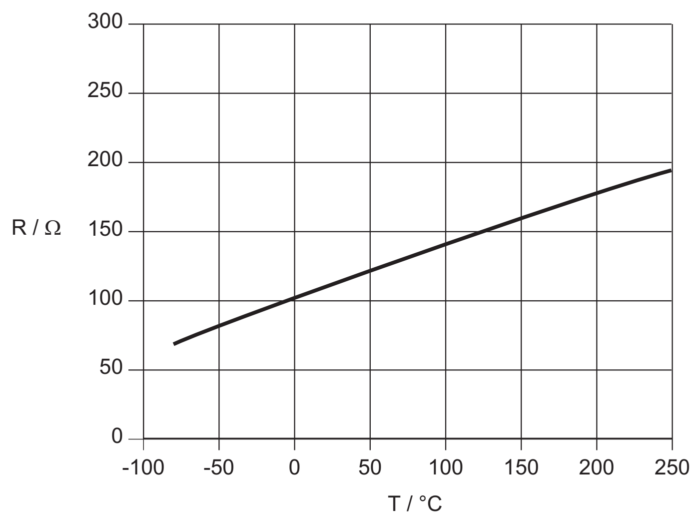
Type	PT100
Connection	Red/white
Total resistance at 20 °C – 25 °C	107 Ω < R < 110 Ω
Test current	< 3 mA

Temperature sensor /PT (Pt100) meets the requirements of IEC 60751.

INFORMATION

Temperature sensors /PT are not polarized; for this reason, swapping the supply cables does not affect the measuring result.

Characteristic curve of a Pt100:



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Order information

Type designation /PT

10.4.4 Temperature sensor /PK

If the option /PK is selected, a Pt1000 platinum sensor is installed in one of the 3 motor windings.

The platinum sensor has a linear characteristic curve and a high level of accuracy. The platinum sensor can take on the function of motor protection when it is used in combination with a control unit or a frequency inverter with the thermal protection model of the motor.

A temperature sensor can also be added to a PTC thermistor or bimetallic switch.

The temperature sensor PK (Pt1000) has 10 times the resistance value of a Pt100.

Technical details

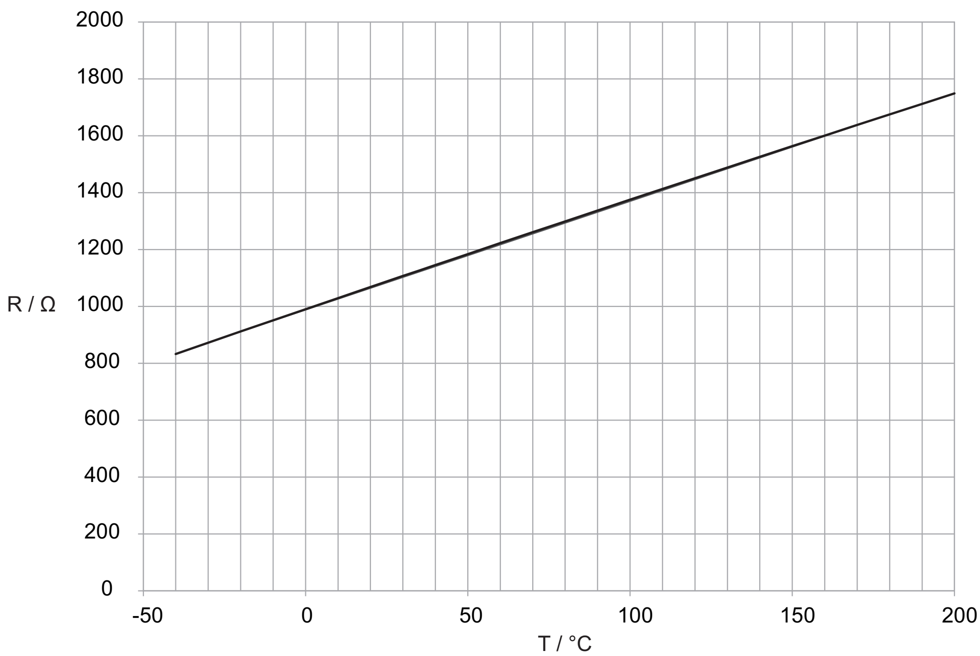
	PT1000
Connection	Red – black
Total resistance at 20 – 25 °C	1050 Ω < R < 1150 Ω
Test current	< 3 mA

Temperature sensors /PK (PT1000) meet the requirements of EN 60751.

INFORMATION

The /PK temperature sensors are not polarized; for this reason, swapping the supply cables does not affect the measuring result.

Characteristic curve of a Pt1000:



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Order information

Type designation /PK

10.5 Terminal box

The terminal box of the motor is attached to the stator housing. The terminal box contains the terminals used to connect the motor and options via separate power cables and control cables. The terminal box protects the motor from potential damage and persons from injury caused by current-carrying components.

The terminal box is available in aluminum or gray cast iron design, depending on the motor size and the selected options, see chapter "Overview of materials used for the motors" (→ 🗎 64).

10.5.1 Technical details

As standard, the terminal boxes of motors are supplied with tapped holes in the terminal box wall so that the appropriate supply cables can be connected, and cable glands affixed.

For motor sizes 56 and 63, an insert nut with metric thread is used instead of the tapped hole.

AC motors from SEW-EURODRIVE have threads in metric dimensions as standard. With motors intended for operation in North America, terminal boxes with Anglo-American pipe threads (NPT, geometric dimensions in inch) are assigned to the order as standard.

In case the drive is ordered with additional features or options connected in the terminal box, a larger terminal box may be required in some cases. The individual standard designs of the terminal boxes for motors are depicted on the dimension sheets.

Metric plastic cable glands (PA) from SEW-EURODRIVE can be preinstalled on request.

10.5.2 Information about drive selection

The terminal boxes made from gray cast iron have different dimensions from those specified in chapter "Dimension sheets for motors/brakemotors" (→ 🗎 234).

10.5.3 Order information

Type designation None

When the order is created, a suitable terminal box is automatically assigned to the motor depending on the selected option.

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10.5.4 Gray cast iron terminal box with connection piece

Larger, gray cast iron terminal boxes with a connection piece are available as an option for some sizes.

The connection piece can be removed from the terminal box to enable the initial fitting of the supply cables. This facilitates the motor connection especially if there is little space available.

Technical details

Combinations

The following connection pieces are available depending on the motor size:

Thread	DR..132M – DR..225	DRN250 – DRN280	DRN315
2 × M32 × 1.5 2 × M16 × 1.5	X	–	–
2 × M50 × 1.5 2 × M16 × 1.5	X	–	–
2 × M40 × 1.5 2 × M16 × 1.5	X	–	–
2 × M63 × 1.5 2 × M16 × 1.5	X	X	X
2 × M63 × 2 2 × M72 × 1.5	–	–	X
1 × NPT 1¼" 2 × NPT ½"	X	–	–
2 × NPT 1½" 2 × NPT ½"	X	X	–
2 × NPT 3" 2 × NPT ½"	–	–	X

X Combination possible
– Combination not possible.

Information about drive selection

Die Klemmenkästen aus Grauguss mit Anschluss-Stück haben abweichende Maße, siehe Kapitel "Dimension sheets for motors/brakemotors" (→ 🗎 234)..

Order information

Type designation None

Please specify the required thread size for the cable glands with your order. In the case of restricted installation space, please request the terminal box dimensions separately.

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10.5.5 Anti-condensation heating

Asynchronous motors from SEW-EURODRIVE can also be equipped with an anti-condensation heating.

The anti-condensation heating consist of strip heaters installed in the winding overhang(s). It is used for heating the switched-off motor in case of low ambient temperatures to prevent condensation in the winding.

Technical details

The anti-condensation heating connection voltage is AC 115 V or AC 230 V.

The following differences arise depending on the motor size:

They are connected to an auxiliary terminal strip in the terminal box.

Motors	Power in W	At 230 V	At 115 V
DR..63 – DR..100	28	0.12	0.24
DR..112 – DR..132S	42	0.18	0.37
DR..132M – DR..225M	56	0.24	0.49
DR..250 – DR..315	150	0.65	1.30

Information about drive selection

Depending on the ambient conditions, using an anti-condensation heating is recommended or mandatory.

- The use of an anti-condensation heating is recommended at ambient temperatures below 0 °C.
- The use of an anti-condensation heating is mandatory at ambient temperatures below -20 °C, and if the motor is exposed to possible condensation.

The anti-condensation heating must be activated as long as the motor is switched off.

Order information

Type designation None

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10.5.6 Condensation drain hole

Depending on ambient conditions, condensation can form in the motor or water infiltration cannot always be prevented despite a high degree of protection. In order to ensure that ingressing water can drain safely, one or more condensation drain holes can be installed upon request.

Technical details

The number and position of required condensation drain holes is based on the relevant mounting position.

The condensation drain holes are sealed at the factory with a closing plug made of NBR. The plug has a labyrinth seal from which condensation can drain off. If contaminated, the condensation drain holes must be checked for proper functioning on a regular basis and cleaned if required.

Closed screw plugs can be selected instead. This type of screw plug must be removed on a regular basis so that the condensation can drain off.

The interval for doing so must be determined by the customer depending on the application and environmental conditions. Observe that condensation must not remain inside the motor over an extended period of time.

The closing plug must not be removed permanently; otherwise, the IP degree of protection for the motor cannot be guaranteed.

Condensation drain holes on the fan guard

With inclined or moving mounting positions, humidity can accumulate in the fan guard. SEW-EURODRIVE offers an optional fan guard with condensation drain hole as an option.

Order information

Type designation	/DH

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10.6 Plug connectors

SEW-EURODRIVE offers AC motors with plug connector as an alternative to motors with conventional motor connection via cables with fixed wiring. This option allows for easier installation without wiring effort by using prefabricated mating connectors (plug-and-play).

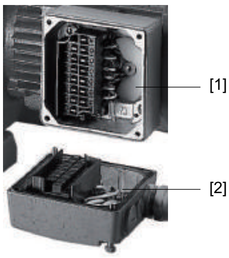
Two types of plug connectors can be selected as standard design:

- Integrated plug connector /IS from SEW-EURODRIVE
- Mounted industrial plug connector /IV with HARTING connector system

SEW-EURODRIVE also offers customer-specific connector solutions from other manufacturers upon request.

10.6.1 Integrated plug connector

The integrated plug connector option consists of 2 interconnected terminal blocks that are integrated in the terminal box instead of the motor terminal board. The advantage of an integrated plug connector is the compact design and the robust, completely enclosed housing.



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[1] Terminal box lower part
[2] Terminal box cover

Technical details

With the /IS standard design, the integrated plug connector is delivered with 2 terminal blocks (pins/bushings) and a terminal box cover with tapped holes. The terminal block (bushings) mounted in the terminal box cover includes a variable terminal link for easy wiring of the motor connection type.

An alternative is the /ISU design where only the terminal block on the motor side (pins) and a transport protection cover are included in the delivery.

This design can be used, for example, when prefabricated cables are used to install the drive, see chapter "Prefabricated cables" (→ 🗎 614).

Technical data

	IS integrated plug connector
Motors	DR..63 – 132S
Nominal value for effective current carrying capacity	AC 16 A
Number of pins	12 contacts for typical use: 6 contacts for motor winding 4 contacts for brake connection 2 contacts for motor option (e.g. thermal motor protection)
Maximum voltage (IEC)	AC 690 V
Maximum voltage (CSA)	AC 600 V
Maximum core cross section	2.5 mm^2 with variable terminal link 4 mm^2 without variable terminal link
Connection technology	Screw connection
Contact type	Pin (terminal box lower part)
	Bushing (terminal box cover)
Grounding (PE)	2 additional contacts in the terminal block insulator
Degree of protection	Up to IP66, depending on motor degree of protection
Ambient temperature	-40 °C to +40 °C (For temperatures above +40 °C reduced contact load according to derating curve)

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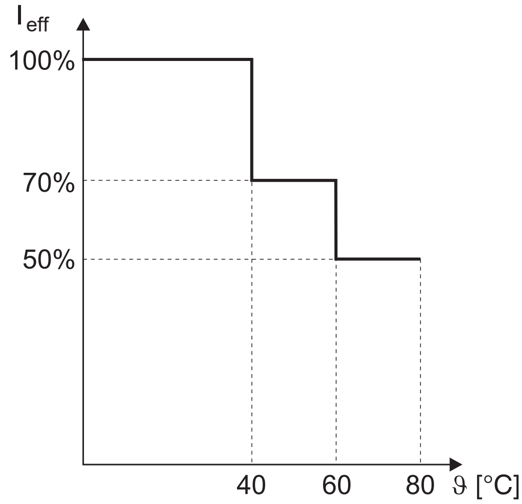
Contact load at ambient temperatures +40 °C and higher

The permitted effective current carrying capacity of the contacts is reduced for ambient temperatures above +40 °C. The following figure shows the permitted contact load depending on the ambient temperature.



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Order information

Description	Designation
Complete design with 2 terminal blocks and variable terminal link	/IS
Design only with terminal block on the motor side, and transport protection cover.	/ISU

- The desired motor connection type (⅄/△) must be specified when the design /IS is ordered. The variable terminal link in the terminal box cover is preinstalled accordingly at the factory.
- The position of the cable entry is decided by the customer during startup. Upon delivery, the position is always "X" and must not be specified in the order.
- The connection of the winding and optional connections of the brake and motor options are performed on the male connector in the factory.

10.6.2 Installed plug connectors

The installed plug connectors are compatible to common industry standards. The motor can be quickly connected to the power supply using the plug connectors.

Three different HARTING connector systems can be selected:

- Han® 10 ES/E.
- Han-Modular®
- Han-Compact®

The mating connectors are not included in the delivery. Mating connectors must be ordered separately from the relevant manufacturer. As an alternative, prefabricated cables with mating connector are available from SEW-EURODRIVE on request.

Information about drive selection

The following chapters provide an overview of technical properties and differences of the individual designs.

Observe the following points:

- Motor sizes specified in the tables describe possible mechanical combinations. What is crucial for implementing these combinations is that the nominal current of the selected motor must not exceed the limit value for the effective current carrying capacity of the plug connector.
- The stated limit values for the effective current carrying capacity refer to ambient temperatures from -40 °C to +40 °C. Observe the derating curve for temperatures up to a maximum of +80 °C.
- The specified motor connection types refer without exceptions to single-speed motors with fixed voltage combinations (e.g. 230 V△/400 V⅄). Contact SEW-EURODRIVE if you require a plug connector for a multi-voltage motor (e.g. 230 V⅄/460 V⅄).
- Mounting the plug connectors results in deviating terminal box dimensions. For the designs AS./AC./AM./AD./AB./AK., the dimensions are marked with the abbreviation IV in the relevant dimension sheet, see chapter "Dimension sheets for motors/brakemotors" (→ 🗎 234). The dimensions for the design AND. are available on request.
- Connector contact pins reserved for motor protection are slightly shorter, with the exception of the AS. types. Observe the wiring diagram, and contact SEW-EURODRIVE for further information.

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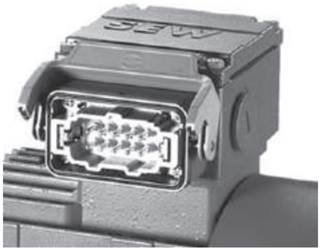
Technical details of Han®10 ES/E



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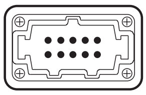
Technical data

/AS.., /AC..

	/ASB..	/ASE..	/ACB..	/ACE..
Motors	DR..63 – 132M	DR..63 – 132M	DR..63 – 132S	DR..63 – 132S
Possible types of motor connection	⅄ / △fixed prewiring set at the factory[1)] ⅄ / △can be wired by the customer			
Connector system	Han®10ES		Han®10E	
Housing	EMC housing, cast or screwed onto the terminal box Harting housing size 10B			
Degree of protection	According to motor degree of protection, up to IP65[2)]			
Interlocking	Han Easy-Lock® 2 brackets Transverse interlocking	Han Easy-Lock® Single-clip Longitudinal closure	Han Easy-Lock® 2 brackets Transverse closure	Han Easy-Lock® Single-clip Longitudinal closure
Motor-side connector view				
Contact insert	Insulator with cage clamp contacts on the motor side		Insulator with crimp contacts on the motor side	
Number of pins	10 (+ PE)			
Contact type	Pin (male) on the motor side Bushing (female) in mating connector			
Grounding (PE)	Via two housing pins on insulator			
Maximum voltage	AC 500 V (IEC) AC 600 V (UL, CSA)			
Nominal value for effective current carrying capacity per contact	AC 16 A			

1) With fixed connection type, also available as design for MOVIMOT®/MOVI-SWITCH® decentralized frequency inverter mounted close to the motor.
2) With plugged in and locked mating connector.

Technical details of Han-Modular®

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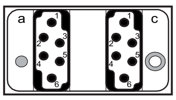
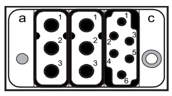
Technical data

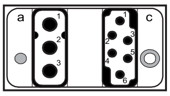
/AM.., /AD..

	/AMB..	/AME..	/ADB..	/ADE..
Motors	DR..63 – 132M	DR..63 – 132M	DR..63 – 225	
Possible types of motor connection	⅄ / △ fixed prewiring set at the factory[1)] ⅄ / △ can be wired by the customer		⅄ / △ can be wired by the customer	
Connector system	Han-Modular®			
Housing	EMC housing, cast or screwed onto the terminal box Harting housing size 10B			
Degree of protection	According to motor degree of protection, up to IP65[2)]			
Interlocking	Han Easy-Lock® 2 brackets Transverse interlocking	Han Easy-Lock® Single-clip Longitudinal closure	Han Easy-Lock® 2 brackets Transverse closure	Han Easy-Lock® single-clip Longitudinal closure
Motor-side connector view				
Contact insert	Articulated frame a/b/c assembled with • a: E module • b: Application cover • c: E module		Articulated frame a/b/c assembled with • a: C module (crimp) • b: C module (crimp) • c: E module	
Number of pins	6 + 6 (+ PE)		3 + 3 + 6 (+ PE)	
Contact type	Pin (male) on the motor side Bushing (female) in mating connector			
Grounding (PE)	Via 2 housing pins on articulated frame			
Maximum voltage	AC 500 V (IEC) AC 600 V (UL, CSA)			

	/AMB..	/AME..	/ADB..	/ADE..
Nominal value for effective current carrying capacity per contact	AC 16 A		AC 36 A (C modules) AC 16 A (E module)	

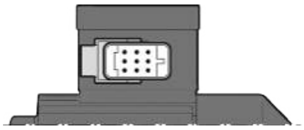
1) With fixed connection type, also available as design for decentralized frequency inverters mounted close to the motor MOVIMOT®/ MOVI-SWITCH®.
2) With plugged in and locked mating connector.

/AB.., /AK..

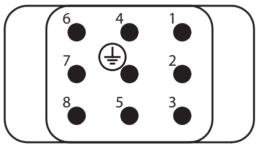
	/ABB..	/ABE..	/AKB..	/AKE..
Motors	DR..71 – 225		DR..132M – 225[1]	
Possible types of motor connection	⅄ / △ fixed prewiring set at the factory			
Connector system	Han-Modular®			
Housing	EMC housing, cast or screwed onto the terminal box Harting housing size 10 B			
Degree of protection	According to motor degree of protection, up to IP65[2]			
Interlocking	Han Easy-Lock® 2 brackets Transverse interlocking	Han Easy-Lock® Single-clip Longitudinal closure	Han Easy-Lock® 2 brackets Transverse closure	Han Easy-Lock® Single-clip Longitudinal closure
Motor-side connector view				
Contact insert	Articulated frame a/b/c assembled with • a: C module (crimp) • b: Application cover • c: E module		Articulated frame a/b/c assembled with • a: C module (axial screw module) • b: Application cover • c: E module	
Number of pins	3 + 6 (+ PE)			
Contact type	Pin (male) on the motor side Bushing (female) in mating connector			
Grounding (PE)	Via 2 housing pins on articulated frame			
Maximum voltage	AC 500 V (IEC) AC 600 V (UL, CSA)			
Nominal value for effective current carrying capacity per contact	AC 36 A (C module) AC 16 A (E module)		AC 60 A (C module) AC 16 A (E module)	

1) An adapted design for the DRN112 – 132S and DR2.112 – 132S is available on request, but has different terminal box dimensions
2) With plugged in and locked mating connector.

Technical details of Han-Compact®



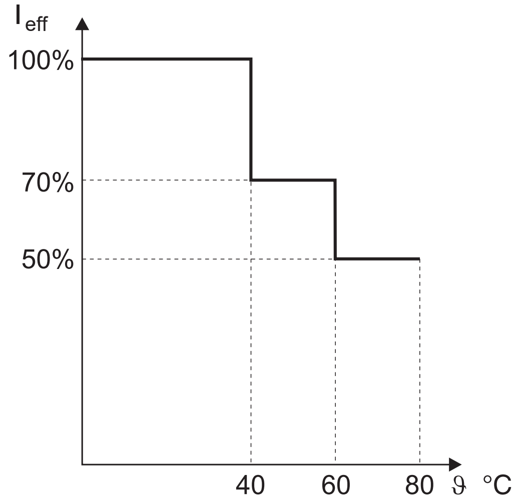
Technical data

	/AND..
Motors	DR..63 – 132M
Possible types of motor connection	⅄ / △ fixed prewiring set at the factory
Connector system	Han-Compact®
Housing	Metal housing, mounted to the terminal box Harting housing size Q8/0
Degree of protection	According to motor degree of protection, up to IP65[1)]
Interlocking	Single-clip transverse closure (metal clip)
Motor-side connector view	
Contact insert	Insulator with Crimp contact on the motor side
Number of pins	8 (+ PE)
Contact type	Pin (male) on the motor side Bushing (female) in mating connector
Grounding (PE)	Via 1 advancing PE contact In the insulator
Maximum voltage	AC 500 V (IEC) AC 600 V (UL, CSA)
Nominal value for effective current carrying capacity per contact	AC 16 A

1) With plugged in and locked mating connector.

Contact load at ambient temperatures +40 °C and higher

The permitted effective current carrying capacity of the contacts is reduced for ambient temperatures above +40 °C. The following figure shows the permitted contact load depending on the ambient temperature.



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Order information

Connector system	Design	Interlocking	Motor connection type ⅄/△	For decentralized inverters mounted close to the motor
Han® 10ES	/ASB..	2 brackets	Fixed prewiring	Available
	/ASE..	1 bracket	Can be wired by the customer	Available
Han® 10E	/ACB..	2 brackets	Fixed prewiring	Not available
	/ACE..	1 bracket	Can be wired by the customer	Not available
Han-Modular®	/AMB..	2 brackets	Fixed prewiring	Available
	/AME..	1 bracket	Can be wired by the customer	Available
	/ADB..	2 brackets	Can be wired by the customer	Not available
	/ADE..	1 bracket	Can be wired by the customer	Not available
	/ABB..	2 brackets	Fixed prewiring	Not available
	/ABE..	1 bracket	Fixed prewiring	Not available
	/AKB..	2 brackets	Fixed prewiring	Not available
	/AKE..	1 bracket	Fixed prewiring	Not available
Han-Compact®	/AND..	1 bracket	Fixed prewiring	Not available

The last position of the type designation (1, 2, 4, 8, 9 as in ASB8) is assigned by SEW-EURODRIVE depending on the desired motor design and options, and does not need to be specified in the order.

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10.7 Cage clamp terminals

As standard, the motor winding is connected to the power supply via a terminal board with threaded bolts. If the customer requests a quicker and easier connection alternative, AC motors can be configured using a power connection via cage clamp terminals. With this option, the power cable connection is replaced by a terminal strip with cage clamp connections.

10.7.1 Terminal strip /KCC

This design contains 6 terminals, plus a grounding terminal (PE).

The star or delta connection is implemented in the middle of the terminal strip as follows:

- Using one jumper for the star connection
- Using 3 jumpers for the delta connection.

These 4 jumpers are included in the scope of delivery.

Technical details

Technical data

Type	/KCC
Cage clamp for motor size	DR..71 – 132S
Number of terminals	6
Grounding (PE)	1 additional terminal
Connection to terminals	Cage clamp
Maximum core cross section	Rigid cores: 4 mm^2 Flexible cores: 4 mm^2 With conductor end sleeve: 2.5 mm^2
Maximum voltage (IEC)	AC 720 V
Maximum load (IEC)	AC 28 A
Maximum voltage (CSA)	AC 600 V
Maximum load (CSA)	AC 20 A
Degree of protection	Corresponding to motor degree of protection
Ambient temperature	-40 °C to +60 °C

Information on drive selection

Additional motor options, e.g. for thermal motor protection, are generally connected separately via screw terminals and not via the terminal strip.

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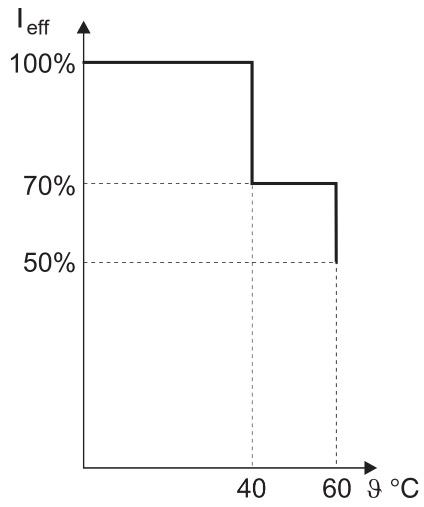
Load of /KCC at ambient temperatures +40 °C and higher

The permitted effective current carrying capacity of the contacts is reduced for ambient temperatures above +40 °C. The following figure shows the permitted load depending on the ambient temperature.



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Order information

Type designation	/KCC

10.7.2 Terminal box in compact design /KC1

For applications where a standard terminal box would create a too large interfering contour, terminal boxes in a compact design can be selected. The terminal box in compact design has smaller dimensions, see chapter "Dimension sheets for DRN.., DR2S.. with cage clamp terminal KCC, KC1" (→ 🗎 351).

With this design, a compact terminal box cover with 3 tapped holes for the cable glands is screwed directly onto the motor housing instead of the terminal box lower part in the standard size. The internal motor terminal board is replaced by a compact terminal strip.

VDI directive 3643 contains a clearance profile for electrified monorail systems, the so-called C1 profile. With the /KC1 option installed, DR..71/80 motors also meet the requirements of this directive in terminal box positions R (0°), L (180°) and T (270°), for all cable entry directions (X, 1, 2, 3).

The option /KC1 remains available for motors in size DR..90 – 132S. But these motors do not comply with the clearance profile according to VDI guideline 3643.

Technical details

Technical data

Type	KC1
Cage clamp for motor size	DR..71 – 132S
Number of terminals	8 for motor/brakemotor
Grounding (PE)	1 additional terminal
Connection to terminals	Cage clamp
Maximum core cross section	Rigid cores: 2.5 mm^2 Flexible cores: 2.5 mm^2 With conductor end sleeve: 1.5 mm^2
Maximum voltage (IEC)	AC 500 V
Maximum load (IEC)	AC 24 A
Maximum voltage (CSA)	AC 600 V
Maximum load (CSA)	AC 5 A
Degree of protection	Corresponding to motor degree of protection
Ambient temperature	-40 °C to +60 °C

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Information on drive selection

The terminal strip consists of the following:

- 3 dual-chamber terminals for power connection of the 3 motor cables.
- 3 single-chamber terminals for connecting the brake. The brake control must be installed in the control cabinet.
- 2 single-chamber terminals for connecting a motor option, e.g., a temperature sensor, temperature switch, or anti-condensation heating.
- A grounding terminal (PE).

The following 3 cable entries are integrated in the cover of design /KC1:

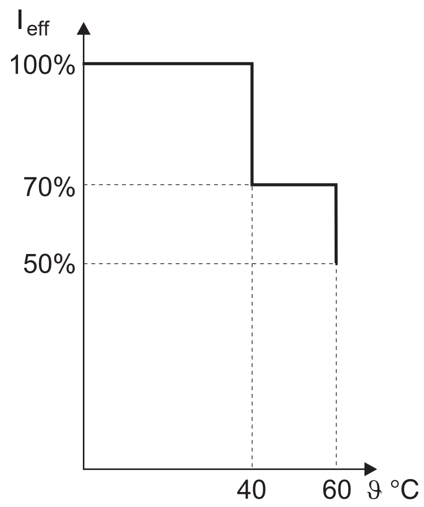
- M20 × 1.5
- M16 × 1.5
- M12 × 1.5

The motor in design /KC1 is supplied with factory-fitted wiring. Unless specified otherwise by the customer, a star connection is provided for 2-, 4-, and 6-pole motors according to wiring diagram R13.

The customer can change the connection type by altering the assignment of the 3 dual-chambers.

Load of /KC1 at ambient temperatures +40 °C and higher

The permitted effective current carrying capacity of the contacts is reduced for ambient temperatures above +40 °C. The following figure shows the permitted load depending on the ambient temperature.



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Order information

Type designation /KC1

10.8 Ventilation

10.8.1 Standard ventilation

The standard motor ventilation consists of a plastic fan that generates an air flow. The air is conducted directly onto and into the cooling fins on the motor's stator housing by the structural design of the fan guard and the fan grille. The fan guard consists of a galvanized sheet steel.

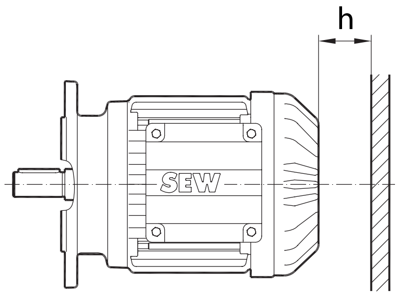
Free air access

The fan-cooled motors require adequate space behind the fan guard in order to draw in the air required for cooling. A distance of half the diameter of the fan guard is normally sufficient.

In order to inspect and maintain the brake, SEW-EURODRIVE recommends extending this distance to the full diameter of the fan guard for the brakemotor. This ensures that the fan guard can be removed in an axial direction.

When integrating a motor or brakemotor into a machine or system, ensure that the heated air is not immediately drawn back in.

Space required to disassemble the fan guard.



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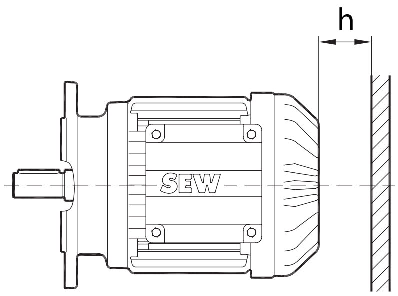
Motor size	Mounted brakes	Free space required	
		For a normal motor fan guard h in mm	For a normal brake-motor fan guard h in mm
DR..56	BE02		
DR..63	BE03		
DR..71	BE05 or BE1	70	139
DR..80	BE05, BE1 or BE2	80	156
DR..90	BE1, BE2 or BE5	90	179
DR..100	BE2 or BE5	100	197
DR..112	BE5 or BE11	115	221
DR..132	BE5 or BE11	115	221
DR..160	BE11 or BE20	135	270
DR..180	BE20, BE30 or BE32	160	316
DR..200	BE30, BE32, BE60 or BE62	200	394
DR..225	BE30, BE32, BE60 or BE62	200	394

Motor size	Mounted brakes	Free space required	
		For a normal motor fan guard h in mm	For a normal brake-motor fan guard h in mm
DR..250	BE60, BE62, BE120 or BE122	255	510
DR..280	BE60, BE62, BE120 or BE122	255	510
DR..315	BE120 or BE122	315	624

10.8.2 Fan guards

As standard, the motors are delivered as fan-cooled design with a plastic fan wheel. The design of the fan guard leads the air flow over the cooling fins of the stator housing. Depending on motor size, motor design, and selected option, the fan guard can be made of plastic or steel. In addition to the standard fan guard or as part of a design, noise-reducing fan guards made from special sheet metal are available as an option.

Cooling air supply distances



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Motors	h in mm
DR..56 – 80	15
DR..90 – 100	20
DR..112 – 132S	25
DR..132M/L	30
DR..180	35
DR..200 – 225	45
DR..250 – 280	50
DR..315	55

Technical details – Fan guard

Combinations with DRN..

Type of fan guard	DRN63 – 90	DRN100 – 132S	DRN132M – 315
Plastic	x	–	–

Type of fan guard	DRN63 – 90	DRN100 – 132S	DRN132M – 315
Sheet metal	•	x	x
Noise reducing sheet metal	–	•	–

x Standard design
• Optional
– Not available
(grey field) With noise-reduction

Combinations with DR2S..

Type of fan guard	DR2S56 – DR2S90	DR2S100 – DR2S132S	DR2S132M – DR2S225
Plastic	x		
Sheet steel	•	x	x
Noise reducing sheet metal	–	•	–

x Standard design
• Optional
– Not available
(grey field) Noise-reduced

Information about drive selection

The type of fan guard only influences the drive dimensioning in exceptional cases. Observe the following points:

- Encoders or forced cooling fans cannot be mounted if fan guards made of noise-reducing sheet metal or plastic are used.
- Plastic fan guards may only be used with drives operated at an ambient temperature between -20 °C and +60 °C.
- Plastic fan guards cannot be treated with an OS3 or OS4 coating for motor sizes 71 – 90.

Axial space required to disassemble the fan guard

The fan-cooled motors require adequate space behind the fan guard in order to draw in the air required for cooling. The distance of half the diameter of the fan guard in the axial direction is usually sufficient.

The space required for removing the fan guard depends on the motor configuration.

Order information

Type designation

- Option designation for plastic fan guard: none
- Option designation of the sheet steel: None
- Option designation for fan guard made of noise-reducing sheet metal: /LN

10.8.3 Canopy for fan guard

If a motor in vertical design with fan guard facing up is installed in the system or machine, ensure that foreign bodies cannot penetrate through the fan grille into the fan wheel. This can be avoided either by constructional measures taken by the customer, or by using a canopy above the fan guard.

Technical details

The canopy extends the motor or brakemotor. For dimensions, refer to chapter "Dimension sheets for motors/brakemotors" (→ 🗎 234).

Information about drive selection

If there is still a risk of foreign objects or liquids entering the motor even though a canopy is installed, please contact SEW-EURODRIVE.

Order information

Type designation /C

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10.8.4 Forced cooling fan

A forced cooling fan can be installed upon request to ensure motor cooling independent of the motor speed. The cooling effect for forced air cooling is at least equivalent to the cooling effect of a fan-cooled motor at rated speed.

This means the motor can permanently deliver the full or up to 1.2 times the rated torque at low speeds without the risk that the motor will overheat.

SEW-EURODRIVE recommends a forced cooling fan in the following applications:

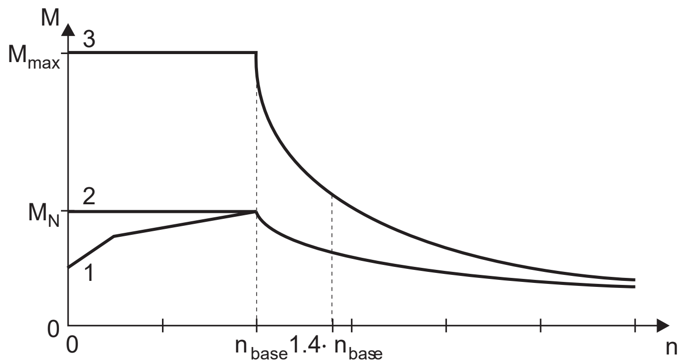
- Mains-operated drives with high switching frequency
- Mains-operated drives with additional flywheel mass Z
- Inverter drives with a setting range ≥ 1:20
- Inverter drives with brakes intended to be released electrically all the time while the motor is at an idle state (position control).
- Inverter drives that have to produce the rated torque at low speeds or even at an idle state.

Technical details

Motor and forced cooling fan are connected via a fan guard dimensioned for this purpose. The length of the forced cooling fan guard varies depending on the desired motor configuration, such as configurations with a brake or encoder.

The following figure shows a typical speed-torque characteristic for a dynamic motor operated at an inverter, for example with MOVIDRIVE® MDX61B with encoder feedback option (DEH11B) in the VFC operating mode.

A forced cooling fan must be used if the effective load torque in the range of 0 – n_{base} is above curve 1. Without a forced cooling fan, there could be a thermal overload in the motor and it could be destroyed.



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M_N	Rated torque of the motor	1	With self-cooling
M_{max}	Maximum torque of the motor	2	With external cooling
n_{base}	Rated speed (base speed) of the motor	3	Maximum torque

Observe the resulting additional length of the overall drive when using a forced cooling fan.

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Technical data

DRN.. motors

Overview of possible operating voltages of the forced cooling fan:

Forced cooling fan			Motors		
			DR..71MS – 132L	**DR..160M – 180L**	**DRN200L – 315H DR2S200L – 225S**
DC 24 V		+ / -	1 × 24 V	–	–
AC 120 V	50 Hz	1~ [1]	1 × 100 – 127 V	–	–
		△	3 × 100 – 127 V	–	–
		⅄	3 × 175 – 220 V	–	–
	60 Hz	1~ [1]	1 × 100 – 135 V	–	–
		△	3 × 100 – 135 V	–	–
		⅄	3 × 175 – 230 V	–	–
AC 230 V	50 Hz	1~ [1]	1 × 230 – 277 V		–
		△	3 × 200 – 303 V		3 × 200 – 400 V
		⅄	3 × 346 – 525 V		
	60 Hz	1~ [1]	1 × 200 – 277 V		–
		△	3 × 220 – 332 V		3 × 220 – 400 V
		⅄	3 × 380 – 575 V		

1) Delta connection with capacitor.

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Technical data of the forced cooling fan depending on motor size

DR..71MS – 132L/V (AC 120 V, 50 Hz)

Forced cooling fan			**/V**					
Motor sizes			**71**	**80**	**90**	**100**	**112**	**132**
Frequency	Hz		50					
Current consumption	AC A	1~	0.78	0.75	0.74	0.74	0.74	0.74
		Δ	0.78	0.89	0.76	0.75	0.74	0.74
		⅄	0.45	0.43	0.44	0.43	0.43	0.43
Maximum power consumption	W		99	94	95	94	94	94
Air flow rate	m^2/h		60	60	170	210	295	295
Ambient temperature	°C		-20 to +60					
Degree of protection			IP66					
Electrical connection			Terminal board in the forced cooling fan's terminal box with 6 M4 bolts. Connection 1~ with enclosed CB running capacitor					
Max. cable cross section	mm^2		4 × 1.5					
Thread for cable gland			1 × M16 × 1.5					
Additional weight	kg		1.9	1.9	2.1	2.1	2.35	2.35
Certificates			CSA, UR					

DR..80M – 132L/V (AC 230 V, 50 Hz)

Forced cooling fan			**/V**					
Motor sizes			**71**	**80**	**90**	**100**	**112**	**132**
Frequency	Hz		50					
Current consumption	AC A	1~	0.18	0.19	0.29	0.29	0.28	0.28
		Δ	0.15	0.16	0.39	0.37	0.35	0.35
		⅄	0.09	0.09	0.22	0.21	0.20	0.20
Maximum power consumption	W		48	48	91	91	97	97
Air flow rate	m^2/h		60	60	170	210	295	295
Ambient temperature	°C		-20 to +60					
Degree of protection			IP66					
Electrical connection			Terminal board in the forced cooling fan's terminal box with 6 M4 bolts. Connection 1~ with enclosed CB running capacitor					
Max. cable cross section	mm^2		4 × 1.5					
Thread for cable gland			1 × M16 × 1.5					
Additional weight	kg		1.9	1.9	2.1	2.1	2.35	2.35
Certificates			CSA, UR					

DRN160M – 315/V (AC 230 V, 50 Hz)

Forced cooling fan			**/V**				
Motor sizes			**160**	**180**	**200/225**	**250/280**	**315**
Frequency	Hz		50				
Current consumption	AC A	1~	0,34	0.34	–	–	–
		Δ	0.43	0.43	0.96	1.64	1.64
		⅄	0.25	0.25	0.32	0.58	0.58
Maximum power consumption	W		84	84	285	454	454
Air flow rate	m^2/h		780	780	1350	1600	2500
Ambient temperature	°C		-20 to +60				
Degree of protection			IP66				
Electrical connection			Terminal board in the forced cooling fan's terminal box with 6 M4 bolts. Connection 1~ with enclosed CB running capacitor				
Max. cable cross section	mm^2		4 × 1.5				
Thread for cable gland			1 × M16 × 1.5				
Additional weight	kg		7.1	7.1	8.6	15	19.3
Certificates			CSA, UR				

Forced cooling fan	/V				
Motor sizes	**160**	**180**	**200/225**	**250/280**	**315**
Identification[1]	–	–	Yes		

1) According to VO327/2011.

DR2S160M – 225S/V (AC 230 V, 50 Hz)

Forced cooling fan			/V		
Motor sizes			**160**	**180**	**200/225S**
Frequency	Hz		50		
Current consumption	AC A	1~	0,34	0.34	–
		Δ	0.43	0.43	0.96
		⅄	0.25	0.25	0.32
Maximum power consumption	W		84	84	285
Air flow rate	m²/h		780	780	1350
Ambient temperature	°C		-20 to +60		
Degree of protection			IP66		
Electrical connection			Terminal board in the forced cooling fan's terminal box with 6 M4 bolts. Connection 1~ with enclosed CB running capacitor		
Max. cable cross section	mm²		4 × 1.5		
Thread for cable gland			1 × M16 × 1.5		
Additional weight	kg		7.1	7.1	8.6
Certificates			CSA, UR		
Identification[1]			–	–	Yes

1) According to VO327/2011.

DR..80M – DR..132L/V (DC 24 V)

Forced cooling fan			/V					
Motor sizes			**71**	**80**	**90**	**100**	**112**	**132**
Voltage	VDC		24					
Current consumption	AC A	1~	0.44	0.52	0.79	1.15	1.62	1.62
Performance	W		10.5	12.5	19	28.6	38.8	38.8
Air discharge rate	m²/h		60	60	170	210	295	295
Ambient temperature	°C		-20 to +60					
Degree of protection			IP66					
Electrical connection			Terminal board in terminal box of forced cooling fan					
Max. cable cross section	mm²		3 × 1.5					
Thread for cable gland			1 × M16 × 1.5					
Additional weight	kg		1.9	1.9	2.1	2.1	2.35	2.35
Certificates			CSA, UR					

Order information

Type designation /V

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10.8.5 Aluminum fan

An aluminum fan is used instead of the standard PVC fan if the expected ambient temperature exceeds +60 °C or drops below -20 °C.

The permitted temperature range for using an aluminum fan is -40 °C to +100 °C.

Information about drive selection

Observe the following notes:

- The aluminum fan decreasingly influences the inertia of the rotor the higher the motor size is selected, see the following table.
- Note the aluminum fan inertia when determining the permitted switching frequency Z.
- The no-load starting frequency Z_0 does not need to be reduced.

DRN..

Motors[1]	J_{AL}	J_{Mot_AL}	Increase in inertia compared to standard design
	10^{-4} kgm^2	10^{-4} kgm^2	%
DRN63MS	0.3	3.2	8
DRN63M	0.3	4	6
DRN71MS	2.8	7.9	46
DRN71M	2.8	9.6	35
DRN80MK	4.3	20.4	19
DRN80MS	1.7	19.8	7
DRN80M	4.3	28	14
DRN80M2	1.7	25.4	5
DRN90S	7	59.7	10
DRN90S2	1.6	54.4	2
DRN90L	7	72.9	8
DRN90L2	1.6	67.5	2
DRN100LS	7	87.1	7
DRN100L	7	117.7	5
DRN100LM2	1.6	90.9	1
DRN112M	7	183	3
DRN132S	7	246	2
DRN132S6	16	255	4
DRN132M	26	405	5
DRN132L	26	463	5
DRN160M	27	839	3
DRN160L	27	1061	2
DRN180M	27	1651	1
DRN180L	27	1971	1
DRN200L	160	2804	5
DRN225S	160	4490	3
DRN225M	160	4490	3
DRN250M	160	7500	2
DRN280S	160	9070	2
DRN280M	160	12136	1
DRN315S	370	23706	1
DRN315M	370	25070	1
DRN315L	370	28870	1
DRN315H	370	35470	1

1) The values for all motors independent of the number of poles apply to motors with no specified number of poles.

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DR2S..

Motors[1]	J_{AL}	J_{Mot_AL}	Increase in inertia compared to standard design
	10^{-4} kgm^2	10^{-4} kgm^2	%
DR2S63MS	0.3	3.2	8
DR2S63M	0.3	4	6
DR2S71MS	2.8	7.9	46
DR2S71M	2.8	9.6	35
DR2S80MK	4.3	20.4	19
DR2S80MS	4.3	22.4	17
DR2S80M	4.3	28	14
DR2S80M2	1.7	25.4	5
DR2S90S	7	59.7	10
DR2S90S2	1.6	54.4	2
DR2S90L	7	72.9	8
DR2S90L2	1.6	67.5	2
DR2S100LS	7	87.1	7
DR2S100L	7	117.7	5
DR2S100LM2	1.6	90.9	1
DR2S112M	16	193	6
DR2S132S	16	256	4
DR2S132S6	16	255	4
DR2S132M	26	405	5
DR2S132L	26	463	5
DR2S160M	66	879	6
DR2S160L	66	1100	5
DR2S180M	66	1700	3
DR2S180L	66	2010	3
DR2S200L	160	2804	5
DR2S225S	160	4490	3

1) The values for all motors independent of the number of poles apply to motors with no specified number of poles.

Order information

Type designation /AL

10.8.6 Additional flywheel mass

The motor can optionally be equipped with an additional flywheel mass to achieve a smoother startup and braking behavior of line-operated motors.

The additional flywheel mass is implemented as a fan made of gray cast iron, and is used instead of a plastic or aluminum fan.

Information about drive selection

Observe the following information:

- Note the additional flywheel mass inertia when determining the permitted switching frequency. The switching frequency is calculated from the permitted no-load starting frequency Z_0 of a motor without additional flywheel mass multiplied by the factor 0.8.
- Observe the resulting additional weight and increased inertia.
- Counter-current braking and running against a mechanical stop are no longer permitted.
- Not available in vibration grade "B".

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Additional flywheel mass inertia:

Motors	J_Z	J_{mot_Z}	Increase in inertia compared to standard design
	10^{-4} kgm^2	10^{-4} kgm^2	%
DR..63MS	5.3	8.2	178
DR..63M	5.3	9	140
DR..71MS	21	26.4	387
DR..71M	21	28.1	294
DR..80MK	38	54	216
DR..80MS	37.9	55.5	200
DR..80M	37.9	61.7	150
DR..90S	100	152.7	183
DR..90L	100	165.9	147
DR..100LS	150	230.1	183
DR..100L	150	260.7	133
DR..112M	200	376	111
DR..132S	200	439	82
DR..132M	470	849	121
DR..132L	470	907	105

Order information

Type designation /Z

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10.8.7 Non-ventilated motors

Asynchronous motors by SEW-EURODRIVE are also available in non-ventilated design. Non-ventilated motors can only be operated at reduced power compared to self-cooled motors of the same size due to the lack of cooling a fan would provide.

Two designs are available for non-ventilated motors:

- /OL

  These motors are designed with a closed B-side endshield, a shortened rotor shaft on the B-side without fan wheel, and without a fan guard. Brakemotors of size DRN71 – 132M with brake size BE05 – BE11 are equipped with a shortened fan guard.

- /U

  This motor design is not equipped with a fan. All other mount-on components correspond to those in standard design.

Order information

Type designation Non-ventilated (closed B-side): /OL

Type designation Non-ventilated (without fan): /U

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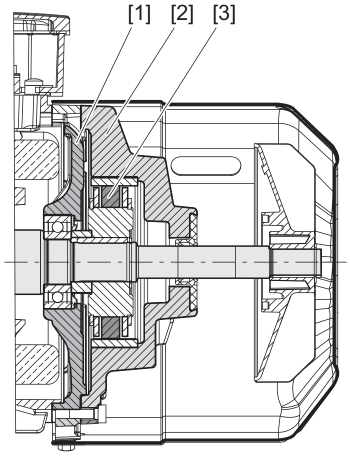
10.9 Mechanical backstop

The backstop is mounted to the motor B-side on the brake endshield [1] instead of a brake. The backstop mechanism consists of a fixed backstop housing [2] with hardened contact surface and the sprag ring [3] that is positively connected to the motor shaft and rotates with the shaft.



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1 Brake endshield
2 Backstop housing
3 Sprag ring

10.9.1 Technical details

Motors	Nominal locking torque	Lift-off speed	Additional weight m_{RS}	Inertia increased by value J_{RS}
	Nm	min^{-1}	kg	10^{-4} kgm^2
DRN63, DRN71 DR2S63, DR2S71	95	890	1.45	0.25
DRN80 DR2S80	130	860	2.1	0.42
DRN90 DRN100	370	750	2.8	1.65
DRN112 DRN132S	490	730	5.5	1.50
DRN132M DRN132L	700	700	8	4.5
DRN160 DRN180	1400	610	15.5	38.0
DRN200 DRN225	2500	470	25	45.0
DRN250 DRN280	3600	400	30	63.0
DRN315	5800	440	48	75.0

10.9.2 Information about drive selection

The backstop is designed for motors in grid operation. The backstop operates maintenance-free above the lift-off speed. Contact SEW-EURODRIVE when operating a motor with backstop on an inverter below lift-off speed.

For the mechanical limit speeds applicable for operating a motor with backstop on an inverter, refer to chapter "Maximum speeds" (→ 🗎 226).

The dimensions of motors with backstop are equal to motors with mounted BE.. brake. Observe the deviating dimensions of the terminal box for sizes 71 to 132S, see chapter "Dimension sheets for motors/brakemotors" (→ 🗎 234).

Backstops can be used with motors designed for ambient temperatures of -40 °C to +60 °C.

10.9.3 Order information

Type designation

/RS

Blocking direction specification

The required motor direction of rotation must be specified in the order. The blocking direction is defined as looking towards the fan guard.

CW: Clockwise

CCW: Counterclockwise

10.10 Functional safety (FS)

Motors from SEW-EURODRIVE are optionally available with functionally safe motor options. These are designed for implementing safety functions.

The motors are available with the following functional safety options upon request:

- Safety brake
- Safety encoder
- MOVIMOT® inverter

SEW-EURODRIVE labels a functionally safe motor option at the drive with an FS logo and a 2-digit number on the motor nameplate. The number is a code that indicates which components in the drive are safety-related. This makes it possible to uniquely identify an available functional safety motor option via the motor nameplate.

FS logo	Available functionally safe motor option		
	Decentralized inverters	Safety brake	Safety encoder
FS 01	X		
FS 02		X	
FS 04			X
FS 07	X		X
FS 11		X	X

If the FS logo, e.g. with the code "FS-11" is present on the motor nameplate, the combination of safety encoder and safety brake is available for the motor. Drives can also be equipped with two encoders, e.g. built-in encoder and add-on encoder. In such cases, the FS logo for the safety encoder always relates to the add-on encoder. If an FS logo is available, adhere to the information specified in the corresponding documentation.

10.11 Surface and corrosion protection

To optimally protect motors that are subject to severe environmental influences, SEW-EURODRIVE offers measures to increase the resistance of highly stressed surfaces.

- Surface protection
- Corrosion protection

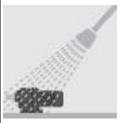
Additional optional protective measures for the output shafts are also available.

10.11.1 Surface protection

As an option for standard surface protection, motors and gear units are also available with surface protection.

The special measure "Z" is also available. During this procedure, large contour recesses are filled with rubber before the coat is applied.

Technical details

Surface protection		Ambient conditions	Application examples
Standard		Suitable for machines and systems in buildings and indoor spaces with neutral atmospheres. According to corrosivity category: • C1 (negligible)	• Machinery and systems in the automotive industry • Transport systems in the logistics area • Conveyor belts at airports
OS1		Suitable for environments prone to condensation and atmospheres with low humidity or contamination, such as applications outdoors under roof or with protection device. Based on corrosivity category: • C2 (low)	• Systems in saw mills • Industrial doors • Agitators and mixers
OS2		Suited for environments with high humidity or moderate atmospheric contamination, such as applications outdoors that are subject to direct weathering. Based on corrosivity category: • C3 (moderate)	• Applications in amusement parks • Funiculars and chair-lifts • Applications in gravel plants • Systems in nuclear power plants
OS3		Suited for environments with high humidity and occasionally severe atmospheric and chemical contamination. Occasionally acidic or caustic wet cleaning. Also for applications in coastal areas with moderate salt exposure. Based on corrosivity category: • C4 (high)	• Sewage treatment plants • Port cranes • Mining applications
OS4		Suitable for environments with permanent humidity and severe atmospheric or chemical contamination. Regular acidic and caustic wet cleaning, also with chemical cleaning agents. According to corrosivity category: • C5 (very high)	• Drives in malting plants • Wet areas in the beverage industry • Conveyor belts in the food industry

- Drives with surface protection OS2 – OS4 are always equipped with /KS corrosion protection.
- Drives in degree of protection IPX6 are always equipped with /KS corrosion protection.
- Drives with surface protection OS4 are always additionally equipped with preventive measure "Z". "Z" = All surface recesses sprayed with elastic rubber compound.
- Corrosivity category: To ISO 12944-2 classification of ambient conditions

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Order information

Type designation None

10.11.2 Corrosion protection

The option description "Corrosion protection" lists all measures to increase the corrosion resistance that refer to treatment of outer surfaces.

A label with the word "KORROSIONSSCHUTZ" (corrosion protection) on the fan guard indicates that special treatment has been applied.

Technical details

The corrosion protection measures are described in the brochure "We have the very thing against corrosion: Surface and corrosion protection". If you have any questions, contact SEW-EURODRIVE.

Order information

Type designation None

10.11.3 Paint

As standard, the motors are painted with "blue/gray"/RAL 7031. Special coatings and other colors are available on request.

11 Prefabricated cables

SEW-EURODRIVE offers prefabricated cables with connectors for straightforward and reliable motor connection.

Prefabricated cables are divided as follows:

- Power cables such as motor cables, brakemotor cables, extension cables
- Encoder cables and their extension cables.

The cable and contact are connected using crimp technology. Cables are available by the meter.

11.1 Preselection of cables

The pre-selection of the prefabricated cables has been performed by SEW-EURODRIVE based on standard EN 60204. The installation type "fixed installation" and "cable carrier installation" have been taken into account.

If other standards are used for machine design, other cross sections may result.

For cables suitable for decentralized installations, refer to the "Drive System for Decentralized Installation" catalog.

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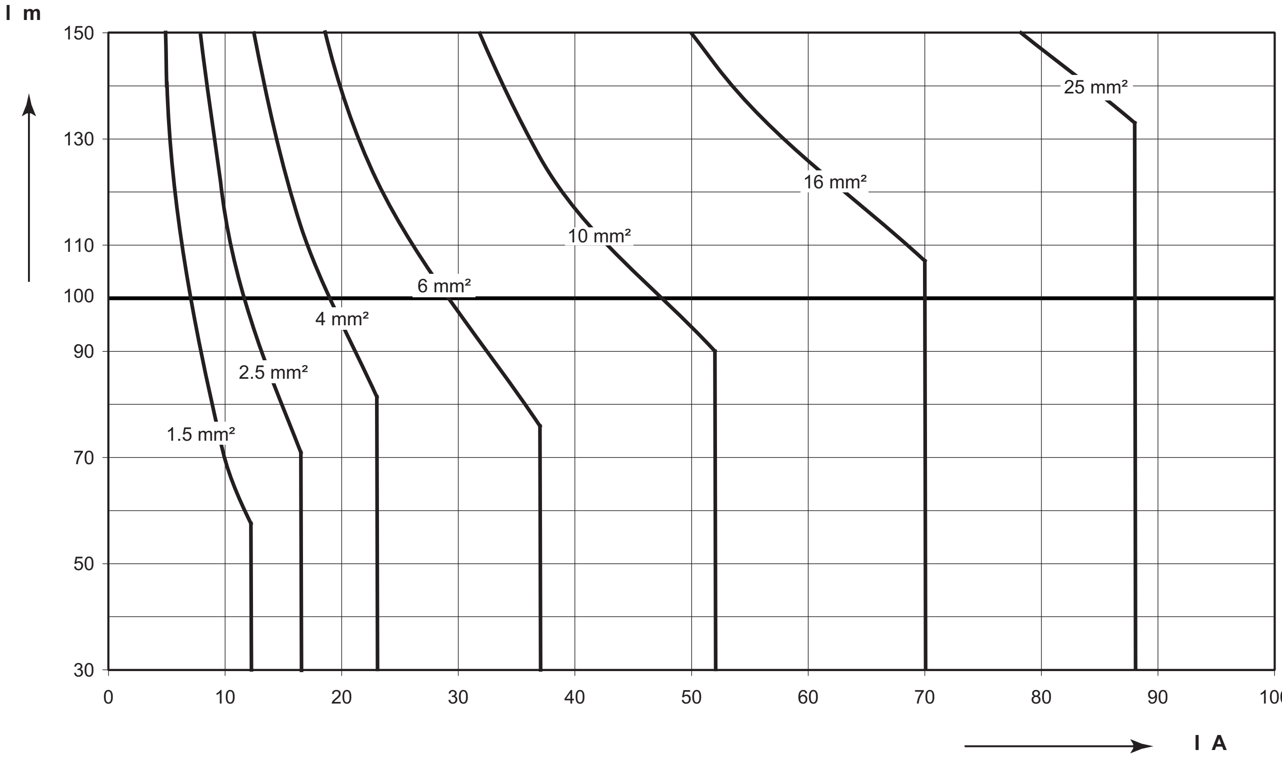
11.2 Project planning

11.2.1 Project planning for cable cross section

The following diagram shows the minimum required cable cross section depending on the cable length and current.



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Prefabricated cables with cross sections of 1.5 mm² to 10 mm² can be ordered from SEW-EURODRIVE.

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11.2.2 Cable dimensioning to EN 60204

Cable load table

Cable load through current **I** according to EN 60204-1:2006 table 6, ambient temperature 40 °C.

Cable cross section	Three-core sheathed cable in pipe or cable	Triple-core, plastic-sheathed cable on top of each other on wall	Three-core sheathed cable lined up horizontally
mm²	**A**	**A**	**A**
1.5	13.1	15.2	16.1
2.5	17.4	21	22
4	23	28	30
6	30	36	37
10	40	50	52
16	54	66	70
25	70	84	88
35	86	104	114

These data are merely recommended values and are no substitute for the detailed project planning of the incoming cables depending on the concrete application considering the applicable regulations.

Observe the voltage drop that occurs along the cable in particular with the DC 24 V brake coil when dimensioning the cross sections for the brake cable. The acceleration current is decisive for the calculation.

Cable load table

Cable load through current **I** according to EN 60204-1:2006 table 6, ambient temperature 40 °C.

Cable cross section	Three-core sheathed cable in pipe or cable	Triple-core, plastic-sheathed cable on top of each other on wall	Three-core sheathed cable lined up horizontally
mm²	**A**	**A**	**A**
35	86	104	110
50	103	125	133
70	130	160	171
95	156	194	207
120	179	225	240

These data are merely recommended values and are no substitute for the detailed project planning of the incoming cables depending on the concrete application considering the applicable regulations.

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11.3 Key

Icon	
	Cables also suitable for cable carriers

Abbreviation	
CL	Ring cable lug
CES	Conductor end sleeve

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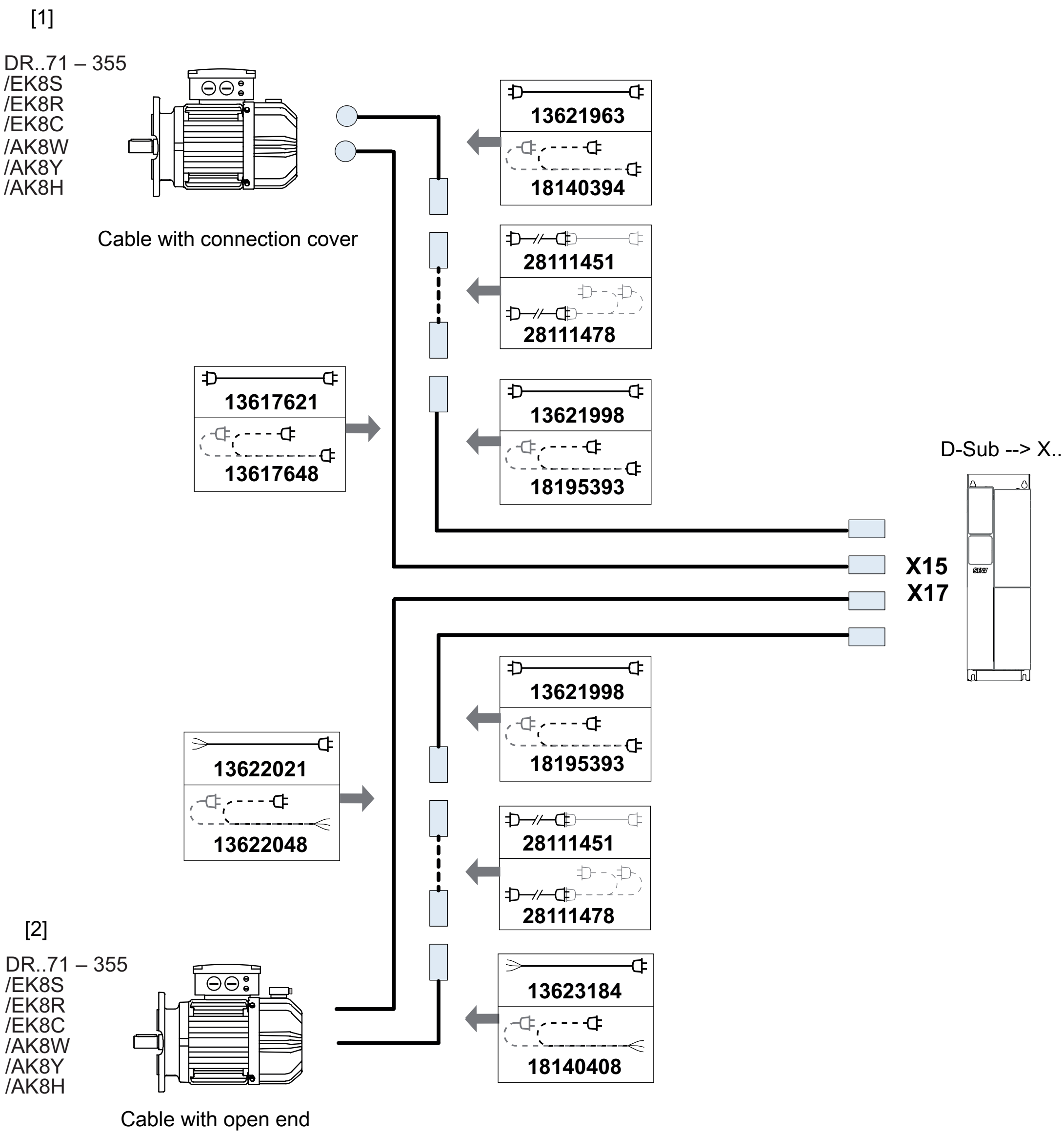
11.4 Encoder cables for DR.. motors

11.4.1 Overview

Overview of encoder cables for encoders of types .K8.



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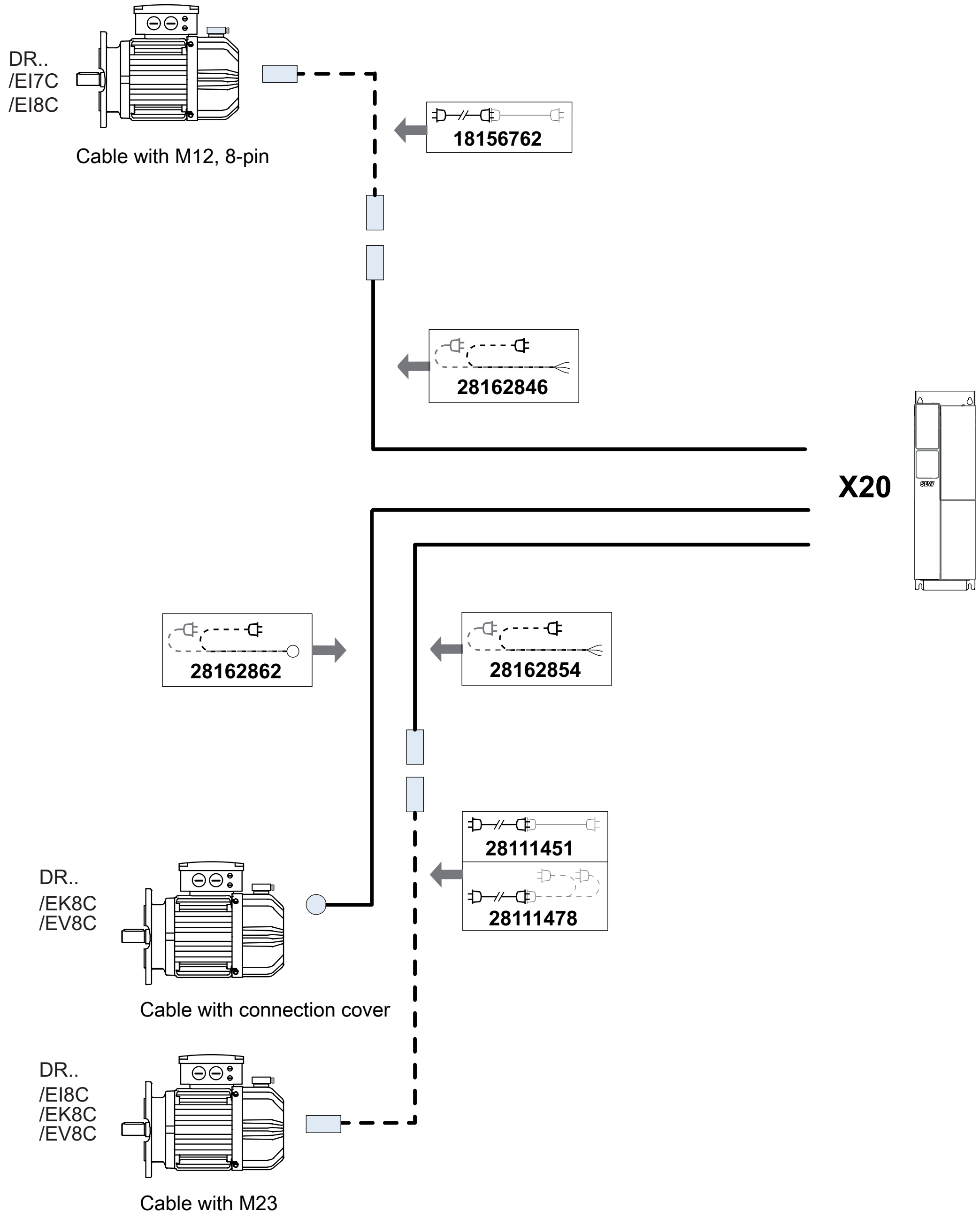
D-Sub --> X.. X15: Connection of encoder/resolver to a MOVIDRIVE® modular/system/technology basic unit
X17: CES11A multi-encoder card
A..Y encoders can be connected only to the CES11A multi-encoder card.

[1] Motors with an integrated plug connector for encoder signals without connection cover, connection type A2GA.
The signals for thermal monitoring of the motor are not present in the encoder cable.

[2] Motors with integrated plug connector for encoder signals with connection cover, connection type A1GA.
The signals for thermal monitoring of the motor are not present in the encoder cable.

Overview of encoder cables for encoders of types .I7., .I8., .K8., .V8. In conjunction with MOVITRAC® advanced



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INFORMATION

Prefabricated encoder cables for operation exclusively at the binary inputs (terminal X20) of MOVITRAC® advanced.

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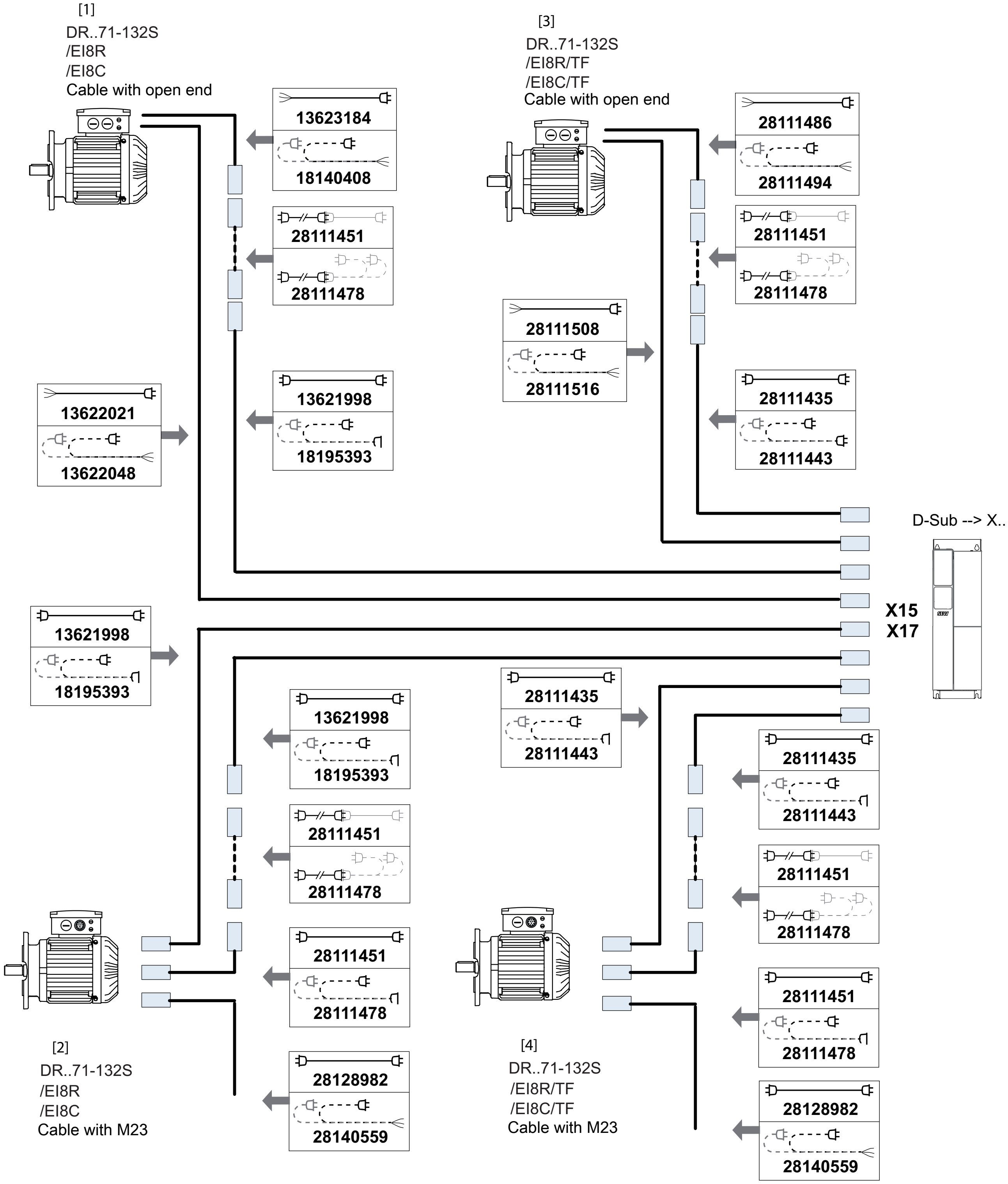
Overview of encoder cables for encoders of types EI8.



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D-Sub --> X..	X15: Connection of encoder/resolver to a MOVIDRIVE® modular/system/technology basic unit X17: CES11A multi-encoder card A..Y encoders can be connected only to the CES11A multi-encoder card.
[1]	Motors with terminal strip in the terminal box for encoder signals and thermal monitoring. The signals for thermal monitoring of the motor are not present in the encoder cable.
[2]	Motors with M23 plug connector at the terminal box for encoder signals, connection type AIGA. The signals for thermal monitoring of the motor are not present in the encoder cable.
[3]	Motors with terminal strip in the terminal box for encoder signals and thermal monitoring. The signals for thermal monitoring of the motor are present in the encoder cable.
[4]	Motors with M23 plug connector at the terminal box for encoder signals and thermal monitoring, connection type AIGB. The signals for thermal monitoring of the motor are present in the encoder cable.

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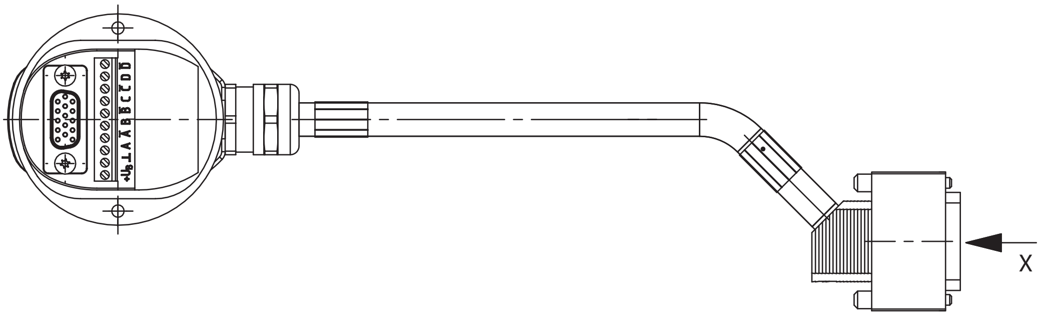
11.4.2 Encoder cables with connection cover and D-sub

Illustration of encoder cable



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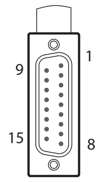
Types of encoder cables

Number of cores and cable cross section	Part number	Installation type
4 × 2 × 0.25 mm^2 + 2 × 0.5 mm^2	13617621	Fixed installation
4 × 2 × 0.25 mm^2 + 2 × 0.5 mm^2	13617648	Cable carrier installation

Pin assignment of encoder cables

Motor connection side					X15 terminal
Contact	**Signal**	**Cable/core color**	**Signal**	**Contact**	**Plug connector view X**
A	cos+	Red (RD)	A	1	**D-sub**  15-pin
$\overline{A}$	cos-	Blue (BU)	$\overline{A}$	9	
B	sin+	Yellow (YE)	B	2	
$\overline{B}$	sin-	Green (GN)	$\overline{B}$	10	
C	C+	Brown (BN)	C	3	
$\overline{C}$	C-	White (WH)	$\overline{C}$	11	
D	Data+	Black (BK)	D	4	
$\overline{D}$	Data-	Violet (VT)	$\overline{D}$	12	
+UB	UB	Red/blue + gray (RD-BU + GY) optionally: Gray (GY)	UB	15	
GND	DGND	Gray-pink+pink (GY-PK +PK) optionally: Pink (PK)	DGND	8	

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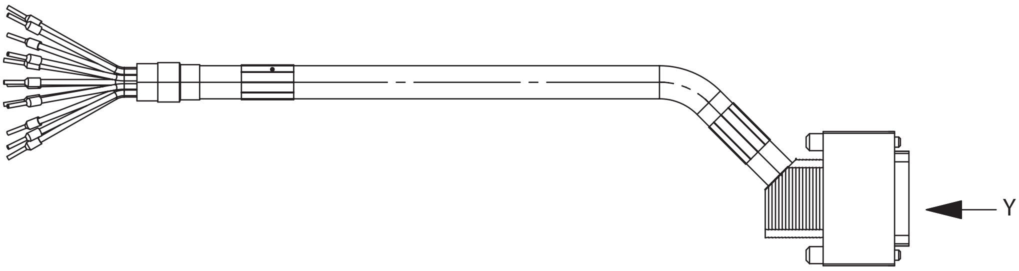
11.4.3 Encoder cables with conductor end sleeves and D-sub

Illustration of encoder cable



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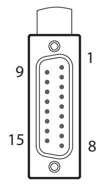
Types of encoder cables

Number of cores and cable cross section	Part number	Installation type
4 × 2 × 0.25 mm^2 + 2 × 0.5 mm^2	13622021	Fixed installation, without TF
4 × 2 × 0.25 mm^2 + 2 × 0.5 mm^2	13622048	Cable carrier installation, without TF
5 × 2 × 0.25 mm^2 + 2 × 0.5 mm^2	28111508	Fixed installation
5 × 2 × 0.25 mm^2 + 2 × 0.5 mm^2	28111516	Cable carrier installation

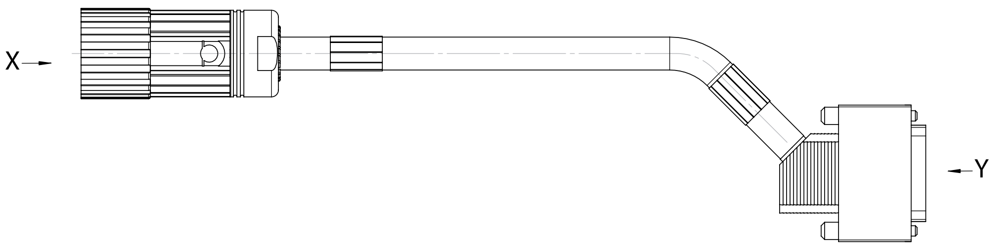
Pin assignment of encoder cables

Motor connection side				Connection X15
	Contact	Description	Conductor color	Plug connector View Y
	1	A (cos+)	Red (RD)	
	9	$\overline{A}$ (cos-)	Blue (BU)	
	2	B (sin+)	Yellow (YE)	
	10	$\overline{B}$ (sin-)	Green (GN)	
	3	C (Clk+)	Brown (BN)	
	11	$\overline{C}$(Clk-)	White (WH)	
	4	Data+	Black (BK)	
	12	Data-	Violet (VT)	
	15	UB	Red-blue + gray (RDBU+GY) Alternative: Gray (GY)	
	8	GND	Gray-pink+pink (GYPK+PK) Alternative: Pink (PK)	
	14	TF+	Gray-pink (GYPK)	
	6	TF-	Red blue (RDBU)	

TF+ and TF-: Assigned only for 28111508 and 28111516

11.4.4 Encoder cables with M23 and D-sub

Illustration of encoder cable



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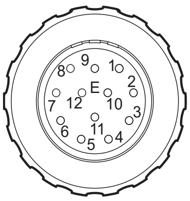
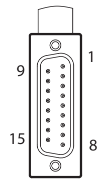
Types of encoder cables

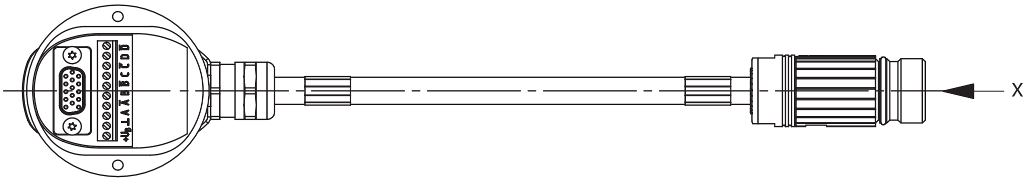
Number of cores and cable cross section	Part number	Installation type
5 × 2 × 0.25 mm^2	13602659	Fixed installation
5 × 2 × 0.25 mm^2	13623206	Cable carrier installation

Pin assignment of encoder cables

Motor connection side					X15 terminal	
Plug connector View X	Contact	Signal	Cable/core color	Signal	Contact	Plug connector View Y
	5	A cos+	Red (RD)	A cos+	1	D-sub  15-pin
	6	$\overline{A}$ cos-	Blue (BU)	$\overline{A}$ cos-	9	
	8	B sin+	Yellow (YE)	B sin+	2	
	1	$\overline{B}$ sin-	Green (GN)	$\overline{B}$ sin-	10	
	3	C+	Brown (BN)	C	3	
	4	C-	White (WH)	$\overline{C}$	11	
	-	Data+	-	D	4	
	-	Data-	-	$\overline{D}$	12	
	12	UB	Black + gray (BK +GY)	UB	15	
	10	GND	Pink + violet (PK+VT)	GND	8	

11.4.5 Encoder extension cables with connection cover and M23

Illustration of encoder extension cable



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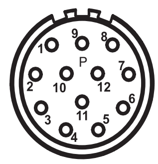
Types of encoder extension cables

Number of cores and cable cross section	Part number	Installation type
4 × 2 × 0.25 mm^2 + 2 × 0.5 mm^2	13621963	Fixed installation
4 × 2 × 0.25 mm^2 + 2 × 0.5 mm^2	18140394	Cable carrier installation

Pin assignment of encoder extension cables

Motor connection side					X15 terminal
Contact	**Signal**	**Cable/core color**	**Signal**	**Contact**	**Plug connector View X**
A	A cos+	Red (RD)	A cos+	3	**AKUA 020** 
$\overline{A}$	$\overline{A}$ cos-	Blue (BU)	$\overline{A}$ cos-	4	
B	B sin+	Yellow (YE)	B sin+	5	
$\overline{B}$	$\overline{B}$ sin-	Green (GN)	$\overline{B}$ sin-	6	
C	C+	Brown (BN)	C+	1	
$\overline{C}$	C-	White (WH)	C-	2	
D	Data+	Black (BK)	Data+	8	
$\overline{D}$	Data-	Violet (VT)	Data-	7	
+UB	UB	Red/blue + gray (RD-BU + GY)	UB	12	
GND	GND	Gray-pink+pink (GY-PK+PK)	GND	11	

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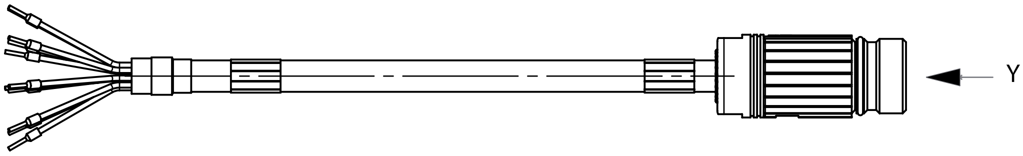
11.4.6 Encoder extension cables with conductor end sleeves and M23

Illustration of encoder extension cable

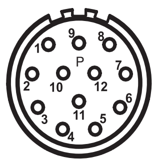


14818388875

Types of encoder extension cables

Number of cores and cable cross section	Part number	Installation type
4 × 2 × 0.25 mm² + 2 × 0.5 mm²	13623184	Fixed installation, without TF
4 × 2 × 0.25 mm² + 2 × 0.5 mm²	18140408	Cable carrier installation, without TF
5 × 2 × 0.25 mm² + 2 × 0.5 mm²	28111486	Fixed installation
5 × 2 × 0.25 mm² + 2 × 0.5 mm²	28111494	Cable carrier installation

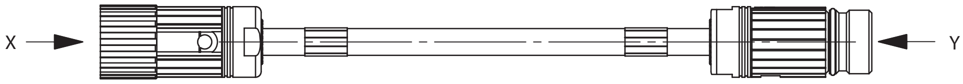
Pin assignment of encoder extension cables

Motor connection side				Connection X15
	Contact	Description	Conductor color	Plug connector View Y
	3	A cos+	Red (RD)	
	4	$\overline{A}$ cos-	Blue (BU)	
	5	B sin+	Yellow (YE)	
	6	$\overline{B}$ sin-	Green (GN)	
	1	C+	Brown (BN)	
	2	C-	White (WH)	
	8	Data+	Black (BK)	
	7	Data-	Violet (VT)	
	12	UB	Red-blue + gray (RDBU+GY) Alternative: Gray (GY)	
	11	GND	Gray-pink+pink (GYPK+PK) Alternative: Pink (PK)	
	9	TF+	Gray-pink (GYPK)	
	10	TF-	Red blue (RDBU)	

TF+ and TF-: Assigned only for 28111486 and 28111494

11.4.7 Encoder extension cables with two M23

Illustration of encoder extension cable

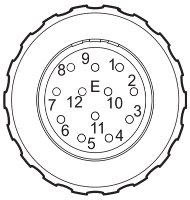
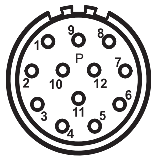


14818397963

Types of encoder extension cables

Number of cores and cable cross section	Part number	Installation type
4 × 2 × 0.25 mm^2 + 2 × 0.5 mm^2	13623192	Fixed installation, without TF
4 × 2 × 0.25 mm^2 + 2 × 0.5 mm^2	13621971	Cable carrier installation, without TF
5 × 2 × 0.25 mm^2 + 2 × 0.5 mm^2	28111451	Fixed installation
5 × 2 × 0.25 mm^2 + 2 × 0.5 mm^2	28111478	Cable carrier installation

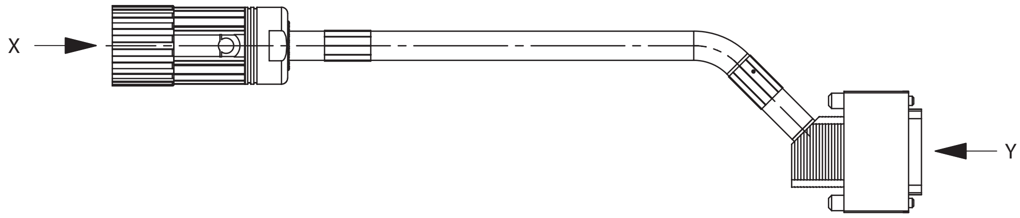
Pin assignment of encoder extension cables

Motor connection side					Connection X15	
Plug connector View X	Contact	Signal	Cable/core color	Signal	Contact	Plug connector View Y
ASTA 021FR 	3	A cos+	Red (RD)	A cos+	3	**AKUA 020** 
	4	$\overline{A}$ cos-	Blue (BU)	$\overline{A}$ cos-	4	
	5	B sin+	Yellow (YE)	B sin+	5	
	6	$\overline{B}$ sin-	Green (GN)	$\overline{B}$ sin-	6	
	1	C+	Brown (BN)	C+	1	
	2	C-	White (WH)	C-	2	
	8	Data+	Black (BK)	Data+	8	
	7	Data-	Violet (VT)	Data-	7	
	12	UB	Red-blue + gray (RD-BU + GY) Alternative: Gray (GY)	UB	12	
	11	GND	Gray-pink+pink (GY-PK+PK) Alternative: Pink (PK)	GND	11	
	9	TF+	Gray-pink (GYPK)	TF+	9	
	10	TF-	Red blue (RDBU)	TF-	10	

TF+ and TF-: Assigned only for 28111451 and 28111478

11.4.8 Encoder extension cables with M23 and D-sub

Illustration of encoder extension cable

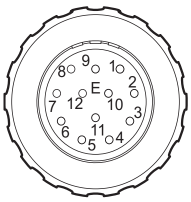
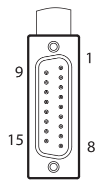


14818406795

Types of encoder extension cables

Number of cores and cable cross section	Part number	Installation type
4 × 2 × 0.25 mm² + 2 × 0.5 mm²	13621998	Fixed installation, without TF
4 × 2 × 0.25 mm² + 2 × 0.5 mm²	18195393	Cable carrier installation, without TF
5 × 2 × 0.25 mm² + 2 × 0.5 mm²	28111435	Fixed installation
5 × 2 × 0.25 mm² + 2 × 0.5 mm²	28111443	Cable carrier installation

Pin assignment of encoder extension cables

Motor connection side					Connection X15	
Plug connector View X	Contact	Signal	Cable/core color	Signal	Contact	Plug connector View Y
ASTA 021FR 	3	A cos+	Red (RD)	A cos+	1	
	4	$\overline{A}$ cos-	Blue (BU)	$\overline{A}$ cos-	9	
	5	B sin+	Yellow (YE)	B sin+	2	
	6	$\overline{B}$ sin-	Green (GN)	$\overline{B}$ sin-	10	
	1	C+	Brown (BN)	C	3	
	2	C-	White (WH)	$\overline{C}$	11	
	8	Data+	Black (BK)	Data+	4	
	7	Data-	Violet (VT)	Data-	12	
	12	UB	Red-blue + gray (RD-BU + GY) Alternative: Gray (GY)	UB	15	
	11	GND	Gray-pink+pink (GY-PK +PK) Alternative: Pink (PK)	GND	8	
	9	TF+	Gray-pink (GYPK)	TF+	14	
	10	TF-	Red blue (RDBU)	TF-	6	

TF+ and TF-: Assigned only for 28111435 and 28111443

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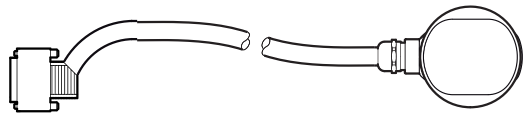
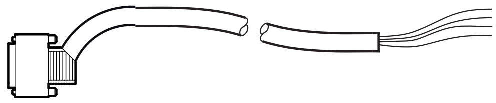
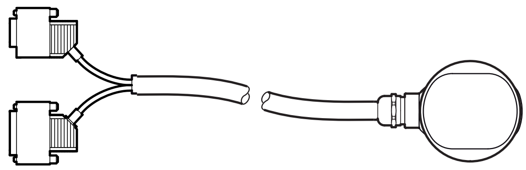
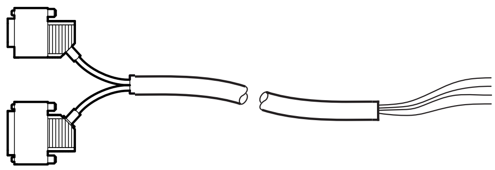
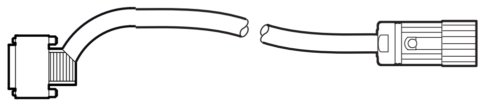
11.5 Overview of add-on encoder cables for DRN..motors – MOVIDRIVE® B

Connection cable			Length/installation type	Specification
	Motor side			
			Fixed length Variable length	If the encoder on the motor is ordered and delivered without an encoder connection cover, the prefabricated cable can be fitted with an encoder connection cover on the encoder end. "Encoder cable with D-sub – encoder connection cover" (→ 🗎 633)
D-Sub (15-pin)		Encoder connection cover		
			Fixed length Variable length	The customer is responsible for connecting the terminal strip in the encoder connection cover. The cable gland in the encoder connection cover is included in the encoder delivery. Connection to MOVIDRIVE®: A 15-pin plug is available that matches the interface on the inverter. "Encoder cable with D-sub – open" (→ 🗎 634)
D-Sub (15-pin)		Open (conductor end sleeve and ring cable lug)		
			Fixed length Variable length	If the encoder on the motor is ordered and delivered without an encoder connection cover, the prefabricated cable can be fitted with an encoder connection cover on the encoder end. "Encoder cable with 2 × D-sub – connection cover" (→ 🗎 635)
D-sub (1 × 9-pin and 1 × 15-pin)		Encoder connection cover		
			Fixed length Variable length	The customer is responsible for connecting the terminal strip in the encoder connection cover. The cable gland in the encoder connection cover is included in the encoder delivery. Connection to MOVIDRIVE®: A 9-pin or 15-pin plug is available to match the inverter in the interface. "Encoder cable with 2 × D-sub – open" (→ 🗎 636)
D-sub (1 × 9-pin and 1 × 15-pin)		Open (conductor end sleeve and ring cable lug)		
			Fixed length Variable length	Connection to MOVIDRIVE®: A 15-pin plug is available that matches the interface on the inverter. "Encoder cable with D-sub – M23 connector" (→ 🗎 637)
D-Sub (15-pin)		M23 connector		

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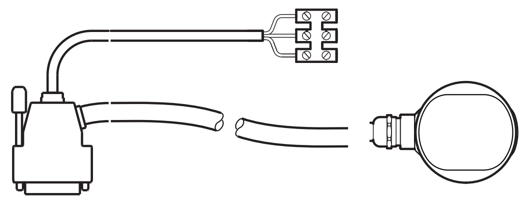
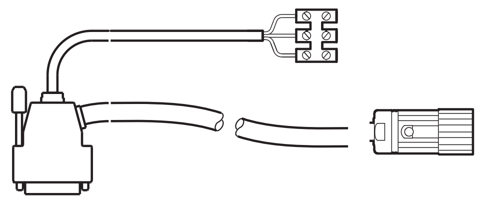
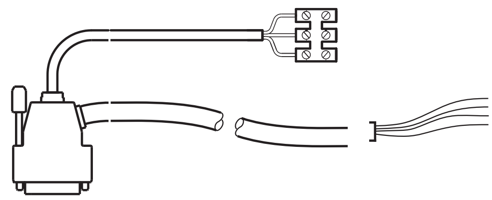
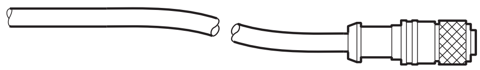
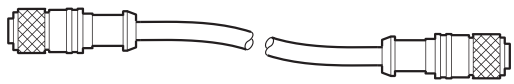
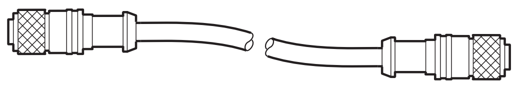
11.6 Overview of add-on encoder cables for DRN..motors – MOVIAXIS®

Connection cable			Length/installation type	Specification
		Motor side		
			Fixed length Variable length	If the encoder on the motor is ordered and delivered without an encoder connection cover, the prefabricated cable can be fitted with an encoder connection cover on the encoder end. Connection with MOVIAXIS®: A 15-pin plug is available that matches the interface on the inverter. "Encoder cable with D-sub – encoder connection cover/terminal" (→ 🗎 638)
D-Sub (15-pin)		Encoder connection cover		
			Fixed length Variable length	Connection with MOVIAXIS®: A 15-pin plug is available that matches the interface on the inverter. The motor protection is routed from the D-sub connector. "Encoder cable with D-sub – M23 connector/terminal" (→ 🗎 639)
D-Sub (15-pin)		M23 connector		
			Fixed length Variable length	The customer is responsible for connecting the terminal strip in the encoder connection cover. The cable gland in the encoder connection cover is included in the encoder delivery. Connection with MOVIAXIS®: A 15-pin plug is available that matches the interface on the inverter. The motor protection is routed from the D-sub connector. "Encoder cable with D-sub – open/terminal" (→ 🗎 640)
D-Sub (15-pin)		Open (conductor end sleeve and ring cable lug)		

11.7 Overview of built-in encoder cables for asynchronous motors

The cable types used for fixed and cable carrier installation are listed in chapter "Cable specifications".

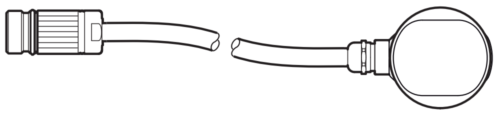
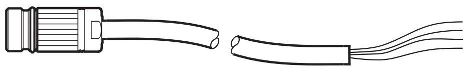
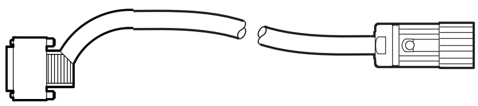
Connection cable		Length/installation type	Specification
	Motor side		
		Fixed length Variable length	4-pin, 8-pin. Cable is suitable for E17 encoder. "EI7. encoder cable with M12 connector and open end" (→ 🗎 642)
	M12 connector		
		Fixed length Variable length	4-pin, 8-pin. Cable is suitable for E17 encoder. "EI7. encoder extension cable with M12 connector to M12 socket" (→ 🗎 645)
M12 connector	M12 connector		
		Fixed length Variable length	8-pin. Cable can also be used for E17-FS encoders. "Detailed information:" (→ 🗎 645)
M12	M12		

11.8 Overview of extensions for add-on encoder cables for asynchronous motors

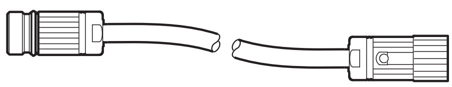
11.8.1 Intermediate sockets and extensions

Intermediate sockets are used whenever part of the wiring is routed in a cable carrier, or if connecting several cable sections is easier for very long distances. The encoder cables are available with intermediate sockets for this purpose.

The cable types used for fixed and cable carrier installation are listed in chapter "Cable specifications".

Connection cable			Length/installation type	Specification
		Motor side		
			Fixed length Variable length	"Encoder extension cable with M23 connector – encoder connection cover" (→ 🗎 650)
M23 connector		Connection cover		
			Fixed length Variable length	The customer is responsible for connecting the terminal strip in the connection cover. The cable gland in the connection cover is included in the delivery of the encoder. "Encoder extension cable with M23 connector – open" (→ 🗎 651)
M23 connector		Open (conductor end sleeve and ring cable lug)		
			Fixed length Variable length	Connection to MOVIDRIVE®: A 15-pin plug is available that matches the interface on the inverter. "Encoder extension cable with D-sub – M23 connector" (→ 🗎 653)
D-Sub (15-pin)		M23 connector		

Extension

Connection cable			Length/ Installation type	Specification
		Motor side		
			Fixed length Variable length	"Encoder extension cable with M23 connector – M23 connector" (→ 🗎 652)
M23 connector		M23 connector		

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11.9 Add-on encoder cable for MOVIDRIVE® B

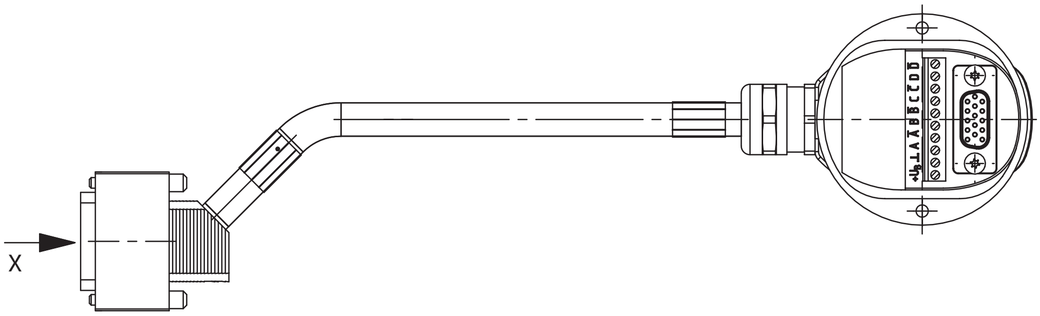
11.9.1 Encoder cable with D-sub – encoder connection cover

Prefabricated cables for encoders

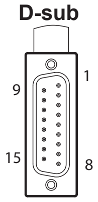
DR.. motors

Encoder	DR..71 – 132S	DR..132M – 280
Sin/cos	ES7S	EG7S
TTL	ES7R	EG7R
Sin/cos + RS485	AS7W	AG7W
Encoder	**DR..71 – 315**	
Sin/cos	EK8S	
TTL	EK8R	
Sin/cos + RS485	AK8W	

Cable drawing and assignment: D-Sub – encoder connection cover



4158198411

Connection MOVIDRIVE® B					Motor connection side
Plug connector view X	**Contact**	**Signal**	**Cable core color**	**Signal**	**Contact**
D-sub  15-pin	1	A	Red (RD)	cos+	A
	9	$\overline{A}$	Blue (BU)	cos-	$\overline{A}$
	2	B	Yellow (YE)	sin+	B
	10	$\overline{B}$	Green (GN)	sin-	$\overline{B}$
	3	C	Brown (BN)	C+	C
	11	$\overline{C}$	White (WH)	C	$\overline{C}$
	4	D	Black (BK)	Data+	D
	12	$\overline{D}$	Violet (VT)	Data-	$\overline{D}$
	15	UB	Red/blue + gray (RD-BU + GY)	UB	+UB
	8		Gray/pink + pink (GY-PK + PK)	DGND	GND

Part numbers

Installation type	D-sub – connection cover
Fixed installation	13617621
Cable carrier installation	13617648

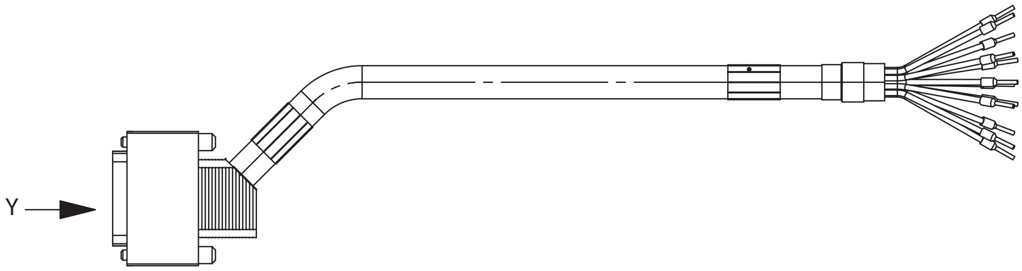
11.9.2 Encoder cable with D-sub – open

Prefabricated cables for encoders

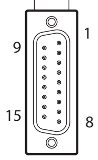
DR.. motors

Encoder	DR..71 – 132S	DR..132M – 280
Sin/cos	ES7S	EG7S
TTL	ES7R	EG7R
Sin/cos + RS485	AS7W	AG7W
Encoder	**DR..71 – 315**	
Sin/cos	EK8S	
TTL	EK8R	
Sin/cos + RS485	AK8W	

Cable drawing and assignment: D-sub – open



4158303499

Connection MOVIDRIVE® B					Motor connection side
Plug connector view Y	Contact	Signal	Cable core color	Signal	Contact
D-sub  15-pin	1	A	Red (RD)	cos+	A
	9	$\overline{A}$	Blue (BU)	cos-	$\overline{A}$
	2	B	Yellow (YE)	sin+	B
	10	$\overline{B}$	Green (GN)	sin-	$\overline{B}$
	3	C	Brown (BN)	C+	C
	11	$\overline{C}$	White (WH)	C-	$\overline{C}$
	4	D	Black (BK)	Data+	D
	12	$\overline{D}$	Violet (VT)	Data-	$\overline{D}$
	15	UB	Red-blue + gray (RD-BU + GY); Alternative: Gray (GY)	UB	+UB
	8	GND	Gray-pink+pink (GY-PK+PK); Alternative: Pink (PK)	GND	GND

Part numbers

Installation type	D-Sub – conductor end sleeve
Fixed installation	13622021
Cable carrier installation	13622048

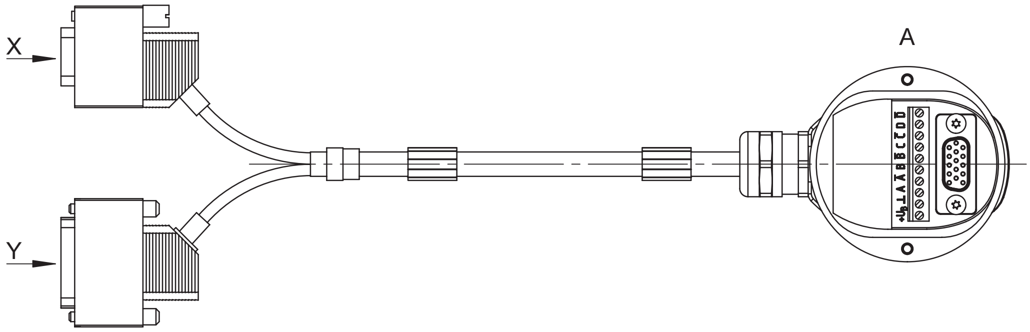
11.9.3 Encoder cable with 2 × D-sub – connection cover

Prefabricated cables for encoders

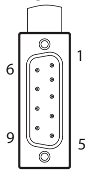
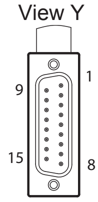
DR.. motors

Encoder	DR..71 – 132S	DR..132M – 280	DRN315
M-SSI	AS7Y	AG7Y	AH7Y
Encoder	**DR..71 – 315**		
M-SSI	AK8Y		

Cable drawing and assignment: 2 × D-sub – encoder connection cover



9007203413047819

Connection MOVIDRIVE® B					Motor connection side
Plug connector	**Contact**	**Signal**	**Cable core color**	**Signal**	**Contact**
D-sub View X  9-pin	3	C	Brown (BN)	C+	C
	8	$\overline{C}$	White (WH)	C-	$\overline{C}$
	1	D	Black (BK)	Data+	D
	6	$\overline{D}$	Violet (VT)	Data-	$\overline{D}$
	9	UB	Red-blue + gray (RD-BU + GY)	UB	+UB
	5	GND	Gray-pink+pink (GY-PK+PK)	GND	GND
D-sub View Y  15-pin	1	A	Red (RD)	cos+	A
	9	$\overline{A}$	Blue (BU)	cos-	$\overline{A}$
	2	B	Yellow (YE)	sin+	B
	10	$\overline{B}$	Green (GN)	sin-	$\overline{B}$

Part numbers

Installation type	2 × D-Sub – connection cover
Fixed installation	13626299
Cable carrier installation	13626302

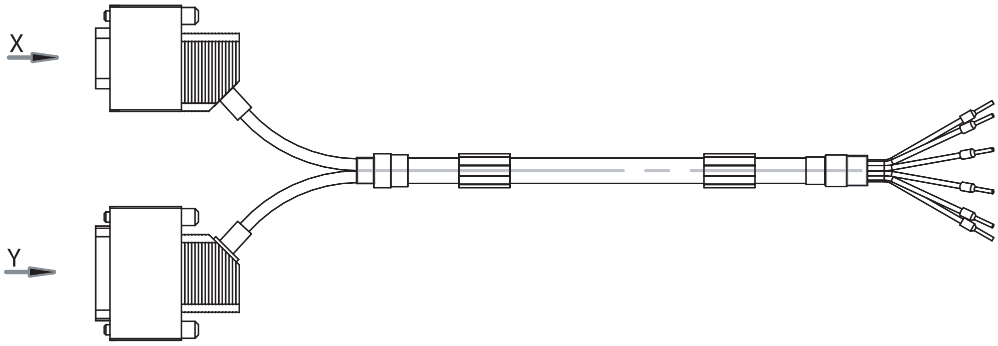
11.9.4 Encoder cable with 2 × D-sub – open

Prefabricated cables for encoders

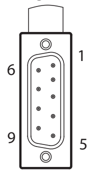
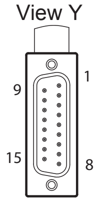
DR.. motors

Encoder	DR..71 – 132S	DR..132M – 280	DRN315
M-SSI	AS7Y	AG7Y	AH7Y
Encoder	**DR..71 – 315**		
M-SSI	AK8Y		

Cable drawing and assignment: 2 × D-sub – open



4158310795

Connection MOVIDRIVE® B					Motor connection side
Plug connector	**Contact**	**Signal**	**Cable core color**	**Signal**	**Contact**
D-sub View X  9-pin	1	Data+	Black (BK)	Data+	D
	6	Data-	Violet (VT)	Data-	$\overline{D}$
	3	C+	Brown (BN)	C+	C
	8	C-	White (WH)	C-	$\overline{C}$
	5	GND	Pink (PK)	GND	GND
	9	UB	Gray (GY)	UB	+UB
D-sub View Y  15-pin	1	cos+	Red (RD)	cos+	A
	9	cos-	Blue (BU)	cos-	$\overline{A}$
	2	sin+	Yellow (YE)	sin+	B
	10	sin-	Green (GN)	sin-	$\overline{B}$

Part numbers

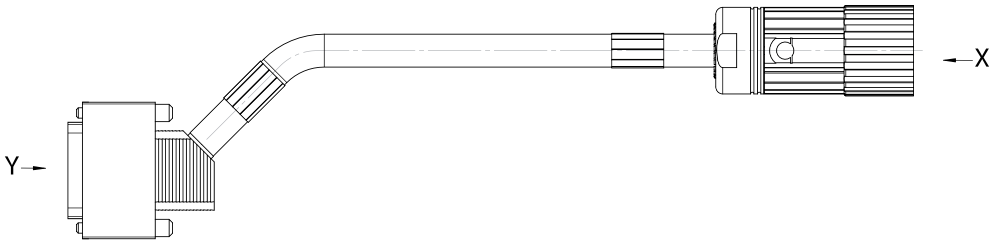
Installation type	2 × D-Sub – connection cover
Fixed installation	13602640
Cable carrier installation	13623265

11.9.5 Encoder cable with D-sub – M23 connector

Prefabricated cables for encoders

Encoder types	DR..315
SinCos	EH7S

Cable drawing and assignment: D-sub – M23 connector



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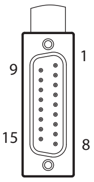
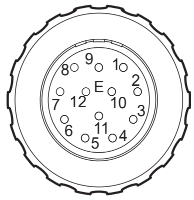
Connection MOVIDRIVE® B					Motor connection side	
Plug connector View Y	Contact	Signal	Cable core color	Signal	Contact	Plug connector View X
D-sub  15-pin	1	A cos+	Red (RD)	A cos+	5	
	9	$\overline{A}$ cos-	Blue (BU)	$\overline{A}$ cos-	6	
	2	B sin+	Yellow (YE)	B sin+	8	
	10	$\overline{B}$ sin-	Green (GN)	$\overline{B}$ sin-	1	
	3	C	Brown (BN)	C+	3	
	11	$\overline{C}$	White (WH)	C	4	
	4	D	-	Data+	-	
	12	$\overline{D}$	-	Data-	-	
	15	UB	Black+gray (BK+GY)	UB	12	
	8	GND	Pink+violet (PK+VT)	GND	10	

Part numbers

Installation type	D-sub15 – M23 connector
Fixed installation	13602659
Cable carrier installation	13623206

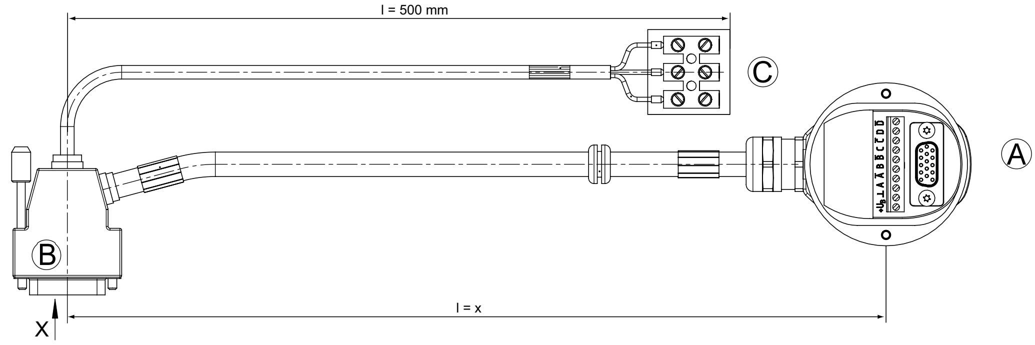
11.10 Add-on encoder cables for MOVIAXIS®

11.10.1 Encoder cable with D-sub – encoder connection cover/terminal

Prefabricated cables for encoders

Encoder
ES7S, EG7S, ES7R, EG7R, AS7W, AG7W, EK8S, EK8R, AK8W

Cable drawing and assignment: D-sub – encoder connection cover/terminal



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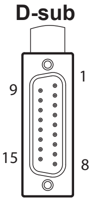
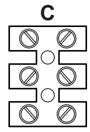
l = x: Length that can be ordered

MOVIAXIS®connection					Motor connection side	
Plug connector View X	**Contact B**	**Signal**	**Cable core color**	**Signal**	**Contact A**	
D-sub  15-pin	1	A	Red (RD)	cos+	A	
	9	$\overline{A}$	Blue (BU)	cos-	$\overline{A}$	
	2	B	Yellow (YE)	sin+	B	
	10	$\overline{B}$	Green (GN)	sin-	$\overline{B}$	
	3	C	Brown (BN)	C+	C	
	11	$\overline{C}$	White (WH)	C	$\overline{C}$	
	4	D	Black (BK)	Data+	D	
	12	$\overline{D}$	Violet (VT)	Data-	$\overline{D}$	
	15	UB	Gray (GY)	UB	+UB	
	15	UB	Red/blue (RD/BU)	UB	+UB	
	8	GND	Pink (PK)	GND	GND	
	8	GND	Gray/pink (GY/PK)	GND	GND	
	14	TF/TH/KTY+	Brown (BN)	TF/TH/KTY+	1	**C** 
	6	TF/TH/KTY-	White (WH)	TF/TH/KTY-	2	
				Shielding	3	

Part numbers

Installation type	D-sub 15 – connection cover
Fixed installation	13631632
Cable carrier installation	13631640

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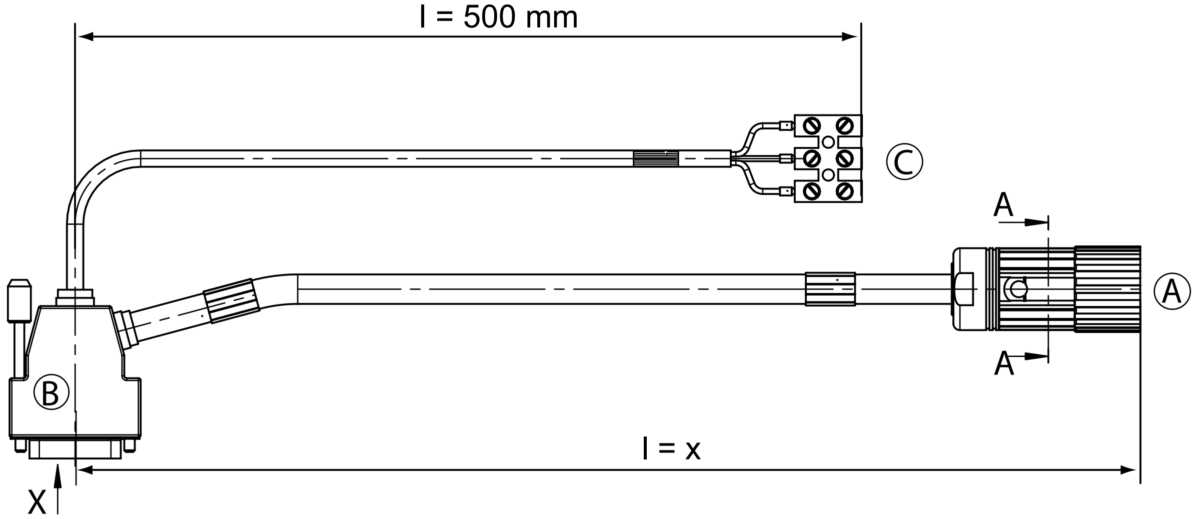
11.10.2 Encoder cable with D-sub – M23 connector/terminal

Prefabricated cables for encoders

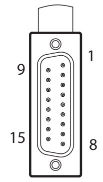
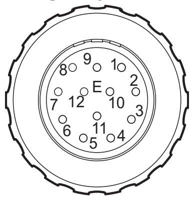
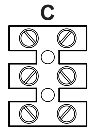
Encoder
ES7S, EG7S, ES7R, EG7R, AS7W, AG7W, EK8S, EK8R, AK8W

Cable drawing and assignment: D-sub – M23 connector/terminal



18014401506392843

l = x: Length that can be ordered

MOVIAXIS®connection					Motor connection side	
Plug connector View X	Contact B	Signal	Cable core color	Signal	Contact A	
D-sub  15-pin	1	A	Red (RD)	A cos+	3	ASTA 021 FR 
	9	$\overline{A}$	Blue (BU)	$\overline{A}$ cos-	4	
	2	B	Yellow (YE)	B sin+	5	
	10	$\overline{B}$	Green (GN)	$\overline{B}$ sin-	6	
	3	C	Brown (BN)	C+	1	
	11	$\overline{C}$	White (WH)	C	2	
	4	D	Black (BK)	Data+	8	
	12	$\overline{D}$	Violet (VT)	Data–	7	
	15	UB	Gray (GY)	UB	12	
	15	UB	Red/blue (RD/BU)	UB	12	
	8	GND	Pink (PK)	GND	11	
	8	GND	Gray/pink (GY/PK)	GND	11	
	14	/TF, /TH, /KTY+	Brown (BN)	/TF, /TH, /KTY+	1	C 
	6	/TF, /TH, /KTY-	White (WH)	/TF, /TH, /KTY-	2	
				Shielding	3	

Part numbers

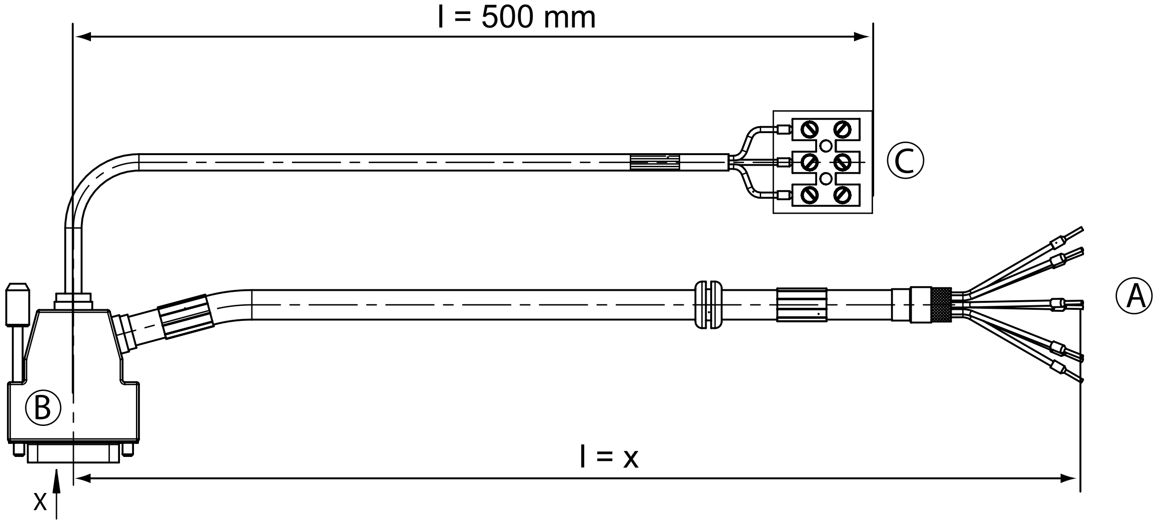
Cable	D-sub15 – M23 connector
Fixed installation	13631691
Cable carrier installation	13631705

11.10.3 Encoder cable with D-sub – open/terminal

Prefabricated cables for encoders

Encoder
E.7., A.7., E.8., A.8.

Cable drawing and assignment: D-sub – open/terminal



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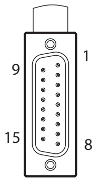
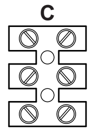
l = x: Length that can be ordered

MOVIAXIS®connection					Motor connection side	
Plug connector View X	**Contact B**	**Signal**	**Cable core color**	**Signal**	**Contact A**	
D-sub  15-pin	1	A	Red (RD)	A cos+	A	
	9	$\overline{A}$	Blue (BU)	$\overline{A}$ cos-	$\overline{A}$	
	2	B	Yellow (YE)	B sin+	B	
	10	$\overline{B}$	Green (GN)	$\overline{B}$ sin-	$\overline{B}$	
	3	C	Brown (BN)	C+	C	
	11	$\overline{C}$	White (WH)	C	$\overline{C}$	
	4	D	Black (BK)	Data+	D	
	12	$\overline{D}$	Violet (VT)	Data–	$\overline{D}$	
	15	UB	Gray (GY)	UB	+UB	
	15	UB	Red/blue (RD/BU)	UB	+UB	
	8	GND	Pink (PK)	GND	GND	
	8	GND	Gray/pink (GY/PK)	GND	GND	
	14	/TF, /TH, /KTY+	Brown (BN)	/TF, /TH, /KTY+	1	C 
	6	/TF, /TH, /KTY-	White (WH)	/TF, /TH, /KTY-	2	
				Shielding	3	

Part numbers

Installation type	D-sub15 – open
Fixed installation	13631659
Cable carrier installation	13631667

11.11 Add-on encoder cable for MOVITRAC® advanced

11.11.1 EK8C, EV8C encoder cable with connection cover to open end with conductor end sleeves at the binary inputs MOVITRAC® advanced

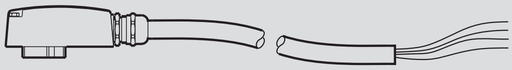
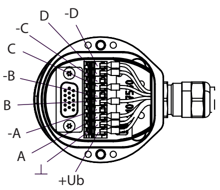
Prefabricated cables

Designation	For motor size	Encoder type	Mounting type	Specification in periods/revolution	Supply voltage in V
EK8C	DRN 71 – 355	Add-on encoders	Conical shaft	1024	DC 4.5 – 30
EV8C	DRN 71 – 280	Add-on encoders	Conical shaft (flange guard mounting)	1024	DC 4.5 – 30

Cable designation and assignment: Connection cover – open

To facilitate speed control and positioning, the EK8C high-resolution HTL built-in encoder by SEW-EURODRIVE can be evaluated via each inverter with fieldbus interface using the X20 digital inputs, with exception of the binary variant.

Designation	Part number	Installation
Connection cover (10-pin) to open end with conductor end sleeves 5 × 2 × 0.25 mm² + 2 × 0.5 mm²	28162862	Cable carrier installation

<table>
<tr><th colspan="2">Motor side</th><th colspan="3"></th><th>Inverter side</th></tr>
<tr><th>Socket</th><th>Contact
Connection cover</th><th>Signal</th><th>Conductor color IEC 60757</th><th>Inverter contact</th><th>Open end
Wire length in mm</th></tr>
<tr><td rowspan="7">
</td><td>A</td><td>A</td><td>RD</td><td>X20:4</td><td>250</td></tr>
<tr><td>B</td><td>B</td><td>YE</td><td>X20:5</td><td>250</td></tr>
<tr><td>C</td><td>C</td><td>BN</td><td>X20:6</td><td>250</td></tr>
<tr><td>D</td><td>TF+[1)]</td><td>GYPK</td><td>X10:TF1</td><td>250</td></tr>
<tr><td>/D</td><td>TF-[1)]</td><td>RDBU</td><td>X10:GND</td><td>250</td></tr>
<tr><td>UB</td><td>+Ub</td><td>GY</td><td>External[2)]</td><td>500</td></tr>
<tr><td>⊥</td><td>GND</td><td>PK</td><td>External[2)]</td><td>500</td></tr>
</table>

1) For EK8C/EV8C encoders with connection via the connection cover of the integrated encoder plug connector, the TF must be routed to the inverter in a separate cable.
2) If the inverter is supported by an external DC 24 V voltage supply via X5, these wires can also be clamped under at terminal X5.

11.12 Built-in encoder cables

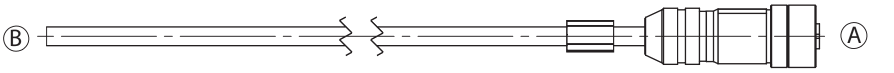
11.12.1 EI7. encoder cable with M12 connector and open end

Prefabricated cables

DR.. motors

Encoder	DR..63 – 132S
HTL	EI7C, EI76, EI72, EI71

Cable drawing and assignment: M12 connector



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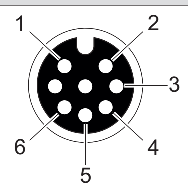
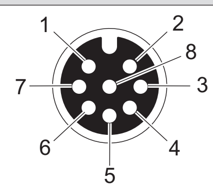
8-pin without /TF

Connection of evaluation unit[1] of the encoder.				Motor connection side	
Contact B	**Signal**	**Cable core color**	**Signal**	**Contact A**	
	A cos+	Brown (BN)	A cos+	3	
	$\overline{A}$ cos	White (WH)	$\overline{A}$ cos	4	
	B sin+	Yellow (YE)	B sin+	5	
	$\overline{B}$ sin	Green (GN)	$\overline{B}$ sin	6	
	n.c.	-	n.c.	7	
	n.c.	-	n.c.	8	
	UB	Gray (GY)	UB	1	
	GND	Pink (PK)	GND	2	

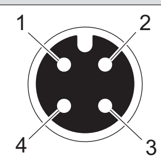
1) Assignment depends on evaluation unit

8-pin with /TF

Connection of evaluation unit[1]				Motor connection side	
Contact B	**Signal**	**Cable core color**	**Signal**	**Contact A**	
	A cos+	Brown (BN)	A cos+	3	
	$\overline{A}$ cos	White (WH)	$\overline{A}$ cos	4	
	B sin+	Yellow (YE)	B sin+	5	
	$\overline{B}$ sin	Green (GN)	$\overline{B}$ sin	6	
	TF	Red (RD)	TF	7	
	TF-	Blue (BU)	TF-	8	
	UB	Gray (GY)	UB	1	
	GND	Pink (PK)	GND	2	

1) Assignment depends on evaluation unit.

4-pole

Connection of evaluation unit[1]				Motor connection side	
Contact B	**Signal**	**Cable core color**	**Signal**	**Contact A**	
	UB	Gray (GY)	UB	1	
	B sin+	Yellow (YE)	B sin+	2	
	GND	Pink (PK)	GND	3	
	A cos+	Brown (BN)	A cos+	4	

1) Assignment depends on evaluation unit.

Part numbers

Installation type	Number of poles	Connection side evaluation unit (B)	Connection side motor (A)	Part number
Fixed installation	4-pole	cut off	M12 connector, radial, 4-pin, A-coded	18156746
	8-pin - with TF	Conductor end sleeves	M12 connector, radial, 8-pin, A-coded	13623273
Cable carrier installation	8-pin - without TF	cut off		18156754
	8-pin - with TF	cut off		18156770
		Conductor end sleeves		13623281
Fixed installation	8-pin - with TF	Conductor end sleeves	M12 connector, 8-pin, A-coded (M12 right-angle plug connector)	28164881

11.12.2 EI7C and EI8C encoder cables with M12 socket and open end with conductor end sleeves at the digital inputs of MOVITRAC® advanced

Prefabricated cables for encoders

Designation	For motor size	Encoder type	Mounting type	Specification in periods/revolution	Supply voltage in V
EI7C[1)]	DRN/DR2. 71 – 132S	Built-in encoders	Integrated	24	DC 9 – 30
EI8C[1)]	DRN/DR2. 71 – 132S	Built-in encoders	Integrated	1024	DC 7 – 30
EI8R[2)]	DRN/DR2. 71 – 132S	Built-in encoders	Integrated	1024	DC 7 – 30

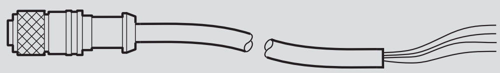
1) Supply the encoder with at least DC 24 V for evaluation at the digital inputs of MOVITRAC® advanced.
2) EI8R has a TTL (5 V) output level and can therefore not be evaluated at digital inputs of MOVITRAC® advanced. However, the prefabricated cable can also be used for third-party inverters and controllers that evaluate a signal level of the encoder with TTL (5 V) input.

Cable drawing and assignment: M12 socket – open

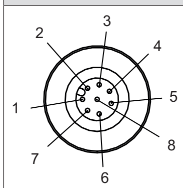
To facilitate easy positioning, the EI7C HTL built-in encoder can be evaluated via each inverter with fieldbus interface using the X20 digital inputs, with exception of the binary variant.

Designation	Part number	Installation
M12 socket (8-pin) to open end with conductor end sleeves 4 × 2 × 0.25 mm²	28162846	Cable carrier installation

Motor side



Inverter side

Socket	Contact M12	Signal	Conductor color IEC 60757	Inverter contact	Open end Wire length in mm
	1	+Ub	GY	External[1)]	500
	2	GND	PK	External[1)]	500
	3	A	BN	X20:4	250
	5	B	YE	X20:5	250
	6	C[2)]	GN	X20:6[2)]	250
	7	TF+	RD	X10:TF1	250
	8	TF-	BU	X10:GND	250

1) If the inverter is supported by an external DC 24 V voltage supply via X5, these wires can also be clamped under at terminal X5.
2) The C track is only used as an option with EI8C encoders. With the EI7C, this wire remains unused.

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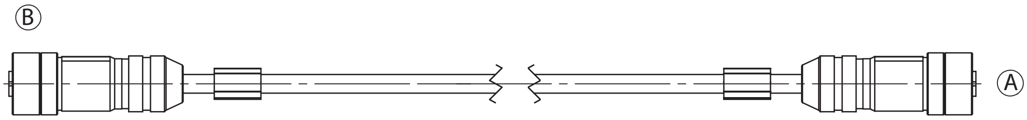
11.12.3 EI7. encoder extension cable with M12 connector to M12 socket

Prefabricated cables

DRN.. motors

Encoder	DR..71 – 132S
HTL	EI7C, EI7C FS, EI76, EI72, EI71

Cable drawing and assignment with M12 connector – M12 connector



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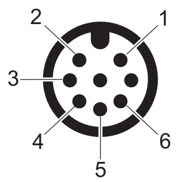
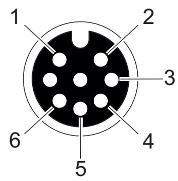
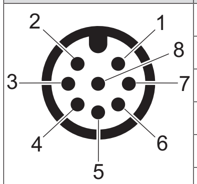
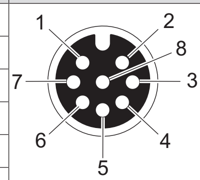
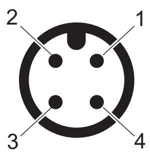
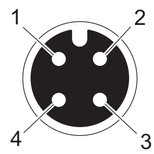
Customer end/motor end 8-pole without /TF (EI7C, EI76, EI72, EI71 and EI7C FS)

Evaluation unit connection					Motor connection side	
	Contact B	Signal	Cable core color	Signal	Contact A	
	3	A cos+	Brown (BN)	A cos+	3	
	4	$\overline{A}$ cos	White (WH)	$\overline{A}$ cos	4	
	5	B sin+	Yellow (YE)	B sin+	5	
	6	$\overline{B}$ sin	Green (GN)	$\overline{B}$ sin	6	
	7	n.c.	-	n.c.	7	
	8	n.c.	-	n.c.	8	
	1	UB	Gray (GY)	UB	1	
	2	GND	Pink (PK)	GND	2	

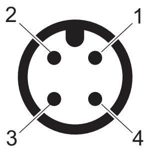
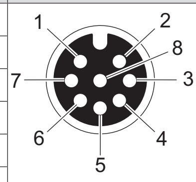
Customer end/motor end 8-pole with /TF (EI7C, EI76, EI72, EI71)

Evaluation unit connection					Motor connection side	
	Contact B	Signal	Cable core color	Signal	Contact A	
	3	A cos+	Brown (BN)	A cos+	3	
	4	$\overline{A}$ cos	White (WH)	$\overline{A}$ cos	4	
	5	B sin+	Yellow (YE)	B sin+	5	
	6	$\overline{B}$ sin	Green (GN)	$\overline{B}$ sin	6	
	7	TF	Red (RD)	TF	7	
	8	TF-	Blue (BU)	TF-	8	
	1	UB	Gray (GY)	UB	1	
	2	GND	Pink (PK)	GND	2	

On the customer/motor side 4-pole without /TF (EI7C, EI76, EI72, EI71)

Evaluation unit connection					Motor connection side	
	Contact B	Signal	Cable core color	Signal	Contact A	
	1	UB	Gray (GY)	UB	1	
	2	B sin+	Yellow (YE)	B sin+	2	
	3	GND	Pink (PK)	GND	3	
	4	A cos+	Brown (BN)	A cos+	4	

On the customer side 4-pole/on the motor side 8-pole without /TF (EI7C, EI76, EI72, EI71)

Evaluation unit connection					Motor connection side	
	Contact B	Signal	Cable core color	Signal	Contact A	
	3	A cos+	Brown (BN)	A cos+	3	
	4				4	
	5	B sin+	Yellow (YE)	B sin+	5	
	6				6	
	7				7	
	8				8	
	1	UB	Gray (GY)	UB	1	
	2	GND	Pink (PK)	GND	2	

Part numbers

EI7C, EI76, EI72, EI71 encoders with or without TF

Installation type	Number of poles	Part number
Fixed installation	On the customer/motor side 8-pole, with TF	18156762
	Customer/motor side 4-pin, without TF, without inverted signal tracks	18156738
Cable carrier installation	Customer/motor side 4-pin, without TF, without inverted signal tracks	28111591

EI7. encoder, without TF and EI7C FS safety-rated encoder

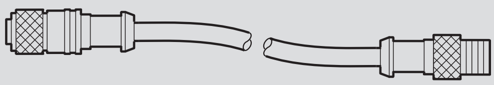
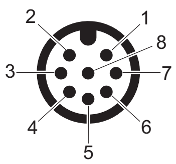
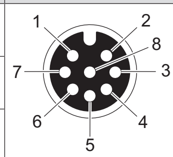
Installation type	Number of poles	Part number
Fixed installation	Customer/motor side 8-pin, without TF	18148670
Cable carrier installation		18158013

11.12.4 EI7C encoder extension cable with M12 socket to M12 connector at the digital inputs of MOVITRAC® advanced

Cable designation and assignment: M12 socket to M12 connector

To facilitate easy positioning, the EI7C HTL built-in encoder can be evaluated via each inverter with fieldbus interface using the X20 digital inputs, with exception of the binary variant.

Designation	Part number	Installation
M12 socket (8-pin) to M12 connector 4 × 2 × 0.25 mm²	18156762	Fixed installation

Motor side						Inverter side
Socket	**Contact M12**	**Signal**	**Conductor color IEC 60757**	**Signal**	**Contact M12**	**Plug connector**
	3	A	BN	A	3	
	4	$\overline{A}$	WH	$\overline{A}$	4	
	5	B	YE	B	5	
	6	$\overline{B}$	GN	$\overline{B}$	6	
	7	TF	RD	TF	7	
	8	TF-	BU	TF-	8	
	1	Ub	GY	Ub	1	
	2	GND	PK	GND	2	

11.12.5 EI8C EK8C encoder cable with M23 socket to open end with conductor end sleeves at the digital inputs of MOVITRAC® advanced

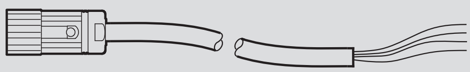
Prefabricated cables for encoders

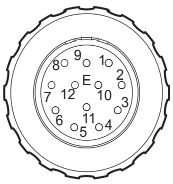
Designation	For motor size	Encoder type	Mounting type	Specification in periods/revolution	Supply voltage in V
EI8C	DRN/DR2. 71 – 132S	Built-in encoders	Integrated	1024	DC 7 – 30
EK8C	DRN 71 – 355	Add-on encoders	Conical shaft	1024	DC 4.5 – 30
EV8C	DRN 71 – 280	Add-on encoders	Conical shaft (flange guard mounting)	1024	DC 4.5 – 30

Cable designation and assignment: M23 socket – open

To facilitate speed control and positioning, the HTL encoder can be evaluated via each MOVITRAC® advanced inverter with fieldbus interface using the X20 digital inputs, with exception of the binary variant.

Designation	Part number	Routing
M23 socket (12-pin) to open end with conductor end sleeves 5 × 2 × 0.25 mm² + 2 × 0.5 mm²	28162854	Cable carrier installation

Motor side  **Inverter side**

Socket	Contact M23	Signal	Conductor color IEC 60757	Inverter contact	Open end Wire length in mm
	1	C	BN	X20:6	250
	3	A	RD	X20:4	250
	5	B	YE	X20:5	250
	9	TF+[1)]	GYPK	X10:TF1	250
	10	TF-[1)]	RDBU	X10:GND	250
	11	GND	PK	External[2)]	500
	12	+Ub	GY	External[2)]	500

1) In preparation for EK8C and EV8C: Encoder with M23 at the terminal box.

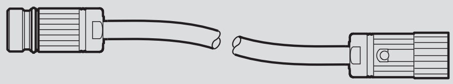
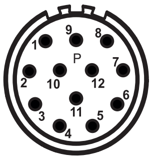
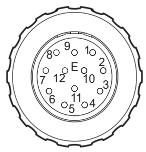
2) If the inverter is supported by an external DC 24 V voltage supply via X5, these wires can also be clamped under at terminal X5.

11.12.6 EI8C EK8C encoder extension cable with M23 socket M23 connector for the binary inputs MOVITRAC® advanced

Cable designation and assignment: M23 socket – M23 plug connector

To facilitate speed control and positioning, the HTL encoder can be evaluated via each MOVITRAC® advanced inverter with fieldbus interface using the X20 digital inputs, with exception of the binary variant.

Designation	Part number	Routing
M23 socket (12-pin) to M23 connector 5 × 2 × 0.25 mm² + 2 × 0.5 mm²	28111451	Fixed installation
	28111478	Cable carrier installation

Motor side					Inverter side	
Socket	**Contact M23**	**Signal**	**Conductor color IEC 60757**	**Signal**	**Contact M23**	**Plug connector**
	3	A	RD	A	3	
	4	$\overline{A}$	BU	$\overline{A}$	4	
	5	B	YE	B	5	
	6	$\overline{B}$	GN	$\overline{B}$	6	
	1	C+	BN	C+	1	
	2	C-	WH	C-	2	
	8	Data+	BK	Data+	8	
	7	Data-	VT	Data-	7	
	12	Ub	RD-BU+GY	Ub	12	
	11	GND	GY-PK+PK	GND	11	
	9	TF+[1)]	GY-PK	TF+[1)]	9	
	10	TF-[1)]	RD-BU	TF-[1)]	10	

1) In preparation for EK8C and EV8C: Encoder with M23 at the terminal box.

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11.13 Extensions for add-on encoder cables

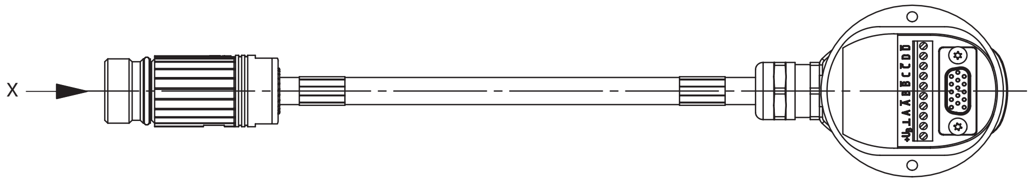
11.13.1 Encoder extension cable with M23 connector – encoder connection cover

Prefabricated cables for encoders

DR.. motors

Encoder	71 – 132S	132M – 280
Sine encoder	ES7S	EG7S
TTL (V_B = DC 9 – 30 V)	ES7R	EG7R
RS485	AS7W	AG7W

Cable drawing and assignment: M23 connector – encoder connection cover



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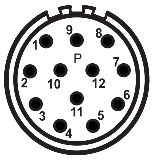
Inverter connection					Motor connection side
Plug connector View X	**Contact**	**Signal**	**Cable core color**	**Signal**	**Contact**
AKUA 020 	3	A cos+	Red (RD)	A cos+	A
	4	$\overline{A}$ cos-	Blue (BU)	$\overline{A}$ cos-	$\overline{A}$
	5	B sin+	Yellow (YE)	B sin+	B
	6	$\overline{B}$ sin-	Green (GN)	$\overline{B}$ sin-	$\overline{B}$
	1	C+	Brown (BN)	C+	C
	2	C-	White (WH)	C-	$\overline{C}$
	8	Data+	Black (BK)	Data+	D
	7	Data-	Violet (VT)	Data-	$\overline{D}$
	12	UB	Pink (PK)	UB	+UB
	11	GND	Gray (GY)	GND	GND

Part numbers

Installation type	M23 connector – encoder connection cover
Fixed installation	13621963

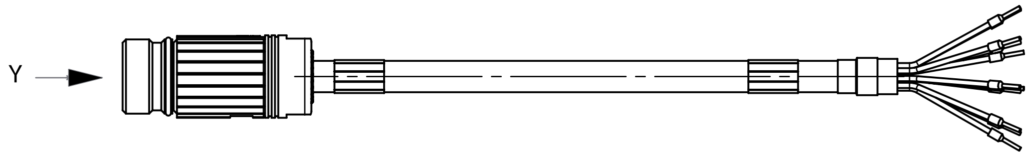
11.13.2 Encoder extension cable with M23 connector – open

Prefabricated cables for encoders

DR.. motors

Encoder	71 – 132S	132M – 280
Sine encoder	ES7S	EG7S
TTL (V_B = DC 9 – 30 V)	ES7R	EG7R
RS485	AS7W	AG7W

Cable drawing and assignment: M23 connector – open



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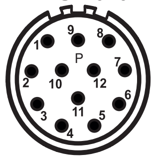
Inverter connection					Motor connection side
Plug connector View Y	Contact	Signal	Cable core color	Signal	Contact
AKUA 020 	3	A cos+	Red (RD)	A cos+	A
	4	$\overline{A}$ cos-	Blue (BU)	$\overline{A}$ cos-	$\overline{A}$
	5	B sin+	Yellow (YE)	B sin+	B
	6	$\overline{B}$ sin-	Green (GN)	$\overline{B}$ sin-	$\overline{B}$
	1	C+	Brown (BN)	C+	C
	2	C	White (WH)	C	$\overline{C}$
	8	Data+	Black (BK)	Data+	D
	7	Data–	Violet (VT)	Data–	$\overline{D}$
	12	UB	Red/blue + gray (RD-BU + GY)	UB	+UB
	11	GND	Gray/pink + pink (GY-PK + PK)	GND	GND

Part numbers

Installation type	M23 connector – open
Fixed installation	13623184

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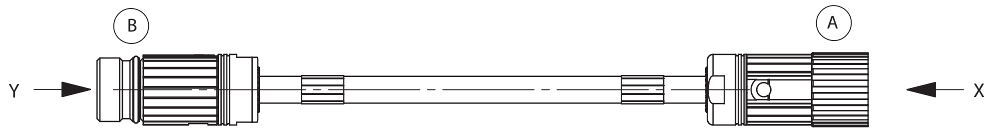
11.13.3 Encoder extension cable with M23 connector – M23 connector

Prefabricated cables for encoders

DR.. motors

Encoder	71 – 132S	132M – 280
Sine encoder	ES7S	EG7S
TTL (V_B = DC 9 – 30 V)	ES7R	EG7R
RS485	AS7W	AG7W

Cable drawing and assignment: M23 connector – M23 connector



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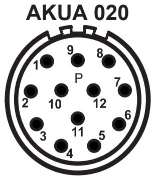
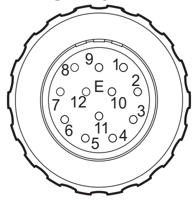
Inverter connection					Motor connection side	
Plug connector View Y	Contact	Signal	Cable core color	Signal	Contact	Plug connector View X
AKUA 020 	3	A cos+	Red (RD)	A cos+	3	ASTA 021FR 
	4	$\overline{A}$ cos-	Blue (BU)	$\overline{A}$ cos-	4	
	5	B sin+	Yellow (YE)	B sin+	5	
	6	$\overline{B}$ sin-	Green (GN)	$\overline{B}$ sin-	6	
	1	C+	Brown (BN)	C+	1	
	2	C	White (WH)	C	2	
	8	Data+	Black (BK)	Data+	8	
	7	Data–	Violet (VT)	Data–	7	
	12	UB	Red/blue + gray (RD-BU + GY)	UB	12	
	11	GND	Gray/pink + pink (GY-PK + PK)	GND	11	

Part numbers

Installation type	M23 connector – M23 connector
Fixed installation	13623192
Cable carrier installation	13621971

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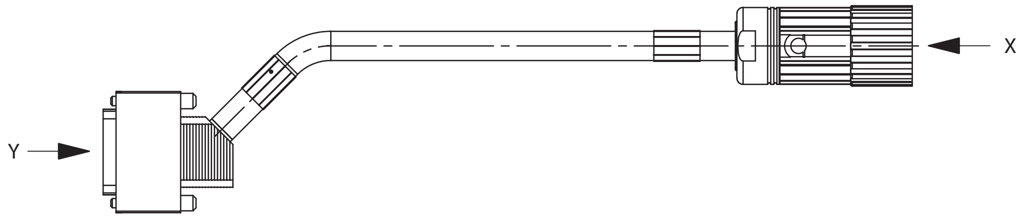
11.13.4 Encoder extension cable with D-sub – M23 connector

Prefabricated cables for encoders

DR.. motors

Encoder	71 – 132S	132M – 280
Sine encoder	ES7S	EG7S
TTL (V_B = DC 9 – 30 V)	ES7R	EG7R
RS485	AS7W	AG7W

Cable drawing and assignment: D-sub – M23 connector



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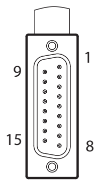
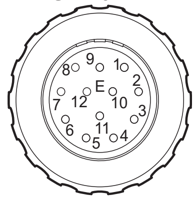
Inverter connection					Motor connection side	
Plug connector View Y	Contact	Signal	Cable core color	Signal	Contact	Plug connector View X
	1	A cos+	Red (RD)	A cos+	3	ASTA 021FR 
	9	$\overline{A}$ cos-	Blue (BU)	$\overline{A}$ cos-	4	
	2	B sin+	Yellow (YE)	B sin+	5	
	10	$\overline{B}$ sin-	Green (GN)	$\overline{B}$ sin-	6	
	3	C+	Brown (BN)	C+	1	
	11	C	White (WH)	C	2	
	4	Data+	Black (BK)	Data+	8	
	12	Data–	Violet (VT)	Data–	7	
	15	UB	Red/blue + gray (RD-BU + GY)	UB	12	
	8	GND	Gray/pink + pink (GY-PK + PK)	GND	11	

Part numbers

Installation type	D-sub – M23 connector
Fixed installation	13621998

11.14 Cable specification of encoder cables

11.14.1 Fixed installation

Accessory identification		**ES7S/EG7S/ES7R/ EG7R/ES7C/EG7C/ AS7W/AG7W/AH7Y/ AS7Y/AG7Y/.K8./EI8.**	**EH7S/AH7Y**	**EI7C**[1)]
Cable cross section		**Cable with part number from SEW-EURODRIVE** **19065434 – (6 × 2 × 0.25 mm²)** **25633090 – (4 × 2 × 0.25 + 2 × 0.5 mm²)** **13251724 – (5 × 2 × 0.25 + 2 × 0.5 mm²)**	**Cable with part number from SEW-EURODRIVE** **13251724 – (5 × 2 × 0.25 mm²)**	
Manufacturer		**HELUKABEL/Leoni**		
Manufacturer's designation		Li9YCY / LEHC 005307		
Operating voltage U_0/ V AC	V	230 / 350V VDE / 300V UL		
Temperature range	°C	Fixed installation -40 to +80		
Maximum temperature	°C	+ 80		
Minimum bending radius	mm	19065434: 6 × D (HELUKABEL), 5 × D (Leoni) 25633090: 3 × D (once), 6 × D 13251724: 5 x D		
Outer diameter D	mm	7.3 ± 0.2		
Core identification		DIN 47 100		
Coat color		Green similar to RAL 6018		
Approval(s)		DESINA/VDE/UL/CSA/CE		
Capacitance core/shielding	pF/m	max. 95		
Capacitance core/core	pF/m	max. 65		
Halogen-free		No		
Silicone-free		Yes		
CFC-free		Yes		
Insulation internal (core)		PP		
Insulation external (sheath)		PVC		
Flame-retardant/self-extinguishing		Flame retardant according to VDE0472, Part 802, Test type B, according to IEC 60332-1		
Conductor material		Cu blank		
Shielding		Braided copper, tinned		

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Accessory identification		ES7S/EG7S/ES7R/EG7R/ES7C/EG7C/AS7W/AG7W/AH7Y/AS7Y/AG7Y/.K8./EI8.	EH7S/AH7Y	EI7C[1]
Cable cross section		**Cable with part number from SEW-EURODRIVE** **19065434 – (6 × 2 × 0.25 mm²)** **25633090 – (4 × 2 × 0.25 + 2 × 0.5 mm²)** **13251724 – (5 × 2 × 0.25 + 2 × 0.5 mm²)**	**Cable with part number from SEW-EURODRIVE** **13251724 – (5 × 2 × 0.25 mm²)**	
Manufacturer		**HELUKABEL/Leoni**		
Weight (cable)	kg/km	19065434: 106 25633090: 93 13251724: 75		

1) EI7C encoders require a maximum of 8 cores, additional cores for potential temperature sensors.

11.14.2 Cable carrier installation

Accessory identification		ES7S /EG7S/ES7R/EG7R/ ES7C/EG7C/AS7W AG7W/ AH7Y/AS7Y/AG7Y/.K8./EI8.	EH7S/AH7Y/EI7C	EI7C[1)]
Cable cross section		**Cable with part number from SEW-EURODRIVE** **19065442 – (4 × 0.25 + 2 × 0.5 mm²)** **25633104 – (4 × 0.25 + 2 × 0.5 mm²)** **13289284 – (4 × 2 × 0.25 mm²)**	**Cable with part number from SEW-EURODRIVE** **13289284 – (4 × 2 × 0.25 mm²)**	
Manufacturer		**HELUKABEL/Leoni**		
Manufacturer's designation		Li9YC11Y-HF, LEHC 005308, TOPGEBER 503 (74419)		Top encoder 503, 74419
Operating voltage V_0 / V AC	V	350 V VDE / 300 V UL		
Temperature range	°C	-20 to +60		-20 to +80
Maximum temperature	°C	+60 (at the conductor)	+60	+80
Minimum bending radius	mm	19065442: 8 × D 25633104: 8 × D 13289284: 7.5 × D		
Outer diameter D	mm	19065442: 8.8 ± 0.2 25633104: 9.4 ± 0.2 13289284: 7.1 × 0.2		7.1 ± 0.2
Maximum acceleration	m/s²	19065442: 20 25633104: 20 13289284: 50		50
Maximum speed	m/min	19065442: 180 25633104: 180 13289284: 300		300
Core identification		DIN 47100		
Coat color		Green similar to RAL 6018		
Approval(s)		DESINA/VDE/UL/CE	DESINA/VDE/UL/ CE	DESINA/VDE/UL/ CSA/CE
Capacitance core/shielding	pF/m	19065442: max. 100 25633104: max. 95 13289284: max. 110		
Capacitance core/core	pF/m	19065442: max. 65 25633104: max. 60 13289284: max. 70		70

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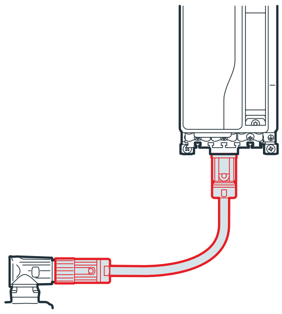
Accessory identification		ES7S /EG7S/ES7R/EG7R/ ES7C/EG7C/AS7W AG7W/ AH7Y/AS7Y/AG7Y/.K8./EI8.	EH7S/AH7Y/EI7C	EI7C[1]
Cable cross section		**Cable with part number from SEW-EURODRIVE** **19065442 – (4 × 0.25 + 2 × 0.5 mm²)** **25633104 – (4 × 0.25 + 2 × 0.5 mm²)** **13289284 – (4 × 2 × 0.25 mm²)**	**Cable with part number from SEW-EURODRIVE** **13289284 – (4 × 2 × 0.25 mm²)**	
Manufacturer		**HELUKABEL/Leoni**		
Halogen-free		Yes		
Silicone-free		Yes		
CFC-free		Yes		
Insulation internal (core)		PP		
Insulation external (sheath)		PUR		
Flame-retardant/self-extinguishing		Flame retardant according to VDE0472, Part 802, Test type B, according to IEC 60332-1		
Conductor material		E-Cu blank		
Shielding		Braided copper, tinned		
Weight	kg/km	19065442: 101 25633104: 90 13289284: 68		
Minimum bending cycles		≥ 5 million		

1) EI7C encoders require a maximum of 8 cores, additional cores potentially for temperature sensors

12 Digital motor integration with MOVILINK® DDI

12.1 Product description

Digital motor integration is a component of the MOVI-C® modular automation system. Digital motor integration means connecting the motor to the inverter via the MOVILINK® DDI digital interface. Data for auto startup, stocktaking, operation, and diagnostics is transferred via MOVILINK® DDI.



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12.1.1 Digital motor integration

With "digital motor integration", SEW-EURODRIVE presents solutions for integrating drive technology into the networked world. The MOVILINK® DDI digital data interface connects the inverter with the drive and integrates the previously unconnected drive into the data network.

Features:

- Voltage supply of the MOVILINK® DDI electronics in the drive
- Detection of the drive, its options, and their properties
- Data transmission for identification, startup, operation, and diagnostics, depending on the design:
  - Electronic nameplate
  - Encoder data
  - Motor temperature
  - Brake control
  - Data of additionally integrated or external sensors, such as sensors for detecting brake wear

Assistance functions:

- Automatic startup of the drive (motor, gear unit, sensors, actuators)
- Simple startup of the speed controller with adjusted dynamics settings
- Automatic detection of a drive replacement, simple new startup when the drive is changed

This makes detection, startup and communication with the drive as simple as with a USB interface between computer and external device.

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12.1.2 MOVILINK® DDI interface

The MOVILINK® DDI interface connects inverters of the MOVI-C® modular automation system with drives. The MOVILINK® DDI interface uses a coaxial signal cable. Power supply of the motor electronics and communication with the drive are performed using the coaxial signal cable.

The inverters can be connected to the drive in different ways depending on the requirements:

- Hybrid cable for single-cable connection (alternatively for fixed installation and for cable carrier installation) consisting of:
  - Motor cables
  - Brake control
  - PE
  - Coaxial signal cable
- Separate coaxial signal cable in addition to the motor cable for dual cable connection, particularly in the case of large cross sections for control of the motor.
- The motor can be connected via cable glands on the terminal box or on the plug connector.

12.1.3 Advantages of digital motor integration with MOVILINK® DDI

- Cost-effective installation of motor cables; one hybrid cable instead of multiple individual cables
- Very long motor cable up to 200 m possible
- One cable for everything:
  - Reduction of cable part numbers
  - Reduction of spare parts inventory
  - Simple cable selection
  - Reduction of ordering errors
- Quick, easy, and error-free motor startup
- Quick, easy, and error-free motor replacement
- Sensor data of the motor for condition monitoring and predictive maintenance
- Data interpretation and visualization via DriveRadar®

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12.1.4 Key features of MOVILINK® DDI

Collect: Motor functions

- MOVILINK® DDI communication unit in the motor, connection of optional sensors
- Integrated data memory for automatic startup of the motor
- Optional sensors detect, for example:
  - Motor temperature and motor protection via temperature sensor
  - Motor position via different encoders
  - Integrated brake control with wear measurement
  - Vibration
  - Acceleration
  - Mounting position
  - Humidity
  - Air pressure
  - Magnetic fields
- Connection to the motor via hybrid connector or cable gland
- Available for asynchronous motors, synchronous motors, linear motors

Transfer: Interface

- Digital interface between motor and inverter
- Transfer of process data
- Transfer of functionally safe data (in preparation)
- Coaxial cable for data transmission with high bandwidth and high interference immunity
- Cable length up to 200 m
- Voltage supply with modulated data transmission
- Single-cable technology for controlling motor, brake control, and data transmission

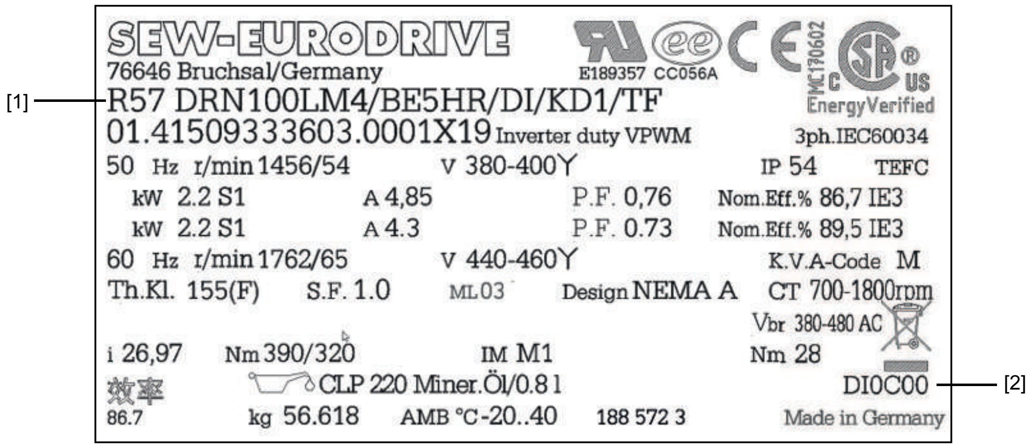
Receive: Inverter functions

- Automatic startup using startup data saved in the motor
- Automatic detection of motor replacement
- Display and processing of motor data
- Provision of the voltage supply for motor electronics
- Transfer of sensor data to the PLC or to a DriveRadar® EdgeProcessingUnit or to the DriveRadar® SmartDataCollector

12.2 Options and types with MOVILINK® DDI

12.2.1 DRN.. motor nameplate

The following figure shows an example of a nameplate of a gearmotor with MOVILINK® DDI interface:



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1 Type designation
2 MOVILINK® DDI interface identification

12.2.2 Type designation of the MOVILINK® DDI interface

The type designation of the MOVILINK® DDI interface describes the characteristics of the MOVILINK® DDI communication unit integrated in the motor. It does not describe the equipment of the motor. This is defined by the motor type code.

DI0E00	
DI	DI = MOVILINK® DDI
0	0 = Motor-external brake control or MOVIMOT® flexible decentralized inverter 1 = BS1Z integrated brake control via MOVILINK® DDI 2 = BG1Z integrated brake control via MOVILINK® DDI
E	B = Temperature detection, no extended electronic nameplate, no encoder function C = Extended electronic nameplate and temperature detection of the motor, no encoder function E = Extended electronic nameplate, temperature detection of the motor, and encoder function F = Extended electronic nameplate and encoder function, no motor temperature detection
00	Reserved

12.3 Encoders with MOVILINK® DDI

	/EI8Z	/EK8Z	/AK8Z
Encoder ability class	Medium Class	High Class	High Class
Motor series	DRN../DR2S../DR2L..		
Motor sizes	71 – 132S	71 – 180	
Combination of brake/brake control	With motor-integrated BG1Z brake control: BE.. With motor-external brake control: Brake BE.. and safety brake BE.. (functional safety[1])		
Combination of motor protection/temperature	Motor protection: TF (in development) Motor protection/motor temperature: PI (Pt1000 in stator housing and motor temperature model with MOVI-C® inverters)		
Combination of forced cooling fans	Yes		
Encoder type	Incremental encoder	Incremental encoder	Multi-turn absolute encoder
Interface	MOVILINK® DDI, coaxial		
MOVILINK® DDI type designation	DI.E..		
Electronic nameplate	ET2000 (MOVILINK® DDI, integrated)		
Voltage supply	DC 24 V (MOVILINK® DDI, integrated)		
Incremental resolution (Position steps per motor revolution)	12 bit 4096 inc	16 bit 65536 inc	–
Single-turn resolution (Position resolution per motor revolution)	–	–	16 bit 65536 inc
Multi-turn resolution (max. counter for complete motor revolutions)	–	–	16 bit 65536 inc
Maximum permissible magnetic field external to the motor	Outer contour of the motor: 25 mT / 20 kA/m	Outer contour of the motor: 25 mT / 20 kA/m, On the encoder housing: 10 mT / 8 kA/m	
Vibration resistance according to EN 60068-2-6	≤ 10 g (f > 18.5 Hz)		
Shock resistance according to EN 60068-2-27	≤ 100 g (t = 6 ms, 18 pulses)		
Maximum speed	6000 min^{-1}		
Degree of protection according to EN 60529	IP66		
Corrosion and surface protection	KS, OS1 – OS4, OSG		
Installation altitude[2]	≤ 3866 m		
Ambient temperature of motor[2]	With MOVI-C® control cabinet inverters and MOVIMOT® flexible decentralized inverter: -20 – +40 °C, (-40 °C – +60 °C[1)2)]) With MOVIMOT® advanced decentralized inverters: See MOVIMOT® advanced operating instructions/manual		
Cable length, maximum[3]	200 m		
Connection technology	KD1: M23 hybrid plug connector, 1.5 – 4.0 mm^2 motor connection, 1.0 mm^2 brake connection KDB: M40 hybrid plug connector, 6.0 – 10.0 mm^2 motor connection, 1.5 mm^2 brake connection KD: Cable gland on the terminal box for hybrid cables with 1.5 – 10 mm^2 motor connection and 1 – 1.5 mm^2 brake connection KDD: Motor and brake connection via cable gland, M23 signal plug connector		
Explosion protection	–		
Functional safety	–	Yes[1]	

1) In preparation.
2) Observe the restrictions of the ambient temperature and potential derating of the respective motor/inverter or of the brake and encoder design when used at an increased ambient temperature and/or depending on the installation altitude.
3) Also dependent on the selected inverter type and configured PWM frequency and/or brake type; see documentation of the respective inverters.

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12.4 Brake controls with MOVILINK® DDI

12.4.1 Functional description

Brake controls with an extended functional scope are available in the MOVILINK® DDI option portfolio. The options of the BG.Z, BS.Z and B series are brake controls which are integrated in the drive or the inverter. BG.Z and BS.Z are connected in the control cabinet via the MOVILINK® DDI interface in the MOVI-C® modular automation system, whereas the HV brake control B is an option of the decentralized inverter from the MOVI-C® modular automation system.

In addition to the basic function of brake monitoring, these brake controls have implemented functions for condition monitoring of the brake and its wear condition and for self-monitoring of the brake control as standard.

INFORMATION

At the same time, the BG.Z, BS.Z brake controls and option B are assistance systems which are intended to simplify maintenance and fault diagnostics. This does not replace or override standard prescribed maintenance intervals.

With the inverters from the MOVI-C® modular automation system, the brake control and the brake are permanently supplied from the local supply voltage network. The brake switching function is implemented via the MOVILINK® DDI interface and the BG.Z or BS.Z brake controls. In the case of decentralized inverters from the MOVI-C® modular automation system, the brake is controlled directly from the DC link of the inverter via the integrated HV brake control.

BG.Z brake control

With their wide voltage input (supply with low voltage according to IEC 60050 in the specified range), the BG.Z brake controls enable spring-loaded brakes from the BE.. and BZ.. series to be operated in a large supply voltage range. Previously, it was necessary to select a rated brake voltage to adapt to the local AC voltage network. With these brake controls, the use of a rated brake voltage is possible over the entire supply voltage range in a completely network-independent way. This provides you with an advantage in terms of logistics and maintenance, since only one brake type needs to be used in one rated brake voltage with one brake control. The same type of brakemotor and the same spare parts can be used.

HV brake control B

The HV brake control B is an option of the decentralized inverters from the MOVI-C® modular automation system for inverter-integrated control of spring-loaded brakes. It combines the network-independent brakemotor version with the advantages of the decentralized infrastructure, and it represents a fully integrated solution for brake control and brake diagnostics that can be implemented without a separate brake supply. With its wide voltage input (supply with low voltage according to IEC 60050 in the specified range), the HV brake control B enables spring-loaded brakes from the BE.. and BZ.. series to be operated in a large supply voltage range. Previously, it was necessary to select a rated brake voltage to adapt to the local AC voltage network. With these brake controls, the use of a rated brake voltage is possible over the entire supply

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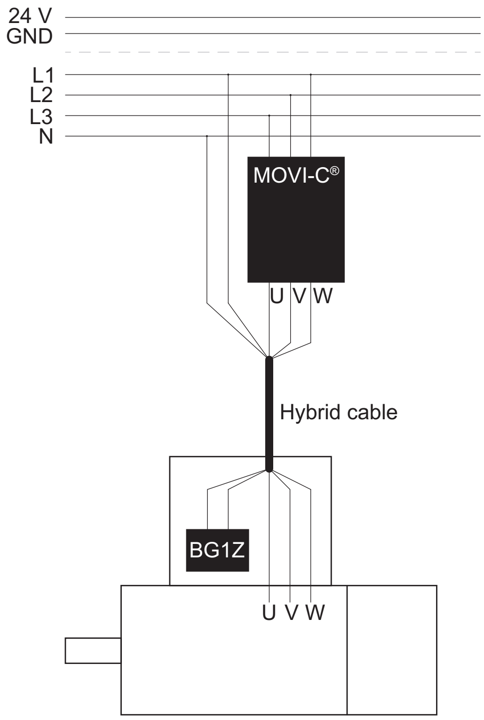
voltage range in a completely network-independent way. This provides you with an advantage in terms of logistics and maintenance, since only one brake type needs to be used in one rated brake voltage with one brake control. The same type of brakemotor and the same spare parts can be used.



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12.4.2 Technical data of brake controls BG1Z and B

It is not possible to combine a BG1Z (MOVILINK® DDI type designation DI2...) with a MOVIMOT® flexible decentralized inverter. MOVIMOT® flexible uses the integrated brake control B (HV brake control). When using a MOVIMOT® flexible, a BG1Z (MOVILINK® DDI type designation DI0...) must not be integrated.

No motor-external brake controls are permitted to be used when using a BG1Z. If no BG1Z is integrated (MOVILINK® DDI type designation DI0...), motor-external brake controls are required.

		BG1Z	B[1)] (HV brake control)
Inverter		MOVI-C® control cabinet inverters: MOVITRAC® advanced MOVIDRIVE® modular MOVIDRIVE® technology MOVIDRIVE® system	MOVI-C® decentralized inverters: MOVIMOT® flexible MOVIMOT® advanced
MOVILINK® DDI type designation		DI2...	DI0...
Brake control installation		Inside the motor in the terminal box	Integrated in the inverter

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		BG1Z	B[1)] (HV brake control)
Motors, motor sizes, brake types[2)]		DRN, DR2. 71 – 180: BE03 – BE32	DRN, DR2. 71-132M: BE03 – BE20
Operating temperature range	Ambient temperature of the motor	-20 – +40 °C	
Supply voltage	Voltage at the input terminal of the brake control	AC 200 – 500 V ±10%	AC 380 – 500 V ±10%
Operating current and operating current factor	Note the operating currents and operating current factors in chapter "Protection against damage due to overvoltage or short circuit".		
Functional safety	Availability with safety brakes	No	
Explosion protection	Availability for applications in the explosion-protected area	No	
Brake control	Supported brake types	BE..	
	Supported braking torques[2)]	Depending on brake type/size: All standard braking torques	
	Control functions	Release, application (normal excitation), rapid application (rapid excitation)	Releasing, rapid application (rapid excitation)
	Monitoring functions of the brake control and brake	Output stage (hardware and temperature error) Brake monitoring (temperature, short circuit and interruption) Startup (initialization) Computer and memory errors	
Brake condition recording[3)] (Condition monitoring)	Supported brake types	BE..[3)]	
	Condition detection functions	Air gap measurement, brake lining reserve Brake temperature Relative thermal brake coil utilization	
	Air gap measurement, brake lining reserve[4)] (Ratio, % specification, parameter 8437.11)	100% brake lining reserve: minimum air gap (no wear) Counting increments and air gap range depending on the brake type and size 0% brake lining reserve: maximum air gap (maximum wear)	
	Brake coil temperature (temperature in °C, parameter 8437.5)	Measuring step 1K	
	Thermal brake coil utilization (ratio, specification %, parameter 8437.12)	0%: ≤ 20 °C or no measured value available 100%: ≥ Maximum temperature of the respective brake coil	

		BG1Z	B[1)] (HV brake control)
Cable length, maximum[5)]		≤ 200 m	≤ 15 m

1) Brake controls B and BG.Z: Operation takes place with low voltage in accordance with IEC 60050 within the specified supply range.
2) For an overview of the standard braking torques, refer to the catalog "AC motors DRN63 – 315, DR2S56 – 225, DR2L71 – 225".
3) Other functions by request.
4) Measured value available after first release procedure.
5) Also dependent on the selected inverter type and configured PWM frequency and/or brake type; see system manuals of the respective inverters.

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12.5 Connection technology and cables for MOVILINK® DDI

12.5.1 Cables for MOVILINK® DDI

The MOVILINK® DDI interface requires a coaxial cable for data transmission between motor and inverter.

If the motor control requires a cross section of up to 10 mm², the coaxial cable is routed in a hybrid cable.

With cross sections larger than 10 mm², the motor and brake control and the coaxial cable are routed in separate cables.

SEW-EURODRIVE offers prefabricated cables with M23/M40 plug connectors. If the connection is made via a cable gland, a FAKRA connector is required on the coaxial cable.

If hybrid cables with open ends on both sides are used, the coaxial cable is connected to the motor and inverter with one FAKRA connector each.

SEW-EURODRIVE also offers hybrid cables that are already equipped with the FAKRA connector on both sides, or raw cables on a roll, for which the FAKRA connectors must be attached. The FAKRA connectors can be assembled using the "MOVILINK® DDI Tool Set 1".

Single-cable technology up to 10 mm²

Prefabricated hybrid cables for motors with MOVILINK® DDI interface are structured as follows:

- 1 conductor for the PE connection
- 3 conductors for controlling the motor
- 4 conductors for controlling the brake
- 1 coaxial cable for MOVILINK® DDI

With this universal hybrid cable, all variants of the brake can be controlled.

Multi-cable technology larger than 10 mm²

For cross sections larger than 10 mm², the coaxial cable is routed separately in a cable. Individual coaxial cables are available as prefabricated cables.

Six plugging positions are available.

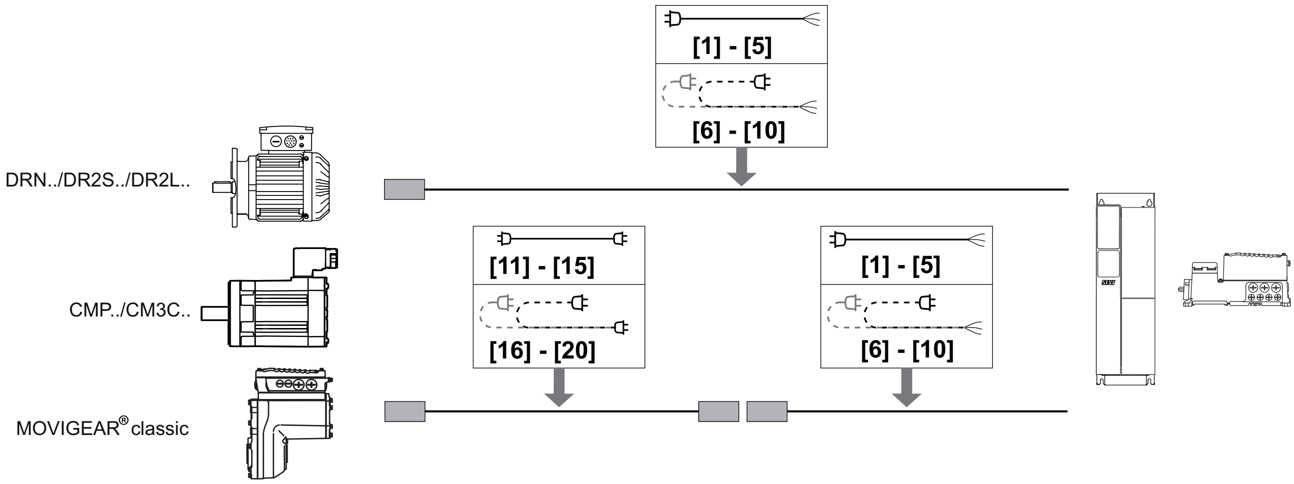
An M23 plug connector is always used for the coaxial cable on the motor side.

The following connection variants are available:

Hybrid cable with connector on the motor side, open end on the inverter side

The cable is used for the following inverters:

- MOVIDRIVE® modular/system/technology
- MOVITRAC® advanced
- MOVIMOT® flexible with cable gland



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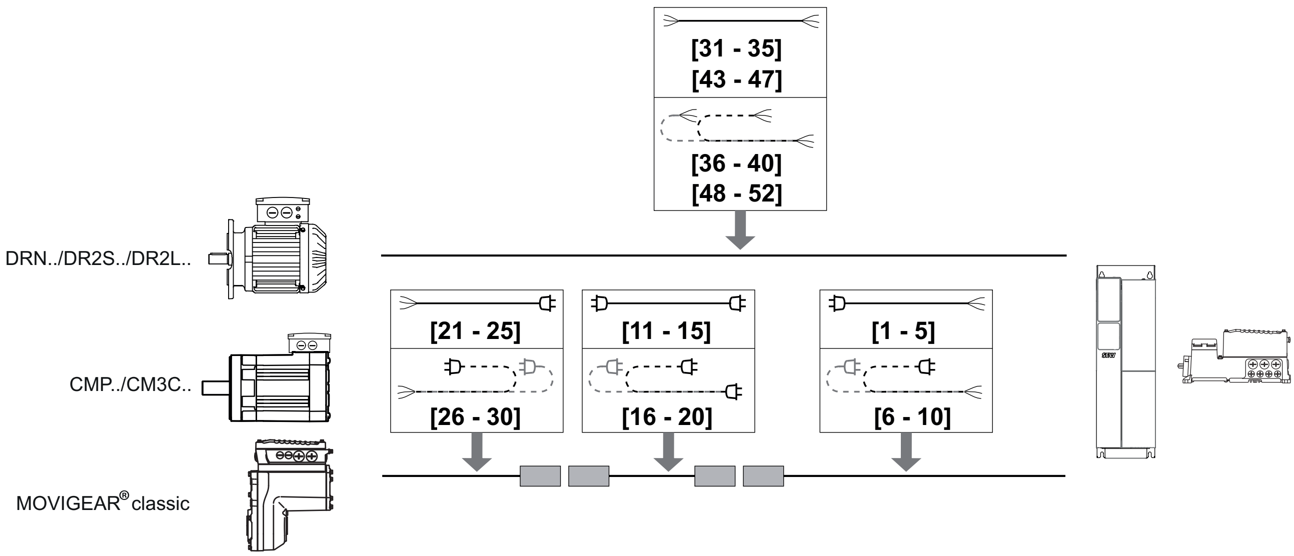
Hybrid cable with open end on the motor side, open end on the inverter side

The cable is used for the following inverters:

- MOVIDRIVE® modular/system/technology
- MOVITRAC® advanced
- MOVIMOT® flexible with cable gland



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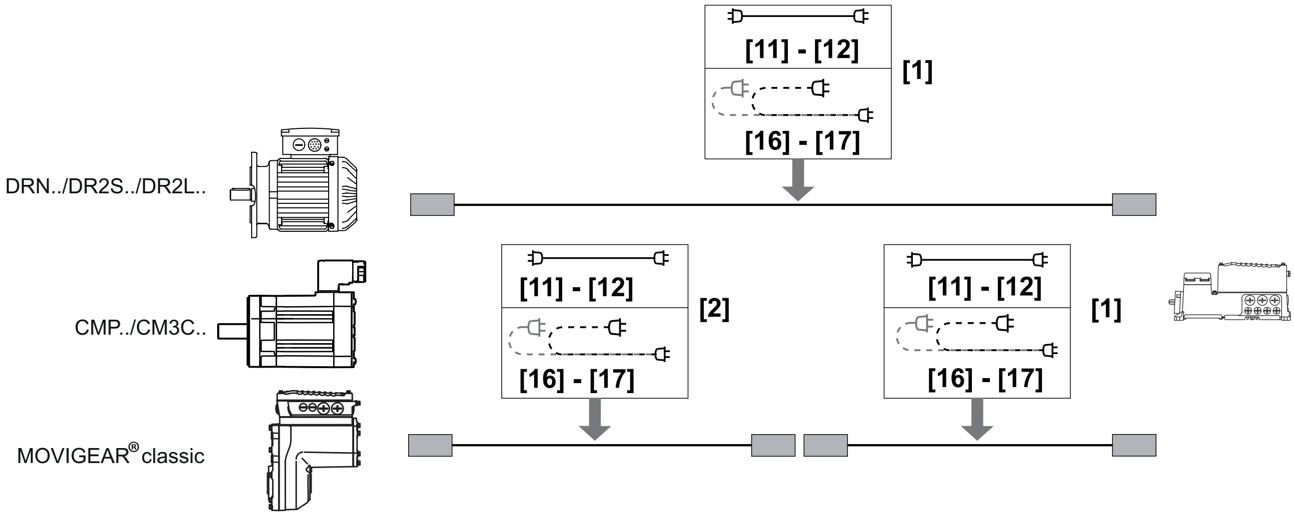
Hybrid cable with connector on the motor side, connector on the inverter side

The cable is used for the following inverters:

- MOVIMOT® flexible with plug connector



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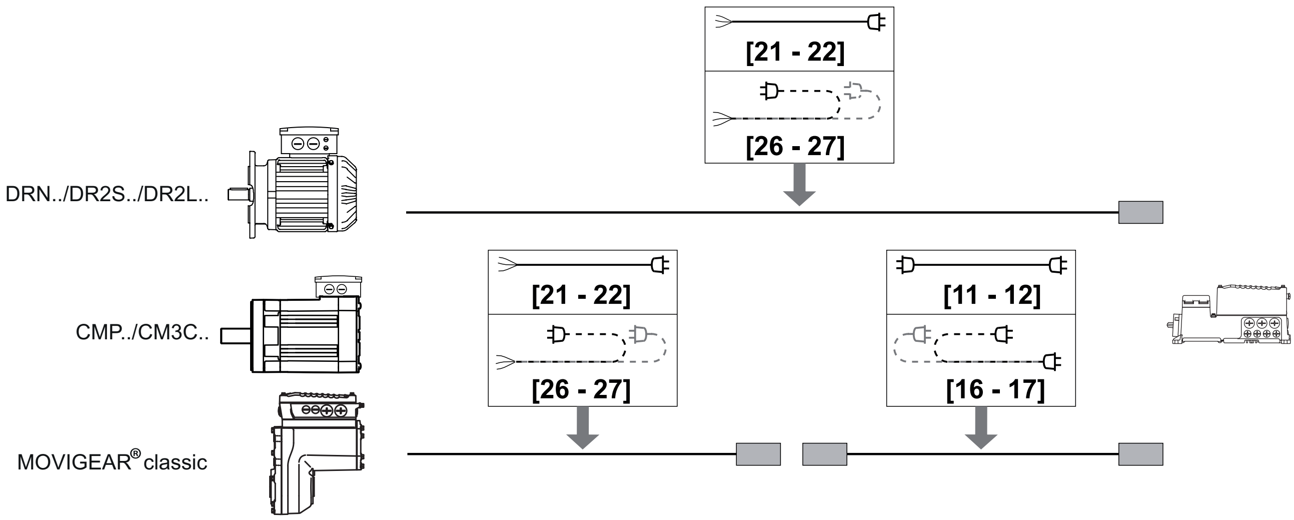
Hybrid cable with open end on the motor side, connector on the inverter side

The cable is used for the following inverters:

- MOVIMOT® flexible



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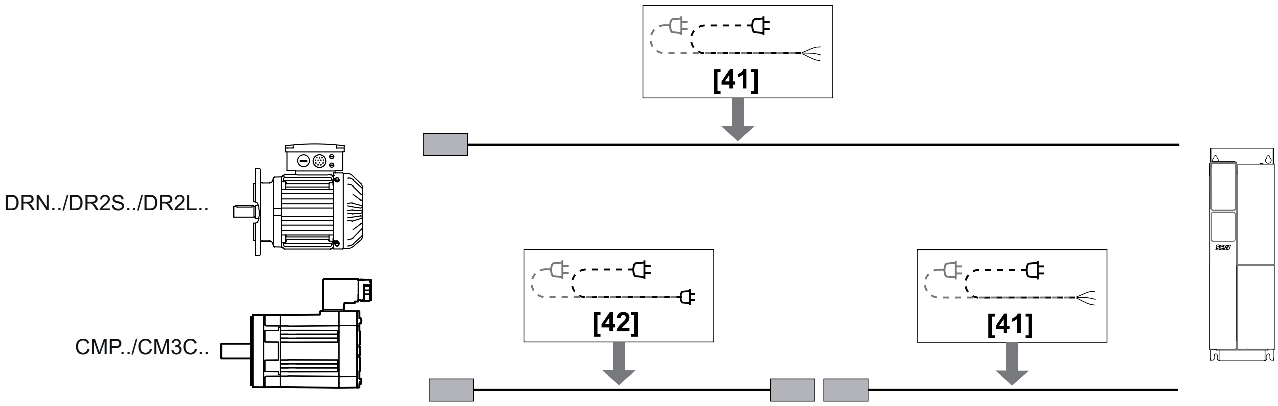
Coaxial cable with connector on the motor side, open end on the inverter side

In the event of a cross section greater than 10 mm², the coaxial cable is required for motor control conductors and includes the signal cable for the MOVILINK® DDI connection. The cable for controlling the motor and the brake must be routed separately.

The cable is used for the following inverters:

- MOVIDRIVE® modular/system/technology
- MOVITRAC® advanced



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Cable tables

No.	Part number	Cross section in mm²	Installation type	Motor connection	Motor side	Inverter side
[1]	28123808	4 × 1.5 + 4 × 1 + coaxial cable	Fixed installation	SD1/KD1	M23	Open
[2]	28123816	4 × 2.5 + 4 × 1 + coaxial cable	Fixed installation	SD1/KD1	M23	Open
[3]	28123824	4 × 4 + 4 × 1 + coaxial cable	Fixed installation	SD1/KD1	M23	Open
[4]	28123832	4 × 6 + 4 × 1.5 + coaxial cable	Fixed installation	SDB/KDB	M40	Open
[5]	28123840	4 × 10 + 4 × 1.5 + coaxial cable	Fixed installation	SDB/KDB	M40	Open
[6]	28123743	4 × 1.5 + 4 × 1 + coaxial cable	Cable carrier installation	SD1/KD1	M23	Open
[7]	28123751	4 × 2.5 + 4 × 1 + coaxial cable	Cable carrier installation	SD1/KD1	M23	Open
[8]	28123778	4 × 4 + 4 × 1 + coaxial cable	Cable carrier installation	SD1/KD1	M23	Open
[9]	28123786	4 × 6 + 4 × 1.5 + coaxial cable	Cable carrier installation	SDB/KDB	M40	Open
[10]	28123794	4 × 10 + 4 × 1.5 + coaxial cable	Cable carrier installation	SDB/KDB	M40	Open
[11]	28123905	4 × 1.5 + 4 × 1 + coaxial cable	Fixed installation	SD1/KD1	M23	M23
[12]	28123913	4 × 2.5 + 4 × 1 + coaxial cable	Fixed installation	SD1/KD1	M23	M23
[13]	28123921	4 × 4 + 4 × 1 + coaxial cable	Fixed installation	SD1/KD1	M23	M23
[14]	28123948	4 × 6 + 4 × 1.5 + coaxial cable	Fixed installation	SDB/KDB	M40	M40
[15]	28123956	4 × 10 + 4 × 1.5 + coaxial cable	Fixed installation	SDB/KDB	M40	M40
[16]	28123859	4 × 1.5 + 4 × 1 + coaxial cable	Cable carrier installation	SD1/KD1	M23	M23
[17]	28123867	4 × 2.5 + 4 × 1 + coaxial cable	Cable carrier installation	SD1/KD1	M23	M23
[18]	28123875	4 × 4 + 4 × 1 + coaxial cable	Cable carrier installation	SD1/KD1	M23	M23
[19]	28123883	4 × 6 + 4 × 1.5 + coaxial cable	Cable carrier installation	SDB/KDB	M40	M40
[20]	28123891	4 × 10 + 4 × 1.5 + coaxial cable	Cable carrier installation	SDB/KDB	M40	M40
[21]	28124367	4 × 1.5 + 4 × 1 + coaxial cable	Fixed installation	KD	Open	M23
[22]	28124375	4 × 2.5 + 4 × 1 + coaxial cable	Fixed installation	KD	Open	M23
[23]	28124383	4 × 4 + 4 × 1 + coaxial cable	Fixed installation	KD	Open	M23
[24]	28143884	4 × 6 + 4 × 1.5 + coaxial cable	Fixed installation	KD	Open	M40
[25]	28143892	4 × 10 + 4 × 1.5 + coaxial cable	Fixed installation	KD	Open	M40
[26]	28124332	4 × 1.5 + 4 × 1 + coaxial cable	Cable carrier installation	KD	Open	M23
[27]	28124340	4 × 2.5 + 4 × 1 + coaxial cable	Cable carrier installation	KD	Open	M23
[28]	28124359	4 × 4 + 4 × 1 + coaxial cable	Cable carrier installation	KD	Open	M23
[29]	28143868	4 × 6 + 4 × 1.5 + coaxial cable	Cable carrier installation	KD	Open	M40
[30]	28143876	4 × 10 + 4 × 1.5 + coaxial cable	Cable carrier installation	KD	Open	M40
[31]	28152395	4 × 1.5 + 4 × 1 + coaxial cable	Fixed installation	KD	Open	Open
[32]	28152409	4 × 2.5 + 4 × 1 + coaxial cable	Fixed installation	KD	Open	Open
[33]	28152417	4 × 4 + 4 × 1 + coaxial cable	Fixed installation	KD	Open	Open
[34]	28152425	4 × 6 + 4 × 1.5 + coaxial cable	Fixed installation	KD	Open	Open
[35]	28152433	4 × 10 + 4 × 1.5 + coaxial cable	Fixed installation	KD	Open	Open
[36]	28152441	4 × 1.5 + 4 × 1 + coaxial cable	Cable carrier installation	KD	Open	Open
[37]	28152468	4 × 2.5 + 4 × 1 + coaxial cable	Cable carrier installation	KD	Open	Open
[38]	28152476	4 × 4 + 4 × 1 + coaxial cable	Cable carrier installation	KD	Open	Open
[39]	28152484	4 × 6 + 4 × 1.5 + coaxial cable	Cable carrier installation	KD	Open	Open
[40]	28152492	4 × 10 + 4 × 1.5 + coaxial cable	Cable carrier installation	KD	Open	Open
[41]	28129431	Coaxial cable	Cable carrier installation	SMCD/SBCD/KDD	M23	Open
[42]	28138376	Coaxial cable	Cable carrier installation	SMCD/SBCD/KDD	M23	M23

The prefabricated cables "open on the motor side" and "open on the inverter side" (lines 31 – 40) can also be supplied as cable reels in lengths 30 m, 100 m, and 200 m (lines 43 – 52). These cables are not prefabricated.

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For more information on assembly, refer to the addendum to the "MOVILINK® DDI Tool Set 1" operating instructions.

No.	Part number	Cross section in mm²	Installation type	Motor connection	Motor side	Inverter side
[43]	28123395	4 × 1.5 + 4 × 1 + coaxial cable	Fixed installation	KD	Open	Open
[44]	28123409	4 × 2.5 + 4 × 1 + coaxial cable	Fixed installation	KD	Open	Open
[45]	28123417	4 × 4 + 4 × 1 + coaxial cable	Fixed installation	KD	Open	Open
[46]	28123425	4 × 6 + 4 × 1.5 + coaxial cable	Fixed installation	KD	Open	Open
[47]	28123433	4 × 10 + 4 × 1.5 + coaxial cable	Fixed installation	KD	Open	Open
[48]	28123336	4 × 1.5 + 4 × 1 + coaxial cable	Cable carrier installation	KD	Open	Open
[49]	28123344	4 × 2.5 + 4 × 1 + coaxial cable	Cable carrier installation	KD	Open	Open
[50]	28123352	4 × 4 + 4 × 1 + coaxial cable	Cable carrier installation	KD	Open	Open
[51]	28123360	4 × 6 + 4 × 1.5 + coaxial cable	Cable carrier installation	KD	Open	Open
[52]	28123379	4 × 10 + 4 × 1.5 + coaxial cable	Cable carrier installation	KD	Open	Open

12.5.2 Motor cables for motors with MOVILINK® DDI interface

The following tables list the cables available for this connection.

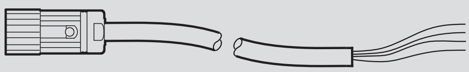
Connecting motor cables for motors without brake with MOVILINK® DDI interface

Connecting cables with connectors at the motor side for the following motors:

- DRN../DR2S../DR2L.. asynchronous motors
- CMP../CM3C.. synchronous motors
- MOVIGEAR® classic drive unit

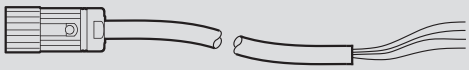
The following table shows the conductor assignment of the cables:

MOVIDRIVE® modular/system/technology, MOVITRAC® advanced

Motor side						Inverter side	
Contact		**Signal**	**Conductor color**	**Conductor color IEC 60757**	**Identifica-tion**	**Prefabrication**	**Description**
M23	**M40**						
U	U	U	Black	BK	U/L1	Not prefabricated	Motor connection phase U
V	V	V	Black	BK	V/L2	Not prefabricated	Motor connection phase V
W	W	W	Black	BK	W/L3	Not prefabricated	Motor connection phase W
A	1	Reserved	Yellow	YE	A	Not prefabricated	Do not connect
B	+	Reserved	Orange	OG	B	Not prefabricated	Do not connect
C	N	Reserved	Pink	PK	C	Not prefabricated	Do not connect
D	2	Reserved	Violet	VT	D	Not prefabricated	Do not connect
PE	PE	PE	Yellow/green	YE/GN		Not prefabricated	Protective earth connection
DDI	DDI	DDI	Violet	VT		Coaxial connector	MOVILINK® DDI

Insulate each unconnected conductor end.

MOVIMOT® flexible

Motor side						Inverter side	
Contact		**Signal**	**Conductor color**	**Conductor color IEC 60757**	**Identification**	**Prefabrication**	**Description**
M23	**M40**						
U	U	U	Black	BK	U/L1	Not prefabricated	Motor connection phase U
V	V	V	Black	BK	V/L2	Not prefabricated	Motor connection phase V
W	W	W	Black	BK	W/L3	Not prefabricated	Motor connection phase W
A	1	A	Yellow	YE	A	Not prefabricated	Connection A
B	+	B	Orange	OG	B	Not prefabricated	Connection B
C	N	C	Pink	PK	C	Not prefabricated	Connection C
D	2	D	Violet	VT	D	Not prefabricated	Connection D
PE	PE	PE	Yellow/green	YE/GN		Not prefabricated	Protective earth connection
DDI	DDI	DDI	Violet	VT		Coaxial connector	MOVILINK® DDI

Insulate each unconnected conductor end.

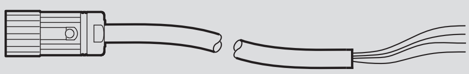
Connecting motor cables for motors with BE.. or BZ.. brake with MOVILINK® DDI interface

Connecting cables with connectors on the motor side for the following motors:

- DRN../DR2S../DR2L.. asynchronous motors
- CM3C.. synchronous motors

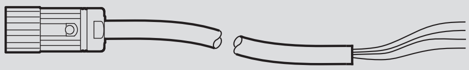
The following table shows the conductor assignment of the cables:

MOVIDRIVE® modular/system/technology, MOVITRAC® advanced

Motor side					Inverter side		
Contact		Signal	Conductor color	Conductor color IEC 60757	Identifica-tion	Prefabrication	Description
M23	M40						
U	U	U	Black	BK	U/L1	Not prefabricated	Motor connection phase U
V	V	V	Black	BK	V/L2	Not prefabricated	Motor connection phase V
W	W	W	Black	BK	W/L3	Not prefabricated	Motor connection phase W
A	1	Reserved	Yellow	YE	A	Not prefabricated	Do not connect
B	+	15	Orange	OG	B	Not prefabricated	Brake connection 15
C	N	13	Pink	PK	C	Not prefabricated	Brake connection 13
D	2	14	Violet	VT	D	Not prefabricated	Brake connection 14
PE	PE	PE	Yellow/green	YE/GN		Not prefabricated	Protective earth connection
DDI	DDI	DDI	Violet	VT		Coaxial connector	MOVILINK® DDI

Insulate each unconnected conductor end.

MOVIMOT® flexible

Motor side  **Inverter side**

Contact M23	Contact M40	Signal	Conductor color	Conductor color IEC 60757	Identifica-tion	Prefabrication	Description
U	U	U	Black	BK	U/L1	Not prefabricated	Motor connection phase U
V	V	V	Black	BK	V/L2	Not prefabricated	Motor connection phase V
W	W	W	Black	BK	W/L3	Not prefabricated	Motor connection phase W
A	1	A	Yellow	YE	A	Not prefabricated	Connection A
B	+	B	Orange	OG	B	Not prefabricated	Connection B
C	N	C	Pink	PK	C	Not prefabricated	Connection C
D	2	D	Violet	VT	D	Not prefabricated	Connection D
PE	PE	PE	Yellow/green	YE/GN		Not prefabricated	Protective earth connection
DDI	DDI	DDI	Violet	VT		Coaxial connector	MOVILINK® DDI

Insulate each unconnected conductor end.

Connection of motor cables for motors with BE.. or BZ.. brake and integrated BG1Z brake control

Connecting cables with connectors on the motor side for the following motors:

- DRN../DR2S../DR2L.. asynchronous motors
- CMP../CM3C.. synchronous motors

The following table shows the conductor assignment of the cables:

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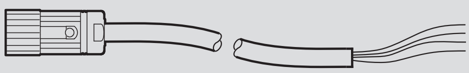
Motor side  Inverter side							
Contact		**Signal**	**Conductor color**	**Conductor color IEC 60757**	**Identifica-tion**	**Prefabrication**	**Description**
M23	**M40**						
U	U	U	Black	BK	U/L1	Not prefabricated	Motor connection phase U
V	V	V	Black	BK	V/L2	Not prefabricated	Motor connection phase V
W	W	W	Black	BK	W/L3	Not prefabricated	Motor connection phase W
A	1	Reserved	Yellow	YE	A	Not prefabricated	Do not connect
B	+	N (L2)	Orange	OG	B	Not prefabricated	Brake connection, neutral conductor N (or phase L2)
C	N	Reserved	Pink	PK	C	Not prefabricated	Do not connect
D	2	L1	Violet	VT	D	Not prefabricated	Brake connection, phase L1
PE	PE	PE	Yellow/green	YE/GN		Not prefabricated	Protective earth connection
DDI	DDI	DDI	Violet	VT		Coaxial connector	MOVILINK® DDI

Insulate each unconnected conductor end.

Representation of connections

Motor connection for motors with MOVILINK® DDI interface KD1

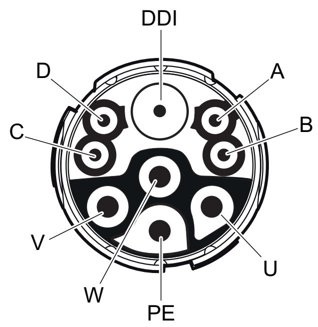
KD1 without brake

The wiring diagram of the plug connector depicts the contact end of the connections.

Function
Motor connection for motors with MOVILINK® DDI interface

Connection type
M23, male, male thread, TE Connectivity – Intercontec products, series 723, SEW-EURODRIVE insert, SpeedTec equipment, coding ring: without, protected against contact

Wiring diagram



Assignment		
Contact	**Signal**	**Description**
U	U	Motor connection, phase U
V	V	Motor connection, phase V
W	W	Motor connection, phase W
A	Reserved	Do not connect
B	Reserved	Do not connect
C	Reserved	Do not connect
D	Reserved	Do not connect
PE	PE	PE connection
DDI	DDI	MOVILINK® DDI

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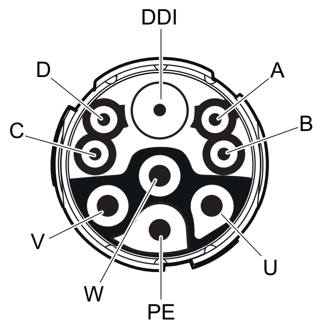
KD1 with BE.. brake and external brake control

The wiring diagram of the plug connector depicts the contact end of the connections.

Function
Motor connection for motors with MOVILINK® DDI interface

Connection type
M23, male, male thread, TE Connectivity – Intercontec products, series 723, SEW-EURODRIVE insert, SpeedTec equipment, coding ring: without, protected against contact

Wiring diagram



Assignment		
Contact	**Signal**	**Description**
U	U	Motor connection, phase U
V	V	Motor connection, phase V
W	W	Motor connection, phase W
A	Reserved	Do not connect
B	15	Brake connection, output 15 brake control
C	13	Brake connection, output 13 brake control
D	14	Brake connection, output 14 brake control
PE	PE	Protective earth connection
DDI	DDI	MOVILINK® DDI

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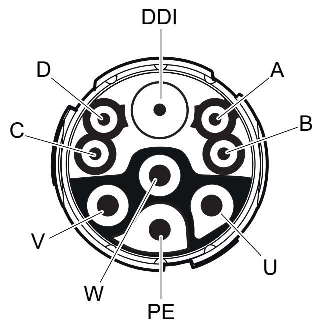
KD1 with BE.. brake and integrated BG1Z brake control

The wiring diagram of the plug connector depicts the contact end of the connections.

Function
Motor connection for motors with MOVILINK® DDI interface

Connection type
M23, male, male thread, TE Connectivity – Intercontec products, series 723, SEW-EURODRIVE insert, SpeedTec equipment, coding ring: without, protected against contact

Wiring diagram



Assignment		
Contact	**Signal**	**Description**
U	U	Motor connection, phase U
V	V	Motor connection, phase V
W	W	Motor connection, phase W
A	Reserved	Do not connect
B	N (L2)	Brake control supply system, neutral conductor or phase L2
C	Reserved	Do not connect
D	L1	Brake control supply system, phase L1
PE	PE	Protective earth connection
DDI	DDI	MOVILINK® DDI

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Motor connection for motors with brake with MOVILINK® DDI interface KDB

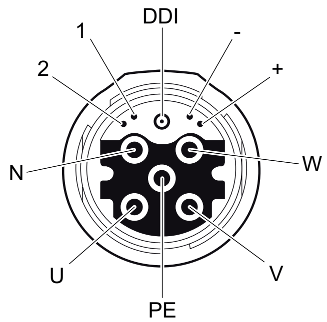
KDB without brake

The wiring diagram of the plug connector depicts the contact end of the connections.

Function
Motor connection for motors with MOVILINK® DDI interface

Connection type
M40, male, male thread, TE Connectivity – Intercontec products, series 740, SEW-EURODRIVE insert, SpeedTec equipment, coding ring: without, protected against contact

Wiring diagram



Assignment		
Contact	**Signal**	**Description**
U	U	Motor connection, phase U
V	V	Motor connection, phase V
W	W	Motor connection, phase W
1	Reserved	Do not connect
+	Reserved	Do not connect
N	Reserved	Do not connect
2	Reserved	Do not connect
PE	PE	PE connection
DDI	DDI	MOVILINK® DDI

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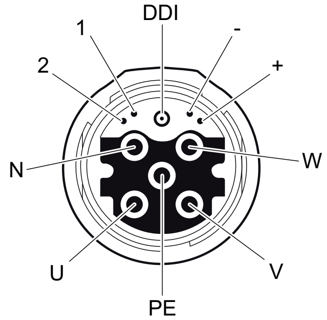
KDB with BE.. brake and external brake control

The wiring diagram of the plug connector depicts the contact end of the connections.

Function
Motor connection for motors with MOVILINK® DDI interface

Connection type
M40, male, male thread, TE Connectivity – Intercontec products, series 740, SEW-EURODRIVE insert, SpeedTec equipment, coding ring: without, protected against contact

Wiring diagram



Assignment		
Contact	**Signal**	**Description**
U	U	Motor connection, phase U
V	V	Motor connection, phase V
W	W	Motor connection, phase W
1	Reserved	Do not connect
+	15	Brake connection, connection 15 brake control
N	13	Brake connection, connection 13 brake control
2	14	Brake connection, connection 14 brake control
PE	PE	Protective earth connection
DDI	DDI	MOVILINK® DDI

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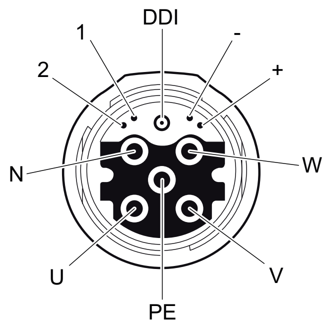
KDB with BE.. brake and integrated BG1Z brake control

The wiring diagram of the plug connector depicts the contact end of the connections.

Function
Motor connection for motors with MOVILINK® DDI interface

Connection type
M40, male, male thread, TE Connectivity – Intercontec products, series 740, SEW-EURODRIVE insert, SpeedTec equipment, coding ring: without, protected against contact

Wiring diagram



Assignment		
Contact	**Signal**	**Description**
U	U	Motor connection, phase U
V	V	Motor connection, phase V
W	W	Motor connection, phase W
1	Reserved	Do not connect
+	N (L2)	Brake control supply system, neutral conductor or phase L2
N	Reserved	Do not connect
2	L1	Brake control supply system, phase L1
PE	PE	Protective earth connection
DDI	DDI	MOVILINK® DDI

Connection of coaxial cables with separate routing of power cable and signal cable

The power cable and signal cable can only be routed together up to a cable cross section of 10 mm². With larger cable cross sections, the power cable is routed separately from the signal cable.

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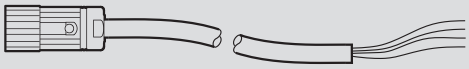
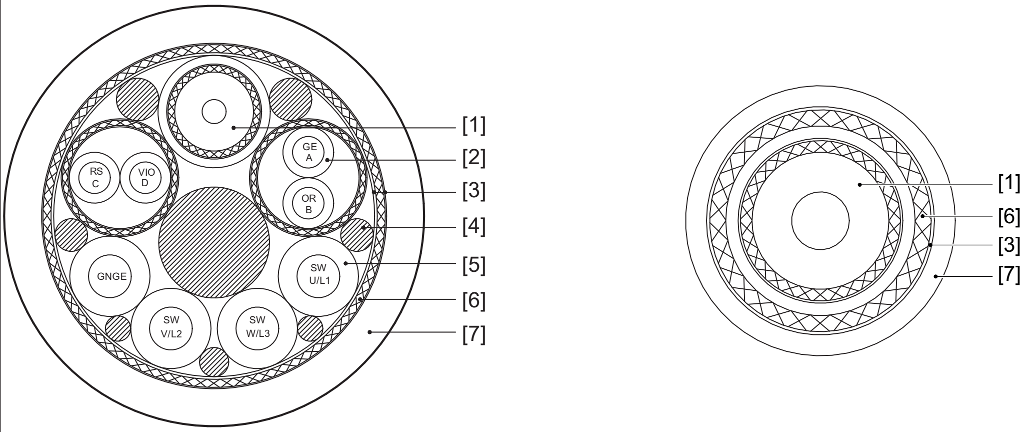
Motor side					Inverter side	
Contact M23	**Signal**	**Conductor color**	**Conductor color IEC 60757**	**Identification**	**Prefabrication**	**Description**
DDI	DDI	Violet	VT		Coaxial connector	MOVILINK® DDI

12.5.3 Cable specifications

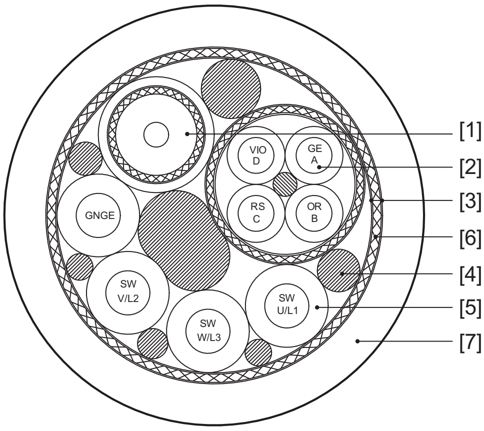
Cable carrier installation

Type		LEHC 005796	LEHC 005770	LEHC 005771	LEHC 005772	LEHC 005773	LEC 005724
Part number of bulk cable, not prefabricated		**28123336**	**28123344**	**28123352**	**28123360**	**28123379**	**25672568**
Cross section		**4 × 1.5 mm²**	**4 × 2.5 mm²**	**4 × 4.0 mm²**	**4 × 6.0 mm²**	**4 × 10 mm²**	**-**
Mechanical design		 29346392715					
[1]	Coaxial cable	Coax Z50 in accordance with RG58					
	Conductor	Stranded copper wire, tinned, 19 × 0.182 mm					
	Dielectric	Polypropylene Ø 2.95					
	Shielding	Braided copper wire, tinned, 0.128 mm					
		Optical coverage at least 90%,					
	Sheath	TPE					
	Diameter	4.2 mm					
	Color	Violet					
[2]	Conductors	2 shielded conductor pairs 2 × 1.0 mm²	2 shielded conductor pairs 2 × 1.0 mm²	2 shielded conductor pairs 2 × 1.0 mm²	2 shielded conductor pairs 2 × 1.5 mm²	Shielded element 4 × 1.5 mm²	-
		Stranded copper wire, bare					-
		Single wire 0.15 mm					-
		In accordance with DIN EN 60228 class 6					-
		IEC 60228 Class 6					-
	Insulation	Polypropylene					-
	Shielding	Braided copper wire 0.10 mm, tinned	Braided copper wire 0.10 mm, tinned	Braided copper wire 0.10 mm, tinned	Braided copper wire 0.10 mm, tinned	Braided copper wire 0.128 mm, tinned	-
		Optical coverage at least 85%					-
	Diameter	2.1 mm	2.1 mm	2.1 mm	2.4 mm	2.4 mm	-
	Colors	Yellow with black A label					-
		Orange with black B label					-
		Pink with black C label					-
		Violet with black D label					-
[3]	Banding	-					-
[4]	Filler	-					-
[5]	Conductors	4 × 1.5 mm²	4 × 2.5 mm²	4 × 4.0 mm²	4 × 6.0 mm²	4 × 10 mm²	-
	Conductor	Stranded copper wire, bare					-
		Single wire 0.15 mm	Single wire 0.15 mm	Single wire 0.15 mm	Single wire 0.2 mm	Single wire 0.2 mm	-
		In accordance with DIN EN 60228 class 6					-
		IEC 60228 Class 6					-
	Diameter	3.0 mm	3.6 mm	3.75 mm	4.6 mm	5.8 mm	-
	Insulation	Polypropylene					-
	Colors	Green/yellow, black with label: U/L1; V/L2; W/L3					-

Type		LEHC 005796	LEHC 005770	LEHC 005771	LEHC 005772	LEHC 005773	LEC 005724
Part number of bulk cable, not prefabricated		**28123336**	**28123344**	**28123352**	**28123360**	**28123379**	**25672568**
Cross section		**4 × 1.5 mm²**	**4 × 2.5 mm²**	**4 × 4.0 mm²**	**4 × 6.0 mm²**	**4 × 10 mm²**	**-**
[6]	Shield	Braided tinned copper wires, 0.15 mm	Braided tinned copper wires, 0.15 mm	Braided tinned copper wires, 0.15 mm	Braided tinned copper wires, 0.2 mm	Braided tinned copper wires, 0.2 mm	Braided tinned copper wires, 0.13 mm
		Optical coverage at least 85%					
[7]	Outer cable jacket	Polyurethane, flame retardant, halogen-free					
	Color	Matt orange					Matt black
	Label	SEW-EURODRIVE 28123336 4 × 1.5 + 2 × 2 × 1C + 1 × Z50	SEW-EURODRIVE 28123344 4 × 2.5 + 2 × 2 × 1C + 1 × Z50	SEW-EURODRIVE 28123352 4 × 4.0 + 2 × 2 × 1C + 1 × Z50	SEW-EURODRIVE 28123360 4 × 6.0 + 2 × 2 × 1.5C + 1 × Z50	SEW-EURODRIVE 28123379 4 × 10 + 2 × 2 × 1.5C + 1 × Z50	SEW-EURODRIVE 25672568 1 × Z50
		LEHC005796 Rev.0 E47543- LIL c US	LEHC 005770 Rev.0 E47543- LIL c US	LEHC 005771 Rev.0 E47543- LIL c US	LEHC 005772 Rev.0 E47543- LIL c US	LEHC 005773 Rev.0 E47543- LIL c US	LEHC 005951 Rev.0 E47543- LIL c US
		AWM STYLE 21223 I/II A/B 80 °C 1000V FT1 Week/year of production					AWM STYLE 11892 I/II A/B 80 °C 300V FT1 Week/year of production
	Diameter	15.7 mm	16.7 mm	17.0 mm	19.7 mm	22.1 mm	7.0 mm
Electrical properties							
	Operating voltage conductors V_0/V	0.6 kV/1.0 kV					0.3 kV/0.3 kV
	Operating voltage according to UL style 21223	Max. 1000 V					Max. 300 V
	Surge impedance coaxial cable	50 Ω ± 2 Ω					
Mechanical properties							
	Bending radius	Min. 3 × outer diameter for one-time installation Min. 5 × outer diameter for fixed installation Min. 7.5 × outer diameter for cable carriers					Min. 5 × outer diameter for one-time installation Min. 8 × outer diameter for fixed installation Min. 20 × outer diameter in the cable carrier
	Travel speed	Max. 5 m/s					3 m/s
	Acceleration	Max. 20 m/s²					
	Bending cycles	Min. 5 × 10^6					Min. 3 × 10^6
	Torsional stability	±180 °/m					
	Torsional cycles	maximum 1 million cycles (at ±180 °/m)					
	Mass	332 kg/km	392 kg/km	444 kg/km	626 kg/km	827 kg/km	73 kg/km
Thermal characteristics							
	Operating temperature	Fixed installation: -40 °C to +90 °C Cable carrier installation: -30 °C to +90 °C					
	Operating temperature according to cURus	Fixed installation: -40 °C to +80 °C Cable carrier installation: -30 °C to +80 °C					
Chemical characteristics							
	Oil resistance	DIN VDE 0282-10/HD 22.10 S2					DIN EN 50363-10-2
	Flame retardance	UL 1581 section 1060 Vertical Flame Test (FT1) CSA C22.2 No.3-92 Vertical Flame Test (FT1) IEC 60332-1 2					
Other characteristics							

<table>
<tr><th colspan="2">Type</th><th>LEHC 005796</th><th>LEHC 005770</th><th>LEHC 005771</th><th>LEHC 005772</th><th>LEHC 005773</th><th>LEC 005724</th></tr>
<tr><th colspan="2">Part number of bulk cable, not prefabricated</th><th>28123336</th><th>28123344</th><th>28123352</th><th>28123360</th><th>28123379</th><th>25672568</th></tr>
<tr><th colspan="2">Cross section</th><th>4 × 1.5 mm²</th><th>4 × 2.5 mm²</th><th>4 × 4.0 mm²</th><th>4 × 6.0 mm²</th><th>4 × 10 mm²</th><th>-</th></tr>
<tr><td></td><td></td><td colspan="6">EU Directive 2011/65/EU (RoHS),
Free of paint-wetting impairment substances,
Halogen-free according to IEC 60754-1,
General fuel resistance,
General resistance to acids, alkalis, and cleaning agents,
General resistance against dusts,
General resistance against microbes and fungi,
Generally hydrolysis-resistant,
General resistance against UV radiation</td></tr>
<tr><td colspan="8">Approvals</td></tr>
<tr><td></td><td></td><td colspan="5">UL Subject 758, Style 21223
CSA - C22.2 No. 210
cURus E47543
UL Style 21223 80 °C 1000V FT1
cUL AWM I/II A/B 80 °C 1000V FT1</td><td>UL Subject 758, Style 11892
CSA - C22.2 No. 210
cURus E47543
UL Style 11892 80 °C 300V FT1
cUL AWM I/II A/B 80 °C 300V FT1</td></tr>
</table>

Fixed installation

Type		LEHC 005775	LEHC 005776	LEHC 005777	LEHC 005778	LEHC 005779
Part number of bulk cable, not prefabricated		**28123395**	**28123409**	**28123417**	**28123425**	**28123433**
Cross section		**4 × 1.5 mm²**	**4 × 2.5 mm²**	**4 × 4.0 mm²**	**4 × 6.0 mm²**	**4 × 10 mm²**
Mechanical design		 29346395147				
[1]	Coaxial cable	Coax Z50 in accordance with RG58				
	Conductor	Stranded copper wire, tinned, 19 × 0.182 mm				
	Dielectric	Polypropylene Ø 2.95				
	Shielding	Braided copper wire, tinned, 0.128 mm				
		Optical coverage at least 90%				
	Sheath	TPE				
	Diameter	4.2 mm				
	Color	Violet				
[2]	Cores	Shielded element 4 × 1.0 mm²	Shielded element 4 × 1.0 mm²	Shielded element 4 × 1.0 mm²	Shielded element 4 × 1.5 mm²	Shielded element 4 × 1.5 mm²
		Stranded copper wire, bare				
		Single wire 0.20 mm	Single wire 0.20 mm	Single wire 0.20 mm	Single wire 0.25 mm	Single wire 0.25 mm
		in accordance with DIN EN 60228 class 5				
		IEC 60228 Class 5				
	Insulation	Polypropylene				
	Shielding	Braided copper wire, 0.128 mm, tinned				
		optical coverage at least 85%				
	Diameter	2.1 mm	2.1 mm	2.1 mm	2.35 mm	2.35 mm
	Colors	Yellow with black label A				
		Orange with black label B				
		Pink with black label C				
		Purple with black label D				
[3]	Banding	-	-	-	-	-
[4]	Filler	-	-	-	-	-
[5]	Cores	4 × 1.5 mm²	4 × 2.5 mm²	4 × 4.0 mm²	4 × 6.0 mm²	4 × 10 mm²
	Conductor	Stranded copper wire, bare				
		Single wire 0.25 mm	Single wire 0.25 mm	Single wire 0.30 mm	Single wire 0.30 mm	Single wire 0.40 mm
		in accordance with DIN EN 60228 class 5				
		IEC 60228 Class 5				
	Diameter	3.0 mm	3.6 mm	3.75 mm	4.7 mm	5.8 mm
	Insulation	Polypropylene				
	Colors	Green/yellow, black with label: U/L1; V/L2; W/L3				
[6]	Shield	Braided tinned copper wires, 0.15 mm	Braided tinned copper wires, 0.15 mm	Braided tinned copper wires, 0.15 mm	Braided tinned copper wires, 0.20 mm	Braided tinned copper wires, 0.20 mm
		optical coverage at least 85%				

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Type		**LEHC 005775**	**LEHC 005776**	**LEHC 005777**	**LEHC 005778**	**LEHC 005779**
Part number of bulk cable, not prefabricated		**28123395**	**28123409**	**28123417**	**28123425**	**28123433**
Cross section		**4 × 1.5 mm²**	**4 × 2.5 mm²**	**4 × 4.0 mm²**	**4 × 6.0 mm²**	**4 × 10 mm²**
[7]	Outer cable jacket	PVC				
	Color	Orange				
	Label	SEW-EURODRIVE 28123395 4 × 1.5 + 4 × 1C + 1 × Z50	SEW-EURODRIVE 28123409 4 × 2.5 + 4 × 1C + 1 × Z50	SEW-EURODRIVE 28123417 4 × 4.0 + 4 × 1C + 1 × Z50	SEW-EURODRIVE 28123425 4 × 6.0 + 4 × 1.5C + 1 × Z50	SEW-EURODRIVE 28123433 4 × 10 + 4 × 1.5C + 1 × Z50
		LEHC005775 Rev. 0 E47543-LIL	LEHC005776 Rev. 0 E47543-LIL	LEHC 005777 Rev.0 E47543-LIL	LEHC 005778 Rev.0 E47543-LIL	LEHC 005779 Rev.0 E47543-LIL
		AWM STYLE 2570 I/II A/B 80 °C 1000 V FT1 Week/year of production				
	Diameter	15.2 mm	16.1 mm	16.4 mm	19.0 mm	21.8 mm
Electrical properties						
	Operating voltage conductors V_0/V	0.6 kV/1.0 kV				
	Operating voltage according to UL style 21223	Max. 1000 V				
	Surge impedance coaxial cable	50 Ω ± 2 Ω				
Mechanical properties						
	Bending radius	min. 3 × outer diameter for one-time installation min. 5 × outer diameter for fixed installation min. 10 × outer diameter if moved occasionally				
	Mass	312 kg/km	361 kg/km	412 kg/km	576 kg/km	791 kg/km
Thermal properties						
	Operating temperature	Fixed installation: -40 °C to +90 °C If moved occasionally: -10 °C to +90 °C				
	Operating temperature according to cURus	Fixed installation: -40 °C to +80 °C If moved occasionally: -10 °C to +80 °C				
Chemical properties						
	Oil resistance	DIN EN 50363-4-1 (test method according to DIN EN 60811-404)				
	Flame retardant	UL 1581 section 1060 Vertical Flame Test (FT1) CSA C22.2 No.3-92 Vertical Flame Test (FT1) IEC 60332-1-2				
Other features						
		EU Directive 2011/65/EU (RoHS)				

12.5.4 Self-assembly of the DDI cable

SEW-EURODRIVE offers assembled hybrid cables. The cable side with the M23 or M40 plug connector can only be assembled by SEW-EURODRIVE. The open side can be assembled by the customer if, for example, a cable needs to be shortened.

When doing this, a special tool set is only required for the coaxial cable; all other conductors are crimped with standard ring lugs or standard cable lugs.

The "MOVILINK® DDI Tool Set 1" contains stripping and crimping pliers to crimp the coaxial connector according to the FAKRA standard. The tool set contains the material required for 50 plug-in connections. The coaxial connector on the cable is the same for the connection to a motor or inverter.

You can assemble the MOVILINK® DDI cables yourself by using the following information.

MOVILINK® DDI case with tool set 1

MOVILINK® DDI tool set 1

MOVILINK® DDI tool set 1 contains the tool for crimping the cables. Tool set 1 can be ordered using part number 28250923.

Quantity	Description	Type designation/part number
1	Mini systainer	
1	Stripping pliers	QWZ WEG 01, QWZ WEG 61
1	Crimping pliers	QWZ WEG 01, QWZ WEG 62
1	Rotary cutter 1	QWZ WEG 61M1
1	Rotary cutter 2	QWZ WEG 61M2
1	MOVILINK® DDI crimp parts 1	28250931
1	Spacer A/B	QWZ WEG 61DA
1	Spacer C/D	QWZ WEG 61DC
1	Spacer E/F	QWZ WEG 61DE

MOVILINK® DDI crimp parts 1

The "MOVILINK® DDI crimp parts 1" package contains parts for assembling 50 plug connectors.

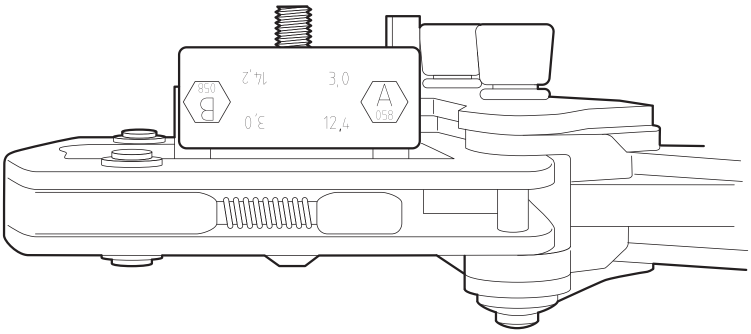
This set is part of "MOVILINK® DDI tool set 1" and can be re-ordered separately by quoting part number 28250931.

Quantity	Description
120	Inner conductor contact
50	Outer conductor contact
50	Crimp sleeves
50	Housing
50	Insulating tubing 230 mm
100	Insulating end cap

Preparing tools and cables

Preparing the tools

The stripping pliers must be equipped with the spacer QWZ WEG 61DA. The spacer must be mounted in position B as shown in the following figure:



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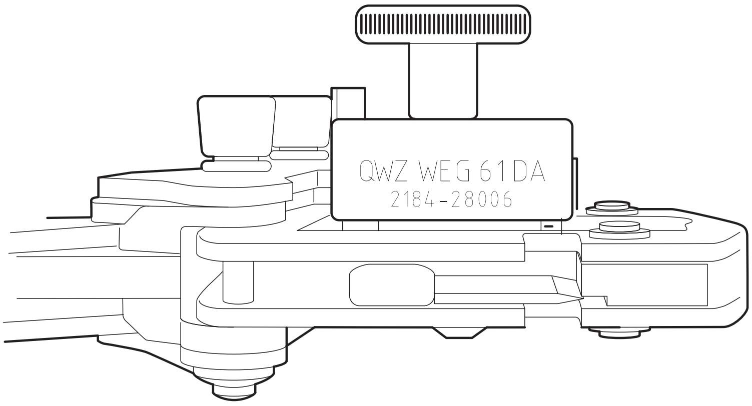

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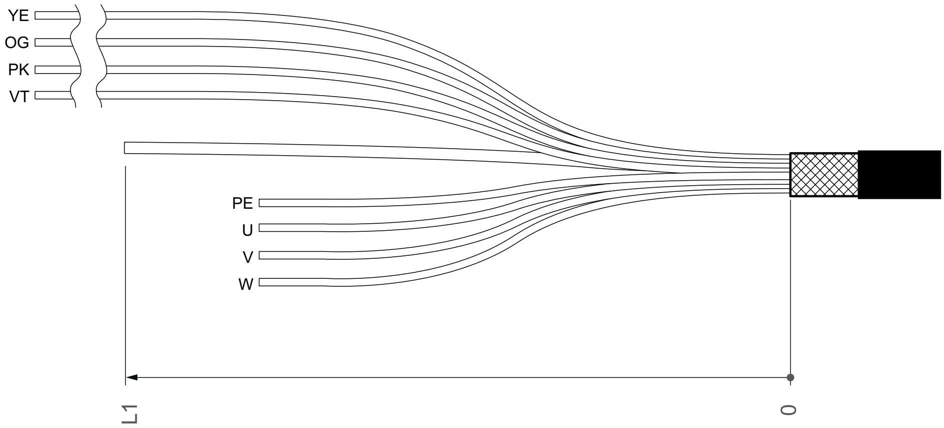
Rotary cutter 2 is used for stripping.

Cutting the coaxial cable to length

Depending on use, the coaxial cable must be cut to length on the motor side or inverter side in such a way that it corresponds to the motor or the inverter.

Cut the coaxial cable to length L1 before starting assembly of the plug connector.

Cable open at motor end



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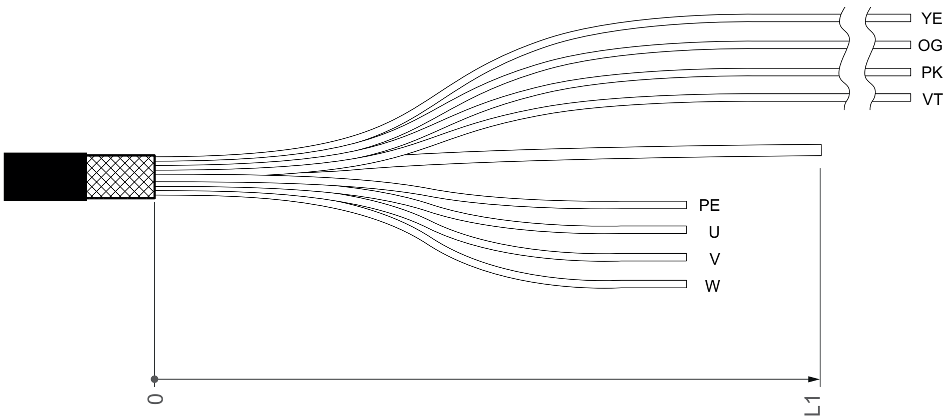
Motor	Size	Cable length L1 in mm
DRN.., DR2S.., DR2L..	71 – 200	150
CMP..	50 – 112	150
CM3C..	63 – 100	150
MGF classic 1	1 – 4	150

Cable open at inverter side



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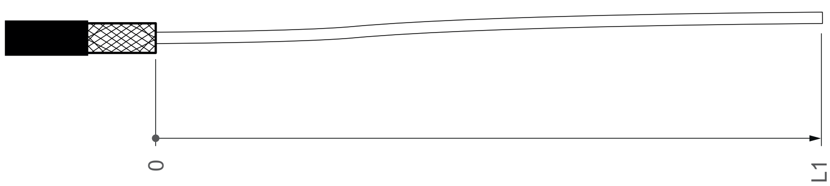
Solo cable open at inverter side



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Inverter	Cable type	Cable length L1 in mm
MOVIDRIVE® modular/system/technology MOVIMOT® flexible	1.5 – 6 mm²	250
	10 mm²	270
	Solo cable	300

Crimping and assembling the connector

Assembling the plug connector

The instructions for fitting the plug connector onto the coaxial cable are included in "MOVILINK® DDI tool set 1".

In addition, you can download a video instruction in German or English that shows the individual steps for fitting the plug connector onto the coaxial cable. The instruction is available at the following link:

German: https://www.youtube.com/watch?v=ZD5oiT5hqaI

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English: https://www.youtube.com/watch?v=X_gHIkaUA04

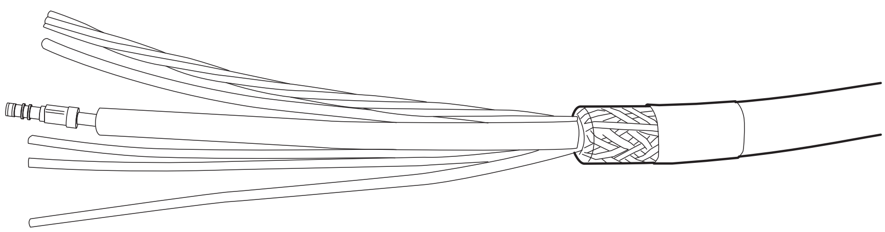
32445256203

Using the insulating tubing

If the coaxial cable is installed in the terminal box of DRN..., DR2S... or DR2L... motors, the coaxial cable must additionally be protected mechanically and electrically with the insulating tubing.

The insulating tubing is included in the "MOVILINK® DDI crimp parts 1" package.

After crimping the connector and **before** fitting the connector housing, push the insulating tubing over the coaxial cable.



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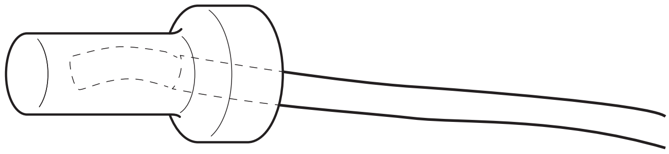
Cut the insulating tubing to the appropriate length. The insulating tubing must cover the coaxial cable completely.

Unconnected wires

All wires that are not connected, such as brake wires, must be individually insulated and mechanically fixed in the terminal box, control cabinet or wiring space of MOVIMOT® flexible. The enclosed insulating caps can be used for insulation.



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It is not permitted to connect the unused wires to PE or GND.

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	Rhône-Alpes West	SEW-USOCOME Parc d'affaires Roosevelt Rue Jacques Tati 69120 Vaulx en Velin, France	Tel. +33 4 72 15 37 04 Fax +33 4 72 15 37 15
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Sales	**Douala, Cameroon**	Electro-Services Rue Drouot Akwa B.P. 2024 Douala, Cameroon	Tel. +237 33 431137 Fax +237 33 431137 electrojemba@yahoo.fr
Canada			
Assembly plants **Sales** **Service**	**Toronto**	SEW-EURODRIVE CO. OF CANADA LTD. 210 Walker Drive Bramalea, ON L6T 3W1	Tel. +1 905 791-1553 Fax +1 905 791-2999 http://www.sew-eurodrive.ca l.watson@sew-eurodrive.ca
	Vancouver	SEW-EURODRIVE CO. OF CANADA LTD. Tilbury Industrial Park 7188 Honeyman Street Delta, BC V4G 1G1	Tel. +1 604 946-5535 Fax +1 604 946-2513 b.wake@sew-eurodrive.ca
	Montreal	SEW-EURODRIVE CO. OF CANADA LTD. 2555 Rue Leger Lasalle, PQ H8N 2V9	Tel. +1 514 367-1124 Fax +1 514 367-3677 a.peluso@sew-eurodrive.ca
	Please contact us for more addresses of service centers in Canada.		
Chile			
Assembly plant **Sales** **Service**	**Santiago de Chile**	SEW-EURODRIVE CHILE LTDA. Las Encinas 1295 Parque Industrial Valle Grande LAMPA RCH-Santiago de Chile P.O. box address Casilla 23 Correo Quilicura - Santiago - Chile	Tel. +56 2 75770-00 Fax +56 2 75770-01 http://www.sew-eurodrive.cl ventas@sew-eurodrive.cl
China			
Production plant **Assembly plant** **Sales** **Service**	**Tianjin**	SEW-EURODRIVE (Tianjin) Co., Ltd. No. 46, 7th Avenue, TEDA Tianjin 300457	Tel. +86 22 25322612 Fax +86 22 25323273 info@sew-eurodrive.cn http://www.sew-eurodrive.cn
Assembly plant **Sales** **Service**	**Suzhou**	SEW-EURODRIVE (Suzhou) Co., Ltd. 333, Suhong Middle Road Suzhou Industrial Park Jiangsu Province, 215021	Tel. +86 51262581781 Fax +86 512 62581783 suzhou@sew-eurodrive.cn
	Guangzhou	SEW-EURODRIVE (Guangzhou) Co., Ltd. No. 9, JunDa Road East Section of GETDD Guangzhou 510530, China	Tel. +86 20 82267890 Fax +86 20 82267922 guangzhou@sew-eurodrive.cn
	Shenyang	SEW-EURODRIVE (Shenyang) Co., Ltd. 10A-2, 6th Road Shenyang Economic Technological Develop-ment Area Shenyang, 110141, China	Tel. +86 24 25382538 Fax +86 24 25382580 shenyang@sew-eurodrive.cn
	Wuhan	SEW-EURODRIVE (Wuhan) Co., Ltd. 10A-2, 6th Road No. 59, the 4th Quanli Road, WEDA 430056 Wuhan, China	Tel. +86 27 84478388 Fax +86 27 84478389 wuhan@sew-eurodrive.cn

China			
	Xi'An	SEW-EURODRIVE (Xi'An) Co., Ltd. No. 12 Jinye 2nd Road Xi'An High-Technology Industrial Development Zone Xi'An 710065	Tel. +86 29 68686262 Fax +86 29 68686311 xian@sew-eurodrive.cn
Colombia			
Assembly plant Sales Service	**Bogota**	SEW-EURODRIVE COLOMBIA LTDA. Calle 22 No. 132-60 Bodega 6, Manzana B Santafé de Bogotá, Colombia	Tel. +57 1 54750-50 Fax +57 1 54750-44 http://www.sew-eurodrive.com.co sew@sew-eurodrive.com.co
Côte d'Ivoire			
Sales	**Abidjan**	SICA Société Industrielle & Commerciale pour l'Afrique 165, Boulevard de Marseille 26 BP 1173 Abidjan 26	Tel. +225 21 25 79 44 Fax +225 21 25 88 28 sicamot@aviso.ci
Croatia			
Sales Service	**Zagreb**	KOMPEKS d. o. o. Zeleni dol 10 10 000 Zagreb, Croatia	Tel. +385 1 4613-158 Fax +385 1 4613-158 kompeks@inet.hr
Czech Republic			
Sales Assembly plant Service	**Hostivice**	SEW-EURODRIVE CZ S.R.O. Floriánova 2459 253 01 Hostivice	Tel. +420 255 709 601 Fax +420 235 350 613 http://www.sew-eurodrive.cz sew@sew-eurodrive.cz
	Drive Service Hotline/24-hour availability	HOTLINE: +420 800 739 739 (800 SEW SEW)	**Service:** Tel. +420 255 709 632 Fax +420 235 358 218 servis@sew-eurodrive.cz
Assembly plant Service	**Plzeň**	SEW-EURODRIVE CZ S.R.O. Areal KRPA a.s. Zahradni 173/2 326 00 Plzeň	Tel. +420 378 775 320 Fax +420 377 970 710 sew@sew-eurodrive.cz
Technical offices	**Brno**	SEW-EURODRIVE CZ S.R.O. Křenová 52 60200 Brno	Tel. +420 543 254 174 Fax +420 543 256 845 radek.chmela@sew-eurodrive.cz
	Hradec Králové	SEW-EURODRIVE CZ S.R.O. Čechova 498 50202 Hradec Králové	Tel. +420 495 510 141 Fax +420 495 521 313 miroslav.moravec@sew-eurodrive.cz
	Ostrava	SEW-EURODRIVE CZ S.R.O. Studentská 6202/17 708 00 Ostrava-Poruba	Tel. +420 597 329 044 david.kenkus@sew-eurodrive.cz
	Klatovy	SEW-EURODRIVE CZ S.R.O. Vídeňská 841 33901 Klatovy	Tel. +420 376 331 634 Fax +420 376 331 634 viktor.kubernat@sew-eurodrive.cz
Service	**Horní Moštěnice**	SEW-EURODRIVE CZ S.R.O. Nám.Dr.M.Tyrše 14/64 751 17 Horní Moštěnice	Tel. +420 581 224 374 Fax +420 581 224 374 servis@sew-eurodrive.cz
Denmark			
Assembly plant Sales Service	**Copenhagen**	SEW-EURODRIVE A/S Geminivej 28-30 2670 Greve, Denmark	Tel. +45 43 9585-00 Fax +45 43 9585-09 http://www.sew-eurodrive.dk sew@sew-eurodrive.dk
Egypt			
Sales Service	**Cairo**	Copam Egypt for Engineering & Agencies 33 El Hegaz ST, Heliopolis, Cairo, Egypt	Tel. +20 2 22566-299 +1 23143088 Fax +20 2 22594-757 http://www.copam-egypt.com/ copam@datum.com.eg
Estonia			
Sales	**Tallinn**	ALAS-KUUL AS Reti tee 4 EE-75301 Peetri küla, Rae vald, Harjumaa, Estonia	Tel. +372 6593230 Fax +372 6593231 veiko.soots@alas-kuul.ee

Finland			
Assembly plant **Sales** **Service**	**Hollola**	SEW-EURODRIVE OY Vesimäentie 4 15860 Hollola 2, Finland	Tel. +358 201 589-300 Fax +358 3 780-6211 http://www.sew-eurodrive.fi sew@sew.fi
Service	**Hollola**	SEW-EURODRIVE OY Keskikankaantie 21 FIN-15860 Hollola	Tel. +358 201 589-300 Fax +358 3 780-6211 http://www.sew-eurodrive.fi sew@sew.fi
Technical offices	**Helsinki**	SEW-EURODRIVE OY Luutnantintie 5 00410 Helsinki, Finland	Tel. +358 201 589-300 sew@sew.fi
	Vaasa	SEW-EURODRIVE OY Asemakatu 7 65100 Vaasa, Finland	Tel. +358 201 589-300 sew@sew.fi
	Kuopio	SEW-EURODRIVE OY Viestikatu 3 70600 Kuopio, Finland	Tel. +358 201 589-300 sew@sew.fi
Production plant **Assembly plant**	**Karkkila**	SEW Industrial Gears Oy Valurinkatu 6, PL 8 FI-03600 Karkkila, 03601 Karkkila	Tel. +358 201 589-300 Fax +358 201 589-310 sew@sew.fi http://www.sew-eurodrive.fi
Gabon			
Sales	**Libreville, Gabon**	ESG Electro Services Gabun Feu Rouge Lalala 1889 Libreville Gabon	Tel. +241 741059 Fax +241 741059 esg_services@yahoo.fr
Greece			
Sales	**Athens**	Christ. Boznos & Son S.A. 12, K. Mavromichali Street P.O. Box 80136 GR-18545 Piraeus	Tel. +30 2 1042 251-34 Fax +30 2 1042 251-59 http://www.boznos.gr info@boznos.gr
Technical office	**Thessaloniki**	Christ. Boznos & Son S.A. Asklipiou 26 562 24 Evosmos, Thessaloniki, Greece	Tel. +30 2 310 7054-00 Fax +30 2 310 7055-15 info@boznos.gr
Great Britain			
Assembly plant **Sales** **Service**	**Normanton**	SEW-EURODRIVE Ltd. DeVilliers Way Trident Park Normanton West Yorkshire WF6 1GX	Tel. +44 1924 893-855 Fax +44 1924 893-702 http://www.sew-eurodrive.co.uk info@sew-eurodrive.co.uk
	Drive Service Hotline/24-hour availability		Tel. +44 1924 896911
Service Competence Centers	**Southern England**	SEW-EURODRIVE Ltd. Unit 41 Easter Park Benyon Road Silchester Reading Berkshire RG7 2PQ	Tel. +44 1189 701-699 Fax +44 1189 701-021
Technical offices	**Midlands**	SEW-EURODRIVE Ltd. 5 Sugar Brook Court Aston Road Bromsgrove Worcs. B60 3EX	Tel. +44 1527 877-319 Fax +44 1527 575-245
	Scotland	SEW-EURODRIVE Ltd. No 37 Enterprise House Springkerse Business Park Stirling FK7 7UF	Tel. +44 17 8647-8730 Fax +44 17 8645-0223

Hong Kong			
Assembly plant **Sales** **Service**	**Hong Kong**	SEW-EURODRIVE LTD. Unit No. 801-806, 8th Floor Hong Leong Industrial Complex No. 4, Wang Kwong Road Kowloon, Hong Kong	Tel. +852 36902200 Fax +852 36902211 contact@sew-eurodrive.hk
Hungary			
Sales **Service**	**Budapest**	SEW-EURODRIVE Kft. 1037 Budapest, Hungary Kunigunda u. 18	Tel. +36 1 437 06-58 Fax +36 1 437 06-50 http://www.sew-eurodrive.hu office@sew-eurodrive.hu
India			
Company office **Assembly plant** **Sales** **Service**	**Vadodara**	SEW-EURODRIVE India Private Limited Plot No. 4, GIDC POR Ramangamdi • Vadodara - 391 243, India Gujarat	Tel. +91 265 3045200, +91 265 2831086 Fax +91 265 3045300, +91 265 2831087 http://www.seweurodriveindia.com salesvadodara@seweurodriveindia.com
Assembly plant **Sales** **Service**	**Chennai**	SEW-EURODRIVE India Private Limited Plot No. K3/1, Sipcot Industrial Park Phase II Mambakkam Village Sriperumbudur - 602105 Kancheepuram Dist, Tamil Nadu	Tel. +91 44 37188888 Fax +91 44 37188811 saleschennai@seweurodriveindia.com
Technical offices	**Ahmedabad**	SEW-EURODRIVE India Private Limited 306, Shaan office complex, Behind Sakar-IV, Ellisebridge, Ashram Road Ahmedabad – Gujarat, India	Tel. +91 79 40072067/68 Fax +91 79 40072069 salesahmedabad@seweurodrivein- dia.com
	Aurangabad	SEW-EURODRIVE INDIA PRIVATE LIMITED	Tel. +91 86000 12333 salesaurangabad@seweurodrivein- dia.com
	Bangalore	SEW-EURODRIVE India Private Limited Sy.no:41-P3, Peenya1, Phase 1A, Peenya Vil- lage, Yeswanthapura Hobli, Bangalore North Taluk, Bangalore Dist, Karnataka	Tel. +91 80 22266565 Fax +91 80 22266569 salesbangalore@seweurodriveindia.com
		SEW-EURODRIVE India Private Limited # C-104, 3rd Block, KSSIDC Complex, Electronic City. Bangalore – 560100, Karnataka	Tel. +91 80 28522662 / 28522663 salesbangalore@seweurodriveindia.com
	Bangladesh	SEW-EURODRIVE INDIA PRIVATE LIMITED Genetic Udayanchal, House-96 (6th Floor), Road-23/A, Block-B, Banani, Dhaka-1213, Bangladesh	Mobile +88 01729 097309 salesdhaka@seweurodrive- bangladesh.com
	Bellary	SEW-EURODRIVE India Private Limited Door no-56/279 Ward No-16, Sindhigi com- pound, Near Raghavendra talkies, Bellary-583101 Karnataka	Tel. +91 77609 88668 salesbellary@seweurodriveindia.com
	Chandigarh	SEW-EURODRIVE India Private Limited # 72, Type- 4, Power Colony, Chandigarh - Rupnagar Highway Rupnagar- 140001, Punjab	Tel. +91 81462 67606 saleschandigarh@seweurodrivein- dia.com
	Chennai	SEW-EURODRIVE India Private Limited 2nd Floor, Josmans Complex, No. 5, McNichols Road, Chetpet Chennai - 600031 - Tamil Nadu, India	Tel. +91 44 42849813 Fax +91 44 42849816 saleschennai@seweurodriveindia.com
	Kochi	SEW-EURODRIVE India Private Limited CF7-(2), Block No 1, Vasanth Nagar, Opposite Jawahar Lal Nehru Stadium, Palarivattom – Cochin 682025	Tel. +91 98951 30375 salescochin@seweurodriveindia.com
	Coimbatore	SEW-EURODRIVE INDIA PRIVATE LIMITED 687/2, SRI SAKTHIVEL TOWERS (NEAR DEEPAM HOSPITAL) TRICHY ROAD, RAMANATHAPURAM COIMBATORE - 641 045.Tamilnadu, India	Tel. +91 422 2322420 Fax +91 422 2323988 salescoimbatore@seweurodrivein- dia.com

India			
	Cuttack	SEW-EURODRIVE India Private Limited Plot No. 1764, Nuasahi, Nayapalli Bhubaneswar-12 Orissa	Tel. +91 9937446333 salescuttack@seweurodriveindia.com
	Gandhidham	SEW-EURODRIVE India Private Limited TCX-S-28, FF, Ward 12/A, Gandhidham - Kutch - 370201	Tel. +91 81282 36850 salesgandhidham@seweurodrivein- dia.com
	Hyderabad	SEW-EURODRIVE India Private Limited 408, 4th Floor, Meridian Place Green Park Road Amerpeet Hyderabad - 500016 - Andhra Pradesh, India	Tel. +91 40 23414698 Fax +91 40 23413884 saleshyderabad@seweurodriveindia.com
	Jamshedpur	SEW-EURODRIVE India Private Limited Flat no.: S1 " Kashi Kunj",h. No. 60, New Rani Kudar Road No - 3 P.o. + P.s. - Kadma Jamshedpur - Pin - 831005 Jharkhand	Tel. +91 9934123671 salesjamshedpur@seweurodrivein- dia.com
	Kolhapur	SEW EURODRIVE India Private Limited	Tel. +91 86000 20846 saleskolhapur@seweurodriveindia.com
	Kolkata	SEW EURODRIVE India Private Limited 2nd floor, Room No. 35 Chowringhee Court 55, Chowringhee Road Kolkata - 700 071 - West Bengal, India	Tel. +91 33 22827457 Fax +91 33 22894204 saleskolkata@seweurodriveindia.com
	Lucknow	SEW-EURODRIVE India Private Limited 69, Shiv Vihar Colony Vikas Nagar-5 Lucknow 226022 - Uttar Pradesh	Tel. +91 9793627333 saleslucknow@seweurodriveindia.com
	Mumbai	SEW-EURODRIVE India Private Limited 312 A, 3rd Floor, Acme Plaza, J.B. Nagar, Andheri Kurla Road, Andheri (E) Mumbai - 400059 - Maharashtra, India	Tel. +91 22 28348440 Fax +91 22 28217858 salesmumbai@seweurodriveindia.com
	Nagpur	SEW-EURODRIVE India Private Limited Plot No 49, New Kailash Nager, Samta colony, Nagpur-440027	Tel. +91 95610 89525 salesnagpur@seweurodriveindia.com
	Nashik	SEW-EURODRIVE India Private Limited 107, "YOG" Bunglow, Mahatama Nagar, Trimbak Road, Nashik, Maharashtra – 422 007	Tel. +91 9665752978 salesnashik@seweurodriveindia.com
	New Delhi	SEW-EURODRIVE India Private Limited 1008, 10th Floor, 12th Level "Westend Mall" Tower Plot, District Centre Adjacent Hotel Hilton Janak Puri, New Delhi – 110058	Tel. +91 11 25544111 Fax +91 11 25544113 salesdelhi@seweurodriveindia.com
	Pune	SEW-EURODRIVE India Private Limited Jai Tulajabhavani Complex. Office No: 15 First Floor, Opp. Century Enka Company, MIDC Bhosari, Pune 411 026	Tel. +91 20-65118890 / 91 Fax +91 20 25380721 salespune@seweurodriveindia.com
		SEW-EURODRIVE India Private Limited LUNAWAT PRISM 4th Floor, S.No. 148 Opposite Wanaz Company, Besides Mega Mart At Neena Co-Operative Housing Society, Paud Road, Pune 411038 - Maharashtra, India	Tel. +91 20 25380730/735 Fax +91 20 25380721 salespune@seweurodriveindia.com praveen.hosur@seweurodriveindia.com
	Raipur	SEW-EURODRIVE India Private Limited A-42, Ashoka Millenium Complex, Ring Road-1, Raipur 492 001 - Chhattisgarh, India	Tel. +91 771 4090765 Fax +91 771 4090765 salesraipur@seweurodriveindia.com
	Ranchi	SEW-EURODRIVE India Private Limited Flat No.: A - 101, Krishna Shree Apartment, Anantpur, P.O. Doranda – Ranchi 834002	Tel. +91 8294630772 salesranchi@seweurodriveindia.com

India			
	Tiruchirappalli	SEW-EURODRIVE India Private Limited A-106,Trichy Towers, Chandrasekarapuram, Salai Road, Trichy – 620018.	Mobile +91 95009 88081 salestrichy@seweurodriveindia.com
	Vadodara	SEW-EURODRIVE India Private Limited Unit No. 301, Savorite Bldg, Plot No. 143, Vinayak Society, off old Padra Road, Vadodara - 390 007. Gujarat	Tel. +91 265 2325258 Fax +91 265 2325259 salesvadodara@seweurodriveindia.com
	Vijayawada	SEW-EURODRIVE India Private Limited Door No:40-5/3-10A, Syam Nagar, NGO's Colony, Tikkle Road, Vijayawada-520010	Tel. +91 99895 01748 Fax +91 8662475157 Mobile +91 9989501748 salesvijayawada@seweurodrivein-dia.com
Indonesia			
Sales	**Jakarta**	PT. Cahaya Sukses Abadi Komplek Rukan Puri Mutiara Blok A no 99, Sunter Jakarta 14350, Indonesia	Tel. +62 21 65310599 Fax +62 21 65310600 csajkt@cbn.net.id
		PT. Agrindo Putra Lestari Jl.Prof.DR.Latumenten no27/A Jakarta 11330	Tel. +62 21 63855588 Fax +62 21 63853789 aplindo@indosat.net.id
	Medan	PT. Serumpun Indah Lestari Pulau Solor no. 8, Kawasan Industri Medan II Medan 20252	Tel. +62 61 687 1221 Fax +62 61 6871429 / +62 61 6871458 / +62 61 30008041 sil@serumpunindah.com serumpunindah@yahoo.com
	Surabaya	PT. TRIAGRI JAYA ABADI Jl. Sukosemolo No. 63, Galaxi Bumi Permai G6 No. 11 Surabaya 60122	Tel. +62 31 5990128 Fax +62 31 5962666 triagri@indosat.net.id
		CV. Multi Mas Jl. Raden Saleh 43A Kav. 18 Surabaya 60174	Tel. +62 31 5458589 / +62 31 5317224 Fax +62 31 5317220 / +62 31 5994629 sianhwa@sby.centrin.net.id
Ireland			
Sales **Service**	**Dublin**	Alperton Engineering Ltd. 48 Moyle Road Dublin Industrial Estate Glasnevin, Dublin 11, Ireland	Tel. +353 1 830-6277 Fax +353 1 830-6458 info@alperton.ie http://www.alperton.ie
Iceland			
Sales	**Reykjavik**	VARMA & VELAVERK EHF Dalshrauni 5 IS-220 Hafnarjördur	Tel. +354 585 1070 Fax +354 585 1071 varmaverk@varmaverk.is http://www.varmaverk.is
Israel			
Sales	**Tel Aviv**	Liraz Handasa Ltd. Ahofer Str 34B / 228 58858 Holon, Israel	Tel. +972 3 5599511 Fax +972 3 5599512 http://www.liraz-handasa.co.il office@liraz-handasa.co.il
Italy			
Assembly plant **Sales** **Service**	**Solaro**	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Via Bernini,14 I-20020 Solaro (Milano), Italy	Tel. +39 02 96 9801 Fax +39 02 96 980 999 http://www.sew-eurodrive.it sewit@sew-eurodrive.it
Technical offices	**Bologna**	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Via della Grafica, 47 40064 Ozzano dell'Emilia (Bo), Italy	Tel. +39 051 65-23-801 Fax +39 02 96 980 499
	Caserta	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Viale Carlo III Km. 23,300 81020 S. Nicola la Strada (Caserta), Italy	Tel. +39 0823 219011 Fax +39 02 96 980 599
	Milan	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Via Bernini,14 I-20020 Solaro (Milano), Italy	Tel. +39 02 96 980229 Fax +39 02 96 980 999

Italy			
	Pescara	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Viale Europa,132 I-65010 Villa Raspa di Spoltore (PE)	Tel. +39 085 41-59-427 Fax +39 02 96 980 699
	Turin	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Filiale Torino c.so Unione Sovietica 612/15 - int. C 10135 Torino, Italy	Tel. +39 011 3473780 Fax +39 02 96 980 799
	Verona	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Via Antonio Meucci 5, I-37042 - Caldiero (VR)	Tel. +39 045 89-239-11 Fax +39 02 96 980 814
Japan			
Assembly plant Sales Service	**Iwata**	SEW-EURODRIVE JAPAN CO., LTD 250-1, Shimoman-no, Iwata Shizuoka 438-0818	Tel. +81 538 373811 Fax +81 538 373855 http://www.sew-eurodrive.co.jp sewjapan@sew-eurodrive.co.jp
Technical offices	**Fukuoka**	SEW-EURODRIVE JAPAN CO., LTD. C-go, 5th-floor, Yakuin-Hiruzu-Bldg. 1-5-11, Yakuin, Chuo-ku Fukuoka, 810-0022, Japan	Tel. +81 92 713-6955 Fax +81 92 713-6860 sewkyushu@jasmine.ocn.ne.jp
	Osaka	SEW-EURODRIVE JAPAN CO., LTD. Higobashi Shimizu Bldg. 10th floor 1-3-7 Tosabori, Nishi-ku Osaka, 550-0001, Japan	Tel. +81 6 6444--8330 Fax +81 6 6444--8338 sewosaka@crocus.ocn.ne.jp
	Tokyo	SEW-EURODRIVE JAPAN CO., LTD. Omarimon Yusen Bldg. 13th floor 3-23-5 Nishinbashi, Minato-ku Tokyo 105-0003, Japan	Tel. +81 3 3239-0469 Fax +81 3 3239-0943 sewtokyo@basil.ocn.ne.jp
Kazakhstan			
Sales	**Almaty**	ТОО "СЕВ-ЕВРОДРАЙВ" пр.Райымбека, 348 050061 г. Алматы Республика Казахстан	Тел. +7 (727) 334 1880 Факс +7 (727) 334 1881 http://www.sew-eurodrive.kz sew@sew-eurodrive.kz
Kenya			
Sales	**Nairobi**	Barico Maintenances Ltd Kamutaga Place Commercial Street Industrial Area P.O.BOX 52217 - 00200 Nairobi	Tel. +254 20 6537094/5 Fax +254 20 6537096 info@barico.co.ke
Latvia			
Sales	**Riga**	SIA Alas-Kuul Katlakalna 11C 1073 Riga, Latvia	Tel. +371 6 7139253 Fax +371 6 7139386 http://www.alas-kuul.com info@alas-kuul.com
Lebanon			
Sales Lebanon	**Beirut**	Gabriel Acar & Fils sarl B. P. 80484 Bourj Hammoud, Beirut, Lebanon	Tel. +961 1 510 532 Fax +961 1 494 971 ssacar@inco.com.lb
		After Sales Service	service@medrives.com
Sales Jordan / Kuwait / Saudi Arabia / Syria	**Beirut**	Middle East Drives S.A.L. (offshore) Sin El Fil. B. P. 55-378 Beirut	Tel. +961 1 494 786 Fax +961 1 494 971 info@medrives.com http://www.medrives.com
		After Sales Service	service@medrives.com
Lithuania			
Sales	**Alytus**	UAB Irseva Statybininku 106C LT-63431 Alytus	Tel. +370 315 79204 Fax +370 315 56175 irmantas@irseva.lt http://www.sew-eurodrive.lt
Luxembourg			
Assembly plant Sales Service	**Brussels**	**SEW-EURODRIVE n.v./s.a.** Researchpark Haasrode 1060 Evenementenlaan 7 BE-3001 Leuven	Tel. +32 16 386-311 Fax +32 16 386-336 http://www.sew-eurodrive.lu info@sew-eurodrive.be

Madagascar			
Sales	**Antananarivo**	Ocean Trade BP21bis. Andraharo Antananarivo. 101 Madagascar	Tel. +261 20 2330303 Fax +261 20 2330330 oceantrabp@moov.mg
Malaysia			
Assembly plant **Sales** **Service**	**Johor**	SEW-EURODRIVE SDN BHD No. 95, Jalan Seroja 39, Taman Johor Jaya 81000 Johor Bahru, Johor West Malaysia	Tel. +60 7 3549409 Fax +60 7 3541404 sales@sew-eurodrive.com.my
Technical offices	**Kuala Lumpur**	SEW-EURODRIVE Sdn. Bhd. No. 2, Jalan Anggerik Mokara 31/46 Kota Kemuning Seksyen 31 40460 Shah Alam Selangor Darul Ehsan	Tel. +60 3 51229633 Fax +60 3 51229622 sewsa@sew-eurodrive.com.my
	Kuching	SEW-EURODRIVE Sdn. Bhd. Lot 268, Section 9 KTLD Lorong 9, Jalan Satok 93400 Kuching, Sarawak East Malaysia	Tel. +60 82 232380 Fax +60 82 242380
	Penang	SEW-EURODRIVE Sdn. Bhd. No. 38, Jalan Bawal Kimsar Garden 13700 Prai, Penang	Tel. +60 4 3999349 Fax +60 4 3999348 sewpg@sew-eurodrive.com.my
Morocco			
Sales **Service**	**Mohammedia**	SEW-EURODRIVE SARL 2 bis, Rue Al Jahid 28810 Mohammedia	Tel. +212 523 32 27 80/81 Fax +212 523 32 27 89 sew@sew-eurodrive.ma http://www.sew-eurodrive.ma
Mauritania			
Sales	**Zouérat**	AFRICOM - SARL En Face Marché Dumez P.B. 88 Zouérate	Tel. +222 45 44 50 19 Fax +222 45 44 03 14 contact@africom-sarl.com
Macedonia			
Sales	**Skopje**	Boznos DOOEL Dime Anicin 2A/7A 1000 Skopje	Tel. +389 23256553 Fax +389 23256554 http://www.boznos.mk
Mexico			
Assembly plant **Sales** **Service**	**Quéretaro**	SEW-EURODRIVE MEXICO SA DE CV SEM-981118-M93 Tequisquiapan No. 102 Parque Industrial Quéretaro C.P. 76220 Quéretaro, Mexico	Tel. +52 442 1030-300 Fax +52 442 1030-301 http://www.sew-eurodrive.com.mx scmexico@seweurodrive.com.mx
Mongolia			
Sales	**Ulan Bator**	SEW-EURODRIVE Representative Office Mongolia Olympic street 8, 2nd floor Juulchin corp bldg., Sukhbaatar district, Ulaanbaatar 14253	Tel. +976-70009997 Fax +976-70009997 http://www.sew-eurodrive.mn sew@sew-eurodrive.mn
Namibia			
Sales	**Swakopmund**	DB Mining & Industrial Services Einstein Street Strauss Industrial Park Unit1 Swakopmund	Tel. +264 64 462 738 Fax +264 64 462 734 sales@dbmining.in.na
New Zealand			
Assembly plants **Sales** **Service**	**Auckland**	SEW-EURODRIVE NEW ZEALAND LTD. P.O. Box 58-428 82 Greenmount Drive East Tamaki Auckland, New Zealand	Tel. +64 9 2745627 Fax +64 9 2740165 http://www.sew-eurodrive.co.nz sales@sew-eurodrive.co.nz
	Christchurch, New Zealand	SEW-EURODRIVE NEW ZEALAND LTD. 10 Settlers Crescent, Ferrymead Christchurch, New Zealand	Tel. +64 3 384-6251 Fax +64 3 384-6455 sales@sew-eurodrive.co.nz

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New Zealand			
Technical offices	**Palmerston North**	SEW-EURODRIVE NEW ZEALAND LTD. C/-Grant Shearman, RD 5, Aronui Road Palmerston North	Tel. +64 6 355-2165 Fax +64 6 355-2316 sales@sew-eurodrive.co.nz
Netherlands			
Assembly plant **Sales** **Service**	**Rotterdam**	SEW-EURODRIVE B.V. Industrieweg 175 3044 AS Rotterdam, Netherlands Postbus 10085 3004 AB Rotterdam, Netherlands	Tel. +31 10 4463-700 Fax +31 10 4155-552 Service: 0800-SEWHELP http://www.sew-eurodrive.nl info@sew-eurodrive.nl
Nigeria			
Sales	**Lagos**	EISNL Engineering Solutions and Drives Ltd Plot 9, Block A, Ikeja Industrial Estate (Ogba Scheme) Adeniyi Jones St. End Off ACME Road, Ogba, Ikeja, Lagos Nigeria	Tel. +234 1 217 4332 team.sew@eisnl.com http://www.eisnl.com
Norway			
Assembly plant **Sales** **Service**	**Moss**	SEW-EURODRIVE A/S Solgaard skog 71 1599 Moss, Norway	Tel. +47 69 24 10 20 Fax +47 69 24 10 40 http://www.sew-eurodrive.no sew@sew-eurodrive.no
Pakistan			
Sales	**Karatschi**	Industrial Power Drives Al-Fatah Chamber A/3, 1st Floor Central Commercial Area, Sultan Ahmed Shah Road, Block 7/8, Karachi	Tel. +92 21 452 9369 Fax +92-21-454 7365 seweurodrive@cyber.net.pk
Paraguay			
Sales	**Fernando de la Mora**	SEW-EURODRIVE PARAGUAY S.R.L De la Victoria 112, Esquina nueva Asunción Departamento Central Fernando de la Mora, Barrio Bernardino	Tel. +595 991 519695 Fax +595 21 3285539 sew-py@sew-eurodrive.com.py
Peru			
Assembly plant **Sales** **Service**	**Lima**	SEW DEL PERU MOTORES REDUCTORES S.A.C. Los Calderos, 120-124 Urbanizacion Industrial Vulcano, ATE, Lima, Peru	Tel. +51 1 3495280 Fax +51 1 3493002 http://www.sew-eurodrive.com.pe sewperu@sew-eurodrive.com.pe
Philippines			
Sales	**Luzon**	Totaltech Corporation 5081-B C&L Mansion Filmore Ave. Cor. Fahrenheit St. 1235 Makati City	Tel. +63 2 551-9265 / +63 2 551-9271 / +63 2 551-9378 Fax +63 2 551-9273 totaltech89@gmail.com
	All Areas	P.T. Cerna Corporation 4137 Ponte St., Brgy. Santa Cruz, Makati City 1205	Tel. +63 2 519 6214 Fax +63 2 890 2802 mech_drive_sys@ptcerna.com
Poland			
Assembly plant **Sales** **Service**	**Łódź**	SEW-EURODRIVE Polska Sp.z.o.o. ul. Techniczna 5 92-518 Łódź, Poland	Tel. +48 42 676 53 00 Fax +48 42 676 53 49 http://www.sew-eurodrive.pl sew@sew-eurodrive.pl
	Service	Tel. +48 42 6765332 / 42 6765343 Fax +48 42 6765346	Linia serwisowa 24 hour hotline Tel. +48 602 739 739 (+48 602 SEW SEW) serwis@sew-eurodrive.pl
Technical office	**Tychy**	SEW-EURODRIVE Polska Sp.z.o.o. ul. Strzelecka 66 PL-43-109 Tychy	Tel. +48 32 32 32 610 Fax +48 32 32 32 648
	Bydgoszcz	SEW-EURODRIVE Polska Sp.z.o.o. ul. Fordońska 246 PL-85-959 Bydgoszcz	Tel. +48 52 3606590 Fax +48 52 3606591
	Gdansk	SEW-EURODRIVE Polska Sp.z.o.o. ul. Galaktyczna 30A PL-80-299 Gdańsk	Tel. +48 58 762 70 00 Fax +48 58 762 70 09

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Poland			
	Poznan	SEW-EURODRIVE Polska Sp.z.o.o. ul. Romana Maya 1 61-371 Poznań, Poland	Tel. +48 61 6465500 Fax +48 61 6465519
	Radom	SEW-EURODRIVE Polska Sp.z.o.o. ul. Słowackiego 84 26-600 Radom, Poland	Tel. +48 48 365 40 50 Fax +48 48 365 40 52
Portugal			
Assembly plant Sales Service	**Coimbra**	SEW-EURODRIVE, LDA. Apartado 15 3050-901 Mealhada, Portugal	Tel. +351 231 20 9670 Fax +351 231 20 3685 http://www.sew-eurodrive.pt infosew@sew-eurodrive.pt
Service Competence Centers	**Lisbon**	SEW-EURODRIVE, LDA. Núcleo Empresarial I de São Julião do Tojal Rua de Entremuros, 54 Fracção I 2660-533 São Julião do Tojal, Portugal	Tel. +351 21 958-0198 Fax +351 21 958-0245 esc.lisboa@sew-eurodrive.pt
Technical office	**Porto**	SEW-EURODRIVE, LDA. Av. 25 de Abril, 68 4440-502 Valongo, Portugal	Tel. +351 229 350 383 Fax +351 229 350 384 Tel. +351 9 32559110 esc.porto@sew-eurodrive.pt
Romania			
Sales Service	**Bucharest**	Sialco Trading SRL str. Brazilia nr. 36 011783 Bucuresti, Romania	Tel. +40 21 230-1328 Fax +40 21 230-7170 sialco@sialco.ro
Russia			
Assembly plant Sales Service	**St. Petersburg**	ZAO SEW-EURODRIVE P.O. Box 36 RUS-195220 St. Petersburg	Tel. +7 812 3332522 +7 812 5357142 Fax +7 812 3332523 http://www.sew-eurodrive.ru sew@sew-eurodrive.ru
Technical office	**Ekaterinburg**	ZAO SEW-EURODRIVE Kominterna Str. 16 Office 614 620078 Ekaterinburg, Russia	Tel. +7 343 310 3977 Fax +7 343 310 3978 eso@sew-eurodrive.ru
	Irkutsk	ZAO SEW-EURODRIVE 5-Armii Str., 31 664011 Irkutsk, Russia	Tel. +7 3952 25 5880 Fax +7 3952 25 5881 iso@sew-eurodrive.ru
	Moscow	ZAO SEW-EURODRIVE Malaja Semjonowskaja Str. д. 9, корпус 2 107023 Moscow	Tel. +7 495 9337090 Fax +7 495 9337094 mso@sew-eurodrive.ru
	Novosibirsk	ZAO SEW-EURODRIVE pr. K Marksa 30 630087 Novosibirsk, Russia	Tel. +7 383 3350200 Fax +7 383 3462544 nso@sew-eurodrive.ru
	Perm	ZAO SEW-EURODRIVE Stakhanovskaya str., 45 Office 512 RUS-614066 Perm	Tel. +7 342 2219494 Fax +7 342 2219444 pso@sew-eurodrive.ru
	Togliatti	ZAO SEW-EURODRIVE Sportivnaya Str. 4B, office 2 Samarskaya obl. 445057 Togliatti, Russia	Tel. +7 8482 710529 Fax +7 8482 810590
Senegal			
Sales	**Dakar**	SENEMECA Mécanique Générale Km 8, Route de Rufisque B.P. 3251, Dakar	Tel. +221 338 494 770 Fax +221 338 494 771 senemeca@sentoo.sn http://www.senemeca.com
Serbia			
Sales	**Belgrade**	DIPAR d.o.o. Ustanicka 128a PC Košum, IV sprat SRB-11000 Beograd, Serbia	Tel. +381 11 347 3244 / +381 11 288 0393 Fax +381 11 347 1337 office@dipar.rs
Singapore			
Assembly plant Sales Service	**Singapore**	SEW-EURODRIVE PTE. LTD. No 9, Tuas Drive 2 Jurong Industrial Estate Singapore 638644	Tel. +65 68621701 Fax +65 68612827 http://www.sew-eurodrive.com.sg sewsingapore@sew-eurodrive.com

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Slovakia			
Sales	**Bratislava**	SEW-EURODRIVE SK s.r.o. Rybničná 40 831 06 Bratislava, Slovakia	Tel. +421 2 33595 202 Fax +421 2 33595 200 sew@sew-eurodrive.sk http://www.sew-eurodrive.sk
	Žilina	SEW-EURODRIVE SK s.r.o. Industry Park - PChZ ulica M.R.Štefánika 71 010 01 Žilina, Slovakia	Tel. +421 41 700 2513 Fax +421 41 700 2514 sew@sew-eurodrive.sk
	Banska Bystrica	SEW-EURODRIVE SK s.r.o. Rudlovská cesta 85 974 11 Banská Bystrica, Slovakia	Tel. +421 48 414 6564 Fax +421 48 414 6566 sew@sew-eurodrive.sk
	Košice	SEW-EURODRIVE SK s.r.o. Slovenská ulica 26 040 01 Košice, Slovakia	Tel. +421 55 671 2245 Fax +421 55 671 2254 sew@sew-eurodrive.sk
Slovenia			
Sales **Service**	**Celje**	Pakman - Pogonska Tehnika d.o.o. UI. XIV. divizije 14 3000 Celje, Slovenia	Tel. +386 3 490 83-20 Fax +386 3 490 83-21 pakman@siol.net
Spain			
Assembly plant **Sales** **Service**	**Bilbao**	SEW-EURODRIVE ESPAÑA, S.L. Parque Tecnológico, Edificio, 302 48170 Zamudio (Vizcaya), Spain	Tel. +34 94 43184-70 Fax +34 94 43184-71 http://www.sew-eurodrive.es sew.spain@sew-eurodrive.es
Technical offices	**Barcelona**	Delegación Barcelona Avda. Francesc Macià, 60 – Planta 16, porta 1 Eix Macià – "Torre Milenium" 08208 Sabadell (Barcelona), Spain	Tel. +34 93 7162200 Fax +34 93 7233007
	Madrid	Delegación Madrid Gran Via. 48-2° A-D 28220 Majadahonda (Madrid), Spain	Tel. +34 91 6342250 Fax +34 91 6340899
	Sevilla	MEB Pólogono Calonge, C/A Nave 2 - C E-41.077 Sevilla, Spain	Tel. +34 954 356 361 Fax +34 954 356 274 mebsa.sevilla@mebsa.com
	Valencia	MEB Músico Andreu i Piqueres, 4 E-46.900 Torrente (Valencia)	Tel. +34 961 565 493 Fax +34 961 566 688 mebsa.valencia@mebsa.com
Sri Lanka			
Sales	**Colombo**	SM International (Pte) Ltd 254, Galle Raod Colombo 4, Sri Lanka	Tel. +94 1 2584887 Fax +94 1 2582981
South Africa			
Assembly plants **Sales** **Service**	**Johannesburg**	SEW-EURODRIVE (PROPRIETARY) LIMITED Eurodrive House Cnr. Adcock Ingram and Aerodrome Roads Aeroton Ext. 2 Johannesburg 2013, South Africa P.O.Box 90004 Bertsham 2013, South Africa	Tel. +27 11 248-7000 Fax +27 11 494-3104 http://www.sew.co.za info@sew.co.za
	Cape Town	SEW-EURODRIVE (PROPRIETARY) LIMITED Rainbow Park Cnr. Racecourse & Omuramba Road Montague Gardens Cape Town, South Africa P.O. Box 36556 Chempet 7442 Cape Town, South Africa	Tel. +27 21 552-9820 Fax +27 21 552-9830 Telex 576 062 bgriffiths@sew.co.za
	Durban, South Africa	SEW-EURODRIVE (PROPRIETARY) LIMITED 48 Prospecton Road Isipingo Durban, South Africa P.O. Box 10433, Ashwood 3605, South Africa	Tel. +27 31 902 3815 Fax +27 31 902 3826 cdejager@sew.co.za
	Nelspruit	SEW-EURODRIVE (PTY) LTD. 7 Christie Crescent Vintonia P.O. Box 1942 Nelspruit 1200	Tel. +27 13 752-8007 Fax +27 13 752-8008 robermeyer@sew.co.za

South Africa			
Technical offices	**Port Elizabeth**	SEW-EURODRIVE PTY LTD. 8 Ruan Access Park Old Cape Road Greenbushes 6000 Port Elizabeth	Tel. +27 41 3722246 Fax +27 41 3722247 dtait@sew.co.za
South Korea			
Assembly plant **Sales** **Service**	**Ansan**	SEW-EURODRIVE KOREA CO., LTD. B 601-4, Banweol Industrial Estate #1048-4, Shingil-Dong, Danwon-Gu, Ansan-City, Kyunggi-Do Zip 425-839	Tel. +82 31 492-8051 Fax +82 31 492-8056 http://www.sew-korea.co.kr master.korea@sew-eurodrive.com
	Busan	SEW-EURODRIVE KOREA Co., Ltd. No. 1720 - 11, Songjeong - dong Gangseo-ku Busan 618-270, Korea	Tel. +82 51 832-0204 Fax +82 51 832-0230 master@sew-korea.co.kr
Technical offices	**Daegu**	SEW-EURODRIVE KOREA Co., Ltd. No.1108 Sungan officetel 87-36, Duryu 2-dong, Dalseo-ku Daegu 704-712	Tel. +82 53 650-7111 Fax +82 53 650-7112
	Daejeon	SEW-EURODRIVE KOREA Co., Ltd. No. 1502, Hongin officetel 536-9, Bongmyung-dong, Yusung-ku Daejeon 305-301	Tel. +82 42 828-6461 Fax +82 42 828-6463
	Gwangju	SEW-EURODRIVE KOREA Co., Ltd. 4fl., Dae-Myeong B/D 96-16 Unam-dong, Buk-ku Kwangju 500-170	Tel. +82 62 511-9172 Fax +82 62 511-9174
	Seoul	SEW-EURODRIVE KOREA Co., Ltd. No.504 Sunkyung officetel 106-4 Kuro 6-dong, Kuro-ku Seoul 152-054, Korea	Tel. +82 2 862-8051 Fax +82 2 862-8199
Swaziland			
Sales	**Manzini**	C G Trading Co. (Pty) Ltd PO Box 2960 Manzini M200	Tel. +268 2 518 6343 Fax +268 2 518 5033 engineering@cgtrading.co.sz
Sweden			
Assembly plant **Sales** **Service**	**Jönköping**	SEW-EURODRIVE AB Gnejsvägen 6-8 55303 Jönköping, Sweden Box 3100 S-55003 Jönköping	Tel. +46 36 3442 00 Fax +46 36 3442 80 http://www.sew-eurodrive.se jonkoping@sew.se
Sales	**Göteborg**	SEW-EURODRIVE AB Gustaf Werners gata 8 42132 Västra Frölunda, Sweden	Tel. +46 31 70968 80 Fax +46 31 70968 93 goteborg@sew.se
	Stockholm	SEW-EURODRIVE AB Björkholmsvägen 10 14146 Huddinge, Sweden	Tel. +46 8 44986 80 Fax +46 8 44986 93 stockholm@sew.se
	Malmö	SEW-EURODRIVE AB Borrgatan 5 21124 Malmö, Sweden	Tel. +46 40 68064 80 Fax +46 40 68064 93 malmo@sew.se
	Skellefteå	SEW-EURODRIVE AB Trädgårdsgatan 8 93131 Skellefteå, Sweden	Tel. +46 910 7153 80 Fax +46 910 7153 93 skelleftea@sew.se
Switzerland			
Assembly plant **Sales** **Service**	**Basel**	Alfred lmhof A.G. Jurastrasse 10 CH-4142 Münchenstein bei Basel	Tel. +41 61 417 1717 Fax +41 61 417 1700 http://www.imhof-sew.ch info@imhof-sew.ch
Technical offices	**Romandy**	André Gerber Es Perreyres 1436 Chamblon, Switzerland	Tel. +41 24 445 3850 Fax +41 24 445 4887
	Bern / Solothurn	Rudolf Bühler Muntersweg 5 2540 Grenchen, Switzerland	Tel. +41 32 652 2339 Fax +41 32 652 2331
	Central Switzer-land, Aargau	Armin Pfister Stierenweid 4950 Huttwil, BE, Switzerland	Tel. +41 62 962 54 55 Fax +41 62 962 54 56

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Switzerland			
	Zurich, Tessin	Gian-Michele Muletta Fischerstrasse 61 8132 Egg bei Zürich, Switzerland	Tel. +41 44 994 81 15 Fax +41 44 994 81 16
	Lake Constance and Eastern Switzerland	Markus Künzle Eichweg 4 9403 Goldach, Switzerland	Tel. +41 71 845 2808 Fax +41 71 845 2809
Taiwan (R.O.C.)			
Sales	**Nan Tou**	Ting Shou Trading Co., Ltd. No. 55 Kung Yeh N. Road Industrial District Nan Tou 540	Tel. +886 49 255353 Fax +886 49 257878
	Taipei	Ting Shou Trading Co., Ltd. 6F-3, No. 267, Sec. 2 Tung Hwa South Road, Taipei, Taiwan	Tel. +886 2 27383535 Fax +886 2 27368268 Telex 27 245 sewtwn@ms63.hinet.net
Tanzania			
Sales	**Dar es Salaam**	SEW-EURODRIVE PTY LIMITED TANZANIA Plot 52, Regent Estate PO Box 106274 Dar Es Salaam	Tel. +255 0 22 277 5780 Fax +255 0 22 277 5788 uroos@sew.co.tz
Thailand			
Assembly plant Sales Service	**Chonburi**	SEW-EURODRIVE (Thailand) Ltd. 700/456, Moo.7, Donhuaroh Muang Chonburi 20000, Thailand	Tel. +66 38 454281 Fax +66 38 454288 sewthailand@sew-eurodrive.com
Technical offices	**Bangkok**	SEW-EURODRIVE (Thailand) Ltd. 6th floor, TPS Building 1023, Phattanakarn Road Suanluang Bangkok,10250	Tel. +66 2 7178149 Fax +66 2 7178152 sewthailand@sew-eurodrive.com
	Hat Yai	SEW-EURODRIVE (Thailand) Ltd. Hadyai Country Home Condominium 59/101 Soi.17/1 Rachas-Utid Road. Hadyai, Songkhla 90110, Thailand	Tel. +66 74 359441 Fax +66 74 359442 sewthailand@sew-eurodrive.com
	Khon Kaen	SEW-EURODRIVE (Thailand) Ltd. 4th Floor, Kaow-U-HA MOTOR Bldg, 359/2, Mitraphab Road. Muang District Khonkaen 40000, Thailand	Tel. +66 43 225745 Fax +66 43 324871 sew-thailand@sew-eurodrive.com
Tunisia			
Sales	**Tunis**	T. M.S. Technic Marketing Service Zone Industrielle Mghira 2 Lot No. 39 2082 Fouchana	Tel. +216 79 40 88 77 Fax +216 79 40 88 66 http://www.tms.com.tn tms@tms.com.tn
Turkey			
Assembly plant Sales Service	**Kocaeli-Gebze**	SEW-EURODRİVE Sistemleri San. Ve TIC. Ltd. Sti Gebze Organize Sanayi Böl. 400 Sok No. 401 41480 Gebze Kocaeli	Tel. +90-262-9991000-04 Fax +90-262-9991009 http://www.sew-eurodrive.com.tr sew@sew-eurodrive.com.tr
Technical offices	**Adana**	SEW-EURODRİVE Cevat Yurdakul Cad.No:52 Akdoğan İş Merkezi K:5 D.18 Seyhan / Adana	Tel. +90 322 359 94 15 Fax +90 322 359 94 16
	Ankara	SEW-EURODRİVE 1368.Cadde Eminel İşmerkezi No: 18/68 İvogsan / Ankara	Tel. +90 312 385 33 90 Fax +90 312 385 32 58
	Bursa	SEW-EURODRİVE Üçevler Mah. Bayraktepe Sok. Akay İş Merkezi Kat:3 No: 7/6 Nilüfer / Bursa	Tel. +90 224 443 45 60 Fax +90 224 443 45 58
	Istanbul	SEW-EURODRİVE Tekstilkent Ticaret Merkezi B-13 Blok No:70 Esenler / İstanbul	Tel. +90-262-9991000-04 Fax +90-262-9991009

Turkey			
	Izmir	SEW-EURODRİVE 1203/11 Sok. No. 4/614 Kara Hasan Atlı İş Merkezi Kat :6 Yenişehir / İzmir	Tel. +90 232 469 62 64 Fax +90 232 433 61 05
Ukraine			
Assembly plant **Sales** **Service**	**Dnipropetrowsk**	ООО «СЕВ-Евродрайв» ул.Рабочая, 23-В, офис 409 49008 Днепропетровск	Тел. +380 56 370 3211 Факс. +380 56 372 2078 http://www.sew-eurodrive.ua sew@sew-eurodrive.ua
Sales	**Kiev**	ООО «СЕВ-Евродрайв» ул.С.Олейника, 21 02068 Киев	Тел. +380 44 503 95 77 Факс. +380 44 503 95 78 kso@sew-eurodrive.ua
	Donetsk	ООО «СЕВ-Евродрайв» ул.25-летия РККА, 1-В, оф. 805 83000 Донецк	Тел. +380 62 38 80 545 Факс. +380 62 38 80 533 dso@sew-eurodrive.ua
	Ivano-Frankivsk	ООО «СЕВ-Евродрайв» ул.Независимости, 4, оф.303 83000 Ивано-Франковск	Тел. +380 342 725 190 Факс. +380 342 725 191 ifso@sew-eurodrive.ua
Uruguay			
Assembly plant **Sales**	**Montevideo**	SEW-EURODRIVE Uruguay, S. A. Jose Serrato 3569 Esqina Corumbe CP 12000 Montevideo	Tel. +598 2 21181-89 Fax +598 2 21181-89 sewuy@sew-eurodrive.com.uy
USA			
Production plant **Assembly plant** **Sales** **Service**	**Southeast Region**	SEW-EURODRIVE INC. 1295 Old Spartanburg Highway P.O. Box 518 Lyman, S.C. 29365	Tel. +1 864 439-7537 Fax Sales +1 864 439-7830 Fax Manufacturing +1 864 439-9948 Fax Assembly +1 864 439-0566 Fax Confidential/HR +1 864 949-5557 http://www.seweurodrive.com cslyman@seweurodrive.com
Assembly plants **Sales** **Service**	**Northeast Region**	SEW-EURODRIVE INC. Pureland Ind. Complex 2107 High Hill Road, P.O. Box 481 Bridgeport, New Jersey 08014, USA	Tel. +1 856 467-2277 Fax +1 856 845-3179 csbridgeport@seweurodrive.com
	Midwest Region	SEW-EURODRIVE INC. 2001 West Main Street Troy, Ohio 45373, USA	Tel. +1 937 335-0036 Fax +1 937 332-0038 cstroy@seweurodrive.com
	Southwest Region	SEW-EURODRIVE INC. 3950 Platinum Way Dallas, Texas 75237, USA	Tel. +1 214 330-4824 Fax +1 214 330-4724 csdallas@seweurodrive.com
	Western Region	SEW-EURODRIVE INC. 30599 San Antonio St. Hayward, CA 94544, USA	Tel. +1 510 487-3560 Fax +1 510 487-6433 cshayward@seweurodrive.com
	Please contact us for other service center addresses in the USA.		
Venezuela			
Assembly plant **Sales** **Service**	**Valencia**	SEW-EURODRIVE Venezuela S.A. Av. Norte Sur No. 3, Galpon 84-319 Zona Industrial Municipal Norte Valencia, Estado Carabobo, Venezuela	Tel. +58 241 832-9804 Fax +58 241 838-6275 http://www.sew-eurodrive.com.ve ventas@sew-eurodrive.com.ve sewfinanzas@cantv.net
United Arab Emirates			
Sales **Service**	**Sharjah**	Copam Middle East (FZC) Sharjah Airport International Free Zone P.O. Box 120709 Sharjah	Tel. +971 6 5578-488 Fax +971 6 5578-499 copam_me@eim.ae
Vietnam			
Sales	**Ho-Chi-Minh-Stadt**	**All sectors except for ports and offshore:** Nam Trung Co., Ltd 250 Binh Duong Avenue, Thu Dau Mot Town, Binh Duong Province HCM office: 91 Tran Minh Quyen Street District 10, Ho Chi Minh City	Tel. +84 8 8301026 Fax +84 8 8392223 namtrungco@hcm.vnn.vn truongtantam@namtrung.com.vn khanh-nguyen@namtrung.com.vn

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Vietnam			
		Ports and offshore: DUC VIET INT LTD Industrial Trading and Engineering Services A75/6B/12 Bach Dang Street, Ward 02, Tan Binh District, 70000 Ho Chi Minh City	Tel. +84 8 62969 609 Fax +84 8 62938 842 totien@ducvietint.com
	Hanoi	Nam Trung Co., Ltd R.205B Tung Duc Building 22 Lang ha Street Dong Da District, Hanoi City	Tel. +84 4 37730342 Fax +84 4 37762445 namtrunghn@hn.vnn.vn
Zambia			
Sales	**Kitwe**	EC Mining Limited Plots No. 5293 & 5294,Tangaanyika Road, Off Mutentemuko Road, Heavy Industrial Park, P.O.BOX 2337 Kitwe	Tel. +260 212 210 642 Fax +260 212 210 645 sales@ecmining.com http://www.ecmining.com

Inquiry/order

Customer data:

Company: ____________ Customer no.: ____________
Department: ____________
Name: ____________ Phone: ____________
Street/P.O. box: ____________ Fax: ____________
____________ Email: ____________
Zip code/city: ____________

Contact at SEW:

Name: ____________ Phone: ____________
Technical office: ____________ Fax: ____________

Technical data:

Quantity: ________ Desired delivery date: ____________
Catalog designation: ____________

Gear unit type:

☐ Helical gear units ☐ Parallel-shaft helical gear units ☐ Helical-bevel gear unit ☐ Helical-worm gear unit ☐ Spiroplan® gear units
☐ Double gear units ☐ Servo gear units ☐ Variable-speed gear unit ☐ Electrified monorail system ☐ Miscellaneous: _____

Power: _______ kW **Output speed:** _________ rpm **Output torque:** ________ Nm

Cycles/hour: ____________ c/h **Cyclic duration factor:** S ________ / ________ % cdf

☐ 1-shift operation ☐ 2-shift operation ☐ 3-shift operation
☐ Regular ☐ Irregular ☐ Very irregular

Mounting position: [1)]

M1 ☐ M2 ☐ M3 ☐ M4 ☐ M5 ☐ M6 ☐ Pivoted ☐

Housing form:

☐ Foot-mounted ☐ Flange (bore) ☐ Flange (thread)
☐ Torque arm ☐ Miscellaneous: ____________

Shaft design:

☐ Solid shaft with key ☐ Shrink disk Shaft/hollow shaft Ø :___________ mm
☐ Hollow shaft with key ☐ TorqLOC® Flange Ø : ___________ mm

Shaft position (for right-angle gear units): ☐ A | ☐ B | ☐ AB

Terminal box position: ☐ 0°(R) ☐ 90°(B) | ☐ 180°(L) | ☐ 270°(T)

Cable entry: ☐X ☐1 | ☐2 | ☐3

Degree of protection: IP54 ☐ IP55 ☐ IP56 ☐ IP65 ☐ IP66 ☐ IP69K ☐

Thermal class: 130(B) ☐ 155(F) ☐ 180(H) ☐

Surface/corrosion protection: KS ☐ OS1 ☐ OS2 ☐ OS3 ☐ OS4 ☐

Line voltage:____________ V
Line frequency: ☐ 50Hz ☐ 60Hz

Connection type: ☐ Δ | ☐ Y | ☐ YY | ☐ Y/Y

Energy efficiency class: ☐IE1 | ☐IE2 | ☐IE3 | ☐IE4

☐ For inverter operation: Max. frequency: ________ Hz | **Control range:** ____________

Required options:

☐ Brake: Voltage _______ V Braking torque: _______ Nm
☐ Manual brake release: ☐ HR or ☐ HF
☐ Forced cooling fan: Forced cooling fan voltage: ____ V
☐ Motor protection: ☐ TF or ☐ TH
☐ Encoder: ____________
☐ Plug connector connection: ____________
☐ Inverter: ____________
☐ RAL 7031 or ☐ RAL ____________

Further options:

Special ambient conditions:

Temperature: from ______ °C to ______ °C | ☐ Operation outdoors | ☐ Installation altitude >1000m above NN
Further environmental conditions: ____________

Miscellaneous: ____________

1) see back

Place, date ____________ **Signature:** ____________

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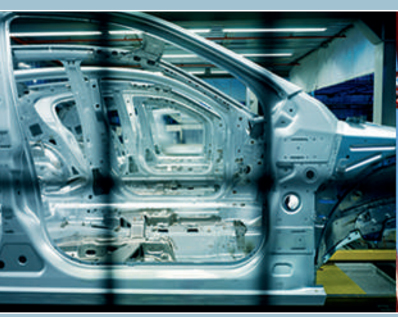

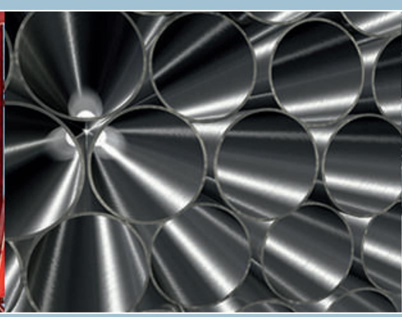


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