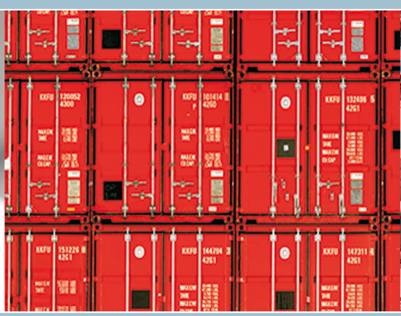
SEW EURODRIVE

Catalog

AC Motors DR.71 - 315, DT56, DR63

Edition 10/2014

19290411/EN



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1 Introduction

1.1 The SEW-EURODRIVE group of companies

1.1.1 Global presence

Driving the world – with innovative drive solutions for all industries and for every application. Products and systems from SEW-EURODRIVE are used in a multitude of applications – worldwide. Be it in the automotive, building materials, food and beverage or metal-processing industry: The decision to use drive technology "made by SEW-EURODRIVE" stands for reliability, both in terms of functionality and investment.

Not only are we represented in all the main industries of our time, but we are also found all over the world: with 15 manufacturing plants and 77 Drive Technology Centers worldwide as well as our customer support, which we consider an integrative service that continues our commitment to outstanding quality.

1.1.2 Always the right drive

The SEW-EURODRIVE modular concept offers millions of combinations. This wide selection enables you to choose the correct drive for all applications, each based on the required speed and torque range, available space, and ambient conditions. Gear units and gearmotors offering a unique and finely tuned performance range and the best economic prerequisites to meet your drive requirements.

The modular DR.. motor series includes the energy-efficient motor types IE1 to IE4 and was designed and constructed with all worldwide requirements for energy efficiency classes in mind. The DR.. motor easily met the requirements for approval and certification in all relevant countries. The energy-efficient drives achieve the highest efficiency in combination with SEW-EURODRIVE gear units.

The gearmotors are electronically enhanced by MOVITRAC® frequency inverters, MOVIDRIVE® drive inverters, and MOVIAXIS® multi-axis servo inverters – a combination that blends perfectly with the existing SEW-EURODRIVE program. As is the case with the mechanical systems, all development, production, and assembly is carried out entirely by SEW-EURODRIVE. In combination with our drive electronics, these drives provide the utmost in flexibility.

Products of the servo drive system, such as low backlash servo gear units, compact servomotors, or MOVIAXIS® multi-axis servo inverters ensure precision and dynamics. From single-axis or multi-axis applications to synchronized process sequences, servo drive systems from SEW-EURODRIVE enable flexible and customized implementation of your applications.

For economical, decentralized installations, SEW-EURODRIVE offers components from its decentralized drive system, such as MOVIMOT®, the gearmotor with integrated frequency inverter, or MOVI-SWITCH®, the gearmotor with integrated switching and protection function. SEW-EURODRIVE has developed hybrid cables to provide cost-effective functional solutions, irrespective of the system philosophy or scope. The latest developments from SEW-EURODRIVE: DRC.. electronic motor, MOVIGEAR® mechatronic drive system, MOVIFIT® decentralized drive controller, MOVIPRO® decentralized drive, positioning, and application controller, as well as MOVITRANS® system components for contactless energy transfer.

Power, quality, and robustness combined in a single standard product: with SEW-EURODRIVE, powerful movements are delivered by industrial gear units with high torques. The modular concept once again ensures optimum adaptation of industrial gear units to meet a wide range of different applications.

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1.1.3 Your ideal partner

Its global presence, extensive product range and broad spectrum of services make SEW-EURODRIVE the ideal partner for the machinery and plant construction industry when it comes to providing drive systems for demanding drive tasks in all industries and applications.

1.2 Products and systems from SEW-EURODRIVE

The products and systems of SEW-EURODRIVE are divided into four product groups:

- Industrial gear units
- Gearmotors and frequency inverters
- Servo drive systems
- Decentralized drive systems
- VARIOLUTION® and MAXOLUTION®

Products and systems used in several groups of applications are listed in a separate group entitled "Products and systems covering several product groups". Consult the following tables to locate the products and systems included in the respective product group:

Industrial gear units
• X, MC, ML helical and bevel-helical gear units • P002 - 102 series planetary gear units • P.MC.., P.X.. series helical and bevel-helical planetary gear units • Application solutions with connections – Swing base – Gearmotor – Motor – Coupling – Brake – Lubrication system For conveyor drives, bucket conveyors, agitators, cooling towers, crane systems, and much more.

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Gearmotors and frequency inverters		
Gear units / gearmotors	**Motors**	**Frequency inverters**
• Helical gear units / helical gearmotors • Parallel-shaft helical gear units / parallel-shaft helical gearmotors • Helical-bevel gear units / helical-bevel gearmotors • Helical-worm gear units and gearmotors • SPIROPLAN® right-angle gearmotors • Drives for electrified monorail systems • Geared torque motors • Pole-changing gearmotors • Variable-speed gear units / variable-speed gearmotors • Aseptic gearmotors • Explosion-proof gear units / gearmotors • Explosion-proof variable-speed gear units / variable-speed gearmotors	• Asynchronous AC motors / AC brakemotors • Pole-changing AC motors / AC brakemotors • Energy-efficient motors • Explosion-proof AC motors / AC brakemotors • Torque motors • Single-phase motors / single-phase brakemotors • Asynchronous linear motors	• MOVITRAC® frequency inverters • MOVI4R-U® frequency inverters • MOVIDRIVE® drive inverters • Control, technology, and communication options for inverters

Servo drive systems		
Servo gear units and gearmotors	**Servomotors**	**Servo drive inverters / servo inverters**
• Low backlash planetary servo gear units / planetary gearmotors • Low backlash helical-bevel servo gear units / helical-bevel gearmotors • R, F, K, S, W gear units / gearmotors • Explosion-proof servo gear units / servo gearmotors	• Asynchronous servomotors / servo brakemotors • Synchronous servomotors • Explosion-proof servomotors / servo brakemotors • Synchronous linear motors	• MOVIDRIVE® servo drive inverters • MOVIAXIS® multi-axis servo inverters • Control, technology, and communication options for servo drive inverters and servo inverters

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Decentralized drive systems		
Decentralized drives	**Communication and installation**	**Contactless energy transfer**
• DRC.. electronic motors / MOVIGEAR® mechatronic drive system – DBC – Direct Binary Communication – DAC – Direct AS-Interface Communication – DSC – Direct SBus Communication – SNI – Single Line Network Installation • MOVIMOT® gearmotors with integrated frequency inverter • MOVIMOT® motors / brakemotors with integrated frequency inverter • MOVI-SWITCH® gearmotors with integrated switching and protection function • MOVI-SWITCH® motors / brakemotors with integrated switching and protection function • Explosion-proof MOVIMOT® and MOVI-SWITCH® gearmotors	• Fieldbus interfaces • Field distributors for decentralized installation • MOVIFIT® product line – MOVIFIT® FDC for controlling MOVIGEAR® and DRC.. drive units – MOVIFIT® MC for controlling MOVIMOT® drives – MOVIFIT® SC with integrated electronic motor switch – MOVIFIT® FC with integrated frequency inverter • MOVIPRO® product line – MOVIPRO® SDC decentralized drive and positioning control	• MOVITRANS® system – Stationary components for energy supply – Mobile components for energy consumption – Line cables and installation material

VARIOLUTION® and MAXOLUTION®
• VARIOLUTION® packages for high technical solution expertise in plants and machines
• MAXOLUTION® systems for customer-specific system solutions and plants

Products and systems covering several product groups
• Operator terminals
• MOVI-PLC® drive-based control system
• Components of the type "functional safety"
• Diagnostic units

In addition to products and systems, SEW-EURODRIVE offers a comprehensive range of services. These include:

- Technical consulting
- Application software
- Seminars and training
- Extensive technical documentation
- Worldwide customer service

Visit our website at

www.sew-eurodrive.com

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The website provides comprehensive information and services.

1.3 Documentation

1.3.1 Contents of this publication

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

- DRS.., DRE.., DRP.. series AC motors
- DRM.. torque motors
- DRK.. single-phase motor
- DRL.. asynchronous servomotors
- DT56 and DR63 series AC motors
- Motor options and versions

1.3.2 Additional documentation

The following documents are available from SEW-EURODRIVE in addition to this "AC Motors" catalog:

- DRE.. DRS.. gearmotors
- Asynchronous servo gearmotors
- Synchronous servomotors
- Synchronous servo gearmotors
- Geared torque motors
- Explosion-proof drives
- Explosion-proof AC motors

The motor/inverter combinations and dynamic and thermal limit characteristics for drive project planning can be found in the manual titled "AC Motors – Inverter Assignments and Characteristic Curves", which supplements this catalog.

The manual contains the following:

- Motor/inverter assignment DRL..-MOVIDRIVE®
- Dynamic and thermal limit characteristics DRL..-MOVIDRIVE®
- Motor/inverter assignment DRL..-MOVIAXIS® ; PWM = 4 kHz; $V_{DC\ link}$ = 565 V and $V_{DC\ link}$ = 750 V
- Dynamic and thermal limit characteristics DRL..-MOVIAXIS® ; PWM = 4 kHz; $V_{DC\ link}$ = 565 V and $V_{DC\ link}$ = 750 V
- Motor/inverter assignment DRL..-MOVIAXIS® ; PWM = 8 kHz; $V_{DC\ link}$ = 565 V and $V_{DC\ link}$ = 750 V
- dynamic and thermal limit characteristics DRL..-MOVIAXIS® ; PWM = 8 kHz; $V_{DC\ link}$ = 565 V and $V_{DC\ link}$ = 750 V
- DRM.. torque magnet speed-torque characteristics

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1.4 Product names and trademarks

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

1.5 Copyright

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2 Product description

2.1 DR.. AC motors

The DR.. AC motors were released worldwide by SEW-EURODRIVE on January 1st, 2008.

In addition to standard and energy-efficient motors, this series includes other versions:

- Asynchronous servomotors
- Torque motors
- Single-phase motors with running capacitor
- Explosion-proof motors.

The motors are available for mounting to gear units or as stand-alone motors in foot-mounted and/or flange-mounted design in sizes 71 to 315.

In addition to the lengths K, S, M, and L, there are two other rotor variants which are shown in the type designation:

- C indicates a die-cast copper rotor cage: MC and LC
- J indicates permanent magnets in addition to the aluminum rotor cage in the line start permanent magnet (LSPM) energy-efficient motor: SJ, MJ, and LJ.

A large number of versions and options allows the DR.. AC motors to be individually designed.

2.1.1 DR.. series motor types

The DR.. motor series comprises the following motors:

- **DR.. motor**: 2-, 4- and 6-pole energy-efficient motors, each in the DRS.., DRE.., and DRP.. classes
- **DR..J motor**: 4-pole line start permanent magnet (LSPM) energy-efficient motors in the classes DRE.., DRP.., and DRU... Detailed information about this motor type is available in a separate document.
- **DRL.. motor**: 4-pole asynchronous servomotors
- **EDR.. motor**: 4-pole explosion-proof motors EDRS.. and EDRE.. series motors in accordance with
  - European 94/9/EC (ATEX) Directive: Category 2 and 3
  - International IECEx agreement: EPL b and c
  - North American HazLoc-NA® classification: Class I and Class II in division 2
- **DRK.. motor**: 4-pole single-phase motors with running capacitor
- **DRM.. motor**: 12-pole torque motors
- **DRS.. motor**: 4/2-, 8/4-, and 8/2-pole standard motors DRS.. with 2 nominal speeds

This catalog uses the above type designations.

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2.1.2 Versions and options

Customers can design a drive in the DR.. motor series from the following versions and options:

- **Use on inverter**: The motors are approved for use on a frequency inverter due to their high-quality winding. Using the winding with reinforced insulation capacity is recommended at voltages exceeding 3x 500 V AC, and the type with reinforced insulation capacity in conjunction with increased partial discharge resistance at voltages exceeding 3x 600 V AC.
- **Brakes:** Each motor size comes with two or three different brake sizes that can be directly mounted on the B-side of the motor according to the required application data.
- **Functionally safe brake:** The brake can alternatively come in a functionally safe version in accordance with ISO EN 13849.
- **Manual brake release:** Two mechanical versions are available: lockable or automatically disengaging. Customers can choose from up to four actuating directions.
- **Forced cooling fan:** Nearly all B-side components allow for the installation of a forced cooling fan. The fan comes in DC, two AC or three-phase versions.
- **Foot-mounted design:** Both motors without gear units and motors for mounting to gear units can come with feet. In addition to the performance-based shaft height in accordance with European standard EN 50347, there are 3 other feet layouts available.
- **Flange-mounted design:** In addition to the design with through bores, a version with threads in the flange can be ordered. Each motor size in turn has multiple flange diameters available. This design can be combined with the foot-mounted design.
- **Encoder**: SEW-EURODRIVE installs incremental and absolute encoders onto AC asynchronous motors to be very short, compact, and without coupling. At least 6 different electrical interfaces are available. Up to 8 encoder mounting adapters are available for mounting an encoder provided by the customer.
- **Functionally safe encoders**: Both add-on encoders and the EI7C built-in encoders also come in a functionally safe version in accordance with ISO EN 13849. The EI7C built-in encoder is highly integratable for no additional motor length.
- **Insulated bearing**: Operating size 250 and higher motors on the frequency inverter can result in shaft currents in the motor. These currents can be prevented by using a bearing that is insulated on one side. This bearing is designed for the B-side of the motor.
- **Terminal box**: Instead of the standard terminal box design, a version with multiple cable glands may be required. Terminal boxes with metric screw fittings or conical inch threads (NPT) can also be selected.
- **Condensation drain holes**: Depending on ambient conditions, condensation can form in the motor or water infiltration cannot always be prevented despite a high degree of protection. One or more condensation drain holes can be added at the customer's request to safely remove this water from the motor.
- **Fan**: Instead of the standard fan, an aluminum fan can be used for extreme ambient conditions. A flywheel fan made of gray cast iron can also be selected.
- **Motor protection**: The motor can come with thermal protective elements according to the thermal class: temperature sensor (PTC resistor) or thermal switch (bimetallic).

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- **Temperature sensor:** While motor protection only sends a near-digital signal, adding PT100 or KTY84-130 temperature sensors can give an accurate image of winding temperature.
- **MOVIMOT®**: Motors up to 4 kW can optionally come with a frequency inverter in the terminal box. MOVIMOT® comes with numerous options that can be added on or included with delivery.
- **Functionally safe MOVIMOT®**: The frequency inverter in the terminal box can alternatively come in a functionally safe version in accordance with ISO EN 13849.
- **MOVI-SWITCH®**: Instead of the star jumpers on the terminal board, MOVI-SWITCH® switches the star jumper, allowing the DR.. motor to be switched on and off remotely.
- **Fan guard options:** The fan guard can be adapted using various alternatives: canopy, fan filter, reduced noise, folding or even non-ventilated and without guard.
- **Backstop:** A backstop can also be mounted in place of a brake. Please indicate blocking direction when ordering.
- **Plug connector:** More than 20 different plug connectors are available across the different motor sizes. There are also built-in and side-mounted terminal box plug connectors.
- **Reinforced bearings and relubrication units:** The already high standard overhung and axial load values of the grooved ball bearing can be increased even more in motor sizes 250 and up with reinforced cylindrical roller bearings. This requires a relubrication unit.
- **Second shaft end:** The B side of the DR.. motor can also come with a second shaft end. This comes in standard and heavy-duty versions.

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2.2 Standards and regulations

AC (brake)motors and servo (brake)motors from SEW-EURODRIVE conform to relevant standards and regulations, specifically:

2.2.1 Standard conformity

An overview of the most important standards:

- IEC 60034-1, EN 60034-1

Rotating electrical machinery, rating and performance.

- IEC 60034-2-1, EN 60034-2-1

Rotating electrical machines, determining losses and efficiency.

- IEC 60034-9, EN 60034-9

Rotating electrical machines, noise limits.

- IEC 60034-14, EN 60034-14

Rotating electrical machines, vibration levels.

- IEC 60034-30, EN 60034-30

Rotating electrical machines, classifying efficiency classes (IE code).

- EN 60529, IEC 60034-5, EN 60034-5

IP degrees of protection for enclosures.

- IEC 60072

Dimensions and performance of rotating electrical machines.

- EN 50262

Metric threads of cable glands.

- EN 50347

Standardized dimensions and power ranges.

- NEMA MG1

US standard for motors and generators.

2.2.2 Rated data

Specific data of an AC asynchronous motor

- Size
- Rated power
- Cyclic duration factor
- Rated speed
- Rated current
- Rated voltage
- Power factor cosφ
- Degree of protection
- Thermal class
- Efficiency class

This data is found on the nameplate of the motor, see the figure below. In accordance with IEC 60034 (EN 60034), the nameplate data applies to a maximum ambient temperature of 40 °C and a maximum altitude of 1,000 m above sea level.

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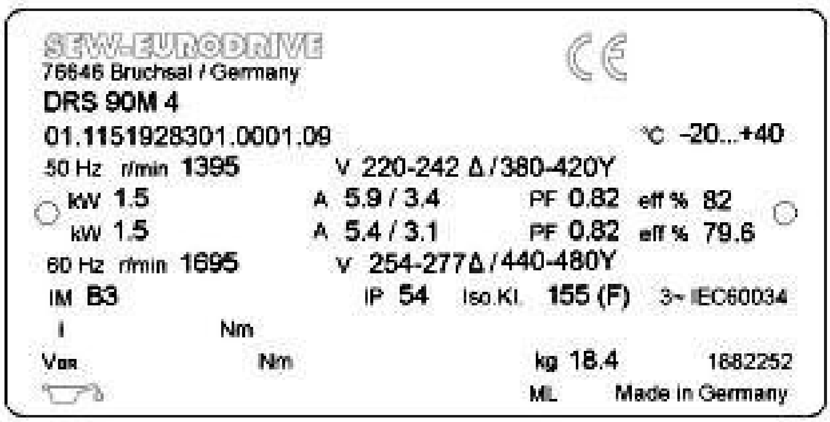
Example of a nameplate:



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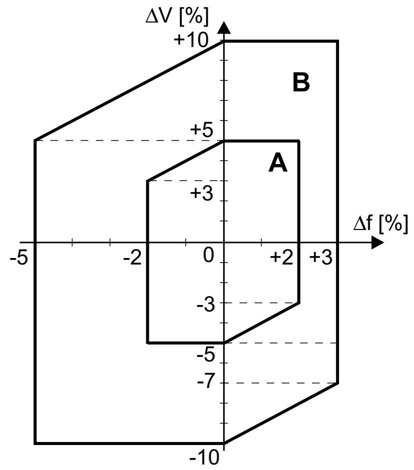
2.2.3 Tolerances

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

Voltage and frequency	Tolerance A or 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%
Mass moment of inertia	±10%

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 ratings. The origin marked "0" identifies the respective ratings for frequency and voltage.



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

In tolerance range B, the motor must be able to deliver the rated torque, but not while on 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 limits of tolerance range B.

Undervoltage

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

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2.3 DR.. series motor features

2.3.1 Noise

All DR.. series motors by SEW-EURODRIVE come in below the sound power level permitted by IEC/EN 60034-9.

2.3.2 Coating

The motors are painted with RAL 7031 blue/gray machine paint standard in accordance with DIN 1843. The asynchronous servomotors of the DRL.. series are also available in RAL 9005 black machine paint in accordance with DIN 1843, at no extra cost. Special coatings and other colors are available on request.

2.3.3 Surface and anti-corrosion protection

All gear units, motors and gearmotors by SEW-EURODRIVE can also come with special surface protection upon request for use in very humid or corrosive environments.

2.3.4 Air admission and accessibility

The motors/brakemotors must be mounted on the driven machine in such a way that there is enough axial and radial space left for unimpeded air admission and for performing maintenance on the brake.

- Leave a clearance of at least half of the fan guard diameter to provide unhindered air admission.
- For brake motors, do not forget to add the space required for removing the fan guard (= fan guard diameter).

2.3.5 Brakemotors

The motors can be equipped with an integrated mechanical brake on request. The SEW-EURODRIVE brake is an electromagnetic disk brake with a DC coil that releases electrically and brakes using spring force. Its design makes it so the brake is applied automatically if the power fails, bringing it in compliance with basic safety requirements.

The brake can also be released mechanically if equipped with manual brake release. For this purpose, the brake comes with either a hand lever with automatic reset or an adjustable setscrew.

The brake is controlled with a brake control that is either installed in the motor wiring space or the control cabinet.

A characteristic feature of the brakes is their very short design. The brake bearing endshield is a part of both the motor and the brake. The integrated design of the SEW-EURODRIVE brake motor facilitates highly compact and robust solutions.

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2.3.6 Operation on inverter

Energy efficient motors

The energy efficient motors in the DRS.., DRE.. and DRP.. series can be used with the following SEW-EURODRIVE frequency inverters:

- MOVIDRIVE®
- MOVITRAC®
- MOVIFIT®
- MOVIMOT®
- MOVIPRO®

Asynchronous servomotors

The DRL.. series asynchronous servomotors can be used with the following SEW-EURODRIVE frequency inverters:

- MOVIDRIVE®
- MOVIAXIS®

LSPM motors

The Line Start Permanent Magnet (LSPM) motors in the DRE..J, DRP...J and DRU..J series can be used with the following SEW-EURODRIVE frequency inverters:

- MOVITRAC®
- MOVIFIT®
- MOVIMOT®

Other inverters

DRS.., DRE.., DRP.., DRU.. and DRL.. series motors can also be used on frequency inverters from other manufacturers. Observe the information on use on other inverters.

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2.4 International markets

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

Many countries have made market access contingent on local approval, and additional legislation, regulations and local business customs very often must be observed.

Certification almost always requires a mark on the motor, whether one or more logos on the main nameplate or additional adhesive labels on the motor itself.

The following tables show an excerpt of the country certifications and identifications for the DR.. series motors.

2.4.1 Market access

Country	Law/Standard/ Regulation	Description	Mark (TS):
Brazil	ABNT	Market conformity requirements include: - Standard no. - Starting current ratio - Wiring diagram(s) - Direction(s) of rotation - Bearing sizes	Information on nameplate
Europe (EU)	2006/95/EC	Low Voltage Directive	CE on nameplate
China	CCC certification	CCC Small Devices Directive	CCC mark on nameplate
Canada	CSA	Market conformity with inspection	CSA mark on nameplate
Russia	EAC	Market conformity	Customs certificate

2.4.2 Local business customs

Country	Law/Standard/ Regulation	Description	Mark
Canada	CSA	Motor standard requirements include: Permitted temperature range Design letter	Ambient: -20 °C to 40 °C H/N on nameplate
USA	UL	Proof of fire endurance based on recognized components	UR mark on nameplate
		Assembly plant no.	ML + 4 numbers of nameplate

Country	Law/Standard/ Regulation	Description	Mark
USA	NEMA MG1	Motor standard requirements include: - KVA letter - Design letter - S.F overload factor TEFC, TENC or TEBC (similar to an IP class)	Information on nameplate Design and ventilation

2.4.3 Efficiency regulations

Country	Law/Standard/ Regulation	Description	Mark
Australia	MEPS 2006 AS/NZS 1359	Energy efficiency legislation from 2002, binding starting April 2006	Numerical value for efficiency
Brazil	NBR 17094-1	Energy efficiency legislation from 2002, binding starting December 2009	Inmetro mark on nameplate
		Addendum to energy efficiency legislation in 2012: Production plant no.	Plant no. on nameplate
Chile	NcH3086	Energy efficiency legislation from 2009, binding starting January 2011	ABCD sticker
China	GB 18613-2012	Energy efficiency legislation from 2012, binding starting September 2012	CEL grade sticker
Europe (EU)	Dir 2009/125/EC Reg 640/2009 Reg 4/2014, mandatory starting July 2014	Energy-related product directive from 2009, binding starting June 2011	CE + IE class on nameplate
Japan	JIS	Energy efficiency legislation from 1979, revised edition for AV motors binding starting April 1st, 2013	JIS mark on nameplate
Canada	EER 2010	Energy efficiency legislation from 2010, binding starting April 2012	CSAe mark on nameplate
New Zealand	MEPS 2006	Energy efficiency legislation from 2002, binding starting June 2006	Numerical value for efficiency
Mexico	NOM 016 ENER 2010	Energy efficiency legislation binding since December 2010	-- none --

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Country	Law/Standard/ Regulation	Description	Mark
Switzer-land	ENV 730.01	Adoption of Reg 640/2009	CE + IE class on nameplate
South Ko-rea	REELS 2010	Energy efficiency legisla-tion from 2007, binding starting December 2010	KEL (Korean Energy Label)
Turkey	Gazette No. 28197/ SGM-2012/2	Adoption of Reg 640/2009	CE + IE class on nameplate
USA	EISA 2007	Energy efficiency legisla-tion from 2007, binding starting December 2010	ee mark on nameplate
		Energy efficiency legisla-tion from 2007, not al-lowed in US	"Not for use in the USA" sticker

2.5 DR.. series energy efficient motors

2.5.1 Design features of energy efficient motors

The design, which is optimized for size and materials, allows standard motors, energy-efficient motors and premium motors to be combined in a single series. This means customers no longer have to use different motor types or series, and there are no separate versions or options.

The motors have been developed and designed as a modular energy saving system in regard to existing and foreseeable national and international legislation and regulations. They consistently utilize all the advantages of a modular system with re-use and multiple use of parts to achieve all efficiency levels safely and easily.

2.5.2 Motor standard IEC 60034

IEC 60034 is an international motor standard. Below is a brief description of the sections of the standard pertaining to energy-efficient designs.

- Part 2-1: Regulations for testing in line operation
- Part 2-3-1: Regulations for testing when using on a frequency inverter
- Part 30: Classification into energy efficiency classes (IE code)
- Part 31: Selection of energy-efficient motors

For the EU, the parts of IEC 50034 have been effectively reproduced and harmonized in EN 60034. For this reason, the label "IEC/EN 60034" is often used. This motor catalog only refers to the "IEC standard" for the sake of simplicity.

IEC 60034-2-1 (2007)

Since 2007, Part 2-1 of motor standard IEC 60034 has described the standard methods for determining the efficiency of an AC asynchronous motor operated on a classic 3-phase supply system from tests.

What is new in Part 2-1 is how additional losses are determined. The across-the-board approach of 0.5% in the previous Part 2 of IEC 60034 is no longer used. The additional losses must be indirectly measured and factored in.

This mathematical approach results in a smaller numerical value. This makes it seem that motor performance has worsened, even though only the across-the-board percentage was changed. No motor components themselves were modified and energy consumption is still the same.

IEC 60034-2-3 (2009), confirmed draft

Since 2009, the draft of Part 2-3 of motor standard IEC 60034 has described the standard methods for determining the efficiency of an AC asynchronous motor operated on a frequency inverter. The numerical result will always be lower than the efficiency in line operation, since the frequency inverter generates additional losses in the motor by producing output voltage.

This will be included in the depiction of efficiency starting in 2015.

IEC 60034-30 (2008)

In 2008, Part 30 of motor standard IEC 60034 established a uniform international method for classifying efficiency.

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Similar to the IP protection class designation, this classification is based on IE. "IE" stands for “International Efficiency”. This part described three classes by the end of 2012:

- IE1 = Standard Efficiency
- IE2 = High Efficiency
- IE3 = Premium Efficiency

Minimum efficiency levels are defined for classes IE1, IE2 and IE3 at 50 Hz and at 60 Hz for the 2-, 4- and 6-pole version of 3-phase AC asynchronous motors in the 0.75 kW to 375 kW power range.

This means a standard applicable to consumers, manufacturers and legislators.

The technical data overviews of the DRS.., DRE.., DRE..J, DRP.. or DRP..J motors include the efficiency values as per IEC 60034-30.

IEC 60034-31 (2011)

Another efficiency class is described in the application guide in Part 31 of motor standard IEC 60034. This class is referred to in common parlance as:

- IE4 = Super-Premium Efficiency

Part 31 contains the numerical specifications for efficiency class IE4. These must either be calculated with a mathematical formula or taken from tables indicating speeds and torques.

The Line Start Permanent Magnet motors in the DRU..J design are energy-efficient motors by SEW-EURODRIVE whose specifications and values are derived from the provisions in IEC 60034-2-1 and -31.

IEC 60034-30-1 (2014)

It has been announced that other motors will be standardized in IEC 60034-30-1.

- The table specifications for efficiency class IE4 have been expanded for 50 Hz and 60 Hz.
- The lower power limit has been reduced from 0.75 kW to 0.12 kW.
- The upper power limit has been increased from 375 kW to 1,000 kW.
- The 8-pole motors have been included in the complete power range of 0.12 to 1,000 kW in all four IE classes.
- The upper voltage of 1,000 V and the lower voltage of 50 V have been fixed in order to reduce exceptions. Motors with voltages over 1,000 V are considered medium- or high-voltage drives that are not subject to IEC 60034-30-1.
- The single-phase motors with running capacitor have an efficiency class of at least IE1.

IEC 60034-30-2 (2014), confirmed draft

The sections from IEC 60034-31 on motors operated on frequency inverters have been incorporated into a new Part 2 of IE 60034-30.

Furthermore, this new Part 2 will specify how the efficiency of a motor operated on a frequency inverter should be rated relative to that of a line-powered drive. The additional losses in the motor by operating on a frequency inverter are indicated in the classic literature as up to 20%. However, this is almost exactly the gap describing the losses between the IE classes. This is why it is intended to assign motors operated on frequency inverters one IE class lower than a line-powered motor.

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2.5.3 EU/Europe

Market access to the EU/Europe is linked to the manufacturer's declaration of conformity to European directives. In the declaration of conformity, the manufacturer indicates the directives with which they are compliant. This is documented with the CE mark on the product.

Example: CE

Only motors with the CE label on the motor nameplate may pass through customs at the external borders of the EU and the signatories of the Schengen Agreement. The declaration of conformity is typically included in the operating instructions, but can also be obtained separately from the manufacturer. It does not have to be included with the product upon delivery, i.e., when passing through customs.

Three directives are relevant for the motors:

- Machinery Directive 2006/42/EC
- Low Voltage Directive 2006/95/EC
- Energy-related Products Directive 2009/125/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.

Directive 2006/95/EC

The Low Voltage Directive describes how a motor must be constructed in regard to safety goals for electrical equipment.

Article 1 of the directive specifies the voltage limits. Equipment connected to alternating current and thus three-phase current from 50 V to 1,000 V must comply with the directive.

All motors above 50 V are developed and designed in accordance with the directive and are subject to internal production controls as per Annex IV of the directive.

Motors with voltages below 50 V cannot have their conformity declared in accordance with the Low Voltage Directive. Please contact SEW-EURODRIVE if necessary.

With the declaration of conformity, SEW-EURODRIVE can place the CE mark on the motors.

Directive 2009/125/EC

Directive 2009/125/EC (Energy-related Products) addresses the following:

1. AC asynchronous motors in Regulation (EC) No. 640/2009
2. Fans/ventilators in Regulation (EC) No. 327/2011
3. Water pumps in Regulation (EC) No. 547/2
4. Wet rotor circulation pumps in Regulation (EC) No. 641/2009
5. Regulation (EC) No. 4/2014 Setting the ecodesign requirements for electric motors

Regulation 640/2009

This implementation directive (Reg 640/2009) regulates the putting on the market of motors within the European Community. A minimum efficiency has been specified since June 16th, 2011 that corresponds to IE2 from IE 60034-30:2008. Motors with lower efficiency ratings are banned.

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Two additional levels for increasing the minimum efficiency of AC asynchronous motors have been concluded.

As of January 1st, 2015, motors in line operation with a power rating ≥ 7.5 kW must meet IE3 as per IEC 60034-30:2008.

As of January 1st, 2015, motors in line operation with a power rating ≥ 0.75 kW must meet the higher IE3 level as per IEC 60034-30:2008.

Excluded from this as of 2015/2017 are motors in the class determined in 2011 (IE2 as per IEC 60034-30:2008) that are operated on frequency inverters.

DRE.. type motors (IE2) that do not meet the below exceptions but are equipped with a VSD (variable speed drive) receive an additional mark:

IE2 EU REGULATION 640/2009 USE WITH VARIABLE SPEED DRIVE ONLY!

This implementation regulation to Directive 2009/125/EC refers to the new parts of motor standard IEC 60034. The international classification and minimum efficiencies are described In Part 30 (→ 25). The method for determining the numerical value of the efficiency is regulatedi in Part 2 (→ 25).

The DRE.. and DRP.. series energy-efficient motors by SEW-EURODRIVE comply with the specifications and values derived from IEC 60034-2-1 and -30.

- IE2 motors

Motors	Lowest power rating	Highest power rating	Logo
2-pole DRE.. motors	from 0.75 kW	to 9.2 kW	CE
4-pole DRE.. motors	from 0.25 kW from 0.75 kW	to 0.55 kW to 225 kW	CE
6-pole DRE.. motors	from 0.25 kW from 0.75 kW	to 0.55 kW to 5.5 kW	CE

- IE3 motors

Motors	Lowest power rating	Highest power rating	Logo
2-pole DRP.. motors	from 0.75 kW	to 5.5 kW	CE
4-pole DRP.. motors	from 0.75 kW	to 132 kW	CE
6-pole DRP.. motors	from 0.75 kW	to 4 kW	CE

The following are exempt from Reg 640/2009 within the ErP Regulation:

- Brake motors
- Explosion-proof motors
- Motors not on continuous duty
- Motors designed as follows:
  – For temperatures greater than 40 °C
    or
  – For temperatures lower than -15 °C
    or
  – For an installation altitude greater than 1,000 m above seal level

Reg 4/2014

Some exceptions were changed by Regulation (EC) No. 4/2014 and are binding as of July 27th, 2014.

- This excludes motors designed as follows:

- For temperatures greater than 60 °C

  or
- For temperatures lower than -30 °C

  or
- For an installation altitude greater than 4,000 m above seal level

Regulation 327/2011

Regulation (EC) 327/2011 determines the ecodesign requirements for fans and ventilators driven by motors with an electrical input power between 125 W and 500 kW.

The required motor data can be provided as needed.

The forced cooling fan option is labeled according to the requirements.

Regulation 547/2012

Regulation (EC) NO. 547/2012 determines the ecodesign requirements for water pumps electrically driven by motors.

The regulation only pertains to the hydraulic part of water pumps. The minimum efficiency requirements for motors used in the electric motor systems of water pumps are described in Regulation 640/2009 (→ 🗎 27).

Regulation 641/2009

Regulation (EC) No. 641/2009 determines the ecodesign requirements for wet rotor circulation pumps. These motors are subject to the provisions described in Regulation 640/2009 (→ 🗎 27).

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Subsidies

There are various subsidies available in Europe to promote the use of energy-efficient motors. Below are some examples from Germany and Great Britain.

- The Federal Ministry for Economic Affairs and Energy started a program on September 18th, 2012 for small and medium-sized enterprises with the goal of promoting energy-efficient technologies.

  This individual project promotes reinvesting between €5,000 to €30,000 to replace old and inefficient components in companies with up to 500 employees or €100 million in revenue. The subsidy cannot exceed 30% of the investment and must be applied for in advance. It is granted as a non-repayable grant and is limited to max. €100,000 per company for systemic optimization. Any consulting services are subsidized by up to 60% or €3,000.

  More information can be obtained from the Federal Office for Economic Affairs and Export Control (BAFA):

  Web: http://bit.ly/QFL1aJ

  E-mail: QST@bafa.bund.de.

- Great Britain has been offering tax deductions for energy-efficient motors for some years. The British government is promoting the ECA (Enhanced Capital Allowance) program together with the non-profit Carbon Trust. The goal of the ECA program is to reduce carbon dioxide emissions. This program allows companies that invest in certain carbon dioxide-minimizing technologies and energy-efficient solutions when procuring new systems and machinery to deduct the entire capital expenditure from their taxes. The products promoted by the program are released in a list that is updated monthly. This Energy Technology Product List (ETPL) can be found under:

  https://etl.decc.gov.uk/etl/site.html

  The 2-, 4-, and 6- pole DRP.. motors in class IE3 by SEW-EURODRIVE have been added to the program and reappeared in the March and April 2013 lists. There is no certificate available.

  Support for motors in the IE2 class (DRE.. motors) was ended with the obligation to use IE2 motors that took effect on June 16th, 2011.

2.5.4 Switzerland

Switzerland adopted the Energy-related Products Directive and its implementation regulation no. 640/2009 in Energy Ordinance 730.01. This applies for motors since January 2012.

With it, the rules for the EU/Europe must be directly applied in Switzerland.

2.5.5 Turkey

Turkey has released rules pertaining to motors in various communiqués (SMG 2012/2), along with Gazette No. 28197 in February 2012.

This is when the Energy-related Products Directive and its implementation regulation no. 640/2009 were adopted.

With it, the rules for the EU/Europe must be directly applied in Turkey.

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2.5.6 Australia, New Zealand AS/NZS1359 (MEPS 2006)

The minimum efficiency (MESP) stipulated by law both in Australia and New Zealand took effect on April 1st, 2006 in Australia and on June 1st, 2006 in New Zealand. It regulates numerical values and methods for measuring the efficiency of 2-, 4-, 6- and 8-pole motors from 0.73 kW to 185 kW.

There are no regulations for up to 0.55 kW, so DRS.. motors up to this power rating are permitted.

At 0.73 kW and higher, the required efficiency corresponds as much as possible with that of the IE2 and IE3 motors specified by IEC 60034-30.

The DRE.. motors and the advanced DRP.. motors meet all legal requirements and have been approved by the authorization agency. There are no separate marks and no additional marking requirement.

The regulations exclude the following:

- Indivisible gearmotors. This means SPIROPLAN® W30 gearmotors (also WA30, WF30, WAF30) and R17 helical gearmotors (also RF17, RZ17) with motors from 0.75 kW to 1.1 kW in the DRS.. design can be provided in compliance with regulations
- Motors only stamped for operation with inverters: Asynchronous servomotors DRL..
- Motors in S2 short-time mode
- Motors with integrated MOVIMOT® frequency inverters
- DRK.. single-phase motors with running capacitor

The overview of permitted motors can be found online by selecting SEW-EURODRIVE under the following link:

http://reg.energyrating.gov.au/comparator/product_types/54/search/

The motor can only pass through Australian and New Zealand customs if the type and catalog designations on the motor nameplate match the entries in the above database.

NOTE:

- In Australia and New Zealand, the IE2 motors are considered the standard model, and the advanced IE3 motors (Premium Efficiency) just "high-efficiency".
- The voltage level 3x 415 V, 50 Hz has already been adapted to 3x 400 V -6%/ +10%, 50 Hz throughout most of these countries.

2.5.7 United States

Market access in the United States requires two primary features for use or export.

- UL (UR) certificate (Underwriters Laboratories)
- EISA 2007 compliance.

  EISA = Energy Independence and Security Act

UL certificate

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 models in the DR.. motor series can come with the appropriate mark on the nameplate.

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Example:

E189357

5112749195

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

Example:

EISA 2007 compliance

The US legal requirements for minimum efficiency from 1992 were modified and renewed in 2007.

Since December 2010, the minimum efficiency for some AC motors has been elevated to Premium level.

EISA 2007 affects the following:

- 2-, 4- and 6-pole motors from 0.75 kW (1 hp) to 150 kW (200 hp). These must meet the Premium Efficiency level
- 2-, 4- and 6-pole motors from 185 kW (225 hp) to 375 kW (500 hp), and 8-pole motors from 0.75 kW (1 hp) to 375 kW (500 hp). These must meet the High Efficiency level

Upon approval by the Department of Energy (DOE), the motors are marked with "ee" and the registration number, which is CC056A for SEW-EURODRIVE.

Example:

CC056A

The motor can only pass through US customs with the "ee" mark or another mark (e.g., "Not for use in the USA") on the motor nameplate.

The "ee" certificate is not included with the drive, since US customs can view the certificate on the DOE website by entering the registration number CC056A.

A multitude of exceptions allow for the requirements to be reduced, with the following exempt or with reduced requirements:

- Gearmotors directly mounted onto the motor with no coupling between motor and gear box
- Brakemotors, if the motor with disassembled brake cannot meet the US degree of protection
- High torque/speed characteristics (NEMA Design C) with simultaneous limitation of the starting current ratio I_a/I_n
- Special mounting position
- Motors that are not designed for continuous duty
- Motors only stamped for operation with inverters (asynchronous servomotors)
- Motors with integrated MOVIMOT® frequency inverters

- DRK.. single-phase motors with running capacitor
- Motors operated at idle (torque motors)

Not exempt are:

- Explosion-proof motors

UR certified motors by SEW-EURODRIVE

The following tables show the motors with UL certification:

Motors	Lowest power rating	Highest power rating	Mark
2-pole DRS.. motors	from 0.18 kW	to 9.2 kW	UR
4-pole DRS.. motors	from 0.18 kW	to 225 kW	UR
4-pole DRK.. motors	from 0.18 kW[1)]	to 1.1 kW[1)]	UR
6-pole DRS.. motors	from 0.18 kW	to 7.5 kW	UR

1) The DRK.. motors with this power rating are in development, models from the previous series are available. Please contact SEW-EURODRIVE

Motors	Lowest power rating	Highest power rating	Mark
2-pole DRE.. motors	from 0.75 kW	to 7.5 kW	UR
4-pole DRE.. motors	from 0.75 kW	to 225 kW	UR
6-pole DRE.. motors	from 0.75 kW	to 5.5 kW	UR

Motors	Lowest power rating	Highest power rating	Mark
2-pole DRP.. motors	from 0.75 kW	to 5.5 kW	UR
4-pole DRP.. motors	from 0.75 kW	to 75 kW	UR
6-pole DRP.. motors	from 0.75 kW	to 4 kW	UR

Motors with two nominal speeds	Lowest power rating	Highest power rating	Mark
4/2-pole DRS.. motors	from 4p: 0.25 kW from 2p: 0.37 kW	to 4p: 18.5 kW to 2p: 20 kW	UR
8/4-pole DRS.. motors	from 8p: 0.10 kW from 4p: 0.18 kW	to 8p: 18 kW to 4p: 34 kW	UR
8/2-pole DRS.. motors (S1/100%)	from 8p: 0.044 kW from 2p: 0.20 kW	to 8p: 1.1 kW to 2p: 4.6 kW	UR
8/2-pole DRS.. motors (S3/40/60%)	from 8p: 0.06 kW from 2p: 0.25 kW	to 8p: 1.1 kW to 2p: 4.6 kW	UR

Motors	Lowest torque	Highest torque	Mark
4-pole DRL.. motors	from 2.7 Nm	to 290 Nm	UR
12-pole DRM.. motors	from 0.6 Nm	to 8.1 Nm	UR

The efficiency on the nameplate represents the typical value that must be indicated under US standard NEMA MG1.

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Each motor's individual values are above standard and are included in the partial load data and depreciation projections, and therefore do not contradict the information required on the nameplate.

"ee" (CC056A) certified motors

The following list contains the motors certified by the US Department of Energy (DOE):

Motors	Lowest power rating	Highest power rating	Mark
2-pole DRE.. motors	from 0.75 kW	to 7.5 kW	ee (CC056A)
4-pole DRE.. motors	from 0.75 kW	to 225 kW	ee (CC056A)
6-pole DRE.. motors	from 0.75 kW	to 5.5 kW	ee (CC056A)

Motors	Lowest power rating	Highest power rating	Mark
2-pole DRP.. motors	from 0.75 kW	to 5.5 kW	ee (CC056A)
4-pole DRP.. motors	from 0.75 kW	to 75 kW	ee (CC056A)
6-pole DRP.. motors	from 0.75 kW	to 4 kW	ee (CC056A)

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 these motors with the "Not for use in the USA" sticker.

Example:

Planned changes

The US has enacted an amendment to the 10 CFR Part 431 Energy Conservation Program by the Department of Energy (DOE) to take effect on June 1st, 2016: Energy Conservation Standards for Commercial and Industrial Electric.

With this, some of the current exemptions will be nullified. These include, for example, brakemotors up to 22 kW and gearmotors. These will then also have to match the values in Table 12-12 of NEMA G1-2011. The values correspond to IE3 under IEC 60034-30-1 at 60 Hz.

2.5.8 Canada

Market access in Canada requires two primary features for use or export.

- CSA approval (CSA = Canadian Standard Association)
- EER2010 certificate

  EER = Energy Efficiency Rules

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CSA certificate

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

The models in the motor series can be ordered certified with the CSA mark on the nameplate.

Example:

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.

The following list includes the motors certified by the CSA.

Motors	**Lowest power rating**	**Highest power rating**	**Mark**
2-pole DRS.. motors	from 0.18 kW	to 1.1 kW	CSA
4-pole DRS.. motors	from 0.18 kW	to 1.1 kW	CSA
4-pole EDRS.. motors	from 0.18 kW	to 0.55 kW	CSA, HazLoc-NA®
4-pole DRK.. motors	from 0.18 kW	to 1.1 kW	CSA
6-pole DRS.. motors	from 0.18 kW	to 0.75 kW	CSA

Motors with two nominal speeds	**Lowest power rating**	**Highest power rating**	**Mark**
4/2-pole DRS.. motors	from 4p: 0.25 kW from 2p: 0.37 kW	to 4p: 18.5 kW to 2p: 20 kW	CSA
8/4-pole DRS.. motors	from 8p: 0.10 kW from 4p: 0.18 kW	to 8p: 18 kW to 4p: 34 kW	CSA
8/2-pole DRS.. motors (S1/100%)	from 8p: 0.044 kW from 2p: 0.20 kW	to 8p: 1.1 kW to 2p: 4.6 kW	CSA
8/2-pole DRS.. motors (S3/40/60%)	from 8p: 0.06 kW from 2p: 0.25 kW	to 8p: 1.1 kW to 2p: 4.6 kW	CSA

Motors	**Lowest torque**	**Highest torque**	**Mark**
4-pole DRL.. motors	from 2.7 Nm	to 290 Nm	CSA
12-pole DRM.. motors	from 0.6 Nm	to 8.1 Nm	CSA

SEW-EURODRIVE places the UL mark with the prefix "c" and suffix "us" on combinations of DR.. motors with MOVIMOT®. This verifies that UL has conducted all testing required by CSA and SEW-EURODRIVE has received certification for market access to Canada.

Example:

EER 2010

The Canadian legal requirements (EER = Energy Efficiency Rules) for minimum efficiency from 1997 were modified and renewed in 2010.

Since April 2010, the minimum efficiency for some AC motors has been elevated to Premium level.

This affects:

- 2-, 4- and 6-pole motors from 0.75 kW (1 hp) to 150 kW (200 hp). These must meet the Premium Efficiency level
- 2-, 4- and 6-pole motors from 185 kW (225 hp) to 375 kW (500 hp), and 8-pole motors from 0.75 kW (1 hp) to 375 kW (500 hp). These must meet the High Efficiency level

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.

Until July 1st, 2012, a separate energy efficiency label with its own mark was required, however the text "Energy Verified" under the CSA mark is sufficient, and use of the old mark is prohibited.

From July 1st, 2012

Energy Verified

A multitude of exceptions allow for the requirements to be reduced, with the following motors exempt or with reduced requirements:

- Gearmotors directly mounted onto the motor with no coupling between motor and gear box
- High torque/speed characteristics (IEC Design H or NEMA Design C) with simultaneous starting current ratio limitation
- Other mounting positions, e.g., flange-mounted motors
- Motors that are not designed for continuous duty
- Motors up to and including IEC Size 80, regardless of nominal power
- Motors only stamped for operation with inverters (asynchronous servomotors)
- Motors with integrated MOVIMOT® frequency inverters
- DRK.. single-phase motors with running capacitor

The following list contains the motors certified CSA and CSA Energy Verified:

Motors	Lowest power rating	Highest power rating	Mark
2-pole DRE.. motors	from 0.75 kW	to 7.5 kW	CSA Energy Verified
4-pole DRE.. motors	from 0.75 kW	to 225 kW	CSA Energy Verified

Motors	Lowest power rating	Highest power rating	Mark
4-pole EDRE.. motors	from 0.75 kW	to 45 kW	CSA Energy Verified HazLoc-NA®
6-pole DRE.. motors	from 0.75 kW	to 5.5 kW	CSA Energy Verified

Motors	Lowest power rating	Highest power rating	Mark
2-pole DRP.. motors	from 0.75 kW	to 5.5 kW	CSA Energy Verified
4-pole DRP.. motors	from 0.75 kW	to 75 kW	CSA Energy Verified
6-pole DRP.. motors	from 0.75 kW	to 4 kW	CSA Energy Verified

2.5.9 Brazil

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

- ABNT

  Associação Brasileira de Normas Técnicas
- NBR 17094-1

  Maquinas Eletricas Girantes - Motores de Inducao - Parte 1: Trifasicos

Legislation

With the passing of Law No. 10.295 in 2001, the Brazilian government established the legal basis for Decree No. 4.508, 533 and 243.

Decree No. 553 is an addendum to Decree No. 4.508. One of the new developments was a reversal on voluntary compliance with the efficiency class. Now, since December 8th, 2009, only motors with the efficiency class "Alto Rendimento" are allowed in Brazil.

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

ENCE stands for "Etiqueta Nacional de Conservaçã de Energia" (National Energy Conservation Label).

ABNT

Brazil's motor standard ABNT requires information on the nameplate in addition to that required by motor standard IE 60034:

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

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

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NBR 17094-1 (2008, expanded 2012)

The Brazilian legal requirements for minimum efficiency from 1998 were modified and expanded in 2012.

Since December 2009, the minimum efficiency for AC motors has been increased to approximately the High Efficiency level.

This affects:

- 2- and 4-pole motors from 0.75 kW (1 hp) to 185 kW (250 hp)
- 6-pole motors from 0.75 kW (1 hp) to 150 kW (200 hp)
- 8-pole motors from 0.75 kW (1 hp) to 110 kW (150 hp)

The motors are given the ENCE mark together with the Inmetro registration number of the production plant after certification.

Certification

Motors are certified by Inmetro. Inmetro (Instituto Nacional de Metrologia, Qualidade e Tecnologia) is the National Institute of Metrology, Quality and Technology of Brazil.

No certificate is issued upon certification, rather permission is given to use the ENCE label and to assign a registration number to each motor family.

Example:

The motor can only pass through Brazilian customs with the ENCE mark on the name-plate.

Inmetro registration number of SEW-EURODRIVE production plant on ABNT design only.

Country	2-pole	4-pole	6-pole
Brazil plant	001472/2013	001482/2013	001481/2013
France plant	001466/2013	001471/2013	001477/2013
Germany plant	-	001479/2013	001613/2013

The following list includes the motors certified by Inmetro (NBR 17094-1):

Motors	Lowest power rating	Highest power rating	Mark
2-pole DRE.. motors	from 0.75 kW	to 7.5 kW	ENCE
4-pole DRE.. motors	from 0.75 kW	to 225 kW	ENCE
6-pole DRE.. motors	from 0.75 kW	to 5.5 kW	ENCE

A number of exceptions allow for the requirements to be reduced, with the following motors exempt or with reduced requirements:

- Gearmotors indivisibly mounted directly on the motor without motor flange
- Motors only stamped for operation with inverters (asynchronous servomotors)
- Motors with integrated MOVIMOT® frequency inverter
- Motors that are not designed for continuous duty
- DRK.. single-phase motors with running capacitor
- Explosion-proof motors with EPL b (ATEX Category 2)

Not exempt are:

- Explosion-proof motors with EPL c (ATEX Category 3)

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2.5.10 People’s Republic of China

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

- GB 12350 (2009) – CCC
- GB 18613 (2012) – CEL

  GB = Gan Biao: national standard

GB 12350 (2009) – CCC

Chinese standard GB 12350 (2009) requires small devices to be certified and labeled, and documentation indicating the plant that produced the motor.

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 multi-speed motors exceeds the above mentioned limits, the entire motor is CCC-exempt. The motor only has to be labeled once all power ratings fall within the limits.

If the following conditions are met, the CCC mark 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

  and
- The motor is a stand-alone motor or a gearmotor

  and
- The motor is not built into a machine or system

Example:

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

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

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.

The following list includes the motors that are CCC certified:

Motors	Lowest power rating	Highest power rating	Mark
2-pole DRS.. motors	from 0.25 kW	to 0.55 kW	CCC
2-pole DRE.. motors	from 0.75 kW	to 2.2 kW	CCC
2-pole DRP.. motors	from 0.75 kW	to 2.2 kW	CCC
4-pole DRS.. motors	from 0.18 kW	to 0.55 kW	CCC
4-pole DRP.. motors	from 0.75 kW	to 1.1 kW	CCC

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Motors	Lowest power rating	Highest power rating	Mark
4-pole DRE.. motors	from 0.75 kW	to 1.1 kW	CCC
6-pole DRS.. motors	from 0.18 kW	to 0.55 kW	CCC
6-pole DRE.. motors	-	0.75 kW	CCC
6-pole DRP.. motors	-	0.75 kW	CCC
4/2-pole DRS.. motors[1]	from 4p: 0.25 kW from 2p: 0.37 kW	to 4p: 0.88 kW to 2p: 1.3 kW	CCC
8/4-pole DRS.. motors[1]	from 8p: 0.10 kW from 4p: 0.18 kW	to 8p: 0.44 kW to 4p: 0.88 kW	CCC
8/2-pole DRS.. motors (S1/100%)	from 8p: 0.044 kW from 2p: 0.20 kW	to 8p: 0.50 kW to 2p: 2.1 kW	CCC
8/2-pole DRS.. motors[1] (S3/40/60%)	from 8p: 0.06 kW from 2p: 0.25 kW	to 8p: 0.45 kW to 2p: 1.8 kW	CCC

1) CCC approval has been requested, please consult with SEW-EURODRIVE

NOTE: Motor sizes DT56 and DR63 are also CCC certified.

GB 18613 (2012) – CEL

Chinese standard GB 18613 (2012) contains the legal requirements on minimum efficiencies.

Since July 2007/September 2012, the minimum efficiency for AC motors has been increased to the High Efficiency level, which approximates class IE2 of IEC 60034-30.

The motors are labeled by China using a grade system. The following table shows the corresponding international motor standard in February 2013.

IEC 60034-30 IEC 60034-31	GB 18613 (2012)
IE1	-
IE2	Grade 3
IE3	Grade 2
IE4	Grade 1

This affects:

- 2-, 4- and 6-pole motors from 0.75 kW (1 hp) to 375 kW (500 hp)

Since September 2012, the following motors are excluded:

- 4- and 6-pole motors with 0.55 kW (0.75 hp)

  This power rating now comes in the standard design and without CEL.

A number of exceptions allow for the requirements to be reduced, with the following motors exempt or with reduced requirements:

- Multi-speed motors with two nominal speeds
- Gearmotors directly mounted onto the motor with no coupling between motor and gear box
- High torque/speed characteristics (IEC Design H) with simultaneous starting current ratio limitation

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- Motors that are not designed for continuous duty
- Motors only stamped for operation with inverters (asynchronous servomotors)
- Motors with integrated MOVIMOT® frequency inverter
- DRK.. single-phase motors with running capacitor
- Non-ventilated motors
- Brakemotors

Not exempt are:

- Motors with 9.2 kW
- Explosion-proof motors

The following list includes the motors that are certified and delivered with the corresponding grade sticker.

Motors	Lowest power rating	Highest power rating	Sticker
2-pole DRE.. motors	from 0.75 kW	to 9.2 kW	Grade 3
4-pole DRE.. motors	from 0.75 kW	to 200 kW	Grade 3
4-pole EDRE.. motors	from 0.75 kW	to 45 kW	Grade 3
6-pole DRE.. motors	from 0.75 kW	to 5.5 kW	Grade 3

The following list includes the motors that are certified and that can be delivered with the CEL Grade 2 sticker.

Motors	Lowest power rating	Highest power rating	Sticker
2-pole DRP.. motors	from 0.75 kW	to 5.5 kW	Grade 2
4-pole DRP.. motors	from 0.75 kW	to 160 kW	Grade 2
6-pole DRP.. motors	from 0.75 kW	to 4 kW	Grade 2

For logistical reasons, SEW-EURODRIVE has added the following information to each of the three 2012 grade stickers:

- Bar code
- Color ID field corresponding to the CEL color code
- SEW item number

Example:

12881105675 12881109003 12881112331

The motor can only pass through Chinese customs with the CEL sticker 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 on the motor nameplate.

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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.

2.5.11 South Korea REELS 2010 – KEL

In South Korea, AC motors must meet the requirements under REELS 2010 (REELS = Regulation of Energy Efficiency and Labeling Standard).

This affects:

- 2-, 4-, 6- and 8-pole motors from 0.75 kW (1 hp) to 375 kW (500 hp)

These motors must be delivered with an efficiency that corresponds to at least class IE2 (under IEC 60034-30:2008). An IE3 requirement (under IEC 60034-30:2008) and corresponding limits are not defined.

Each motor is given the Korea Energy Label (KEL). This sticker contains the following information:

- Type designation
- Number of poles
- Nominal power
- Efficiency
- Conversion into CO_2 g/a
- Monetary equivalent in South Korean won

All motors can pass through South Korean customs, with or without the KEL sticker or NON-KEL sticker. It is only decide at the setup and installation site whether or not the drive is correctly labeled and may be operated.

Example:

A number of exceptions allow for the requirements to be reduced or for a full exemption, with the following motors exempt or with reduced requirements:

- Multi-speed motors with two nominal speeds
- Gearmotors directly mounted onto the motor with no coupling between motor and gear box
- Motors in S2 short-time mode
- Motors only stamped for operation with inverters (asynchronous servomotors)
- Motors operated on an inverter Exception: Drives for fans, ventilators and pumps
- Motors with integrated MOVIMOT® frequency inverter
- DRK.. single-phase motors with running capacitor
- Non-ventilated motors (TENV, TEAO)

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2

Example:

9007207520049803

KEL certified motors

The following list includes the motors that are KEL certified.

Motors	Lowest power rating	Highest power rating	Sticker
2-pole DRE.. motors	from 0.75 kW	to 7.5 kW	KEL
4-pole DRE.. motors	from 0.75 kW	to 200 kW	KEL
6-pole DRE.. motors	from 0.75 kW	to 5.5 kW	KEL

Motors with NON-KEL

Only motors that normally require the KEL receive the NON-KEL if they are operated in "abnormal" conditions.

Example: A DRE90L4 with T = -20 °C to 40 °C requires and receives the KEL, since "... at refrigerant temperature under 50 °C". However, the same motor with a temperate range of T = -20 °C to 60 °C receives the NON-KEL.

Potentially abnormal conditions include:

- Temperatures < -15 °C
- Temperatures > 50 °C
- Installation higher than 1,000 m above sea level

2.5.12 Mexico

Generally, IE3 motors between 0.746 and 373 kW must be used in Mexico (corresponds to NEMA Premium Efficiency Level).

Mexican standard NOM-016-ENER-2010 has been required since December 2010. It applies for:

- AC motors with squirrel-cage motor rotor
- At nominal power from 0.746 to 373 kW
- With a nominal voltage of up to 600 V
- For open or enclosed designs
- Single-speed motors
- Mounted horizontally or vertically
- Continuous duty

The nameplate must be in Spanish. Mexico's exemptions are the same as those of the United States. The approved gearmotors are listed in Chapter "United States" (→ 🗎 31).

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2.5.13 Japan

The Top Runner program has been the approach to standards on energy efficiency in Japan since 1998.

Asynchronous motors will be added to the Top Runner program on April 1st, 2015.

This affects:

- 2-, 4- and 6-pole three-phase asynchronous motors from 0.75 kW to 375 kW
- Voltages below 1,000 V
- Frequencies 50 Hz, 60 Hz and 50/60 Hz
- Operating modes S1 or S3 above 80%

At this point, all motors meeting these conditions will have to operate at the efficiency stated in the Top Runner program. The required efficiencies under Japanese standard JIS C 4034-30:2011 correspond to the efficiencies under IEC 60034-30:2008 efficiency class IE3. The DRP.. type motors already meet these requirements.

Not included are motors for use in areas with risk of explosion as well as motors with forced cooling fans that are specially designed for use on inverters (DRL../V type motors).

The following table includes the motors that may be used under JIS 4034:

Motors	Lowest power rating	Highest power rating
2-pole DRP.. motors	from 0.75 kW	to 9.2 kW
4-pole DRP.. motors	from 0.75 kW	to 160 kW
6-pole DRP.. motors	from 0.75 kW	to 5.5 kW

2.5.14 Russia, Belarus, Kazakhstan

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

Motors marketed in Russia, Belarus or Kazakhstan after March 15th, 2015 must bear the EAC mark (Eurasian Conformity), similar to the European CE mark.

Example:

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.

All of the motors listed in this catalog meet the technical regulations of the Customs Union for low-voltage systems.

2.6 The global motor

Due to the large number of regulations, standards, and laws regarding the efficiency of an AC asynchronous motor which must be observed in international trade, SEW-EURODRIVE offers a standardized variant which complies with these comprehensive guidelines. This way, SEW-EURODRIVE reduces the materials our customers must manage and allows them to rely on SEW-EURODRIVE to be compliant and up to date.

The characteristic feature of the global motor is that nameplate displays both 50 Hz and 60 Hz specifications as well as elements required by law in each country.

2.6.1 Designs

There are two versions of the 2- and 4-pole global motor depending on power limit and energy efficiency regulations.

- DRS.. series motors are available up to and including 0.55 kW.
- DRE.. series motors with an energy efficiency mark are available starting from 0.75 kW.

There are three versions of the 6-pole general motor depending on power limits and energy efficiency regulations.

- DRS.. series motors are available for a power rating of 0.18 kW.
- DRE.. series motors are available up to and including 0.55 kW.
- DRE.. series motors with an energy efficiency mark are available starting from 0.75 kW.

2.6.2 Voltage

The voltage range enables 50 Hz and 60 Hz to be combined for the global motor. The following voltage block designs are typical for delta/wye connections (△/人) for a power rating of up to 45 kW.

Voltage blocks up to 55 kW

Type	Voltages at 50 Hz	Voltages at 60 Hz
Voltage block 1	220 – 242 V/380 – 420 V (△/人)	254 – 277 V/440 – 480 V (△/人)
Voltage block 2	175 – 190 V/304 – 330 V (△/人)	200 – 230 V/346 – 380 V (△/人)
Voltage block 3	380 – 420 V/660 – 725 V (△/人)	440 – 480 V/ ----- (△/人)

Voltage blocks from 75 kW

The specifications for the 60 Hz voltage are reduced to the nominal value at power ratings starting from 75 kW.

Type	Voltages at 50 Hz	Voltages at 60 Hz
Voltage block 1	220 – 242 V/380 – 420 V (△/人)	266/460 (△/人)
Voltage block 2	380 – 420 V/660 – 725 V (△/人)	460 V/ ----- (△/人)

Reductions to one voltage specification, either in a delta or wye connection, may be necessary due to options such as a plug connector.

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2.6.3 Combinations

The highest possible combination of energy efficiency regulations can be reached with a global motor for Europe, USA, Canada, Australia, New Zealand, China and Brazil. See No. 25 in the following table for more.

Table legend:

Icon	Meaning
x	Yes, this country is included in the global motor design
–	No, this country is not included in the global motor design

Overview of combinations:

No.	Europe	USA	Canada	Australia	New Zealand	PR China	Brazil
12	x	x	x	x	x	–	–
13	x	x	–	x	x	–	–
14	x	–	x	x	x	–	–
22	x	–	–	x	x	–	x
23	x	x	x	x	x	–	x
24	x	x	–	x	x	–	x
25	x	x	x	x	x	x	x
26	x	x	–	x	x	x	x
27	x	x	x	x	x	x	–
28	x	x	–	x	x	x	–
29	x	–	x	x	x	x	–

Example of mark:

CE	CE mark for Europe
E189357 5112749195	UR mark for USA
C US Energy Verified	CSA and CSAe marks for Canada
CC056A	ee mark for USA
	CEL mark for China
	CCC mark for China (if required)
	PROCEL mark for Brazil

The motors are given the marks after being certified with the ENCE mark together with the Inmetro registration number of the production plant.

The motor can only pass through Brazilian customs with the ENCE mark on the name-plate.

The Inmetro certificate is not included with the drive, since Brazilian customs can view the certificate on the Inmetro website by entering the plant registration number. This plant registration number is listed on the nameplate.

Even the global motor for Brazil must have a production plant ID on the nameplate. This number differs from the ID on just the ABNT design.

Inmetro registration number of production plant for DRE.. series global motors:

Country	2-pole	4-pole	6-pole
Brazil plant	-	001480/2013	-
France plant	001476/2013	001474/2013	001473/2013
Germany plant	-	001478/2013	001614/2013
China plant	000884/2014	001331/2014	000885/2014

2.6.4 Additional information on nameplates

Some national regulations require special information on the nameplate in addition to the information under IE 60034. Aside from the energy efficiency approval marks previously mentioned in this chapter, the following table contains the additional information and an example of a DRE90M4 (1.1 kW) global motor designed according to No. 25.

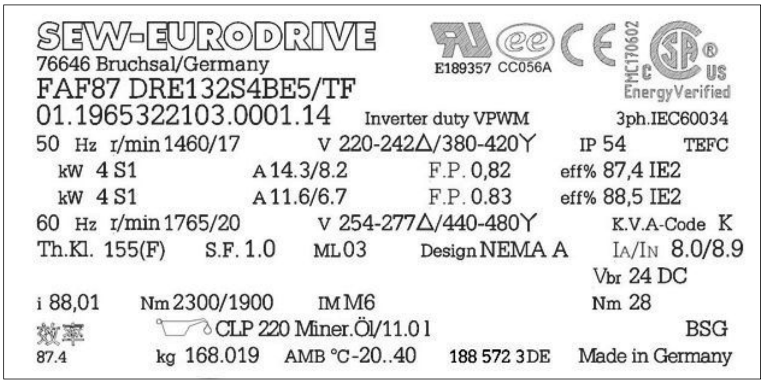
Overview of additional information:

No.	Country	Designation	Information required
1	USA	K.V.A. Code	From NEMA MG1 Ch. 10.37.2 Code letter for classifying short-circuit apparent power
2		ML	From UL/UR certification: Mounting Location = number of certified SEW-EURODRIVE assembly plant
3		S.F.	From NEMA MG1 Ch. 12.51 Permitted overload factor of motor (values 1.0, 1.1 or 1.15)
4		TEFC	From NEMA MG1 Ch. 1.26 Identification of type of protection: TEFC = totally enclosed, fan-cooled
5	USA (Canada)	Design	From NEMA MG1 Ch. 12.35 - 12.40 or from IEC 60034-12: Code letter for classifying speed/torque characteristics NEMA MG1: A, B or C IEC 60034: N or H
6	Canada	"…+40 °C"	From CSA C22: The temperature range of the motor must always be indicated
7	China	效率	From GB 18613:2012 Numerical value of motor efficiency
8		CCC	From GB 12350:2009 CCC mark upon delivery not built into a system or machine

No.	Country	Designation	Information required
9	Brazil	I_a/I_n	From ABNT: Starting current-to-nominal current ratio
10		(CCW) (CW)	From ABNT: Direction of motor shaft rotation looking from motor output shaft CCW: Counterclockwise CW: Clockwise
11		"...Alto rendimento..."	From ABNT/NBR 17094: Statement confirming this induction motor meets efficiency requirements
12		Storage	From ABNT: Sizes of A-side and B-side bearing
13		Wiring diagram(s)	According to standard ABNT: Wiring diagrams: Show how the jumpers must be arranged according to the voltages
14		design	According to standard ABNT: CAT N or CAT H

Example of the nameplate of a global motor:

Main nameplate



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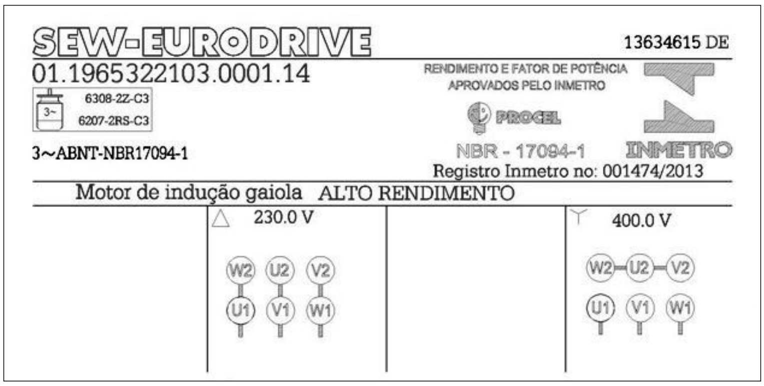
ABNT nameplate



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2.7 DRL.. series asynchronous servomotors

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

2.7.1 Product description of DRL.. motors

DRL.. asynchronous servomotors are a drive package made up from the many options of the DR.. modular motor system.

In its basic design, the drive package always includes:

- Encoder with sinusoidal signals
- Electronic nameplate in encoder for simple startup support
- Thermal motor protection in the form of a temperature sensor
- Dynamics package
- Various connection options
- Winding optimized for speed

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

- An absolute encoder or just a mounting adapter for encoders instead of a sine encoder
- Bimetallic switch in the winding instead of the thermal motor protection
- Plug connector instead of terminal box

Depending on the application and requirements, the following may be added:

- Brake or backstop
- Forced cooling fan
- Thermometer using KTY84-130 or PT100
- Canopy
- And many more

2.7.2 Properties of DRL.. motors: Dynamics

AC motors operated on the supply system usually have an overload capacity of 160-180% of the rated torque during startup.

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 provide higher current and therefore greater torque. The mechanical load capacity of the motor must be checked, which might reach or exceed the permitted limits.

As a rule, synchronous servomotors and the corresponding inverters are designed for a high short-time overload. Here, 400% of the nominal torque and higher is permitted.

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

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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 nominal torque
Dynamics 1 (D1)	190% – 220%
Dynamics 2 (D2)	300% – 350%

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

2.7.3 Properties of DRL.. motors: Speeds

In order to optimally adapt motor speed to the required control limits of the applications, SEW-EURODRIVE offers the DRL.. servomotors with the following 4 rated speeds:

- 1,200 rpm
- 1,700 rpm
- 2,100 rpm
- 3,000 rpm

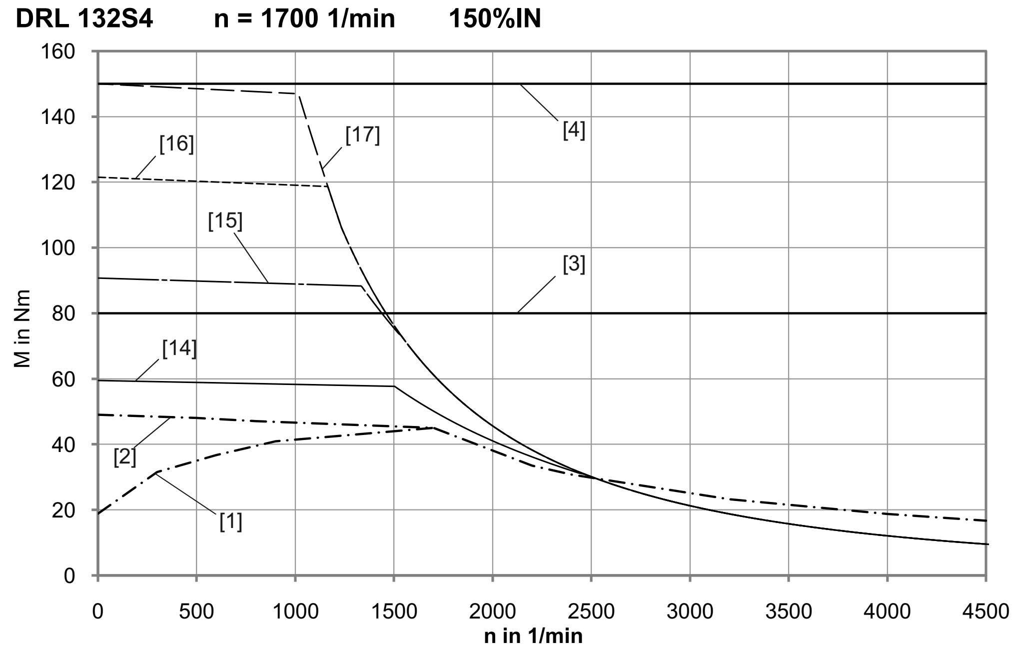
In inverter operation, field weakening begins at the rated speed.

2.7.4 Properties of DRL.. motors: Inverter combinations

The motors are optimally adapted for operation on MOVIDRIVE® drive inverters and MOVIAXIS® servo controllers.

Usually, the selection diagrams offer several inverter sizes. The size of the inverter which fits perfectly is based on the application data and project planning.

Example of a selection diagram for the MOVIDRIVE® drive inverter (dynamic and thermal limit characteristics):



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[1] S1 characteristic curve
[2] S1 characteristic curve with forced cooling fan
[3] Maximum limit torque of dynamics package 1
[4] Maximum limit torque of dynamics package 2
[14] 7.5 kW inverter power
[15] 11 kW inverter power
[16] 15 kW inverter power
[17] 22 kW inverter power

2.7.5 Properties of DRL.. motors: Startup

Encoders with an electronic nameplate make starting up motors on the MOVIDRIVE® drive inverter especially convenient.

The nameplate of the following encoders contain all drive-relevant data uploaded from the encoder to the drive inverter during startup:

- Incremental sine encoders
  - ES7S on motors DRL71S4 to DRL132MC
  - EG7S on motors DRL160M4 to DRL225MC4

  Sine encoders come standard in the basic design of the DRL.. motors
- Absolute encoders
  - AS7S on motors DRL71S4 to DRL132MC
  - AG7S on motors DRL160M4 to DRL225MC4

  Absolute encoders can be used with DRL.. motors instead of sine encoders

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2.8 DRM.. series torque motors

Torque motors are AC motors designed to operate with rated torque at idle. They are comparable with springs with endless spring travel.

Supply voltages and degrees of protection of torque motors correspond to those of DR.. AC motors.

2.8.1 Applications

Geared torque motors move flaps, gates or switches. They move press dies into die change position and, in all cases, serve as a drive in which a stop position must be reached and held following a short movement.

While under voltage, geared torque motors can also have their speed matched temporarily by another drive and then continue running under their own power.

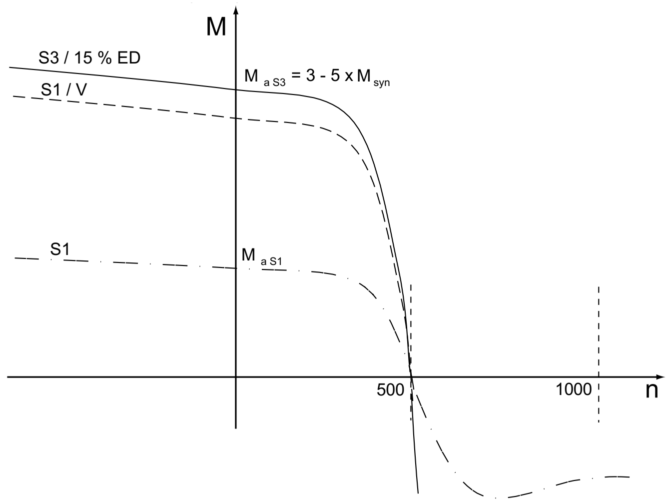
2.8.2 Properties of DRM.. motors: Operating mode

The electrical design enables torque motors to be continuously operated in S1 mode/ 100% cdf with the permitted starting torque. Higher starting frequency is possible without reducing torque.

Depending on size, the attainable torque is three to five times that of the S1 design when torque motors are operated in S3 mode/15% cdf. This operating mode is only permitted for a short period of time (15% cdf).

Torque motors can also be operated on continuous duty with forced cooling fan. Depending on size, torques up to three times that of the fan-cooled S1 variant can be continuously reached.

The following figure shows the three principal curves of the speed/torque characteristics for DRM.. torque motors.



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2.8.3 Properties of DRM.. motors: Dimensions

The dimensions of the DRM.. motors are identical to those of the DR.. motors of the same size, e.g., a DRE132M is the same as a DRM132M. The dimensions of the gearmotors can be found in the "DRE.. Gearmotors" catalog.

Geared torque motors are combined from a modular system just like gearmotors. Since torque motors develop less torque in comparison to DR.. motors of the same type due to thermal conditions, a greater range of possible combinations with gear units is available.

2.8.4 Properties of DRM.. motors: Combinations

Torque motors running idle without ventilation will produce greater thermal strain on the parts of the motor that would otherwise be cooled. This is why some options and designs cannot be combined, while others are only possible with additions to the motor.

For example, the terminal box must be thermally separated from the stator by an intermediate plate if the terminal box is to have a brake with a brake rectifier. The intermediate plate increases the height of the terminal box by about 9 – 10 mm.

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2.9 Functional safety (FS)

The DR.. series motors are available in a safety-rated version upon request.

- Safety-rated brakes BE05 – BE32
- Safety-rated encoders and encoder mounting adapters

MOVIMOT®, encoders, brakes or, if necessary, other accessories, can each or all be integrated into AC motors in a safety-rated manner.

SEW-EURODRIVE identifies such an integration with the FS mark and a number on the nameplate.

The number is a code that indicates which components in the drive are safety-rated. See the following code table for all products:

Functional safety	Inverter (e.g., MOVIMOT®)	Motor monitoring (e.g., motor protection)	Encoders	Brakes	Brake monitoring (e.g., function)	Manual brake release
01	x					
02				x		
03		x				
04			x			
05	x			x		
06	x	x				
07	x		x			
08				x		x
09				x	x	
10		x		x		
11			x	x		

If the FS mark on the nameplate contains the code "FS 11", for example, the motor is equipped with a combination of a safety-rated brake and a safety-rated encoder.

FS mark: FS 02

If the drive bears the FS mark on the nameplate, the information in the following documents must be observed:

- "Safety-Rated Brakes – Functional Safety for AC Motors DR.71-225" addendum to operating instructions
- "Safety-Rated Brakes – Functional Safety for AC Motors DR.71-225" addendum to operating instructions
- "MOVIMOT® MM..D Functional Safety" manual

These are included with the operating instructions.

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2.9.1 Brakes

The BE brake can also be included with a DR.. motor in a safety-rated version upon request.

This version is based on the regulations in EN 13849.

With a safety-rated brake, the following safety functions can be implemented to force a drive into idle and safely hold the drive in place.

- SBA (safe brake actuation)
- SBH (safe brake hold)

Additional information on safety-rated brakes can be found in "Safety-Rated Brakes – Functional Safety for AC Motors DR.71-225".

2.9.2 Encoders

The DR.. series motors can be equipped with an EI7C FS built-in encoder as well as with Type ES7S, EG7S, AS7W, AS7Y, AG7W and AG7Y safety-rated encoders.

Additional information on safety-rated encoders can be found in "Safety-Rated Encoders – Functional Safety for AC Motors DR.71-315".

2.9.3 MOVIMOT®

The safety technology of the MOVIMOT® MM..D was developed and tested according to the following safety requirements:

- Category 3 as per EN 954-1
- Performance level d as per EN ISO 13849-1
- SIL 2 as per IEC 61800-5-2

This was certified by TÜV Nord.

For the safety-related use of the MOVIMOT® MM..D, "Safe Torque Off" is defined as a safe condition (STO safety function). The underlying safety concept is based on this.

Additional information on the safety-related use of the MOVIMOT® MM..D can be found in the "MOVIMOT® MM..D Functional Safety" manual.

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2.10 Corrosion and surface protection

2.10.1 Preventive measures

SEW-EURODRIVE offers various optional preventive measures for operating motors under special environmental conditions.

These preventive measures comprise two groups:

- CP corrosion protection
- SP surface protection

For motors, optimal protection is offered through a combination of CP corrosion protection and SP surface protection.

In addition, special optional preventive measures for the output shafts are also available.

2.10.2 CP corrosion protection

CP corrosion protection for motors comprises the following measures:

- All retaining screws that are loosened during operation are made of stainless steel.
- The nameplates are made of stainless steel.
- Various motor parts are coated with a finishing varnish.
- Flange contact surfaces and shaft ends are treated with a temporary rust preventative.
- Additional measures for brakemotors.

A sticker labeled "KORROSIONSSCHUTZ" (corrosion protection) on the fan guard indicates special treatment has been applied.

INFORMATION

The following motor options are not available with CP corrosion protection:

- /V forced cooling fan

- Shaft-centered encoders /ES, /ES7, /EG, /EG7, /EV7, /AS, /AS7, /AG, /AG7, /AV7

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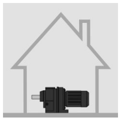
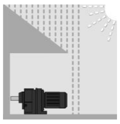
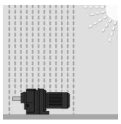
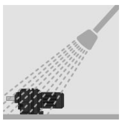
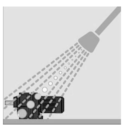
2.10.3 SP surface protection

In addition to standard surface protection, motors and gear units also available with surface protection SP1 to SP4. The special measure "Z" is also available. Special measure "Z" means that large contour recesses are filled with rubber before painting.

Surface protection[1)]		Ambient conditions	Sample applications
Standard		Suitable for machines and systems in buildings and indoor rooms with neutral atmospheres. Similar to corrosivity category[2)] : • C1 (negligible)	• Machines and systems in the automotive industry • Transport systems in logistics • Conveyor belts at airports
SP1		Suited for environments prone to condensation and atmospheres with low humidity or contamination, such as outdoor applications under roof or with protection. According to corrosivity category[2)]: • C2 (low)	• Systems in saw mills • Hall gates • Agitators and mixers
SP2		Suited for environments with high humidity or moderate atmospheric contamination, such as outdoor applications subject to direct weathering. According to corrosivity category[2)]: • C3 (moderate)	• Applications in amusement parks • Aerial tramways and chair-lifts • Applications in gravel plants • Systems in nuclear power plants
SP3		Suitable 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 load. According to corrosivity category[2)]: • C4 (high)	• Sewage treatment plants • Port cranes • Mining applications
SP4		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[2)]: • C5-1 (very high)	• Drives in malting plants • Wet areas in the beverage industry • Conveyor belts in the food industry

1) IP56 and IP66 motors/brakemotors are only available with SP2, SP3, or SP4 surface protection.
2) According to DIN EN ISO 12944-2 classification of ambient conditions

2.11 Humidity/acid protection and tropicalization

The motors DR63 – DR.315 are also available with humidity/acid protection for and tropicalization of the winding. This is additional protection for the winding. It does not protect the motor against corrosion. This can be achieved with the existing CS corrosion protection and SP surface protection options.

2.11.1 Humidity and acid protection

The motors are available with additional, optional winding protection. This design uses stators that have a resin-impregnated winding. The resins allow the motors to be used in high humidity conditions. The impregnation also includes increased resistance to solvents and solvent vapors.

2.11.2 Tropicalization

The motors are availabe with increased tropicalization. This design uses stators that are impregnated with highly hydrolysis-resistant resins. This allows the motors to be used in areas with increased air humidity and normal tropical climate conditions (according to ISO 62).

Tropicalization is often associated with protection against termite-related damages. The wire insulation materials and resins used in the motors meet this requirement.

2.11.3 Additional enhancement of protective properties

Since selecting the options "humidity and acid protection" and "tropicalization" implies use in a humid environment, the option "CP corrosion protection" is recommended in combination with at least the "SP2 surface protection" option.

2.12 Operating temperatures

The motors are designed for use in a temperature range between -20 °C and 40 °C.

This expands the standardized temperature range required by IEC 60034.

Using the motors outside the above temperature range is possible with some special adjustments. Please consult with SEW-EURODRIVE to find out which options are available.

Please observe Reg 4/2014 when determining the motor's IE class as required for EU/Europe.

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2.13 The motors at a glance

2.13.1 Motor data legend

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

P_N	Rated power
M_N	Rated torque for 50 Hz or 60 Hz, with number of poles if necessary
n_N	Rated speed for 50 Hz or 60 Hz, with number of poles if necessary
IE	Energy efficiency class as per IEC 60034-30:2008

INFORMATION

Please observe Reg 640/2009 and Reg 4/2014 regarding the the use of IE1 motors in EU/Europe being prohibited.

2.13.2 2-pole motors for 50/60 Hz, S1

DRS.. motor type

DRS.. motor type	P_N kW	M_{N_50Hz} Nm	n_{N_50Hz} rpm	M_{N_60Hz} Nm	n_{N_60Hz} rpm	IE
DRS71S2	0.18	0.61	2800	0.51	3400	IE1
DRS71S2	0.25	0.85	2800	0.7	3400	IE1
DRS71S2	0.37	1.26	2800	1.04	3400	IE1
DRS71M2	0.55	1.87	2810	1.53	3425	IE1
DRS80S2	0.75	2.55	2800	2.1	3440	IE1
DRS80M2	1.1	3.7	2840	3	3475	IE1
DRS90M2	1.5	5.1	2830	4.15	3470	IE1
DRS90L2	2.2	7.4	2820	6.1	3450	IE1
DRS100M2	3	10.1	2840	8.3	3465	IE1
DRS100LC2	4	13.2	2900	10.9	3520	IE1
DRS112M2	4	13.2	2900	10.9	3510	IE1
DRS132S2	5.5	18.2	2890	15	3500	IE1
DRS132M2	7.5	24.5	2910	20.5	3520	IE1
DRS132M2	9.2	30.5	2900	25	3505	IE1

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DRE.. motor type

DRE.. motor type	P_N kW	M_{N_50Hz} Nm	n_{N_50Hz} rpm	M_{N_60Hz} Nm	n_{N_60Hz} rpm	IE
DRE80M2	0.75	2.5	2890	2.05	3505	IE2
DRE90M2	1.1	3.65	2870	3	3485	IE2
DRE90L2	1.5	5	2840	4.15	3460	IE2
DRE100M2	2.2	7.3	2880	6	3495	IE2
DRE100L2	3	10.1	2850	8.2	3475	IE2
DRE112M2	4	13.2	2900	10.9	3510	IE2
DRE132M2	5.5	17.9	2935	14.8	3540	IE2
DRE132MC2	7.5	24.5	2940	20	3555	IE2

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2.13.3 4-pole motors for 50/60 Hz, S1

DRS.. motor type

DRS.. motor type	P_N kW	M_{N_50Hz} Nm	n_{N_50Hz} rpm	M_{N_60Hz} Nm	n_{N_60Hz} rpm	IE
DRS71S4	0.18	1.25	1380	1.01	1700	IE1
DRS71S4	0.25	1.72	1390	1.4	1700	IE1
DRS71S4	0.37	2.55	1380	2.1	1700	IE1
DRS71M4	0.55	3.85	1360	3.1	1700	IE1
DRS80S4	0.55	3.75	1400	3.05	1720	IE1
DRS80S4	0.75	5.1	1400	4.15	1720	IE1
DRS80M4	1.1	7.4	1410	6.1	1725	IE1
DRS90M4	1.5	10.3	1395	8.3	1720	IE1
DRS90L4	2.2	15	1400	12.2	1720	IE1
DRS100M4	3	20.5	1400	16.7	1720	IE1
DRS100LC4	4	26.5	1440	22	1750	IE1
DRS112M4	4	26.5	1435	22	1750	IE1
DRS132S4	5.5	36.5	1445	30	1750	IE1
DRS132M4	7.5	49.5	1445	41	1750	IE1
DRS132MC4	9.2	60	1465	49.5	1770	IE1
DRS160S4	9.2	60	1460	49.5	1770	IE1
DRS160M4	11	72	1460	59	1770	IE1
DRS160MC4	15	97	1470	81	1770	IE1
DRS180S4	15	98	1460	81	1765	IE1
DRS180M4	18.5	121	1465	100	1775	IE1
DRS180L4	22	143	1465	119	1770	IE1
DRS180LC4	30	195	1470	162	1770	IE1
DRS200L4	30	194	1475	161	1775	IE1
DRS225S4	37	240	1475	198	1780	IE1
DRS225M4	45	290	1480	240	1780	IE1
DRS225MC4	55	355	1480	295	1780	IE1

DRE.. motor type

DRE.. motor type	P_N kW	M_{N_50Hz} Nm	n_{N_50Hz} rpm	M_{N_60Hz} Nm	n_{N_60Hz} rpm	IE
DRE80S4	0.37	2.45	1435	2.05	1740	IE2
DRE80M4	0.55	3.65	1445	3	1755	IE2
DRE80M4	0.75	5	1435	4.1	1745	IE2
DRE90M4	1.1	7.4	1420	6.1	1735	IE2
DRE90L4	1.5	10	1430	8.2	1745	IE2

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DRE.. motor type	P_N kW	M_{N_50Hz} Nm	n_{N_50Hz} rpm	M_{N_60Hz} Nm	n_{N_60Hz} rpm	IE
DRE100L4	2.2	14.6	1440	12	1750	IE2
DRE100LC4	3	19.7	1455	16.3	1760	IE2
DRE112M4	3	19.7	1455	16.3	1760	IE2
DRE132S4	4	26	1460	21.5	1765	IE2
DRE132M4	5.5	36	1455	30	1760	IE2
DRE132MC4	7.5	48.5	1470	40.5	1775	IE2
DRE160S4	7.5	49	1465	40.5	1770	IE2
DRE160M4	9.2	60	1470	49.5	1775	IE2
DRE160MC4	11	71	1475	59	1780	IE2
DRE180S4	11	71	1470	59	1775	IE2
DRE180M4	15	97	1470	81	1775	IE2
DRE180L4	18.5	120	1470	100	1775	IE2
DRE180LC4	22	142	1480	118	1780	IE2
DRE200L4	30	194	1475	161	1780	IE2
DRE225S4	37	240	1477	198	1780	IE2
DRE225M4	45	290	1478	240	1780	IE2

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2.13.4 6-pole motors for 50/60 Hz, S1

DRE.. motor type

DRE.. motor type	P_N kW	M_{N_50Hz} Nm	n_{N_50Hz} rpm	M_{N_60Hz} Nm	n_{N_60Hz} rpm	IE
DRE71M6	0.25	2.6	910	2.1	1130	IE2
DRE80S6	0.37	3.8	935	3.1	1145	IE2
DRE80M6	0.55	5.6	935	4.6	1145	IE2
DRE90L6	0.75	7.6	940	6.3	1145	IE2
DRE100LC6	1.1	10.8	970	9	1170	IE2
DRE112M6	1.5	14.8	970	12.2	1170	IE2
DRE132M6	2.2	21.5	970	18	1170	IE2
DRE132M6	3	29.5	970	24.5	1170	IE2
DRE132M6	4	40	960	33	1165	IE2
DRE160M6	5.5	54	965	45	1170	IE2

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2.13.5 DR.., DRS.., DRE.., DRP.. motors, 50 Hz, 2-pole, S1

Motor type	DR.., DRS..				DRE..				DRP..			
	P_N kW	M_N 50 Hz Nm	n_N rpm	IE	P_N kW	M_N 50 Hz Nm	n_N rpm	IE	P_N kW	M_N 50 Hz Nm	n_N rpm	IE
DR63S2	0.18	0.63	2720	–	–	–	–	–	–	–	–	–
DR63M2	0.25	0.90	2660	–	–	–	–	–	–	–	–	–
DR63L2	0.37	1.30	2650	–	–	–	–	–	–	–	–	–
DRS71S2	0.25	0.85	2800	–	–	–	–	–	–	–	–	–
DRS71S2	0.37	1.31	2700	IE1	–	–	–	–	–	–	–	–
DRS71M2	0.55	1.87	2810	IE1	–	–	–	–	–	–	–	–
DRS80S2	0.75	2.55	2800	IE1	–	–	–	–	–	–	–	–
DR.80M2	1.1	3.7	2840	IE1	0.75	2.50	2890	IE2	0.75	2.50	2890	IE3
DR.90M2	1.5	5.1	2830	IE1	1.1	3.65	2870	IE2	1.1	3.65	2870	IE3
	–	–	–	–	1.5	5.10	2830	IE2	–	–	–	–
DR.90L2	2.2	7.4	2820	IE1	–	–	–	–	–	–	–	–
DR.100M2	3	10.1	2820	IE1	2.2	7.3	2880	IE2	1.5	4.95	2890	IE3
DR.100L2	–	–	–	–	3	10.1	2850	IE2	–	–	–	–
DR.100LC2	4	13.2	2900	IE1	–	–	–	–	3	9.8	2920	IE3
DR.112M2	4	13.2	2900	IE1	4	13.2	2900	IE2	3	9.8	2920	IE3
DR.132S2	5.5	18.2	2890	IE1	5.5	18.2	2890	IE2	4	13.1	2910	IE3
DR.132M2	7.5	24.5	2910	IE1	7.5	24.5	2910	IE2	5.5	17.9	2935	IE3
	9.2	30.5	2900	IE1	–	–	–	–	–	–	–	–
DR.132MC2	–	–	–	–	9.2	30	2935	IE2	–	–	–	–

Detailed motor data can be found in the chapter titled "Technical data" (→ 🗎 96).

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2.13.6 DT.., DR.., DRS.., DRE.., DRP.. motors, 50 Hz, 4-pole, S1

Motor type	DT.., DR.., DRS..				DRE..				DRP..			
	P_N kW	M_N 50 Hz Nm	n_N rpm	IE	P_N kW	M_N 50 Hz Nm	n_N rpm	IE	P_N kW	M_N 50 Hz Nm	n_N rpm	IE
DT56M4	0.09	0.66	1300	–	–	–	–	–	–	–	–	–
DT56L4	0.12	0.88	1300	–	–	–	–	–	–	–	–	–
DR63S4	0.12	0.83	1380	–	–	–	–	–	–	–	–	–
DR63M4	0.18	1.30	1320	–	–	–	–	–	–	–	–	–
DR63L4	0.25	1.80	1300	–	–	–	–	–	–	–	–	–
DRS71S4	0.18	1.25	1380	IE1	–	–	–	–	–	–	–	–
	0.25	1.72	1390	IE1	–	–	–	–	–	–	–	–
	0.37	2.55	1380	IE1	–	–	–	–	–	–	–	–
DRS71M4	0.55	3.85	1360	IE1	–	–	–	–	–	–	–	–
DR.80S4	0.75	5.1	1400	IE1	0.25	1.66	1440	–	–	–	–	–
	–	–	–	–	0.37	2.45	1435	IE2	–	–	–	–
DR.80M4	1.1	7.4	1410	IE1	0.55	3.65	1445	IE2	–	–	–	–
	–	–	–	–	0.75	5	1435	IE2	–	–	–	–
DR.90M4	1.5	10.3	1395	IE1	1.1	7.4	1420	IE2	0.75	4.95	1450	IE3
DR.90L4	2.2	15	1400	IE1	1.5	10	1430	IE2	1.1	7.3	1440	IE3
DR.100M4	3	20.5	1400	IE1	2.2	14.7	1425	IE2	1.5	9.9	1440	IE3
DR.100L4	–	–	–	–	–	–	–	–	2.2	14.6	1440	IE3
DR.100LC4	4	26.5	1440	IE1	3	19.7	1455	IE2	–	–	–	–
DR.112M4	4	26.5	1435	IE1	3	19.7	1455	IE2	3	19.7	1455	IE3
DR.132S4	5.5	36.5	1445	IE1	4	26	1460	IE2	–	–	–	–
DR.132M4	7.5	49.5	1445	IE1	5.5	36	1455	IE2	4	26	1465	IE3
DR.132MC4	9.2	60	1465	IE1	7.5	48.5	1470	IE2	5.5	35.5	1475	IE3
DR.160S4	9.2	60	1460	IE1	7.5	49	1465	IE2	5.5	35.5	1475	IE3
DR.160M4	11	72	1460	IE1	9.2	60	1470	IE2	7.5	48.5	1470	IE3
DR.160MC4	15	97	1470	IE1	11	71	1475	IE2	9.2	60	1475	IE3
DR.180S4	15	98	1460	IE1	11	71	1470	IE2	9.2	60	1475	IE3
DR.180M4	18.5	121	1465	IE1	15	97	1470	IE2	11	71	1475	IE3
DR.180L4	22	143	1465	IE1	18.5	120	1470	IE2	15	97	1475	IE3
DR.180LC4	30	195	1470	IE1	22	142	1480	IE2	18.5	119	1480	IE3
DR.200L4	30	194	1475	IE1	30	194	1475	IE2	18.5	119	1483	IE3
	–	–	–	–	–	–	–	–	22	142	1482	IE3
DR.225S4	37	240	1475	IE1	37	240	1477	IE2	30	194	1480	IE3
DR.225M4	45	290	1480	IE1	45	290	1478	IE2	37	240	1482	IE3

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Motor type	DT.., DR.., DRS..				DRE..				DRP..			
	P_N kW	M_N 50 Hz Nm	n_N rpm	IE	P_N kW	M_N 50 Hz Nm	n_N rpm	IE	P_N kW	M_N 50 Hz Nm	n_N rpm	IE
DR.225MC4	55	355	1480	IE1	–	–	–	–	–	–	–	–
DR.250M4	55	355	1479	IE1	55	355	1479	IE2	45	290	1482	IE3
DR.280S4	75	485	1480	IE1	75	485	1480	IE2	55	355	1482	IE3
DR.280M4	90	580	1478	IE1	90	580	1478	IE2	75	485	1479	IE3
DR.315K4	110	710	1482	IE1	110	710	1483	IE2	90	580	1484	IE3
DR.315S4	132	850	1484	IE1	132	850	1483	IE2	110	710	1486	IE3
DR.315M4	160	1030	1483	IE1	160	1030	1484	IE2	132	850	1488	IE3
DR.315L4	200	1290	1481	IE1	200	1290	1482	IE2	160	1030	1488	IE3

Detailed motor data can be found in the chapter titled "Technical data" (→ 🗎 99).

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2.13.7 DR.., DRS.., DRE.., DRP.. motors, 50 Hz, 6-pole, S1

Motor type	DR.., DRS..				DRE..				DRP..			
	P_N kW	M_N 50 Hz Nm	n_N rpm	IE	P_N kW	M_N 50 Hz Nm	n_N rpm	IE2	P_N kW	M_N 50 Hz Nm	n_N rpm	IE
DR63S6	0.09	0.95	900	–	–	–	–	–	–	–	–	–
DR63M6	0.12	1.2	900	–	–	–	–	–	–	–	–	–
DR63L6	0.18	2	870	–	–	–	–	–	–	–	–	–
DR.71S6	0.18	1.91	900	–	–	–	–	–	–	–	–	–
	0.25	2.65	895	–	–	–	–	–	–	–	–	–
DR.71M6	0.37	3.9	905	–	0.25	2.6	910	–	–	–	–	–
DR.80S6	0.55	5.7	915	–	0.37	3.8	935	–	–	–	–	–
DR.80M6	0.75	7.8	915	IE1	0.55	5.6	935	–	–	–	–	–
DR.90L6	1.1	11.3	930	IE1	0.75	7.6	940	IE2	0.75	7.6	940	IE3
DR.100M6	1.5	15.5	925	IE1	1.1	11.2	940	IE2	–	–	–	–
DR.100L6	–	–	–	–	1.5	15.2	940	IE2	1.1	11.1	950	IE3
DR.100LC6	2.2	22	955	IE1	–	–	–	–	–	–	–	–
DR.112M6	2.2	22	955	IE1	2.2	22	955	IE2	1.5	14.8	965	IE3
	3	30.5	945	IE1	–	–	–	–	–	–	–	–
DR.132S6	4	40.5	940	IE1	3	30	955	IE2	2.2	22	965	IE3
DR.132M6	–	–	–	–	4	40	960	IE2	3	29.5	970	IE3
DR.132MC6	5.5	54	970	IE1	5.5	54	970	IE2	4	39	980	IE3
DR.160S6	5.5	55	960	IE1	–	–	–	–	–	–	–	–
DR.160M6	7.5	75	955	IE1	5.5	54	965	IE2	4	39	975	IE3

Detailed motor data can be found in the chapter "Technical Data" (→ 🗎 106).

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2.13.8 DRS.. motors, 50/60 Hz, 2- and 4-pole, S1

2-pole DRS.. motors for 50/60 Hz, IE1

Motor type DRS..	P_N	M_{N_50Hz}	n_{N_50Hz}	M_{N_60Hz}	n_{N_60Hz}	IE
	kW	Nm	rpm	Nm	rpm	
DRS90M2	1.5	5.1	2830	4.15	3470	IE1
DRS90L2	2.2	7.4	2820	6.1	3450	IE1
DRS100M2	3	10.1	2840	8.3	3455	IE1
DRS100LC2	4	13.2	2900	10.9	3520	IE1
DRS112M2	4	13.2	2900	10.9	3510	IE1
DRS132S2	5.5	18.2	2890	15	3500	IE1
DRS132M2	7.5	24.5	2910	20.5	3520	IE1
DRS132M2	9.2	30.5	2900	25	3505	IE1

4-pole DRS.. motors for 50/60 Hz, IE1

Motor type DRS..	P_N	M_{N_50Hz}	n_{N_50Hz}	M_{N_60Hz}	n_{N_60Hz}	IE
	kW	Nm	rpm	Nm	rpm	
DRS80S4	0.55	3.75	1400	3.05	1720	IE1
DRS80S4	0.75	5.1	1400	4.15	1720	IE1
DRS80M4	1.1	7.4	1410	6.1	1725	IE1
DRS90M4	1.5	10.3	1395	8.3	1720	IE1
DRS90L4	2.2	15	1400	12.2	1720	IE1
DRS100M4	3	20.5	1400	16.7	1720	IE1
DRS100LC4	4	26.5	1445	22	1750	IE1
DRS112M4	4	26.5	1435	22	1750	IE1
DRS132S4	5.5	36.5	1445	30	1750	IE1
DRS132M4	7.5	49.5	1445	41	1750	IE1
DRS132MC4	9.2	60	1465	49.5	1770	IE1
DRS160S4	9.2	60	1460	49.5	1770	IE1
DRS160M4	11	72	1460	59	1770	IE1
DRS160MC4	15	97	1470	81	1770	IE1
DRS180S4	15	98	1460	81	1765	IE1
DRS180M4	18.5	121	1465	100	1775	IE1
DRS180L4	22	143	1465	119	1770	IE1
DRS180LC4	30	195	1470	162	1770	IE1
DRS200L4	30	194	1475	161	1775	IE1
DRS225S4	37	240	1475	198	1780	IE1
DRS225M4	45	290	1480	240	1780	IE1
DRS225MC4	55	355	1480	295	1780	IE1

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2.13.9 DRS.. motors, 50 Hz, 2-pole, S3/75%

Motor type DRS..	P_N	M_N	n_N
	kW	Nm	rpm
DRS71M2	0.6	2.05	2795
DRS80S2	0.8	2.75	2775
DRS80M2	1.2	4.06	2820
DRS90M2	1.6	5.44	2810
DRS90L2	2.4	8.21	2790
DRS100M2	3.3	11.2	2820
DRS100LC2	4.4	14.5	2895
DRS112M2	4.4	14.6	2885
DRS132S2	6	20	2870
DRS132M2	10	33.2	2880

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2.13.10 DRS../DRE.. motors, 50 Hz, 4-pole, S3/75%

DR.. motor type	DRS.. S3/75%			DRE.. S3/75%		
	P_N	M_N	n_N	P_N	M_N	n_N
	kW	Nm	rpm	kW	Nm	rpm
DR.71S4	0.4	2.8	1365	–	–	–
DR.71M4	0.6	4.23	1355	–	–	–
DR.80S4	0.8	5.48	1395	0.4	2.67	1430
DR.80M4	1.2	8.18	1400	0.82	5.48	1430
DR.90M4	1.6	11.1	1380	1.2	8.13	1410
DR.90L4	2.5	17.3	1380	1.7	11.4	1420
DR.100M4	3.3	22.8	1380	2.4	16.2	1415
DR.100LC4	4.4	29.3	1435	3.3	21.7	1450
DR.112M4	4.4	29.3	1435	3.3	21.7	1450
DR.132S4	6	39.8	1440	4.4	28.9	1455
DR.132M4	8	53.4	1430	6	39.6	1445
DR.132MC4	10	65.2	1465	8	52.1	1465
DR.160S4	10	65.6	1455	8	52.3	1460
DR.160M4	12	78.5	1460	10	65.2	1465
DR.160MC4	16	104	1465	12	77.7	1475
DR.180S4	16	105	1460	12	78	1470
DR.180M4	20	130	1465	16	104	1470
DR.180L4	24	157	1460	20	130	1470
DR.180LC4	33	214	1470	24	155	1480
DR.200L4	33	214	1470	33	214	1470
DR.225S4	40	259	1475	40	259	1475
DR.225M4	48	311	1475	48	311	1476
DR.225MC4	60	387	1480	–	–	–

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2.13.11 DRS.. motors, 50 Hz, 6-pole, S3/75%

Motor type DRS..	P_N	M_N	n_N
	kW	Nm	rpm
DRS71S6	0.28	3.07	870
DRS71M6	0.4	4.29	890
DRS80S6	0.6	6.37	900
DRS80M6	0.8	8.39	910
DRS90L6	1.2	12.5	920
DRS100M6	1.6	16.5	925
DRS100LC6	2.4	24.1	950
DRS112M6	3.3	33.7	935
DRS132S6	4.4	45.2	930
DRS132MC6	6	59.4	965
DRS160S6	6	59.4	965
DRS160M6	8.2	82.4	950

2.13.12 DRS.. motor, 50 Hz, 4/2-pole, Dahlander connection, S1

DR.. motor type	P_n	$M_{N\text{-}50Hz\text{-}4pole}$	$n_{N\text{-}4pole}$	$M_{N\text{-}50Hz\text{-}2pole}$	$n_{N\text{-}2pole}$
	kW	Nm	rpm	Nm	rpm
DR63M4/2	0.15/0.20	1.05	1370	0.70	2710
DR63L4/2	0.20/0.28	1.39	1370	0.99	2710
DRS71S4/2	0.25/0.37	1.71	1400	1.30	2720
DRS71M4/2	0.40/0.63	2.75	1380	2.25	2660
DRS80S4/2	0.55/0.88	3.60	1455	2.95	2860
DRS90M4/2	0.88/1.3	5.90	1430	4.45	2780
	1.2/1.8	8	1440	6.20	2780
DRS100M4/2	1.5/2.2	10	1430	7.40	2840
DRS100L4/2	2.5/3	17.1	1400	10.1	2840
DRS132S4/2	3.3/4	21.5	1450	13.1	2915
DRS132M4/2	4.4/5.5	28.9	1455	17.9	2930
DRS160S4/2	6/7.5	39	1470	24.5	2950
DRS160M4/2	8.8/11	57	1465	35.5	2940
DRS180L4/2	13/15	84	1475	48.5	2960
DRS180L4/2	18.5/20	120	1470	64.5	2960

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2.13.13 DRS.. motor, 50 Hz, 8/4-pole, Dahlander connection, S1

Motor type DRS..	P_n kW	$M_{N-50Hz-8pole}$ Nm	$n_{N-8pole}$ rpm	$M_{N-50Hz-4pole}$ Nm	$n_{N-4pole}$ rpm
DRS71S8/4	0.10/0.18	1.39	685	1.23	1400
DRS71M8/4	0.16/0.30	2.25	685	2.05	1400
DRS80M8/4	0.22/0.40	2.95	710	2.65	1440
DRS90M8/4	0.30/0.60	4.05	710	4	1440
DRS90L8/4	0.44/0.88	6	700	5.90	1425
DRS100M8/4	0.66/1.30	9.1	690	8.7	1420
DRS100L8/4	0.90/1.8	12.5	690	12.2	1410
DRS112M8/4	1.2/2.2	17	675	15.1	1390
DRS132S8/4	1.6/3.3	22.5	680	23	1385
DRS132M8/4	2.1/4.2	29.5	680	29	1390
DRS160S8/4	2.7/5.5	35.5	725	35.5	1470
DRS160M8/4	3.8/7.5	49.5	730	48.5	1470
DRS180S8/4	5.5/10	72	730	65	1465
DRS180L8/4	7.5/15	97	735	97	1470
DRS200L8/4	11/22	143	735	142	1475
DRS225S8/4	14/28	182	735	181	1475
DRS225M8/4	18/34	230	740	220	1475

2.13.14 DRS.. motor, 50 Hz, 8/2-pole, separate winding, S3 40/60%

Motor type DRS..	P_n kW	$M_{N-50Hz-8pole}$ Nm	$n_{N-8pole}$ rpm	$M_{N-50Hz-2pole}$ Nm	$n_{N-2pole}$ rpm
DRS71S8/2	0.06/0.25	0.84	685	0.83	2870
DRS71M8/2	0.08/0.37	1.12	685	1.24	2855
DRS71M8/2	0.10/0.40	1.43	670	1.34	2840
DRS71M8/2	0.11/0.44	1.56	675	1.47	2860
DRS80S8/2	0.15/0.60	2.15	660	2.15	2710
DRS80M8/2	0.22/0.90	3.10	680	3.10	2780
DRS90M8/2	0.30/1.30	4.05	710	4.30	2880
DRS90L8/2	0.45/1.80	6	720	5.90	2905
DRS100M8/2	0.60/2.40	8.1	710	7.90	2890
DRS112M8/2	0.80/3	10.8	710	10.4	2750
DRS132M8/2	1.10/4.60	14.8	710	15.8	2800

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2.13.15 DRS.. motor, 50 Hz, 8/2-pole, separate winding, S1

Motor type DRS..	P_n kW	$M_{N\text{-}50Hz\text{-}8pole}$ Nm	$n_{N\text{-}8pole}$ rpm	$M_{N\text{-}50Hz\text{-}2pole}$ Nm	$n_{N\text{-}2pole}$ rpm
DRS71S8/2	0.044/0.20	0.61	685	0.67	2870
DRS80S8/2	0.15/0.60	2.17	660	2.17	2645
DRS80M8/2	0.22/0.90	3.09	680	3.09	2780
DRS90L8/2	0.37/1.60	4.98	710	5.29	2890
DRS100M8/2	0.50/2.10	6.68	715	6.91	2900
DRS132M8/2	1.10/4.60	14.8	710	15.8	2785

2.13.16 4-pole DRL.. motors for system voltage 400 V, 50 Hz

DRL.. motor type	M_N in Nm				M_{pk}		J_{Mot}
	1200 rpm	1700 rpm	2100 rpm	3000 rpm	D1 Nm	D2 Nm	10^{-4} kgm^2
DRL71S4	2.7	2.7	2.6	2.5	5	8.5	4.9
DRL71M4	4	4	3.8	3.6	7	14	7.1
DRL80S4	6.5	6.5	6.2	6	10	25	14.9
DRL80M4	9.5	9.5	9.5	8.8	14	30	21.5
DRL90L4	15	15	15	14	25	46	43.5
DRL100L4	26	26	25	21	40	85	68
DRL132S4	42	42	41	35	80	150	190
DRL132MC4	56	56	52	42	130	200	340
DRL160M4	85	85	85	79	165	280	450
DRL160MC4	90	90	88	83	185	320	590
DRL180S4	120	120	110	100	210	380	900
DRL180M4	135	135	130	105	250	430	1110
DRL180L4	165	165	160	130	320	520	1300
DRL180LC4	175	175	170	140	420	600	1680
DRL220L4	200	200	195	165	475	680	2360
DRL225S4	250	245	235	195	520	770	2930
DRL225MC4	290	280	265	220	770	1100	4330

Detailed motor data can be found in the chapter "Technical Data" (→ 🗎 117).

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2.13.17 12-pole DRM.. torque motors, 50 Hz

Motor type DRM..	M_0 in Nm	M_0 in Nm	M_0 in Nm
	fan-cooled		forced air cooling
	S1 duty cycle	S3 duty cycle (15%)	S1 duty cycle
DRM71S12	0.7	2.6	1.9
DRM71M12	0.9	3	2.7
DRM90M12	1.3	6.2	3.9
DRM100M12	2.3	10.4	5
DRM100L12	2.6	11.7	7
DRM132S12	2.9	12.9	7.2
DRM132M12	3.6	17.3	8.7

Detailed motor data can be found in the chapter "Technical Data" (→ 🗎 116).

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2.14 Material overview of the DR.. motor series

The concept of the motor is based on the reuse and multiple use of parts irrespective of size.

This allows the extensive modular motor concept to ensure a wide range of variants with a manageable number of parts.

The following table shows a simplified overview of the materials used.

Component part	Sizes / Material	DR.71-132	DR.160-180	DR.200-225	DR.280-315
Shaft	Steel	C45			
Storage	Deep groove ball bearing	Series 62.. and 63..			
	Cylindrical roller bearing	-			NU 3…
Laminated core rotor/stator	IE1 / IE2 / IE3	high-permeable cold-rolled dynamo or semi-finished sheet metal			
Rotor cage	Aluminum	DG-$AlSi_9Cu_2$ DG-$AlSi_{12}Cu$			
	Copper	-	DG-Cu99.9		-
Seals	Oil seals	NBR			
		FKM			
A-flanges	Gray-cast iron	GG20			
	Aluminum	$AlSi_9Cu_2$	-		
Stator housing	Aluminum	$AlSi_9Cu_2$			-
	Gray-cast iron	-	GG20		
Bed plate	Aluminum	$AlSi_9Cu_2$	-		
Individual feet	Gray-cast iron	-	GG20		
B-flanges	Gray-cast iron	GG20			
	Aluminum	DR.71 – 80: $AlSi_9Cu_2$			
Terminal boxes	Aluminum	$AlSi_9Cu_2$			-
	Gray cast iron	GG20			
Insulation	Surfaces	DuPont NOMEX®MNM			
Winding	Copper + paint	Cu99.9+1L			
		Cu99.9+2L or Cu99.9+2L/Si			
Terminal boards	Socket	Polyester resin molding compound PMV ISO 14530-UP-2			
	Terminal stud	$CuZn_{39}Pb_3$ or $CuZn_{37}$			
Plug connector	SEW-EURODRIVE	PA6	-		
	Harting	PO6			-
Fan	Plastic	PO6			
	Aluminum	$AlSi_9Cu_2$			
	Gray-cast iron	GG20		-	
Fan guard	Galvanized sheet steel	ST37 (Zn)			
	Aluminum	$AlSi_9Cu_2$			

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3 General project planning information

3.1 EMC measures

3.1.1 EMC directive 2004/108/EC

AC motors, AC brakemotors and MOVIMOT® drives from SEW-EURODRIVE are components for installation in machinery and systems. The originator of the machine or system is responsible for complying with the EMC Directive 2004/108/EC.

For specific information on MOVIMOT® drives, refer to the "Drive System for Decentralized Installation" system manual.

3.1.2 Line operation

SEW-EURODRIVE AC (brake)motors satisfy the EMC generic standards EN 50081 and EN 50082 when used in accordance with their designated use in continuous duty. No interference prevention measures are required.

3.1.3 Switching operation

For switching operation of the motor, please take suitable measures for suppressing interference from the switchgear.

3.2 Inverter operation

3.2.1 Installation note

For the duty cycle of AC motors of series DR.., refer to the installation and EMC instructions provided by the inverter manufacturer.

Please also observe the information in chapter "Drive selection – controlled motor" (→ 🗎 179) and the following project planning guidelines.

3.2.2 Brake motors on the 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.

3.2.3 Connection of a speed sensor to the inverter

Observe the following instructions when connecting the tachometer:

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

In this regard, please also observe the information in chapter "Drive selection – controlled motor" (→ 🗎 179)

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3.2.4 Connection of a PTC thermistor (TF) to the inverter

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

3.3 Safe switching of inductances

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

3.3.1 Switching of motor windings with a high number of poles

If the cable is installed unfavorably, switching of low-speed motor windings can generate voltage peaks. Voltage peaks can damage windings and contacts. To avoid this, install the incoming cables with varistors.

3.3.2 Switching of brake coils

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

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

- Use switch contacts in utilization category AC-3 according to EN 60947-4-1 for switching the motor and the brake.
- Use switch contacts in utilization category DC-3 according to EN 60947-4-1 for switching the brake with DC 24 V.

3.3.3 Suppressor circuit on the switching devices

According to EN 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 switching operations, we recommend installing suppressor circuits on the switching devices.

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3.4 Energy-efficient motors

Due to their higher costs and inertia of the rotor, energy-efficient motors are not suitable for all applications. Important requirements for an economically and ecologically suitable application are:

- High number of daily operating hours
- Majority of operation with high capacity utilization
- Few starting and braking operations
- Combination with gear units that also feature a high efficiency

3.4.1 Application Examples

For example, a garage door drive that is operated twice a day and reaches the output speed by using a helical-worm gear unit should not be an energy efficient motor. The additional costs cannot be justified.

The indexing mechanism that operates a slider or cam follower 60 times per minute should not be an energy efficient motor. The starting energy increases due to the higher rotor mass.

In such applications, an energy efficient motor actually consumes more energy than a standard motor.

But a conveyor belt that transports material in the cement plant all day long, cooling tower drives, agitators, drives in wastewater treatment plants, etc. benefit significantly from using an energy efficient motor and save the plant operator money.

The energy consumption of electric drives with asynchronous motors can be considerably reduced if all existing means such as process optimization with electronic control end energy efficient motors are used in a meaningful way and in combination.

By using all design options for building an energy efficient motor, the DR.. motor offers an excellent platform for saving electrical energy.

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4 Overview of types and unit designation

4.1 Versions and options for the motor series DR..

The type designations of the motor series DR.. and the versions and options are listed in the following tables.

4.1.1 Designation of the motors

Design	Description
DRS..	Standard motor, Standard Efficiency IE1
DRE..	Energy-efficient motor, High Efficiency IE2
DRP..	Energy-efficient motor, Premium Efficiency IE3
DRU..	Energy efficient motor, Super Premium Efficiency IE4
DRL..	Asynchronous servomotor
DRK..	Single-phase motor with running capacitor
DRM..	Torque motor: Torque motor for operation at speed n = 0
DR..J[1]	Line start permanent magnet motor
71 – 315	Sizes: 71 / 80 / 90 / 100 / 112 / 132 / 160 / 180 / 200 / 225 / 250 / 280 / 315
K – L, MC, LC	Lengths: K= very short / S = short / M = medium / L = long MC/LC = Rotors with copper cage
2, 4, 6, 8/2, 8/4, 4/2	Number of poles

1) Detailed information about this motor type is provided in a separate document

4.1.2 Output options

Option	Description
/FI	IEC foot-mounted motor with specification of axis height
/FF	IEC flange-mounted motor with bore
/FT	IEC flange-mounted motor with threads
/FL	General flange-mounted motor (other than IEC)
/FG	7-series integral motor, as stand-alone motor
/FM	7 series integral gearmotor with IEC feet, with specification of shaft height if required
/FE	IEC flange-mounted motor with bore holes and IEC feet, with specification of shaft height
/FY	IEC flange-mounted motor with thread and IEC feet, with specification of shaft height if required
/FK	General flange-mounted motor (other than IEC) with feet, with specification of shaft height if required
/FC	C-face flange-mounted motor, dimensions in inch

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Option	Description
/F.A	Universal foot-mounted variant, with specification of shaft height, only DR. 250/280, feet pre-assembled
/F.B	Universal foot-mounted variant, with specification of shaft height, only DR. 250/280, feet included separately

4.1.3 Mechanical attachments

Design	Description
BE..	Spring-loaded brake with specification of size
HR	Manual brake release of the brake, automatic disengaging function
HF	Manual brake release, lockable

Option	Description
/RS	Backstop
/MSW	MOVI-SWITCH®
/MI	Motor identification module for MOVIMOT®
/MM03 – MM40	MOVIMOT®
/MO	One or several MOVIMOT® option(s)

4.1.4 Temperature sensor / temperature detection

Option	Description
/TF	Temperature sensor (positive coefficient thermistor or PTC resistor)
/TH	Thermal switch (bimetallic switch)
/KY	One sensor for temperature detection KTY84 – 130
/PT	One/three sensor(s) for temperature detection PT100

4.1.5 Encoders

Option	Description
/ES7S, /EG7S, /EH7S, /EV7S	Mount-on speed sensor with Sin/Cos interface, /ES., /EG., /EV. with electronic nameplate
/ES7R, /EG7R, /EH7R	Mount-on speed sensor TTL(RS422) interface
/EH7T	Mount-on speed sensor TTL(RS422) interface
/ES7C, /EG7C, /EH7C, /EV7C	Mounted speed sensor with HTL interface
/EI7C	Built-in encoder with HTL interface, 24 periods Also available in a functionally safe design
/EI76, /EI72,	Built-in encoder with HTL interface and 6/2/1 period(s)

Option	Description
/AS7W /AG7W, /AV7W	Mount-on absolute encoder, RS485 (Multi-Turn) + Sin/Cos output and electronic nameplate
/AS7Y, /AG7Y, /AH7Y, /AV7Y	Mount-on absolute encoder, SSI interface (Multi-Turn) + Sin/Cos output, AH7Y + TTL(RS422) output
/ES7A , /EG7A	Mounting adapter for encoders from the SEW portfolio
/XV.A , /XH.A	Mounting adapter for non-SEW encoders
/XV.. , /XH..	Mounted non-SEW encoders

4.1.6 Connection alternatives

Option	Description
/IS	Integrated plug connector
/ISU	Integrated plug connector, only on the motor side
/ASE.	Harting HAN 10ES plug connector on terminal box with single locking latch (cage clamp contacts on the motor side)
/ASB.	Harting HAN 10ES plug connector on terminal box with double locking latch (cage clamp contacts on the motor side)
/ACE.	Harting HAN 10E plug connector on terminal box with single locking latch (crimp contacts on the motor side)
/ACB.	Harting HAN 10E plug connector on terminal box with double locking latch (crimp contacts on the motor side)
/AME. /ABE. /ADE. /AKE.	Harting HAN modular 10B plug connector on terminal box with single locking latch (crimp contacts on the motor side)
/AMB. /ABB. /ADB. /AKB.	Harting HAN modular 10B plug connector on terminal box with double locking latch (crimp contacts on the motor side)
/KCC	6- or 10-pole terminal strip with cage clamp contacts for DR.71 – DR.132, depending on the design
/KC1	C1-profile-compliant connection of the electric monorail drive (VDI guideline 3643) for DR71, 80 Alternatively for DR.90 – 132 for a more compact connection range
/IV	Other industrial plug connectors according to customer specifications

4.1.7 Ventilation

Option	Description
/V	Axial forced cooling fan
/Z	Additional inertia (flywheel fan)
/AL	Metal fan
/U	Non-ventilated (without fan)
/OL	Non-ventilated (closed B-side)
/C	Protection canopy for fan guard

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Option	Description
/LF	Air filter for DR.71 – 132
/LN	Low-noise fan guard for DR.71 – 132

4.1.8 Storage

Option	Description
/NS	Relubrication device, only for DR.250, 280, 315
/ERF	Reinforced bearing A-side with cylindrical rolling bearing, only for DR.250, 280, 315
/NIB	Insulated bearing B-side, only for DR.250, 280, 315

4.1.9 Explosion-proof motors EDR..

Option	Description
/2GD	Motors according to EU Directive 94/9/EC (ATEX), category 2 (gas/dust)
/2G	Motors according to EU Directive 94/9/EC (ATEX), category 2 (gas)
/3GD	Motors according to EU Directive 94/9/EC (ATEX), category 3 (gas/dust)
/3D	Motors according to EU Directive 94/9/EC (ATEX), category 3 (dust)
/2GD-b	Motors according to IECEx agreement, EPL GD-b
/2G-b	Motors according to IECEx agreement, EPL G-b
/3GD-c	Motors according to IECEx agreement, EPL GD-c
/3D-c	Motors according to IECEx agreement, EPL D-c
/CID2	Motors according to HazLoc-NA®, North America, Class I (gas), Division 2
/CIID2	Motors according to HazLoc-NA®, North America, Class II (dust), Division 2
/CICIID2	Motors according to HazLoc-NA®, North America, Class I (gas) and Class II (dust), Division 2
/VE	Axial forced cooling fan for motors according to EU Directive 94/9/EC (ATEX), category 3 (gas/dust)

For detailed information about explosion-proof motors of the EDR.. series, refer to the "Explosion-Proof AC Motors" catalog.

4.1.10 Additional options

Option	Description
/DH	Condensation drain hole
/RI	Reinforced winding insulation
/RI2	Reinforced winding insulation with increased resistance against partial discharge

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Option	Description
/2W	Second shaft end on the motor/brakemotor

4.2 Serial number

01.	12212343	01.	0001.	13
Sales organization:	Order number (8-digit)	Order item (2-digit)	Quantities (4-digit)	Final digits of the year of manufacture (2-digit)

This results in:

01.1234567801.01.0001.13

If the design has customer adaptations, an "x" is found between the 16th and 17th digit in place of a point:

01.1234567801.01.0001x13

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4.3 Example of the type designation

AC motor of the DR.. series		
Series	DR	
Type identifier	S	E, P, U, K
Size	71	80, 90, 100, 112, 132, 160, 180, 200, 225, 250, 280, 315
Mounting position	S	K, M, L, MC, LC, SJ, MJ, LJ
Number of poles	4	2, 6, 12, 4/2, 8/2, 8/4
Output options		
Output options	/FI	/FF, /FT, /FL, /FG, /FM, /FE, /FY, /FC, /F..
Mechanical attachments		
Brakes	-	BE05, BE1, BE2, BE5, BE11, BE20, BE30, BE32, BE60, BE62, BE120, BE122
Manual brake release	-	HF, HR
Backstop	-	/RS
Decentralized installation	-	/MI, /MO, /MSW, /MM03, /MM05, /MM07, /MM11, /MM15, /MM22, /MM30, /MM40
Temperature sensor / temperature detection		
Thermal motor protection	-	/TF, /TH
Temperature measuring	-	/KT, /PT
Encoders		
Built-in encoder	-	/EI7C, /EI76, /EI72, /EI71
Add-on encoder DR71-132	-	/ES7S, /ES7R, /ES7C, /AS7W, /AS7Y, /EV7., /AV7., /XV.., /XH..
Add-on encoder DR160-280	-	/EG7S, /EG7R, /EG7C, /AG7W, /AG7Y, /EV7., /AV7., /XV.., /XH..
Add-on encoder DR315	-	/EH7S, /AH7Y
Mounting device	-	/ES7A, /EG7A, /XV.A, /XH.A
Storage		
Insulated bearing (only 250, 280, 315)	-	/NIB
Relubrication (only 250, 280, 315)	-	/NS
Increased overhung load (only 250, 280, 315)	-	/ERF
Connection alternatives		
Connection alternatives	-	/IS, /ISU, /AB.., /AC.., /AD.., /AK.., /AM.., /AS.., /KCC, /KC1, /IV
Ventilation		
Low noise fan guard	-	/LN
Fan guard	-	/C, /LF
Fan	-	/Z, /AL, /U, /OL
Forced cooling fan	-	/V, /VE
Additional options		
Condition monitoring	-	/DUB
2nd shaft end	-	/2W
Reinforced winding insulation	-	/RI, /RI2
Condensation drain hole	-	/DH
Explosion-proof motors		
Explosion protection	-	/2G, /2GD, /3GD, /3D, /2G-b, /2GD-b, /3GD-c, /3D-c, /CID2, /CIID2, /CICIID2

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4.4 Examples of the type designation motor series DRL..

AC motor of the DRL.. series		
Series	DR	
Type identifier	L	
Size	71	80, 90, 100, 112, 132, 160, 180, 200, 225
Mounting position	S	M, L, MC, LC
Number of poles	4	
Output options		
Output options	/FI	/FF, /FT, /FL, /FG, /FM, /FE, /FY, /FC
Mechanical attachments		
Brakes	-	BE05, BE1, BE2, BE5, BE11, BE20, BE30, BE32, BE60, BE62
Manual brake release	-	HF, HR
Backstop	-	/RS
Temperature sensor / temperature detection		
Thermal motor protection	-	/TF, /TH
Temperature measuring	-	/KT, /PT
Encoders		
Built-in encoder	-	/EI7C, /EI76, /EI72, /EI71
Add-on encoder DR71-132	-	/ES7S, /ES7R, /ES7C, /AS7W, /AS7Y, /EV7., /AV7., /XV.., /XH..
Add-on encoder DR160-225	-	/EG7S, /EG7R, /EG7C, /AG7W, /AG7Y, /EV7., /AV7., /XV.., /XH..
Mounting device	-	/ES7A, /EG7A, /XV.A, /XH.A
Connection alternatives		
Connection alternatives	-	/IS, /ISU, /AB.., /AC.., /AD.., /AK.., /AM.., /AS.., /KCC, /KC1, /IV
Ventilation		
Fan guard	-	/C, /LF
Fan	-	/AL
Forced cooling fan	-	/V
Additional options		
Condition monitoring	-	/DUB
2nd shaft end	-	/2W
Reinforced winding insulation	-	/RI
Condensation drain hole	-	/DH

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4.5 Examples of the type designation torque motors DRM..

AC motor of the DRM.. series		
Series	DR	
Type identifier	M	
Size	71	80, 90, 100, 112, 132
Mounting position	S	M, L
Number of poles	12	
Output options		
Output options	/FI	/FF, /FT, /FL, /FG, /FM, /FE, /FY, /FC
Mechanical attachments		
Brakes	-	BE05, BE1, BE2, BE5, BE11
Manual brake release	-	HF, HR
Temperature sensor / temperature detection		
Thermal motor protection	-	/TF, /TH
Temperature measuring	-	/KT, /PT
Encoders		
Built-in encoder	-	/EI7C, /EI76, /EI72, /EI71
Add-on encoder DR71-132	-	/ES7S, /ES7R, /ES7C, /AS7W, /AS7Y, /EV7., /AV7., /XV.., /XH..
Mounting device	-	/ES7A, /XV.A, /XH.A
Connection alternatives		
Connection alternatives	-	/IS, /ISU, /AS.., /AC.., /AM.., /AD.., /AK.., /AB.., /KCC, /KC1, /IV
Ventilation		
Low noise fan guard	-	/LN,
Fan guard	-	/C, /LF
Fan	-	/AL, /U, /OL
Forced cooling fan	-	/V
Additional options		
2nd shaft end	-	/2W
Condensation drain hole	-	/DH

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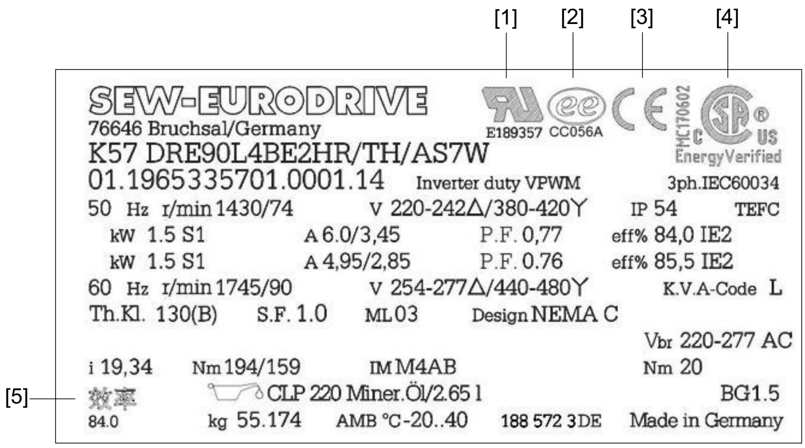
4.6 Example of a nameplate for the global motor

Using the example of the DRE90L4 with 15 kW, the nameplate of the complete "Global Motor and China" is shown below and the individual logos and certification marks are noted.



9007204305736971

[1]	UR certification mark of fire insurance for the USA
[2]	ee energy efficiency certification mark for the USA
[3]	Declaration of conformity CE for Europe
[4]	CSAe energy efficiency certification mark and CSA market approval for Canada
[5]	CEL energy efficiency certification mark – separate sticker for China

Please note the following:

- Three supply voltages are common in Brazil at a frequency of 60 Hz. In addition to 3 x 230 V and 3 x 380 V, there are supply systems with 3 x 440 V. The global motor can only be used for 440 V, see Nameplate (→ 🗎 49).
- The time-consuming certification process in South Korea does not recognize any motors that were designed for one voltage range. SEW-EURODRIVE is currently in discussions with the certification body as to how the extension of fixed voltage to voltage range can be designed. At present, the global motor can only be supplied to South Korea by making use of one of the exceptions according to REELS.

4.7 Mounting position designation of motors

4.7.1 Position of motor terminal box and cable entry

The product standard EN 60034 specifies that the following designations have to be used for terminal box positions:

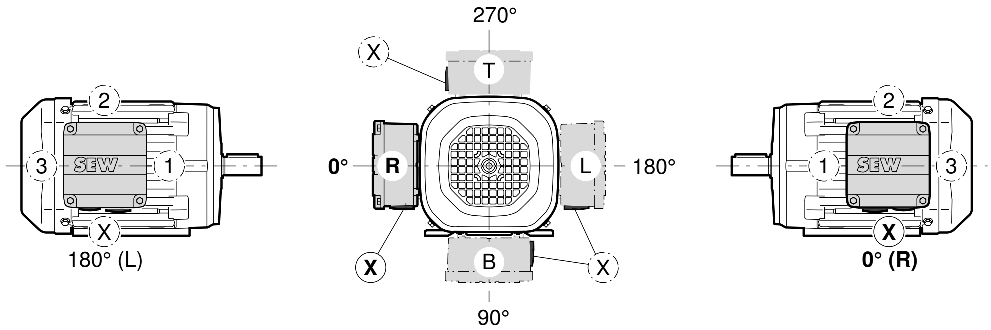
- As viewed onto the output shaft = A-side
- Designation as R (right), B (bottom), L (left) and T (top)

This new designation applies to motors without a gear unit in mounting position B3 (= M1). The previous designation is retained for gearmotors.

The position of the motor terminal box has so far been specified indicated 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.



3975310859

INFORMATION

Unless other information is provided regarding the terminal box, the 270° design with "x" cable entry will be supplied (see figure below).

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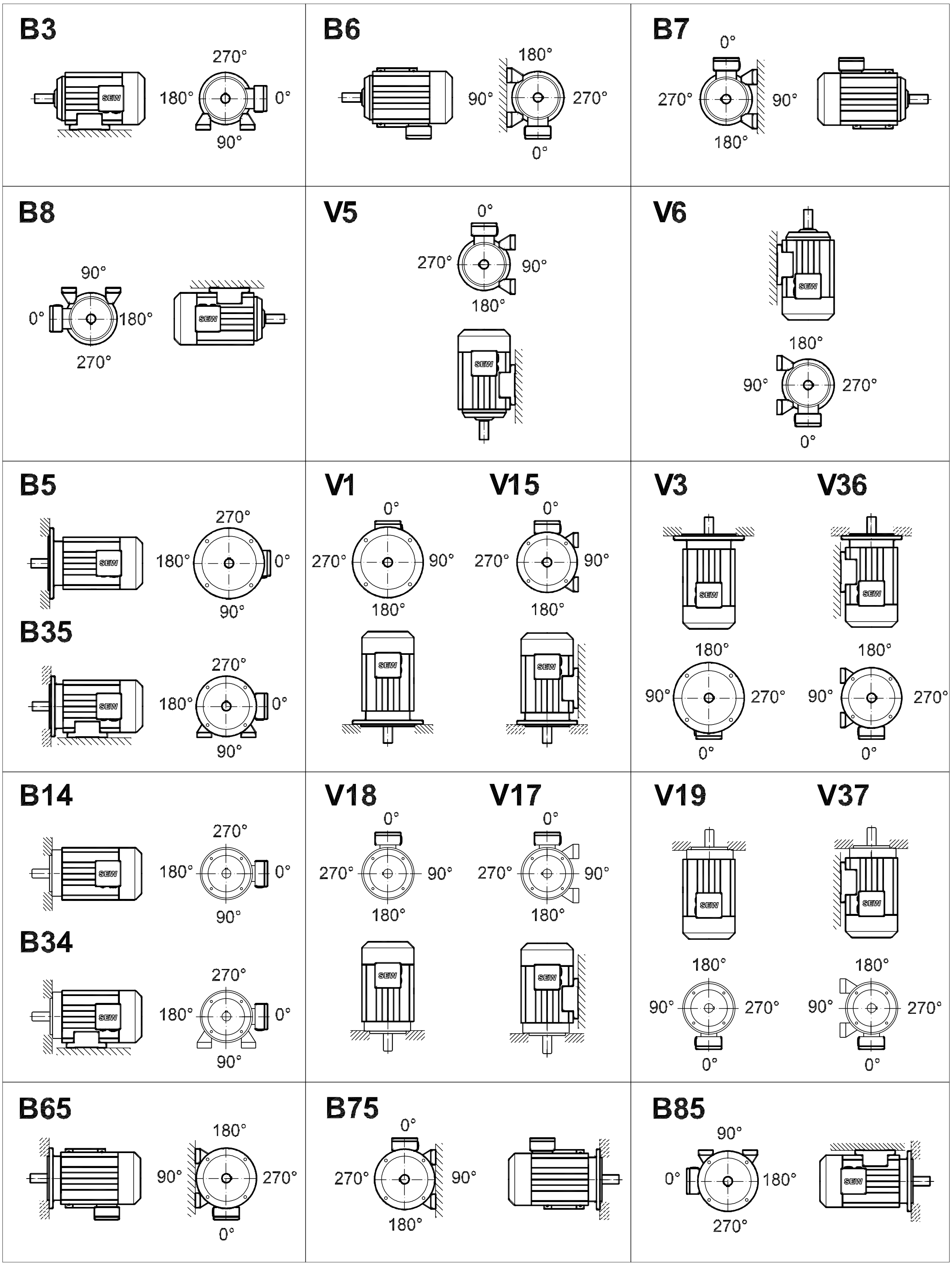
4.7.2 Mounting positions for AC motors



18014402484795531

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5 Technical data of the motors

5.1 Key to the data of the global motor / energy-efficient motor

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
cosφ	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	Mass of the motor
J_{Mot}	Mass moment of inertia of the motor
BE..	Brake used
Z_0 BG	Starting frequency for operation with BG brake controller
Z_0 BGE	Starting frequency for operation with BGE brake controller
M_B	Braking torque
m_B	Mass of the brake motor
J_{MOT_BE}	Mass moment of inertia of the brake motor

INFORMATION

Please also note VO640/2009 and VO4/2014 regarding the prohibition of using IE1 motors in EU Europe.

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5.2 Global motor, 50/60 Hz, 2-pole, S1

2-pole DRS.. motors for 400 V, 50/60 Hz, IE1

Motor type DRS..	P_N kW	M_N Nm	n_N rpm	I_N A	cosφ	IE	$η_{50\%}$ %	$η_{75\%}$ %	$η_{100\%}$ %	I_A/I_N	M_A/M_N	M_H/M_N	M_K/M_N
DRS71M2	0.55	1.87 1.53	2810 3425	1.37 1.35	0.79 0.79	IE1	70.7 73.2	73.5 76.3	72.9 75.5	4.9 5.8	2.9 3.4	2.1 2.1	2.3 2.7

2-pole DRS.. motors/brakemotors for 400 V, 50/60 Hz, IE1

Motor type DRS..	P_N kW	M_N Nm	n_N rpm	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
DRS71M2	0.55	1.87 1.53	2810 3425	9.1	7.21	BE05	2000 4500	3.5	11.5	8.51

2-pole DRE.. motors for 400 V, 50/60 Hz, IE2

Motor type DRE..	P_N kW	M_N Nm	n_N rpm	I_N A	cosφ	IE	$η_{50\%}$ %	$η_{75\%}$ %	$η_{100\%}$ %	I_A/I_N	M_A/M_N	M_H/M_N	M_K/M_N
DRE80M2	0.75	2.5 2.05	2890 3505	1.54 1.3	0.89 0.89	IE2	81.1 81.6	79.2 81.0	79.2 80.0	7.9 9.7	3.4 4.0	3.0 3.3	3.4 4.1
DRE90M2	1.1	3.65 3	2870 3485	2.2 1.9	0.89 0.89	IE2	83.5 84.4	82.2 83.8	81.2 82.5	7.2 8.8	3.2 3.7	3.0 3.4	3.2 3.9
DRE90L2	1.5	5 4.15	2840 3460	2.75 2.5	0.93 0.93	IE2	84.7 86.3	84.0 86.1	81.7 84.0	6.3 7.9	2.9 3.4	2.5 2.8	2.6 3.1
DRE100M2	2.2	7.3 6	2880 3495	4.15 3.65	0.91 0.91	IE2	87.4 87.8	85.6 86.8	84.5 85.5	8.2 10.0	3.8 4.5	3.3 3.5	3.4 4.0
DRE100L2	3	10.1 8.2	2850 3475	5.5 4.8	0.93 0.93	IE2	88.0 88.9	87.4 88.8	85.6 87.5	7.2 9.3	3.5 4.4	3.1 3.9	3.1 4.0
DRE112M2	4	13.2 10.9	2900 3510	7.5 6.6	0.89 0.89	IE2	87.7 88.3	87.6 88.2	86.5 87.5	6.3 7.4	2.3 2.6	2.1 2.3	2.8 3.3
DRE132M2	5.5	17.9 14.8	2935 3540	9.8 8.8	0.90 0.90	IE2	90.2 89.5	90.7 89.2	90.1 88.5	8.7 9.1	2.9 3.1	2.5 2.5	3.5 3.9
DRE132MC2	7.5	24.5 20	2940 3555	13.7 12.2	0.89 0.89	IE2	90.2 88.5	90.1 90.3	88.9 89.5	7.6 8.7	2.2 2.5	1.9 2.1	2.9 3.3

2-pole DRE.. motors/brakemotors for 400 V, 50/60 Hz, IE2

Motor type DRE..	P_N kW	M_N Nm	n_N rpm	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
DRE80M2	0.75	2.5 2.05	2890 3505	14.3	21.7	BE05	1300 3200	5	17.1	23.2
DRE90M2	1.1	3.65 3	2870 3485	18.4	35.7	BE1	1100 2700	10	21.3	37.3
DRE90L2	1.5	5 4.15	2840 3460	21.4	43.9	BE2	900 2200	14	26	48.6
DRE100M2	2.2	7.3 6	2880 3495	26	56.2	BE2	700 1800	14	30.6	61
DRE100L2	3	10.1 8.2	2850 3475	29	68.6	BE2	450 1000	20	33.6	73.3
DRE112M2	4	13.2 10.9	2900 3510	41.3	114	BE5	- 600	28	48.5	119
DRE132M2	5.5	17.9 14.8	2935 3540	60	193	BE5	- 500	55	67.2	198
DRE132MC2	7.5	24.5 20	2940 3555	63	239	BE11	- 380	80	77.5	250

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5.3 Global motor, 50/60 Hz, 4-pole, S1

4-pole DRS.. motors for 400 V, 50/60 Hz, IE1

Motor type DRS..	P_N kW	M_N Nm	n_N rpm	I_N A	cosφ	IE	$\eta_{50\%}$ %	$\eta_{75\%}$ %	$\eta_{100\%}$ %	I_A/I_N	M_A/M_N	M_H/M_N	M_K/M_N
DRS71S4	0.18	1.25 1.01	1380 1700	0.64 0.45	0.70 0.69	IE1	59.1 66.5	65.3 67.7	66.6 68.0	3.5 4.2	1.8 1.9	1.8 1.9	2.1 2.5
DRS71S4	0.25	1.72 1.4	1390 1700	0.67 0.62	0.75 0.69	IE1	68.6 70.0	72.6 74.3	72.6 74.0	4.1 4.2	1.9 1.9	1.9 1.9	2.3 2.5
DRS71S4	0.37	2.55 2.1	1380 1700	1.14 1.06	0.70 0.65	-	59.1 66.5	65.3 67.7	66.6 68.0	3.5 4.4	1.8 2.1	1.8 2.1	2.1 2.8
DRS71M4	0.55	3.85 3.1	1360 1700	1.55 1.31	0.72 0.68	IE1	69.1 72.8	71.9 76.1	70.6 74.0	3.6 4.5	2.1 2.4	2.1 2.3	2.2 2.6

4-pole DRS.. motors/brakemotors for 400 V, 50/60 Hz, IE1

Motor type DRS..	P_N kW	M_N Nm	n_N rpm	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
DRS71S4	0.18	1.25 1.01	1380 1700	7.8	5.13	BE05	6000 9500	5	10.2	6.43
DRS71S4	0.25	1.72 1.4	1390 1700	7.8	5.13	BE05	6000 9500	5	10.2	6.43
DRS71S4	0.37	2.55 2.1	1380 1700	7.8	5.13	BE05	6000 9500	5	10.2	6.43
DRS71M4	0.55	3.85 3.1	1360 1700	9.1	7.21	BE1	4100 11000	10	11.7	8.51

4pole DRE.. motors for 400 V, 50/60 Hz, IE2

Motor type DRE..	P_N kW	M_N Nm	n_N rpm	I_N A	cosφ	IE	$\eta_{50\%}$ %	$\eta_{75\%}$ %	$\eta_{100\%}$ %	I_A/I_N	M_A/M_N	M_H/M_N	M_K/M_N
DRE80S4	0.37	2.45 2.05	1435 1740	0.87 0.79	0.77 0.73	IE2	76.5 78.2	78.5 80.2	78.8 80.0	4.9 6.9	2.6 3.0	2.1 2.4	2.9 3.7
DRE80M4	0.55	3.65 3	1445 1755	1.27 1.15	0.76 0.73	IE2	79.7 80.1	82.0 82.2	82.3 82.5	6.7 8.1	3.1 3.7	2.2 2.6	3.4 4.2
DRE80M4	0.75	5 4.1	1435 1745	1.68 1.52	0.79 0.76	IE2	79.2 79.6	81.3 82.9	81.0 82.5	6.2 7.6	2.9 3.3	2.1 2.3	3.1 3.9
DRE90M4	1.1	7.4 6.1	1420 1735	2.45 2.1	0.79 0.77	IE2	82.5 82.2	83.5 84.5	82.4 84.0	5.9 7.3	2.9 3.2	2.3 2.6	3.0 3.4
DRE90L4	1.5	10 8.2	1430 1745	3.35 2.85	0.77 0.76	IE2	83.5 83.6	84.7 85.8	84.0 85.5	6.6 7.9	3.2 3.7	2.8 3.3	3.4 4.0
DRE100L4	2.2	14.6 12	1440 1750	4.7 4.2	0.77 0.75	IE2	85.8 85.8	87.5 87.9	87.1 87.5	7.7 8.9	4.2 4.8	3.2 3.3	3.7 4.9
DRE100LC4	3	19.7 16.3	1455 1760	6.2 5.3	0.81 0.80	IE2	86.3 86.9	87.1 88.5	86.3 87.5	7.5 9.4	2.7 3.2	2.4 2.7	3.3 4.0
DRE112M4	3	19.7 16.3	1455 1760	6 5.1	0.83 0.82	IE2	87.7 87.0	87.4 88.4	86.5 87.5	7.3 8.8	2.4 2.7	2.0 1.7	3.0 3.5
DRE132S4	4	26 21.5	1460 1765	8 6.7	0.82 0.83	IE2	87.6 88.0	88.2 89.4	87.4 88.5	8.0 8.9	2.7 2.7	2.4 2.2	3.2 3.7
DRE132M4	5.5	36 30	1455 1760	10.5 9	0.85 0.85	IE2	89.8 90.1	89.6 90.8	88.5 89.5	7.7 8.8	2.6 2.5	1.9 1.7	3.1 3.0
DRE132MC4	7.5	48.5 40.5	1470 1775	14.8 13.8	0.82 0.76	IE2	88.9 87.3	89.5 89.5	89.0 89.5	8.2 8.7	2.2 2.1	1.8 1.6	3.2 3.2
DRE160S4	7.5	49 40.5	1465 1770	14.7 12.6	0.82 0.83	IE2	90.3 90.0	90.3 91.0	89.3 90.2	6.5 7.6	2.4 2.8	1.8 2.0	2.5 2.9
DRE160M4	9.2	60 49.5	1470 1775	18.3 15.7	0.80 0.80	IE2	90.4 90.4	90.7 91.6	90.0 91.0	7.7 8.4	2.9 3.3	2.2 2.4	3.0 3.2
DRE160MC4	11	71 59	1475 1780	21.5 18.3	0.81 0.82	IE2	90.3 90.9	90.6 92.0	90.2 91.7	7.7 8.6	2.6 3.2	1.9 2.2	2.8 3.3
DRE180S4	11	71 59	1470 1775	21 18.1	0.83 0.83	IE2	89.5 89.7	90.4 91.4	90.2 91.0	7.2 8.0	2.6 3.1	2.2 2.4	2.9 3.3
DRE180M4	15	97 81	1470 1775	28 24	0.85 0.85	IE2	90.9 89.5	91.5 91.5	91.0 91.7	7.1 7.8	2.4 2.8	2.0 2.1	3.0 3.3

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Motor type DRE..	P_N kW	M_N Nm	n_N rpm	I_N A	cosφ	IE	$\eta_{50\%}$ %	$\eta_{75\%}$ %	$\eta_{100\%}$ %	I_A/I_N	M_A/M_N	M_H/M_N	M_K/M_N
DRE180L4	18.5	120 100	1470 1775	34 29.5	0.85 0.85	IE2	91.4 91.5	92.0 92.7	91.7 92.4	7.1 8.1	2.5 2.9	2.1 2.2	3.0 3.4
DRE180LC4	22	142 118	1480 1780	42 35.5	0.82 0.84	IE2	91.7 91.7	92.2 92.8	91.8 92.4	7.1 8.0	2.3 2.6	1.9 2.0	2.8 3.2
DRE200L4	30	194 161	1475 1780	57 48.5	0.82 0.83	IE2	92.6 92.2	92.9 93.3	92.4 93.0	6.3 7.4	2.1 2.6	1.9 2.1	2.6 2.9
DRE225S4	37	240 198	1477 1780	70 60	0.82 0.83	IE2	93.0 92.4	93.4 93.4	93.0 93.0	7.0 7.9	2.5 3.2	2.0 2.4	3.0 3.2
DRE225M4	45	290 240	1478 1780	84 73	0.83 0.83	IE2	93.5 92.9	93.7 93.8	93.3 93.6	7.3 8.0	2.5 3.3	2.1 2.3	2.9 3.1

4pole DRE.. motors/brakemotors for 400 V, 50/60 Hz, IE2

Motor type DRE..	P_N kW	M_N Nm	n_N rpm	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
DRE80S4	0.37	2.45 2.05	1435 1740	11.5	15.9	BE1	3500 9000	10	14.5	17.4
DRE80M4	0.55	3.65 3	1445 1755	14.3	22.3	BE1	3500 9000	10	17.3	23.8
DRE80M4	0.75	5 4.1	1435 1745	14.3	22.3	BE1	3500 9000	10	17.3	23.8
DRE90M4	1.1	7.4 6.1	1420 1735	18.4	36.6	BE2	3000 8000	14	23	41.3
DRE90L4	1.5	10 8.2	1430 1745	21.4	44.9	BE2	3000 8000	20	26	49.6
DRE100L4	2.2	14.6 12	1440 1750	29	69.5	BE5	- 7600	28	34.9	75.5
DRE100LC4	3	19.7 16.3	1455 1760	31.2	91	BE5	- 3800	40	37.1	97
DRE112M4	3	19.7 16.3	1455 1760	41.3	148	BE5	- 3100	40	48.5	152
DRE132S4	4	26 21.5	1460 1765	46.3	191	BE5	- 2800	55	53.5	196
DRE132M4	5.5	36 30	1455 1760	60	258	BE11	- 2000	80	74.5	269
DRE132MC4	7.5	48.5 40.5	1470 1775	63	347	BE11	- 1500	110	77.5	357
DRE160S4	7.5	49 40.5	1465 1770	79.5	366	BE11	- 1100	110	98.2	388
DRE160M4	9.2	60 49.5	1470 1775	88.5	442	BE20	- 1000	150	115.2	493
DRE160MC4	11	71 59	1475 1780	93.5	600	BE20	- 900	150	120.2	651
DRE180S4	11	71 59	1470 1775	121.9	909	BE20	- 900	150	153.9	969
DRE180M4	15	97 81	1470 1775	138.3	1130	BE20	- 800	200	170.3	1190
DRE180L4	18.5	120 100	1470 1775	152.1	1310	BE30	- 590	300	192.1	1450
DRE180LC4	22	142 118	1480 1780	161.1	1700	BE30	- 520	300	201.1	1830
DRE200L4	30	194 161	1475 1780	258	2390	BE32	- 550	400	313	2620
DRE225S4	37	240 198	1477 1780	294.5	2970	BE32	- 320	500	349.5	3200
DRE225M4	45	290 240	1478 1780	315.5	3470	BE32	- 270	600	370.5	3700

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5.4 Global motor, 50/60 Hz, 6pole, S1

6-pole DRE.. motors for 400 V, 50/60 Hz, IE2

Motor type DRE..	P_N kW	M_N Nm	n_N rpm	I_N A	cosφ	IE	$\eta_{50\%}$ %	$\eta_{75\%}$ %	$\eta_{100\%}$ %	I_A/I_N	M_A/M_N	M_H/M_N	M_K/M_N
DRE71M6	0.25	2.6 2.1	910 1130	0.73 0.65	0.73 0.67	IE2	64.8 66.0	70.0 71.0	68.8 72.0	3.4 4.0	2.0 1.9	2.0 1.9	2.1 2.1
DRE80S6	0.37	3.8 3.1	935 1145	1.19 1.01	0.69 0.63	IE2	67.2 69.0	71.2 73.0	71.5 74.0	3.7 4.5	2.0 2.4	2.0 2.3	2.3 2.8
DRE80M6	0.55	5.6 4.6	935 1145	1.58 1.51	0.69 0.64	IE2	70.5 73.0	74.0 76.5	74.0 77.0	4.4 4.8	2.2 2.5	2.2 2.5	2.4 3.0
DRE90L6	0.75	7.6 6.3	940 1145	2.05 1.85	0.65 0.64	IE2	78.7 80.5	80.5 82.5	80.0 81.5	4.6 5.1	2.4 2.4	2.4 2.4	2.8 2.9
DRE100LC6	1.1	10.8 9	970 1170	2.8 2.6	0.68 0.64	IE2	78.5 82.0	79.4 85.4	78.7 85.5	5.9 6.7	2.3 2.7	2.2 2.4	3.2 3.7
DRE112M6	1.5	14.8 12.2	970 1170	3.5 3.7	0.72 0.69	IE2	80.6 85.4	81.5 87.1	80.9 86.5	5.4 5.9	1.9 2.0	1.6 1.8	2.7 3.0
DRE132M6	2.2	21.5 18	970 1170	5.2 4.7	0.70 0.69	IE2	83.2 86.0	84.2 88.0	83.0 87.5	5.9 6.8	2.4 2.6	2.1 2.3	3.2 3.9
DRE132M6	3	29.5 24.5	970 1170	7.3 6.6	0.67 0.68	IE2	84.9 87.2	85.8 88.5	84.4 87.5	6.1 6.9	2.5 2.8	2.2 2.4	3.4 4.0
DRE132M6	4	40 33	960 1165	9.5 8.5	0.71 0.72	IE2	85.3 87.2	86.2 88.3	85.4 87.5	6.1 5.9	2.8 2.2	2.6 2.0	3.2 3.2
DRE160M6	5.5	54 45	965 1170	12.6 10.5	0.72 0.72	IE2	86.4 88.3	87.4 89.8	86.8 89.5	5.8 6.2	2.3 2.2	2.0 1.9	2.8 2.9

6-pole DRE.. motors/brakemotors for 400 V, 50/60 Hz, IE2

Motor type DRE..	P_N kW	M_N Nm	n_N rpm	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
DRE71M6	0.25	2.6 2.1	910 1130	9.1	11.9	BE05	6600 15000	5	11.5	13.2
DRE80S6	0.37	3.8 3.1	935 1145	11.5	15.9	BE1	6000 14000	10	14.5	17.4
DRE80M6	0.55	5.6 4.6	935 1145	14.3	22.3	BE2	4300 10000	14	18	26.8
DRE90L6	0.75	7.6 6.3	940 1145	21.4	44.6	BE2	3500 8000	20	26	49.2
DRE100LC6	1.1	10.8 9	970 1170	31.2	91	BE5	- 5000	40	37.1	97
DRE112M6	1.5	14.8 12.2	970 1170	41.3	148	BE5	- 4000	55	48.5	152
DRE132M6	2.2	21.5 18	970 1170	60	251	BE11	- 3300	80	74.5	261
DRE132M6	3	29.5 24.5	970 1170	60	251	BE11	- 3300	80	74.5	261
DRE132M6	4	40 33	960 1165	60	251	BE11	- 3300	80	74.5	261
DRE160M6	5.5	54 45	965 1170	88.5	634	BE11	- 2700	110	107.2	656

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5.5 Standard and energy-efficient motor 50 Hz, 2-pole, S1

2-pole motors DR63, DRS.. for 400 V (380 – 420 V), 50 Hz, IE1

Motor type DRS..	P_N kW	M_N Nm	n_N rpm	I_N 400 V A	I_N 380-420 V A	cosφ	IE	$\eta_{50\%}$ %	$\eta_{75\%}$ %	$\eta_{100\%}$ %	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DR63S2	0.18	0.63	2720	0.45	0.46	0.88	-	-	-	-	4.2	2.4 2.2	-
DR63M2	0.25	0.9	2660	0.65	0.66	0.86	-	-	-	-	3.5	2.2 1.9	-
DR63L2	0.37	1.3	2650	0.92	1.0	0.87	-	-	-	-	3.5	2.1 1.9	-
DRS71S2	0.37	1.31	2700	1.01	1.06	0.89	IE1	72.0	73.2	70.5	3.2	2.2 1.9	2.0
DRS71M2	0.55	1.87	2810	1.37	1.42	0.79	IE1	70.7	73.5	72.9	4.9	2.9 2.1	2.3
DRS80S2	0.75	2.55	2800	1.73	1.78	0.84	IE1	71.3	74.6	74.4	4.6	2.5 2.3	2.5
DRS80M2	1.1	3.7	2840	2.35	2.4	0.88	IE1	80.2	77.7	76.5	6.0	2.7 2.5	2.8
DRS90M2	1.5	5.1	2830	3.1	3.2	0.89	IE1	83.3	80.0	78.3	5.9	2.7 2.6	2.7
DRS90L2	2.2	7.4	2820	4.45	4.6	0.89	IE1	84.9	82.8	80.5	5.8	2.9 2.5	2.6
DRS100M2	3	10.1	2840	5.8	6	0.91	IE1	86.9	84.6	82.5	6.4	3.1 2.8	2.8
DRS100LC2	4	13.2	2900	7.8	8	0.88	IE1	86.9	85.6	84.2	7.7	2.7 2.1	3.0
DRS112M2	4	13.2	2900	7.6	7.9	0.89	IE1	87.7	85.4	84.3	6.3	2.3 2.1	2.8
DRS132S2	5.5	18.2	2890	10.2	10.7	0.91	IE1	89.2	87.0	85.5	6.5	2.3 2.1	2.8
DRS132M2	7.5	24.5	2910	13.7	14.4	0.91	IE1	90.0	87.8	86.5	7.3	2.5 2.3	3.1
DRS132M2	9.2	30.5	2900	16.9	17.6	0.89	IE1	90.2	88.8	87.2	6.9	2.5 2.3	3.0

2-pole motors /brakemotors DR63, DRS.. for 400 V (380 – 420 V), 50 Hz, IE1

Motor type DRS..	P_N kW	M_N Nm	n_N rpm	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
DR63S2	0.18	0.63	2720	6.2	3.6	BR03	5000 -	1.6	8.0	4.8
DR63M2	0.25	0.9	2660	6.2	3.6	BR03	4500 -	2.4	8.0	4.8
DR63L2	0.37	1.3	2650	6.7	4.4	BR03	4000 -	3.2	8.5	5.6
DRS71S2	0.37	1.31	2700	7.8	5.13	BE05	2450 4150	5	10	6.43
DRS71M2	0.55	1.87	2810	9.1	7.21	BE05	2000 4500	3.5	12	8.51
DRS80S2	0.75	2.55	2800	12	15.3	BE05	1400 3300	5	14	16.8
DRS80M2	1.1	3.7	2840	14	21.7	BE1	1300 3000	7	17	23.2
DRS90M2	1.5	5.1	2830	18	35.7	BE1	1100 2700	10	21	37.3
DRS90L2	2.2	7.4	2820	21	43.9	BE2	900 2200	14	26	48.6
DRS100M2	3	10.1	2840	26	56.2	BE2	700 1800	20	31	61

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Motor type DRS..	P_N kW	M_N Nm	n_N rpm	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
DRS100LC2	4	13.2	2900	31	90	BE5	- 700	28	37	96
DRS112M2	4	13.2	2900	41	114	BE5	- 600	28	48	119
DRS132S2	5.5	18.2	2890	44	147	BE5	- 500	40	51	151
DRS132M2	7.5	24.5	2910	60	193	BE5	- 500	55	67	198
DRS132M2	9.2	30.5	2900	60	193	BE5	- 500	55	67	198

2-pole motors DRE.. for 400 V (380 – 420 V), 50 Hz, IE2

Motor type DRE..	P_N kW	M_N Nm	n_N rpm	I_N 400 V A	I_N 380-420 V A	cosφ	IE	$\eta_{50\%}$ %	$\eta_{75\%}$ %	$\eta_{100\%}$ %	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DRE80M2	0.75	2.5	2890	1.54	1.6	0.89	IE2	81.1	79.2	79.2	7.9	3.4 3.0	3.4
DRE90M2	1.1	3.65	2870	2.2	2.3	0.89	IE2	83.5	82.2	81.2	7.2	3.2 3.0	3.2
DRE90M2	1.5	5.1	2830	2.95	3.05	0.89	IE2	83.3	83.5	81.8	5.9	2.7 2.6	2.7
DRE100M2	2.2	7.3	2880	4.15	4.3	0.91	IE2	87.4	85.6	84.5	8.2	3.8 3.3	3.4
DRE100L2	3	10.1	2850	5.5	5.7	0.93	IE2	88.0	87.4	85.6	7.2	3.5 3.1	3.1
DRE112M2	4	13.2	2900	7.5	7.8	0.89	IE2	87.7	87.6	86.5	6.3	2.3 2.1	2.8
DRE132S2	5.5	18.2	2890	10	10.5	0.91	IE2	89.2	88.9	87.4	6.5	2.3 2.1	2.8
DRE132M2	7.5	24.5	2910	13.5	14.3	0.91	IE2	90.0	89.8	88.5	7.3	2.5 2.3	3.1
DRE132MC2	9.2	30	2935	17.2	17.9	0.87	IE2	89.7	89.7	88.8	7.2	2.2 1.9	2.8

2-pole motors/brakemotors DRE.. for 400 V (380 – 420 V), 50 Hz, IE2

Motor type DRE..	P_N kW	M_N Nm	n_N rpm	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
DRE80M2	0.75	2.5	2890	14	21.7	BE05	1300 3200	5	17	23.2
DRE90M2	1.1	3.65	2870	18	35.7	BE1	1100 2700	10	21	37.3
DRE90M2	1.5	5.1	2830	18	35.7	BE1	1100 2700	10	21	37.3
DRE100M2	2.2	7.3	2880	26	56.2	BE2	700 1800	14	31	61
DRE100L2	3	10.1	2850	29	68.6	BE2	450 1000	20	34	73.3
DRE112M2	4	13.2	2900	41	114	BE5	- 600	28	48	119
DRE132S2	5.5	18.2	2890	46	147	BE5	- 500	40	54	151
DRE132M2	7.5	24.5	2910	60	193	BE5	- 500	55	67	198
DRE132MC2	9.2	30	2935	63	239	BE11	- 380	80	78	250

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2-pole motors DRP.. for 400 V (380 – 420 V), 50 Hz, IE3

Motor type DRP..	P_N kW	M_N Nm	n_N rpm	I_N 400 V A	I_N 380-420 V A	cosφ	IE	$\eta_{50\%}$ %	$\eta_{75\%}$ %	$\eta_{100\%}$ %	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DRP80M2	0.75	2.5	2890	1.46	1.52	0.89	IE3	81.1	83.2	83.2	7.9	3.4 3.0	3.4
DRP90M2	1.1	3.65	2870	2.1	2.2	0.89	IE3	83.5	84.7	83.7	7.2	3.2 3.0	3.2
DRP100M2	1.5	4.95	2890	2.65	2.85	0.93	IE3	87.4	87.9	87.1	8.7	3.8 3.3	3.5
DRP100M2	2.2	7.3	2880	4	4.15	0.91	IE3	87.4	87.8	86.7	8.2	3.8 3.3	3.4
DRP100LC2	3	9.8	2920	5.5	5.7	0.90	IE3	87.4	88.0	87.1	9.1	3.0 2.4	3.5
DRP112M2	3	9.8	2920	5.5	5.8	0.89	IE3	87.5	88.6	88.2	7.4	2.6 2.4	3.2
DRP132S2	4	13.1	2910	7.2	7.6	0.91	IE3	88.9	89.2	88.2	7.3	2.5 2.2	3.1
DRP132M2	5.5	17.9	2935	9.8	10.3	0.90	IE3	90.2	90.7	90.1	8.7	2.9 2.5	3.5

2-pole motors/brakemotors DRP.. for 400 V (380 – 420 V), 50 Hz, IE3

Motor type DRP..	P_N kW	M_N Nm	n_N rpm	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
DRP80M2	0.75	2.5	2890	14	21.7	BE05	1300 3200	5	17	23.2
DRP90M2	1.1	3.65	2870	18	35.7	BE1	1100 2700	7	21	37.3
DRP100M2	1.5	4.95	2890	26	56.2	BE2	700 1800	14	31	61
DRP100M2	2.2	7.3	2880	26	56.2	BE2	700 1800	14	31	61
DRP100LC2	3	9.8	2920	31	90	BE2	300 700	20	36	94.7
DRP112M2	3	9.8	2920	41	114	BE5	- 600	20	48	119
DRP132S2	4	13.1	2910	46	147	BE5	- 500	28	54	151
DRP132M2	5.5	17.9	2935	60	193	BE5	- 500	40	67	198

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5.6 Standard and energy-efficient motor, 50 Hz, 4-pole, S1

4-pole motors DR63, DRS.. for 400 V (380 – 420 V), 50 Hz, IE3

Motor type DRS..	P_N	M_N	n_N	I_N 400 V	I_N 380-420 V	cosφ	IE	$\eta_{50\%}$	$\eta_{75\%}$	$\eta_{100\%}$	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
	kW	Nm	rpm	A	A			%	%	%			
DT56M4	0.09	0.66	1300	0.29	0.31	0.68	-	-	-	-	2.6	2.1 1.8	-
DT56L4	0.12	0.88	1300	0.42	0.46	0.68	-	-	-	-	2.6	2.2 1.9	-
DR63S4	0.12	0.83	1380	0.39	0.39	0.69	-	-	-	-	3.3	2.4 2.2	-
DR63M4	0.18	1.3	1320	0.55	0.55	0.78	-	-	-	-	2.9	1.8 1.7	-
DR63L4	0.25	1.8	1300	0.68	0.73	0.81	-	-	-	-	2.8	1.8 1.7	-
DRS71S4	0.18	1.25	1380	0.64	0.66	0.70	IE1	59.1	65.3	66.6	3.5	1.8 1.8	2.1
DRS71S4	0.25	1.72	1390	0.67	0.69	0.75	IE1	68.6	72.6	72.6	4.1	1.9 1.9	2.3
DRS71S4	0.37	2.55	1380	1.14	1.24	0.70	IE1	59.1	65.3	66.6	3.5	1.8 1.8	2.1
DRS71M4	0.55	3.85	1360	1.55	1.62	0.72	IE1	69.1	71.9	70.6	3.6	2.1 2.1	2.2
DRS80S4	0.75	5.1	1400	1.8	1.82	0.81	IE1	74.6	76.6	75.3	4.3	1.9 1.9	2.2
DRS80M4	1.1	7.4	1410	2.4	2.5	0.84	IE1	77.7	78.6	77.0	5.1	2.2 1.7	2.3
DRS90M4	1.5	10.3	1395	3.3	3.4	0.82	IE1	82.0	82.0	79.6	5.0	2.3 2.0	2.5
DRS90L4	2.2	15	1400	4.85	4.95	0.81	IE1	82.9	83.1	81.1	5.1	2.5 2.2	2.5
DRS100M4	3	20.5	1400	6.4	6.5	0.82	IE1	85.2	84.7	82.4	5.3	2.8 2.4	2.8
DRS100LC4	4	26.5	1440	8.9	9.1	0.78	IE1	83.2	84.3	83.2	6.5	2.5 2.3	3.1
DRS112M4	4	26.5	1435	8.1	8.4	0.84	IE1	86.1	85.6	83.8	6.0	2.0 1.7	2.5
DRS132S4	5.5	36.5	1445	11.1	11.6	0.82	IE1	86.4	86.7	85.7	6.7	2.4 2.1	2.8
DRS132M4	7.5	49.5	1445	14.4	15.1	0.85	IE1	90.0	89.1	87.1	6.6	2.4 1.9	2.7
DRS132MC4	9.2	60	1465	18.6	19.3	0.81	IE1	87.9	88.5	87.6	7.2	2.1 1.6	2.9
DRS160S4	9.2	60	1460	18.9	19.2	0.79	IE1	87.9	89.0	88.0	6.4	2.5 2.0	2.6
DRS160M4	11	72	1460	22	22.5	0.81	IE1	89.2	89.1	88.0	6.8	2.7 2.3	2.8
DRS160MC4	15	97	1470	30	31	0.80	IE1	90.3	90.2	89.1	6.3	2.1 1.7	2.4
DRS180S4	15	98	1460	29	29.5	0.83	IE1	90.0	90.3	89.5	6.2	2.3 2.0	2.6
DRS180M4	18.5	121	1465	34.5	35.5	0.85	IE1	90.6	90.8	90.0	6.5	2.2 1.8	2.7
DRS180L4	22	143	1465	41.5	42.5	0.84	IE1	90.9	91.2	90.5	6.9	2.4 2.0	2.8
DRS180LC4	30	195	1470	57	59	0.84	IE1	92.2	92.0	90.9	5.6	1.8 1.5	2.2
DRS200L4	30	194	1475	57	59	0.82	IE1	91.6	91.9	91.3	6.4	2.1 1.9	2.6
DRS225S4	37	240	1475	70	72	0.82	IE1	92.2	92.0	91.6	7.1	2.4 1.9	3.0

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Motor type DRS..	P_N kW	M_N Nm	n_N rpm	I_N 400 V A	I_N 380-420 V A	cosφ	IE	$\eta_{50\%}$ %	$\eta_{75\%}$ %	$\eta_{100\%}$ %	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DRS225M4	45	290	1480	84	86	0.83	IE1	92.8	92.7	92.3	7.4	2.5 2.2	2.9
DRS225MC4	55	355	1480	106	108	0.81	IE1	92.4	92.8	92.4	6.8	2.4 1.8	2.4
DRS250M4	55	355	1479	105	108	0.82	IE1	92.1	92.5	92.7	6.9	3.0 2.1	2.6
DRS280S4	75	485	1480	140	144	0.83	IE1	92.3	93.0	93.4	7.8	3.0 2.1	2.6
DRS280M4	90	580	1478	170	172	0.82	IE1	93.2	93.7	93.6	7.0	3.4 2.3	2.8
DRS315K4	110	710	1482	200	210	0.84	IE1	93.7	94.2	94.0	6.1	2.2 1.7	2.5
DRS315S4	132	850	1484	230	240	0.86	IE1	93.4	94.2	94.2	6.5	2.4 1.9	2.7
DRS315M4	160	1030	1483	280	290	0.87	IE1	94.6	94.8	94.6	6.9	2.1 1.7	2.3
DRS315L4	200	1290	1481	350	375	0.88	IE1	94.7	94.9	94.6	6.4	2.1 1.7	2.3

4-pole motors/brakemotors DR.., DRS.. for 400 V (380 – 420 V), 50 Hz, IE1

Motor type DRS..	P_N kW	M_N Nm	n_N rpm	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
DT56M4	0.09	0.66	1300	-[1)]	1.1	BMG02	10000 -	0.8	-[1)]	1.2
DT56L4	0.12	0.88	1300	-[1)]	1.1	BMG02	10000 -	1.2	-[1)]	1.2
DR63S4	0.12	0.83	1380	6.1	3.6	BR03	10000 -	2.4	7.6	4.8
DR63M4	0.18	1.3	1320	6.1	3.6	BR03	10000 -	3.2	7.6	4.8
DR63L4	0.25	1.8	1300	6.7	4.4	BR03	10000 -	3.2	8.2	5.6
DRS71S4	0.18	1.25	1380	7.8	5.13	BE05	6000 9500	5	10	6.43
DRS71S4	0.25	1.72	1390	7.8	5.13	BE05	6000 9500	5	10	6.43
DRS71S4	0.37	2.55	1380	7.8	5.13	BE05	6000 9500	5	10	6.43
DRS71M4	0.55	3.85	1360	9.1	7.21	BE1	4100 11000	10	12	8.51
DRS80S4	0.75	5.1	1400	12	15.9	BE1	3500 9000	10	14	17.4
DRS80M4	1.1	7.4	1410	14	22.3	BE2	3500 9000	14	18	26.8
DRS90M4	1.5	10.3	1395	18	36.6	BE2	2900 7500	20	23	41.3
DRS90L4	2.2	15	1400	21	44.9	BE5	2300 5600	40	27	50.9
DRS100M4	3	20.5	1400	26	57.2	BE5	- 8500	40	32	63.2
DRS100LC4	4	26.5	1440	31	91	BE5	- 3800	55	37	97
DRS112M4	4	26.5	1435	41	152	BE5	- 3100	55	48	157
DRS132S4	5.5	36.5	1445	44	196	BE11	- 2800	80	59	206
DRS132M4	7.5	49.5	1445	60	258	BE11	- 2000	110	74	269

Motor type DRS..	P_N kW	M_N Nm	n_N rpm	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
DRS132MC4	9.2	60	1465	63	347	BE11	- 1500	110	78	357
DRS160S4	9.2	60	1460	80	366	BE20	- 1100	150	105	417
DRS160M4	11	72	1460	92	442	BE20	- 1000	150	120	493
DRS160MC4	15	97	1470	94	609	BE20	- 900	200	120	661
DRS180S4	15	98	1460	120	909	BE20	- 900	200	155	969
DRS180M4	18.5	121	1465	140	1130	BE30	- 800	300	180	1260
DRS180L4	22	143	1465	150	1310	BE30	- 590	300	190	1450
DRS180LC4	30	195	1470	160	1700	BE32	- 520	400	205	1930
DRS200L4	30	194	1475	260	2390	BE32	- 550	400	315	2620
DRS225S4	37	240	1475	295	2970	BE32	- 320	500	350	3200
DRS225M4	45	290	1480	315	3470	BE32	- 270	600	370	3700
DRS225MC4	55	355	1480	330	4390	BE32	- 200	600	385	4620
DRS250M4	55	355	1479	440	6360	BE62	- 200	800	530	6950
DRS280S4	75	485	1480	530	8930	BE62	- 150	1000	620	9520
DRS280M4	90	580	1478	530	8990	BE62	- 100	1200	620	9580
DRS315K4	110	710	1482	850	18500	BE122	- 65	1600	980	19600
DRS315S4	132	850	1484	930	22600	BE122	- 50	2000	1060	23700
DRS315M4	160	1030	1483	1080	28000	BE122	- 35	2000	1210	29100
DRS315L4	200	1290	1481	1160	32000	BE122	- 25	2000	1290	33100

1) only available as gearmotors

4-pole motors DRE.. for 400 V (380 – 420 V), 50 Hz, IE2

Motor type DRE..	P_N kW	M_N Nm	n_N rpm	I_N 400 V A	I_N 380-420 V A	cosφ	IE	$\eta_{50\%}$ %	$\eta_{75\%}$ %	$\eta_{100\%}$ %	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DRE80S4	0.37	2.45	1435	0.87	-	0.77	IE2	76.5	78.5	78.8	4.9	2.6 2.1	2.9
DRE80M4	0.55	3.65	1445	1.27	-	0.76	IE2	79.7	82.0	82.3	6.7	3.1 2.2	3.4
DRE80M4	0.75	5	1435	1.68	1.75	0.79	IE2	79.2	81.3	81.0	6.2	2.9 2.1	3.1
DRE90M4	1.1	7.4	1420	2.45	2.55	0.79	IE2	82.5	83.5	82.4	5.9	2.9 2.3	3.0
DRE90L4	1.5	10	1430	3.35	3.45	0.77	IE2	83.5	84.7	84.0	6.6	3.2 2.8	3.4
DRE100M4	2.2	14.7	1425	4.6	4.7	0.80	IE2	86.3	86.7	85.4	6.4	3.3 2.7	3.2
DRE100LC4	3	19.7	1455	6.2	6.3	0.81	IE2	86.3	87.1	86.3	7.5	2.7 2.4	3.3

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Motor type DRE..	P_N kW	M_N Nm	n_N rpm	I_N 400 V A	I_N 380-420 V A	cosφ	IE	$η_{50\%}$ %	$η_{75\%}$ %	$η_{100\%}$ %	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DRE112M4	3	19.7	1455	6	6.2	0.83	IE2	87.7	87.4	86.5	7.3	2.4 2.0	3.0
DRE132S4	4	26	1460	8	8.2	0.82	IE2	87.6	88.2	87.4	8.0	2.7 2.4	3.2
DRE132M4	5.5	36	1455	10.5	11	0.85	IE2	89.8	89.6	88.5	7.7	2.6 1.9	3.1
DRE132MC4	7.5	48.5	1470	14.8	15.2	0.82	IE2	88.9	89.5	89.0	8.2	2.2 1.8	3.2
DRE160S4	7.5	49	1465	14.7	15.3	0.82	IE2	90.3	90.3	89.3	6.5	2.4 1.8	2.5
DRE160M4	9.2	60	1470	18.3	18.7	0.80	IE2	90.4	90.7	90.0	7.7	2.9 2.2	3.0
DRE160MC4	11	71	1475	21.5	22	0.81	IE2	90.3	90.6	90.2	7.7	2.6 1.9	2.8
DRE180S4	11	71	1470	21	21.5	0.83	IE2	89.5	90.4	90.2	7.2	2.6 2.2	2.9
DRE180M4	15	97	1470	28	29	0.85	IE2	90.9	91.5	91.0	7.1	2.4 2.0	3.0
DRE180L4	18.5	120	1470	34	35.5	0.85	IE2	91.4	92.0	91.7	7.1	2.5 2.1	3.0
DRE180LC4	22	142	1480	42	43	0.82	IE2	91.7	92.2	91.8	7.1	2.3 1.9	2.8
DRE200L4	30	194	1475	57	59	0.82	IE2	92.6	92.9	92.4	6.3	2.1 1.9	2.6
DRE225S4	37	240	1477	70	72	0.82	IE2	93.0	93.4	93.0	7.0	2.5 2.0	3.0
DRE225M4	45	290	1478	84	86	0.83	IE2	93.5	93.7	93.3	7.3	2.5 2.1	2.9
DRE250M4	55	355	1479	104	107	0.82	IE2	93.0	93.8	93.6	6.9	3.0 2.1	2.6
DRE280S4	75	485	1480	138	143	0.83	IE2	93.3	94.1	94.4	7.8	3.0 2.1	2.6
DRE280M4	90	580	1478	170	172	0.82	IE2	93.7	94.5	94.4	7.0	3.4 2.3	2.8
DRE315K4	110	710	1483	196	205	0.85	IE2	94.4	94.9	94.7	6.0	2.3 1.8	2.6
DRE315S4	132	850	1483	230	235	0.87	IE2	94.3	95.0	95.0	6.6	2.4 2.0	2.7
DRE315M4	160	1030	1484	275	285	0.88	IE2	95.3	95.5	95.3	6.8	2.2 1.8	2.4
DRE315L4	200	1290	1482	345	360	0.89	IE2	95.4	95.7	95.3	6.3	2.2 1.8	2.4

4-pole motors/brakemotors DRE.. for 400 V (380 – 420 V), 50 Hz, IE2

Motor type DRE..	P_N kW	M_N Nm	n_N rpm	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
DRE80S4	0.37	2.45	1435	12	15.9	BE1	3500 9000	10	14	17.4
DRE80M4	0.55	3.65	1445	14	22.3	BE1	3500 9000	10	17	23.8
DRE80M4	0.75	5	1435	14	22.3	BE1	3500 9000	10	17	23.8
DRE90M4	1.1	7.4	1420	18	36.6	BE2	3000 8000	14	23	41.3
DRE90L4	1.5	10	1430	21	44.9	BE2	3000 8000	20	26	49.6
DRE100M4	2.2	14.7	1425	26	57.2	BE5	- 8000	55	32	63.2

Motor type DRE..	P_N kW	M_N Nm	n_N rpm	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
DRE100LC4	3	19.7	1455	31	91	BE5	- 3800	40	37	97
DRE112M4	3	19.7	1455	41	148	BE5	- 3100	40	48	152
DRE132S4	4	26	1460	46	191	BE5	- 2800	55	54	196
DRE132M4	5.5	36	1455	60	258	BE11	- 2000	80	74	269
DRE132MC4	7.5	48.5	1470	63	347	BE11	- 1500	110	78	357
DRE160S4	7.5	49	1465	80	366	BE11	- 1100	110	98	388
DRE160M4	9.2	60	1470	88	442	BE20	- 1000	150	115	493
DRE160MC4	11	71	1475	94	600	BE20	- 900	150	120	651
DRE180S4	11	71	1470	120	909	BE20	- 900	150	155	969
DRE180M4	15	97	1470	140	1130	BE20	- 800	200	170	1190
DRE180L4	18.5	120	1470	150	1310	BE30	- 590	300	190	1450
DRE180LC4	22	142	1480	160	1700	BE30	- 520	300	200	1830
DRE200L4	30	194	1475	260	2390	BE32	- 550	400	315	2620
DRE225S4	37	240	1477	295	2970	BE32	- 320	500	350	3200
DRE225M4	45	290	1478	315	3470	BE32	- 270	600	370	3700
DRE250M4	55	355	1479	440	6360	BE62	- 200	800	530	6950
DRE280S4	75	485	1480	530	8930	BE62	- 150	1000	620	9520
DRE280M4	90	580	1478	530	8990	BE62	- 100	1200	620	9580
DRE315K4	110	710	1483	850	18500	BE122	- 65	1600	980	19600
DRE315S4	132	850	1483	930	22600	BE122	- 50	2000	1060	23700
DRE315M4	160	1030	1484	1080	28000	BE122	- 35	2000	1210	29100
DRE315L4	200	1290	1482	1160	32000	BE122	- 25	2000	1290	33100

4-pole motors DRP.. for 400 V (380 – 420 V), 50 Hz, IE3

Motor type DRP..	P_N kW	M_N Nm	n_N rpm	I_N 400 V A	I_N 380-420 V A	cosφ	IE	$\eta_{50\%}$ %	$\eta_{75\%}$ %	$\eta_{100\%}$ %	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DRP90M4	0.75	4.95	1450	1.81	1.86	0.72	IE3	79.8	82.7	83.3	7.3	3.7 3.1	3.9
DRP90L4	1.1	7.3	1440	2.4	2.5	0.78	IE3	84.8	86.0	85.3	6.8	3.2 2.7	3.4
DRP100M4	1.5	9.9	1440	3.2	3.3	0.79	IE3	86.4	87.2	86.6	7.4	3.6 3.1	3.7
DRP100L4	2.2	14.6	1440	4.75	4.85	0.77	IE3	86.4	87.5	87.1	7.7	4.2 3.2	3.7
DRP112M4	3	19.7	1455	6	6.2	0.82	IE3	88.2	88.7	88.0	7.3	2.4 2.0	3.0

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Motor type DRP..	P_N kW	M_N Nm	n_N rpm	I_N 400 V A	I_N 380-420 V A	cosφ	IE	$\eta_{50\%}$ %	$\eta_{75\%}$ %	$\eta_{100\%}$ %	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DRP132M4	4	26	1465	7.7	8	0.84	IE3	89.9	90.4	89.7	8.9	2.6 2.0	3.5
DRP132MC4	5.5	35.5	1475	11	11.4	0.84	IE3	90.2	90.8	90.3	8.8	2.3 1.9	3.3
DRP160S4	5.5	35.5	1475	10.9	11.2	0.80	IE3	90.3	91.1	90.7	8.0	3.0 2.2	3.1
DRP160M4	7.5	48.5	1470	14.7	15.2	0.81	IE3	90.9	91.3	90.7	8.1	3.1 2.3	3.0
DRP160MC4	9.2	60	1475	17.5	18.2	0.84	IE3	91.9	92.0	91.3	7.6	2.5 1.8	2.6
DRP180S4	9.2	60	1475	17.5	18.1	0.82	IE3	91.0	92.0	92.0	7.8	2.8 2.3	3.2
DRP180M4	11	71	1475	20.5	21.5	0.84	IE3	91.2	92.5	92.0	8.1	2.9 2.2	3.3
DRP180L4	15	97	1475	27.5	28.5	0.84	IE3	92.6	93.1	92.7	7.7	2.7 2.0	3.2
DRP180LC4	18.5	119	1480	35	36	0.82	IE3	92.7	93.4	93.2	8.0	2.6 2.0	3.1
DRP200L4	18.5	119	1483	34.5	36	0.83	IE3	92.7	93.5	93.3	7.8	2.6 2.2	3.0
DRP200L4	22	142	1482	41	42.5	0.83	IE3	92.7	93.5	93.4	7.9	2.7 2.3	3.0
DRP225S4	30	194	1480	55	57	0.85	IE3	94.0	94.3	93.9	7.4	2.6 2.2	2.8
DRP225M4	37	240	1482	69	71	0.83	IE3	93.5	94.1	94.0	8.4	2.9 2.6	3.2
DRP250M4	45	290	1482	85	88	0.81	IE3	93.6	93.7	94.3	7.6	3.2 2.1	3.2
DRP280S4	55	355	1482	100	103	0.84	IE3	94.8	95.2	95.1	8.0	3.1 2.1	2.6
DRP280M4	75	485	1479	138	142	0.83	IE3	95.2	95.4	95.0	7.2	3.2 2.1	2.6
DRP315K4	90	580	1484	159	169	0.86	IE3	0.0	95.1	95.2	6.7	2.4 1.9	2.7
DRP315S4	110	710	1486	192	200	0.87	IE3	0.0	95.6	95.5	7.1	2.3 1.8	2.5
DRP315M4	132	850	1488	230	240	0.87	IE3	94.7	95.6	95.6	8.1	2.5 2.0	2.8
DRP315L4	160	1030	1488	275	280	0.88	IE3	95.5	96.0	96.1	8.0	2.8 2.2	3.1

4-pole motors/brakemotors DRP.. for 400 V (380 – 420 V), 50 Hz, IE3

Motor type DRP..	P_N kW	M_N Nm	n_N rpm	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
DRP90M4	0.75	4.95	1450	18	36.6	BE1	2900 7500	10	21	38.2
DRP90L4	1.1	7.3	1440	21	44.9	BE2	2300 5600	14	26	49.6
DRP100M4	1.5	9.9	1440	26	57.2	BE2	- 8500	20	31	61.9
DRP100L4	2.2	14.6	1440	29	69.5	BE5	- 7600	28	35	75.5
DRP112M4	3	19.7	1455	41	148	BE5	- 3100	40	48	152
DRP132M4	4	26	1465	60	258	BE5	- 2000	55	67	263
DRP132MC4	5.5	35.5	1475	63	347	BE11	- 1500	80	78	357

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Motor type DRP..	P_N kW	M_N Nm	n_N rpm	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
DRP160S4	5.5	35.5	1475	80	366	BE11	- 1100	80	98	388
DRP160M4	7.5	48.5	1470	88	442	BE11	- 1000	110	105	464
DRP160MC4	9.2	60	1475	94	600	BE20	- 900	150	120	651
DRP180S4	9.2	60	1475	120	899	BE20	- 900	150	155	959
DRP180M4	11	71	1475	140	1120	BE20	- 800	150	170	1180
DRP180L4	15	97	1475	150	1300	BE20	- 590	200	185	1360
DRP180LC4	18.5	119	1480	160	1690	BE30	- 520	300	200	1820
DRP200L4	18.5	119	1483	260	2390	BE30	- 550	300	310	2520
DRP200L4	22	142	1482	260	2390	BE30	- 550	300	310	2520
DRP225S4	30	194	1480	290	2970	BE32	- 320	400	345	3200
DRP225M4	37	240	1482	315	3470	BE32	- 270	500	370	3700
DRP250M4	45	290	1482	445	6330	BE60	- 200	600	520	6670
DRP280S4	55	355	1482	520	8900	BE62	- 150	800	600	9500
DRP280M4	75	485	1479	530	8900	BE62	- 100	1000	620	9500
DRP315K4	90	580	1484	850	18500	BE122	- 65	1200	980	19600
DRP315S4	110	710	1486	930	22600	BE122	- 50	1600	1060	23700
DRP315M4	132	850	1488	1080	28000	BE122	- 35	2000	1210	29100
DRP315L4	160	1030	1488	1160	32000	BE122	- 25	2000	1290	33100

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5.7 Standard and energy-efficient motor, 50 Hz, 6-pole, S1

6-pole DR63, DRS.. motors for 400 V (380 – 420 V), 50 Hz, IE1

Motor type DRS..	P_N kW	M_N Nm	n_N rpm	I_N 400 V A	I_N 380-420 V A	cosφ	IE	$η_{50\%}$ %	$η_{75\%}$ %	$η_{100\%}$ %	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DR63S6	0.09	0.95	900	0.38	0.42	0.64	-	-	-	-	2.2	1.8 1.6	-
DR63M6	0.12	1.2	900	0.58	0.62	0.65	-	-	-	-	2.1	1.8 1.7	-
DR63L6	0.18	2	870	0.78	0.81	0.70	-	-	-	-	2.2	1.6 1.5	-
DRS71S6	0.25	2.65	895	0.83	0.86	0.70	IE1	55.3	61.4	62.2	2.7	1.7 1.7	2.0
DRS71M6	0.37	3.9	905	1.13	1.16	0.71	IE1	61.9	66.4	66.5	3.1	1.9 1.9	2.0
DRS80S6	0.55	5.7	915	1.64	1.66	0.71	IE1	64.1	68.2	67.9	3.4	1.8 1.8	2.1
DRS80M6	0.75	7.8	915	2.15	2.15	0.71	IE1	68.3	71.6	70.7	3.6	2.0 1.9	2.2
DRS90L6	1.1	11.3	930	3.1	3.15	0.68	IE1	77.5	76.3	75.0	4.2	2.3 2.3	2.5
DRS100M6	1.5	15.5	925	4.25	4.25	0.68	IE1	76.0	77.3	75.7	4.2	2.7 2.7	2.7
DRS100LC6	2.2	22	955	5.5	5.6	0.71	IE1	80.1	80.8	80.0	5.1	2.2 2.2	2.7
DRS112M6	2.2	22	955	5.4	5.5	0.74	IE1	81.0	80.5	79.3	5.5	2.1 1.8	2.7
DRS112M6	3	30.5	945	7	7.2	0.76	IE1	84.6	83.0	81.0	5.1	1.9 1.6	2.5
DRS132S6	4	40.5	940	9.8	10.2	0.76	IE1	85.1	84.2	81.7	4.3	2.1 1.9	2.4
DRS132MC6	5.5	54	970	12.2	12.4	0.76	IE1	87.2	86.6	85.5	5.8	1.9 1.7	2.7
DRS160S6	5.5	55	960	12.9	13.1	0.73	IE1	85.5	85.4	84.4	5.2	2.0 1.8	2.6
DRS160M6	7.5	75	955	17.3	17.6	0.73	IE1	86.8	87.1	85.9	5.1	2.2 1.9	2.5

6-pole DR63, DRS.. motors/brakemotors for 400 V (380 – 420 V), 50 Hz, IE1

Motor type DRS..	P_N kW	M_N Nm	n_N rpm	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
DR63S6	0.09	0.95	900	6.0	5.4	BR03	20,000 -	2.5	7.5	6.6
DR63M6	0.12	1.2	900	6.0	5.4	BR03	20,000 -	3.2	7.5	6.6
DR63L6	0.18	2	870	6.6	6.8	BR03	20,000 -	3.2	8.1	8.0
DRS71S6	0.25	2.65	895	7.8	8.29	BE05	7000 16,000	5	10	9.59
DRS71M6	0.37	3.9	905	9.1	11.9	BE1	6600 15000	10	12	13.2
DRS80S6	0.55	5.7	915	12	15.9	BE2	6000 14000	20	15	20.4
DRS80M6	0.75	7.8	915	14	22.3	BE2	4300 10000	20	18	26.8
DRS90L6	1.1	11.3	930	21	44.6	BE5	3500 8000	40	27	50.5
DRS100M6	1.5	15.5	925	26	56.8	BE5	- 7000	40	32	62.8

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Motor type DRS..	P_N kW	M_N Nm	n_N rpm	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
DRS100LC6	2.2	22	955	31	91	BE5	- 5000	55	37	97
DRS112M6	2.2	22	955	41	148	BE11	- 4000	80	56	158
DRS112M6	3	30.5	945	41	148	BE11	- 3600	80	56	158
DRS132S6	4	40.5	940	44	190	BE11	- 3500	80	59	201
DRS132MC6	5.5	54	970	63	345	BE11	- 2900	110	78	356
DRS160S6	5.5	55	960	80	522	BE11	- 2700	110	98	544
DRS160M6	7.5	75	955	92	634	BE20	- 2700	150	120	685

6-pole DRE.. motors for 400 V (380 – 420 V), 50 Hz, IE2

Motor type DRE..	P_N kW	M_N Nm	n_N rpm	I_N 400 V A	I_N 380-420 V A	cosφ	IE	$\eta_{50\%}$ %	$\eta_{75\%}$ %	$\eta_{100\%}$ %	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DRE71M6	0.25	2.6	910	0.73	-	0.73	IE2	64.8	70.0	68.8	3.4	2.0 2.0	2.1
DRE80S6	0.37	3.8	935	1.19	1.24	0.69	IE2	67.2	71.2	71.5	3.7	2.0 2.0	2.3
DRE80M6	0.55	5.6	935	1.58	-	0.69	IE2	70.5	74.0	74.0	4.4	2.2 2.2	2.4
DRE90L6	0.75	7.6	940	2.05	2.1	0.65	IE2	78.7	80.5	80.0	4.6	2.4 2.4	2.8
DRE100M6	1.1	11.2	940	3.1	3.15	0.64	IE2	77.2	79.4	78.7	4.7	3.0 2.9	3.1
DRE100L6	1.5	15.2	940	4	4.05	0.66	IE2	79.7	81.5	80.9	5.0	3.3 3.1	3.2
DRE112M6	2.2	22	955	5.2	5.3	0.74	IE2	83.5	84.2	83.0	5.5	2.1 1.8	2.7
DRE132S6	3	30	955	6.8	7	0.74	IE2	85.4	85.8	84.4	5.5	2.3 2.1	2.8
DRE132M6	4	40	960	9.5	9.6	0.71	IE2	85.3	86.2	85.4	6.1	2.8 2.6	3.2
DRE132MC6	5.5	54	970	12.1	12.3	0.76	IE2	87.5	88.0	86.9	5.8	1.9 1.7	2.7
DRE160M6	5.5	54	965	12.6	12.8	0.72	IE2	86.4	87.4	86.8	5.8	2.3 2.0	2.8

6-pole DRE.. motors/brakemotors for 400 V (380 – 420 V), 50 Hz, IE2

Motor type DRE..	P_N kW	M_N Nm	n_N rpm	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
DRE71M6	0.25	2.6	910	9.1	11.9	BE05	6600 15000	5	12	13.2
DRE80S6	0.37	3.8	935	12	15.9	BE1	6000 14000	10	14	17.4
DRE80M6	0.55	5.6	935	14	22.3	BE2	4300 10000	14	18	26.8
DRE90L6	0.75	7.6	940	21	44.6	BE2	3500 8000	20	26	49.2
DRE100M6	1.1	11.2	940	26	56.8	BE5	- 7000	28	32	62.8
DRE100L6	1.5	15.2	940	29	69	BE5	- 6000	40	35	75

Motor type DRE..	P_N kW	M_N Nm	n_N rpm	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
DRE112M6	2.2	22	955	41	148	BE5	- 4000	55	48	152
DRE132S6	3	30	955	46	190	BE11	- 3500	80	61	201
DRE132M6	4	40	960	60	251	BE11	- 3300	80	74	261
DRE132MC6	5.5	54	970	63	345	BE11	- 2900	80	78	356
DRE160M6	5.5	54	965	88	634	BE11	- 2700	110	105	656

6-pole DRP. motors for 400 V (380 – 420 V), 50 Hz, IE3

Motor type DRP..	P_N kW	M_N Nm	n_N rpm	I_N 400 V A	I_N 380-420 V A	cosφ	IE	$\eta_{50\%}$ %	$\eta_{75\%}$ %	$\eta_{100\%}$ %	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DRP90L6	0.75	7.6	940	2.05	2.1	0.65	IE3	78.7	80.5	80.0	4.6	2.4 2.4	2.8
DRP100L6	1.1	11.1	950	3.1	3.15	0.63	IE3	79.8	82.3	82.4	5.3	3.6 3.1	3.2
DRP112M6	1.5	14.8	965	3.5	3.6	0.70	IE3	84.5	86.1	85.8	6.2	2.4 1.7	2.7
DRP132S6	2.2	22	965	5.1	5.2	0.72	IE3	85.5	86.5	85.6	6.0	2.5 2.2	3.0
DRP132M6	3	29.5	970	7.1	7.2	0.70	IE3	86.5	87.7	87.3	6.6	2.9 2.7	3.4
DRP132MC6	4	39	980	9	-	0.72	IE3	87.7	88.8	88.5	6.8	2.2 1.7	3.2
DRP160M6	4	39	975	9.3	9.4	0.69	IE3	87.2	88.9	88.9	6.4	2.5 2.2	3.2

6-pole DRP.. motors/brakemotors for 400 V (380 – 420 V), 50 Hz, IE3

Motor type DRP..	P_N kW	M_N Nm	n_N rpm	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
DRP90L6	0.75	7.6	940	21	44.6	BE2	3500 8000	20	26	49.2
DRP100L6	1.1	11.1	950	29	69	BE5	- 6000	28	35	75
DRP112M6	1.5	14.8	965	41	148	BE5	- 4000	40	48	152
DRP132S6	2.2	22	965	46	190	BE5	- 3500	55	54	195
DRP132M6	3	29.5	970	60	251	BE11	- 3300	80	74	261
DRP132MC6	4	39	980	63	345	BE11	- 2900	80	78	356
DRP160M6	4	39	975	88	634	BE11	- 2700	110	105	656

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5.8 Standard motor, 50/60 Hz, 2-pole, S1

2-pole DRS.. motors for 400 V, 50/60 Hz, IE1

Motor type DRS..	P_N kW	M_N Nm	n_N rpm	I_N A	cosφ	IE	$η_{50\%}$ %	$η_{75\%}$ %	$η_{100\%}$ %	I_A/I_N	M_A/M_N	M_H/M_N	M_K/M_N
DRS80S2	0.75	2.55 2.1	2800 3440	1.73 1.5	0.84 0.81	IE1	71.3 74.4	74.6 77.9	74.4 77.0	4.6 5.9	2.5 2.9	2.3 2.7	2.5 2.9
DRS80M2	1.1	3.7 3	2840 3475	2.35 1.93	0.88 0.87	IE1	80.2 82.0	77.7 82.5	76.5 81.5	6.0 7.7	2.7 3.3	2.5 2.9	2.8 3.3
DRS90M2	1.5	5.1 4.15	2830 3470	3.1 2.65	0.89 0.85	IE1	83.3 85.0	80.0 84.4	78.3 82.5	5.9 7.9	2.7 3.2	2.6 3.0	2.7 3.4
DRS90L2	2.2	7.4 6.1	2820 3450	4.45 3.75	0.89 0.89	IE1	84.9 86.0	82.8 85.8	80.5 84.0	5.8 7.5	2.9 3.4	2.5 2.8	2.6 3.1
DRS100M2	3	10.1 8.3	2840 3465	5.8 5	0.91 0.91	IE1	86.9 88.3	84.6 87.5	82.5 85.5	6.4 8.3	3.1 3.7	2.8 3.2	2.8 3.3
DRS100LC2	4	13.2 10.9	2900 3520	7.8 6.7	0.88 0.87	IE1	86.9 88.2	85.6 87.6	84.2 86.5	7.7 9.5	2.7 3.2	2.1 2.4	3.0 3.6
DRS112M2	4	13.2 10.9	2900 3510	7.6 6.6	0.89 0.89	IE1	87.7 88.6	85.4 88.2	84.3 87.5	6.3 7.4	2.3 2.6	2.1 2.3	2.8 3.3
DRS132S2	5.5	18.2 15	2890 3500	10.2 9	0.91 0.91	IE1	89.2 89.8	87.0 88.7	85.5 87.5	6.5 7.2	2.3 2.4	2.1 2.1	2.8 3.1
DRS132M2	7.5	24.5 20.5	2910 3520	13.7 12.1	0.91 0.90	IE1	90.0 90.7	87.8 90.1	86.5 88.5	7.3 8.5	2.5 2.7	2.3 2.3	3.1 3.5
DRS132M2	9.2	30.5 25	2900 3505	16.9 14.4	0.89 0.90	IE1	90.2 91.1	88.8 89.6	87.2 87.5	6.9 7.3	2.5 2.5	2.3 2.2	3.0 3.1

2-pole DRS.. motors/brakemotors for 400 V, 50/60 Hz, IE1

Motor type DRS..	P_N kW	M_N Nm	n_N rpm	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
DRS 80S 2	0.75	2.55 2.1	2800 3440	11.5	15.3	BE05	1400 3300	5	14.3	16.8
DRS 80M 2	1.1	3.7 3	2840 3475	14.3	21.7	BE1	1300 3000	7	17.3	23.2
DRS 90M 2	1.5	5.1 4.15	2830 3470	18.4	35.7	BE1	1100 2700	10	21.3	37.3
DRS 90L 2	2.2	7.4 6.1	2820 3450	21.4	43.9	BE2	900 2200	14	26	48.6
DRS 100M 2	3	10.1 8.3	2840 3465	26	56.2	BE2	700 1800	20	30.6	61
DRS 100LC 2	4	13.2 10.9	2900 3520	31.2	90	BE5	- 700	28	37.1	96
DRS 112M 2	4	13.2 10.9	2900 3510	41.3	114	BE5	- 600	28	48.5	119
DRS 132S 2	5.5	18.2 15	2890 3500	44.2	147	BE5	- 500	40	51.4	151
DRS 132M 2	7.5	24.5 20.5	2910 3520	60	193	BE5	- 500	55	67.2	198
DRS 132M 2	9.2	30.5 25	2900 3505	60	193	BE5	- 500	55	67.2	198

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5.9 Standard motor, 50/60 Hz, 4-pole, S1

4-pole DRS.. motors for 400 V, 50/60 Hz, IE1

Motor type DRS..	P_N kW	M_N Nm	n_N rpm	I_N A	cosφ	IE	$\eta_{50\%}$ %	$\eta_{75\%}$ %	$\eta_{100\%}$ %	I_A/I_N	M_A/M_N	M_H/M_N	M_K/M_N
DRS80S4	0.55	3.75 3.05	1400 1720	1.32 1.18	0.81 0.77	IE1	74.6 75.7	76.6 77.8	75.3 78.5	4.3 5.3	1.9 2.4	1.9 2.4	2.2 2.5
DRS80S4	0.75	5.1 4.15	1400 1720	1.8 1.75	0.81 0.77	IE1	74.6 75.7	76.6 77.8	75.3 78.5	4.3 5.3	1.9 2.4	1.9 2.4	2.2 2.5
DRS80M4	1.1	7.4 6.1	1410 1725	2.4 2.2	0.84 0.79	IE1	77.7 80.2	78.6 80.4	77.0 80.0	5.1 6.4	2.2 2.9	1.7 2.0	2.3 3.1
DRS90M4	1.5	10.3 8.3	1395 1720	3.3 2.85	0.82 0.76	IE1	82.0 84.0	82.0 84.1	79.6 82.5	5.0 6.3	2.3 3.2	2.0 2.6	2.5 3.3
DRS90L4	2.2	15 12.2	1400 1720	4.85 4.15	0.81 0.78	IE1	82.9 85.1	83.1 85.4	81.1 84.0	5.1 6.4	2.5 3.0	2.2 2.7	2.5 3.2
DRS100M4	3	20.5 16.7	1400 1720	6.4 5.5	0.82 0.79	IE1	85.2 86.3	84.7 86.1	82.4 84.0	5.3 7.0	2.8 3.5	2.4 2.6	2.8 3.6
DRS100LC4	4	26.5 22	1440 1750	8.9 7.1	0.78 0.77	IE1	83.2 86.9	84.3 87.6	83.2 86.5	6.5 7.2	2.5 3.9	2.3 3.1	3.1 3.9
DRS112M4	4	26.5 22	1435 1750	8.1 6.8	0.84 0.82	IE1	86.1 89.3	85.6 88.7	83.8 86.5	6.0 7.0	2.0 2.2	1.7 1.8	2.5 2.8
DRS132S4	5.5	36.5 30	1445 1750	11.1 9.4	0.82 0.81	IE1	86.4 89.3	86.7 89.4	85.7 88.5	6.7 7.8	2.4 2.8	2.1 2.3	2.8 3.3
DRS132M4	7.5	49.5 41	1445 1750	14.4 13.1	0.85 0.85	IE1	90.0 90.3	89.1 89.4	87.1 87.5	6.6 7.8	2.4 2.6	1.9 2.1	2.7 3.2
DRS132MC4	9.2	60 49.5	1465 1770	18.6 17.2	0.81 0.77	IE1	87.9 88.3	88.5 89.0	87.6 88.5	7.2 9.1	2.1 2.4	1.6 1.8	2.9 3.7
DRS160S4	9.2	60 49.5	1460 1770	18.9 15.9	0.79 0.79	IE1	87.9 89.2	89.0 90.1	88.0 88.5	6.4 7.4	2.5 2.8	2.0 2.0	2.6 2.9
DRS160M4	11	72 59	1460 1770	22 18.8	0.81 0.79	IE1	89.2 89.9	89.1 90.2	88.0 89.5	6.8 8.0	2.7 3.2	2.3 2.4	2.8 3.1
DRS160MC4	15	97 81	1470 1770	30 27	0.80 0.80	IE1	90.3 90.5	90.2 90.7	89.1 90.2	6.3 7.6	2.1 2.6	1.7 1.9	2.4 2.8
DRS180S4	15	98 81	1460 1765	29 25.5	0.83 0.82	IE1	90.0 89.9	90.3 91.0	89.5 90.2	6.2 7.0	2.3 2.8	2.0 2.2	2.6 3.0
DRS180M4	18.5	121 100	1465 1775	34.5 31.5	0.85 0.85	IE1	90.6 90.2	90.8 91.2	90.0 91.0	6.5 7.5	2.2 2.6	1.8 2.0	2.7 3.1
DRS180L4	22	143 119	1465 1770	41.5 37.5	0.84 0.84	IE1	90.9 90.3	91.2 91.2	90.5 91.0	6.9 7.9	2.4 2.8	2.0 2.1	2.8 3.3
DRS180LC4	30	195 162	1470 1770	57 51	0.84 0.84	IE1	92.2 91.8	92.0 92.5	90.9 91.7	5.6 6.4	1.8 2.0	1.5 1.6	2.2 2.4
DRS200L4	30	194 161	1475 1775	57 52	0.82 0.82	IE1	91.6 91.7	91.9 92.6	91.3 92.4	6.4 7.4	2.1 2.6	1.9 2.1	2.6 2.9
DRS225S4	37	240 198	1475 1780	70 61	0.82 0.82	IE1	92.2 92.1	92.0 93.1	91.6 92.4	7.1 7.6	2.4 3.0	1.9 2.2	3.0 3.0
DRS225M4	45	290 240	1480 1780	84 72	0.83 0.81	IE1	92.8 92.9	92.7 93.8	92.3 93.0	7.4 8.0	2.5 3.4	2.2 2.3	2.9 3.1
DRS225MC4	55	355 295	1480 1780	106 88	0.81 0.83	IE1	92.4 92.8	92.8 93.7	92.4 93.0	6.8 7.1	2.4 2.6	1.8 1.8	2.4 2.6

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4-pole DRS.. motors/brakemotors for 400 V, 50/60 Hz, IE1

Motor type DRS..	P_N kW	M_N Nm	n_N rpm	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
DRS80S4	0.55	3.75 3.05	1400 1720	11.5	15.9	BE1	3500 9000	10	14.5	17.4
DRS80S4	0.75	5.1 4.15	1400 1720	11.5	15.9	BE1	3500 9000	10	14.5	17.4
DRS80M4	1.1	7.4 6.1	1410 1725	14.3	22.3	BE2	3500 9000	14	18	26.8
DRS90M4	1.5	10.3 8.3	1395 1720	18.4	36.6	BE2	2900 7500	20	23	41.3
DRS90L4	2.2	15 12.2	1400 1720	21.4	44.9	BE5	2300 5600	40	27.3	50.9
DRS100M4	3	20.5 16.7	1400 1720	26	57.2	BE5	- 8500	40	31.9	63.2
DRS100LC4	4	26.5 22	1440 1750	31.2	91	BE5	- 3800	55	37.1	97
DRS112M4	4	26.5 22	1435 1750	41.3	152	BE5	- 3100	55	48.5	157
DRS132S4	5.5	36.5 30	1445 1750	44.2	196	BE11	- 2800	80	58.7	206
DRS132M4	7.5	49.5 41	1445 1750	60	258	BE11	- 2000	110	74.5	269
DRS132MC4	9.2	60 49.5	1465 1770	63	347	BE11	- 1500	110	77.5	357
DRS160S4	9.2	60 49.5	1460 1770	79.5	366	BE20	- 1100	150	106.2	417
DRS160M4	11	72 59	1460 1770	91.5	442	BE20	- 1000	150	118.2	493
DRS160MC4	15	97 81	1470 1770	93.5	609	BE20	- 900	200	120.2	661
DRS180S4	15	98 81	1460 1765	121.9	909	BE20	- 900	200	153.9	969
DRS180M4	18.5	121 100	1465 1775	141.1	1130	BE30	- 800	300	181.1	1260
DRS180L4	22	143 119	1465 1770	152.1	1310	BE30	- 590	300	192.1	1450
DRS180LC4	30	195 162	1470 1770	161.1	1700	BE32	- 520	400	206.1	1930
DRS200L4	30	194 161	1475 1775	258	2390	BE32	- 550	400	313	2620
DRS225S4	37	240 198	1475 1780	294.5	2970	BE32	- 320	500	349.5	3200
DRS225M4	45	290 240	1480 1780	315.5	3470	BE32	- 270	600	370.5	3700
DRS225MC4	55	355 295	1480 1780	329	4390	BE32	- 200	600	384	4620

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5.10 Standard motor, 50 Hz, 4/2-pole, Dahlander connection, S1

4/2-pole DRS.. motors for 400 V, 50 Hz

Motor type DRS..	P_N kW	M_N Nm	n_N rpm	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
DRS 71S 4/2	0.25 0.37	1.71 1.3	1400 2720	1.05 1	0.71 0.88	37.9 52.5	45.9 59.3	48.6 60.7	3.0 3.5	1.5 1.5	1.4 1.3	1.9 1.6
DRS 71M 4/2	0.4 0.63	2.75 2.25	1380 2660	1.24 1.66	0.75 0.90	56.1 68.8	62.3 68.0	62.3 61.2	3.0 3.5	1.6 1.4	1.4 1.2	1.8 1.4
DRS 80M 4/2	0.55 0.88	3.6 2.95	1455 2860	1.43 1.91	0.71 0.86	71.8 74.4	76.7 77.4	78.1 77.4	6.3 5.6	2.8 2.3	2.5 1.9	3.5 2.6
DRS 90M 4/2	0.88 1.3	5.9 4.45	1430 2780	2.4 3	0.75 0.86	0.0 0.0	70.0 73.0	71.0 73.0	5.7 5.4	2.5 1.9	2.5 1.8	3.0 2.1
DRS 90M 4/2	1.2 1.8	8 6.2	1440 2780	3.15 4.1	0.74 0.86	68.8 72.1	73.6 75.0	75.0 75.0	5.1 4.6	2.4 2.0	2.4 2.0	2.8 2.2
DRS 100M 4/2	1.5 2.2	10 7.4	1430 2840	3.35 4.3	0.80 0.93	81.0 80.5	82.1 80.5	81.1 79.2	6.4 6.4	2.7 2.2	2.5 1.8	3.2 2.7
DRS 100L 4/2	2.5 3	17.1 10.1	1400 2840	5.5 5.8	0.84 0.93	83.2 82.4	80.9 81.6	78.4 79.7	5.0 6.7	2.2 2.5	1.9 2.0	2.3 2.3
DRS 132S 4/2	3.3 4	21.5 13.1	1450 2915	9 7.5	0.65 0.90	77.9 85.2	80.8 86.4	81.0 85.8	4.5 7.3	1.8 2.2	1.8 1.9	2.6 2.8
DRS 132M 4/2	4.4 5.5	29 17.9	1455 2930	11.3 9.9	0.67 0.91	80.9 87.6	83.3 88.4	83.3 87.6	4.9 7.9	1.9 2.2	1.8 1.9	2.7 2.9
DRS 160S 4/2	6 7.5	39 24.5	1470 2950	12 17	0.80 0.75	89.3 81.5	89.7 83.9	88.9 84.2	7.0 6.8	2.5 2.7	1.8 1.5	2.6 3.0
DRS 160M 4/2	8.8 11	57 35.5	1465 2940	17.5 25	0.82 0.76	89.6 82.3	89.2 83.8	87.7 83.2	6.3 6.3	2.2 2.3	1.7 1.5	2.5 2.8
DRS 180L 4/2	13 15	84 48.5	1475 2960	23.5 31.5	0.87 0.78	92.1 84.2	92.7 87.1	92.4 88.0	8.0 8.2	2.6 3.0	1.8 1.6	3.1 3.6
DRS 180L 4/2	18.5 20	120 65	1470 2960	34.5 45.5	0.84 0.72	92.0 84.8	92.0 87.2	91.2 87.7	7.0 7.6	2.4 2.9	1.7 1.5	2.8 3.2

4/2-pole motors/brakemotors DRS.. for 400 V, 50 Hz

Motor type DRS..	P_N kW	M_N Nm	n_N rpm	m kg	J_{Mot} 10^{-4} kgm²	BE..	Z_0 BG 1/h	Z_0 BGE 1/h	M_B Nm	m_B kg	J_{Mot_BE} 10^{-4} kgm²
DRS 71S 4/2	0.25 0.37	1.71 1.3	1400 2720	7.8	5.13	BE05	4800 2000	7500 2700	3.5	10	6.43
DRS 71M 4/2	0.4 0.63	2.75 2.25	1380 2660	9.1	7.21	BE05	3000 1700	5400 2200	5	12	8.51
DRS 80M 4/2	0.55 0.88	3.6 2.95	1455 2860	14	22.3	BE1	1100 800	2200 1900	7	17	23.8
DRS 90M 4/2	0.88 1.3	5.9 4.45	1430 2780	18	36.6	BE2	1900 850	3850 1300	20	23	41.3
DRS 90M 4/2	1.2 1.8	8 6.2	1440 2780	18	36.6	BE2	1900 850	3850 1300	20	23	41.3
DRS 100M 4/2	1.5 2.2	10 7.4	1430 2840	26	57.2	BE2	920 550	3280 820	20	31	61.9
DRS 100L 4/2	2.5 3	17.1 10.1	1400 2840	29	69.5	BE5	- -	2250 920	28	35	75.5
DRS 132S 4/2	3.3 4	21.5 13.1	1450 2915	44	147	BE5	- -	1200 450	55	51	151
DRS 132M 4/2	4.4 5.5	29 17.9	1455 2930	60	193	BE11	- -	670 350	80	74	204
DRS 160S 4/2	6 7.5	39 24.5	1470 2950	80	366	BE11	- -	900 280	80	98	388
DRS 160M 4/2	8.8 11	57 35.5	1465 2940	92	442	BE20	- -	750 190	110	120	493
DRS 180L 4/2	13 15	84 48.5	1475 2960	150	1300	BE20	- -	750 140	200	185	1360
DRS 180L 4/2	18.5 20	120 65	1470 2960	150	1300	BE30	- -	750 140	300	190	1440

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5.11 Standard motor, 50 Hz, 8/2-pole separate winding, S3 40/60% or S1

8/2-pole DRS.. motors for 400 V, 50 Hz

Motor type DRS..	P_N kW	M_N Nm	n_N rpm	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
DRS 71S 8/2	0.06 0.25	0.84 0.83	685 2870	0.48 0.98	0.62 0.65	0.0 0.0	0.0 0.0	29.1 57.2	1.7 3.4	1.6 2.0	1.5 1.5	1.7 2.2
DRS 71M 8/2	0.08 0.37	1.12 1.24	685 2855	0.61 0.98	0.58 0.81	0.0 0.0	0.0 0.0	32.7 66.6	1.7 4.2	1.7 1.9	1.6 1.4	1.7 1.9
DRS 71M 8/2	0.1 0.4	1.43 1.34	670 2840	0.66 1.04	0.66 0.83	0.0 0.0	0.0 0.0	33.6 66.6	1.5 4.0	1.3 1.8	1.3 1.3	1.3 1.8
DRS 71M 8/2	0.11 0.44	1.56 1.47	675 2860	0.82 1.34	0.60 0.74	0.0 0.0	0.0 0.0	32.5 63.1	1.5 3.4	1.5 2.0	1.4 1.5	1.5 2.0
DRS 80S 8/2	0.15 0.6	2.15 2.1	670 2710	0.95 1.9	0.65 0.80	0.0 0.0	0.0 0.0	35.9 58.6	1.8 3.0	1.5 2.0	1.6 1.7	1.8 1.8
DRS 80M 8/2	0.22 0.9	3.1 3.1	680 2780	1.15 2.4	0.60 0.80	32.1 64.2	39.8 68.5	43.3 68.7	2.0 4.0	1.7 2.6	1.7 2.4	1.9 2.5
DRS 90M 8/2	0.3 1.3	4.05 4.3	710 2880	1.41 3.3	0.55 0.80	0.0 0.0	0.0 0.0	56.1 71.0	2.5 4.6	1.4 1.9	1.4 1.7	1.9 2.3
DRS 90L 8/2	0.45 1.8	6 5.9	720 2905	2.5 4.7	0.52 0.74	0.0 0.0	0.0 0.0	55.0 74.5	2.3 5.6	1.4 2.5	1.4 2.1	2.0 2.6
DRS 100M 8/2	0.6 2.4	8.1 7.9	710 2890	3.1 5.4	0.57 0.82	0.0 0.0	0.0 0.0	49.8 79.2	2.3 6.2	1.4 2.6	1.4 2.2	1.9 2.7
DRS 112M 8/2	0.8 3	10.8 10.4	710 2750	4.2 6.7	0.53 0.87	0.0 0.0	0.0 0.0	53.4 75.7	2.5 4.6	1.4 2.7	0.9 2.2	1.6 2.4
DRS 132M 8/2	1.1 4.6	14.8 15.7	710 2800	4.6 8.5	0.53 0.92	0.0 0.0	0.0 0.0	65.9 80.5	3.0 6.7	1.5 3.1	1.5 2.0	2.1 2.5

8/2-pole motors/brakemotors DRS.. for 400 V, 50 Hz

Motor type DRS..	P_N kW	M_N Nm	n_N rpm	m kg	J_{Mot} 10^{-4} kgm²	BE..	Z_0 BG 1/h	Z_0 BGE 1/h	M_B Nm	m_B kg	J_{Mot_BE} 10^{-4} kgm²
DRS 71S 8/2	0.06 0.25	0.84 0.83	685 2870	7.8	5.13	BE05	15000 6000	20000 9000	1.8	10	6.43
DRS 71M 8/2	0.08 0.37	1.12 1.24	685 2855	9.1	7.21	BE05	14000 6000	18000 8000	3.5	12	8.51
DRS 71M 8/2	0.1 0.4	1.43 1.34	670 2840	9.1	7.21	BE05	14000 6000	18000 8000	3.5	12	8.51
DRS 71M 8/2	0.11 0.44	1.56 1.47	675 2860	9.1	7.21	BE05	14000 6000	18000 8000	3.5	12	8.51
DRS 80S 8/2	0.15 0.6	2.15 2.1	670 2710	12	15.9	BE05	8000 3800	14000 5000	5	14	17.4
DRS 80M 8/2	0.22 0.9	3.1 3.1	680 2780	14	22.3	BE1	8000 3000	14000 4000	7	17	23.8
DRS 90M 8/2	0.3 1.3	4.05 4.3	710 2880	18	36.6	BE1	7000 2300	11000 3500	10	21	38.2
DRS 90L 8/2	0.45 1.8	6 5.9	720 2905	21	44.9	BE2	5000 1700	10000 3300	14	26	49.6
DRS 100M 8/2	0.6 2.4	8.1 7.9	710 2890	26	57.2	BE2	4000 1700	9000 2600	20	31	61.9
DRS 112M 8/2	0.8 3	10.8 10.4	710 2750	41	152	BE5	- -	7000 1500	28	48	157
DRS 132M 8/2	1.1 4.6	14.8 15.7	710 2800	60	258	BE5	- -	5000 1000	40	67	263

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5.12 Standard motor, 50 Hz, 8/4-pole, Dahlander connection, S1

8/4-pole DRS.. motors for 400 V, 50 Hz

Motor type DRS..	P_N kW	M_N Nm	n_N rpm	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
DRS 71S 8/4	0.1 0.18	1.39 1.23	685 1400	0.485 0.52	0.62 0.79	38.8 57.0	47.1 63.6	51.0 64.7	2.2 3.3	1.7 1.5	1.7 1.4	2.0 1.9
DRS 71M 8/4	0.16 0.3	2.25 2.05	685 1400	0.71 0.79	0.62 0.83	42.5 60.9	50.6 65.6	54.0 65.6	2.4 3.5	1.7 1.5	1.7 1.4	2.0 1.9
DRS 80M 8/4	0.22 0.4	2.95 2.65	710 1440	0.98 0.96	0.56 0.81	44.9 71.6	53.2 74.9	57.4 74.7	3.0 4.9	1.8 1.7	1.8 1.4	2.4 2.2
DRS 90M 8/4	0.3 0.6	4.05 4	710 1440	1.44 1.42	0.51 0.79	47.8 75.8	55.6 78.0	59.4 77.3	2.9 5.1	2.1 1.9	2.1 1.7	2.5 2.4
DRS 90L 8/4	0.44 0.88	6 5.9	700 1425	1.9 1.98	0.54 0.83	52.2 78.0	59.2 79.1	61.2 76.9	2.9 4.7	1.8 1.7	1.7 1.6	2.2 2.1
DRS 100M 8/4	0.66 1.3	9.1 8.7	690 1420	2.65 2.9	0.57 0.84	57.2 79.7	62.7 79.7	63.9 77.2	2.8 4.5	1.7 1.8	1.7 1.6	2.0 2.0
DRS 100L 8/4	0.9 1.8	12.5 12.2	690 1410	3.5 4	0.58 0.85	57.7 80.5	63.0 79.7	63.9 76.5	2.8 4.5	1.7 1.7	1.7 1.6	2.0 1.9
DRS 112M 8/4	1.2 2.2	17 15.1	675 1390	4.2 4.6	0.58 0.87	69.3 83.5	72.1 82.6	71.0 79.7	2.9 4.8	1.9 2.2	1.9 1.9	2.1 2.2
DRS 132S 8/4	1.6 3.3	22.5 23	680 1385	5.8 6.8	0.55 0.87	70.5 84.2	72.4 82.1	72.2 79.9	2.9 4.7	2.0 2.1	2.0 1.9	2.3 2.1
DRS 132M 8/4	2.1 4.2	29.5 29	680 1390	7 8.6	0.59 0.87	73.4 85.5	75.4 83.7	74.2 80.2	3.3 5.0	1.9 2.1	1.9 1.9	2.2 2.2
DRS 160S 8/4	2.7 5.5	35.5 35.5	725 1470	9.2 11	0.54 0.84	0.0 0.0	0.0 0.0	78.9 85.6	4.0 6.3	2.1 1.9	1.9 1.4	2.3 2.2
DRS 160M 8/4	3.8 7.5	49.5 48.5	730 1470	12.9 15	0.54 0.84	0.0 0.0	0.0 0.0	78.4 85.6	3.9 6.2	2.0 1.9	1.9 1.4	2.3 2.2
DRS 180S 8/4	5.5 10	72 65	730 1465	17.4 18.7	0.55 0.87	79.7 89.9	82.5 89.9	83.1 88.9	4.0 6.0	2.2 1.9	2.0 1.4	2.6 2.3
DRS 180L 8/4	7.5 15	97 97	735 1470	22.5 27.5	0.55 0.87	0.0 0.0	0.0 0.0	86.3 89.9	4.4 6.0	2.4 1.9	2.1 1.4	2.7 2.3
DRS 200L 8/4	11 22	143 142	735 1475	35.5 41.5	0.52 0.85	0.0 0.0	0.0 0.0	85.3 89.9	4.0 5.9	2.4 1.8	2.0 1.4	2.5 2.0
DRS 225S 8/4	14 28	182 181	735 1475	45 52	0.52 0.85	0.0 0.0	0.0 0.0	86.2 90.8	4.1 6.2	2.5 1.9	2.2 1.5	2.6 2.0
DRS 225M 8/4	18 34	230 220	740 1475	57 63	0.53 0.86	0.0 0.0	0.0 0.0	86.4 91.1	4.0 6.3	2.4 2.0	2.0 1.5	2.5 2.1

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8/4-pole motors/brakemotors DRS.. for 400 V, 50 Hz

Motor type DRS..	P_N kW	M_N Nm	n_N rpm	m kg	J_{Mot} 10^{-4} kgm^2	BE..	Z_0 BG 1/h	Z_0 BGE 1/h	M_B Nm	m_B kg	J_{Mot_BE} 10^{-4} kgm^2
DRS 71S 8/4	0.1 0.18	1.39 1.23	685 1400	7.8	8.29	BE05	7000 4000	12000 7000	3.5	10	9.59
DRS 71M 8/4	0.16 0.3	2.25 2.05	685 1400	9.1	11.9	BE05	5300 3100	9800 5300	5	12	13.2
DRS 80M 8/4	0.22 0.4	2.95 2.65	710 1440	14	22.3	BE1	3800 2300	7000 4200	7	17	23.8
DRS 90M 8/4	0.3 0.6	4.05 4	710 1440	18	36.6	BE1	2600 2000	6700 3700	10	21	38.2
DRS 90L 8/4	0.44 0.88	6 5.9	700 1425	21	44.9	BE2	2500 2000	5800 3400	20	26	49.6
DRS 100M 8/4	0.66 1.3	9.1 8.7	690 1420	26	57.2	BE2	2400 1800	5200 3400	20	31	61.9
DRS 100L 8/4	0.9 1.8	12.5 12.2	690 1410	29	69.5	BE5	2300 1400	4700 2500	28	35	75.5
DRS 112M 8/4	1.2 2.2	17 15.1	675 1390	41	152	BE5	- -	3800 1800	40	48	157
DRS 132S 8/4	1.6 3.3	22.5 23	680 1385	44	196	BE5	- -	3000 1600	55	51	200
DRS 132M 8/4	2.1 4.2	29.5 29	680 1390	60	258	BE11	- -	3000 1500	80	74	269
DRS 160S 8/4	2.7 5.5	35.5 35.5	725 1470	80	366	BE11	- -	2600 1400	80	98	388
DRS 160M 8/4	3.8 7.5	49.5 48.5	730 1470	92	442	BE11	- -	1900 1300	110	110	464
DRS 180S 8/4	5.5 10	72 65	730 1465	120	909	BE20	- -	1600 1200	150	155	969
DRS 180L 8/4	7.5 15	97 97	735 1470	150	1310	BE20	- -	1100 900	200	185	1370
DRS 200L 8/4	11 22	143 142	735 1475	260	2390	BE30	- -	900 700	300	310	2520
DRS 225S 8/4	14 28	182 181	735 1475	295	2970	BE32	- -	700 500	400	350	3200
DRS 225M 8/4	18 34	230 220	740 1475	315	3470	BE32	- -	600 450	500	370	3700

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5.13 Key to the data of DRM.. torque motors

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
cosφ	Power factor
J_{Mot}	Mass moment of inertia of the motor
BE..	Brake used
M_B	Braking torque

5.14 DRM.. torque motors, 50 Hz, 12-pole

12-pole DRM.. torque motors for 400 V, 50 Hz, S1, fan-cooled

DRM.. motor type	n_N	M_N	I_N	cosφ	J_{Mot}	BE..	M_B
	rpm	Nm	A		10^{-4} kgm²		Nm
DRM71S12	500	0.7	0.26	0.76	8.1	BE05	1.8
DRM71M12	500	0.9	0.31	0.69	11.7	BE05	1.8
DRM90M12	500	1.3	0.51	0.56	33.9	BE1	5
DRM100M12	500	2.3	0.8	0.50	54.4	BE2	5
DRM100L12	500	2.6	0.88	0.49	66.7	BE2	5
DRM132S12	500	2.9	1.53	0.31	190	BE5	14
DRM132M12	500	3.6	2.05	0.29	253	BE5	14

12-pole DRM.. torque motors for 400 V, 50 Hz, S3/15 %, fan-cooled

DRM.. motor type	n_N	M_N	I_N	cosφ	J_{Mot}	BE..	M_B
	rpm	Nm	A		10^{-4} kgm²		Nm
DRM71S12	500	2.6	0.87	0.74	8.1	BE05	1.8
DRM71M12	500	3.0	0.99	0.71	11.7	BE05	1.8
DRM90M12	500	6.2	1.76	0.59	33.9	BE1	5
DRM100M12	500	10.4	2.75	0.60	54.4	BE2	5
DRM100L12	500	11.7	2.95	0.56	66.7	BE2	5
DRM132S12	500	12.9	5.6	0.36	190	BE5	14
DRM132M12	500	17.3	7.7	0.34	253	BE5	14

12-pole DRM.. torque motors for 400 V, 50 Hz, S1, forced air cooling

DRM.. motor type	n_N	M_N	I_N	cosφ	J_{Mot}	BE..	M_B
	rpm	Nm	A		10^{-4} kgm²		Nm
DRM71S12	500	1.9	0.61	0.75	8.1	BE05	5
DRM71M12	500	2.7	0.85	0.72	11.7	BE1	7
DRM90M12	500	3.9	1.09	0.58	35.2	BE1	10
DRM100M12	500	5	1.52	0.52	55.9	BE2	10
DRM100L12	500	7	1.85	0.55	68.1	BE2	14
DRM132S12	500	7.2	3.2	0.34	190	BE5	20
DRM132M12	500	8.7	4.25	0.32	253	BE5	20

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5.15 Key to the technical data for asynchronous DRL.. 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 brake motor
M_B D1	Braking torque (dynamics package 1)
M_B D2	Braking torque (dynamics package 2)

5.16 Asynchronous DRL.. servomotors

4-pole DRL.. servomotors for 400 V, 50 Hz

n_N	Motor type	M_N	I_N	I_{q_rated}	I_{d_rated}	k_T	M_{pk} D1	M_{pk} D2	m	J_{Mot}
		Nm	A	A	A	Nm/A	Nm	Nm	kg	10^{-4} kgm²
1200	DRL71S4	2.7	1.18	1.02	0.62	2.66	5	8.5	8.6	4.9
	DRL71M4	4	1.6	1.36	0.80	2.93	7	14	10	7.1
	DRL80S	6.5	2.15	1.95	0.88	3.33	10	25	11.5	14.9
	DRL80M4	9.5	2.9	2.64	1.10	3.60	14	30	15.2	21.5
	DRL90L4	15	4.8	4.14	2.21	3.63	25	46	22.5	43.5
	DRL100L4	26	8.5	8.05	2.68	3.23	40	85	30	68
	DRL132S4	42	12.6	11.9	4.07	3.52	80	150	45.5	190
	DRL132MC4	56	17.6	15.4	7.50	3.63	130	200	65	340
	DRL160M4	85	25.5	24.2	8.05	3.51	165	280	93	450
	DRL160MC4	90	28	25.1	10.9	3.58	185	320	95	590
	DRL180S	120	34.5	33.2	10.8	3.62	210	380	122	900
	DRL180M4	135	38	36.1	11.3	3.74	250	430	143	1110
	DRL180L4	165	47	44.9	14.8	3.67	320	520	154	1300
	DRL180LC4	175	52	46.8	17.1	3.74	420	600	163	1680
	DRL200L	200	58.5	56.0	17.8	3.57	475	680	260	2360
	DRL225S4	250	72	68.1	23.4	3.67	520	770	295	2930
	DRL225MC4	290	89	78.6	29.2	3.69	770	1100	330	4330

n_N	Motor type	M_N	I_N	I_{q_rated}	I_{d_rated}	k_T	M_{pk} D1	M_{pk} D2	m	J_{Mot}
		Nm	A	A	A	Nm/A	Nm	Nm	kg	10^{-4} kgm²
1700	DRL71S4	2.7	1.63	1.40	0.86	1.92	5	8.5	8.6	4.9
	DRL71M4	4	2.2	1.90	1.11	2.11	7	14	10	7.1
	DRL80S	6.5	2.96	2.71	1.22	2.40	10	25	11.5	14.9
	DRL80M4	9.5	4	3.65	1.52	2.60	14	30	15.2	21.5
	DRL90L4	15	6.6	5.67	3.02	2.65	25	46	22.5	43.5
	DRL100L4	26	11.4	11.00	3.66	2.36	40	85	30	68
	DRL132S4	42	17.8	16.9	5.75	2.49	80	150	45.5	190
	DRL132MC4	56	24.9	21.9	10.6	2.56	130	200	65	340
	DRL160M4	85	35	33.5	11.1	2.54	165	280	93	450
	DRL160MC4	90	36	32.3	14.0	2.78	185	320	95	590
	DRL180S	120	47.5	45.6	14.8	2.63	210	380	122	900
	DRL180M4	135	52	50.1	15.7	2.70	250	430	143	1110
	DRL180L4	165	63	61.3	20.2	2.69	320	520	154	1300
	DRL180LC4	175	72	65.7	24.1	2.66	420	600	163	1680
	DRL200L	200	80.6	78.4	25.0	2.55	475	680	260	2360
	DRL225S4	245	97	92	32.2	2.66	520	770	295	2930
	DRL225MC4	280	130	114	43.9	2.45	770	1100	330	4330
2100	DRL71S4	2.6	2	1.70	1.08	1.53	5	8.5	8.6	4.9
	DRL71M4	3.8	2.7	2.25	1.39	1.69	7	14	10	7.1
	DRL80S	6.2	3.59	3.22	1.52	1.92	10	25	11.5	14.9
	DRL80M4	9.5	5	4.60	1.91	2.07	14	30	15.2	21.5
	DRL90L4	15	8.4	7.21	3.84	2.08	25	46	22.5	43.5
	DRL100L4	25	14	13.4	4.63	1.87	40	85	30	68
	DRL132S4	41	21.4	20.3	7.07	2.02	80	150	45.5	190
	DRL132MC4	52	28.8	25.0	13.0	2.08	130	200	65	340
	DRL160M4	85	44	42.1	14.0	2.02	165	280	93	450
	DRL160MC4	88	48	42.8	18.9	2.06	185	320	95	590
	DRL180S	110	55.3	52.7	18.7	2.09	210	380	122	900
	DRL180M4	130	64	60.4	19.6	2.15	250	430	143	1110
	DRL180L4	160	78	75.8	25.8	2.11	320	520	154	1300
	DRL180LC4	170	87	79.1	29.8	2.15	420	600	163	1680
	DRL200L	195	99	94.6	30.9	2.06	475	680	260	2360
	DRL225S4	235	119	111	40.6	2.11	520	770	295	2930
	DRL225MC4	265	142	125	50.8	2.12	770	1100	330	4330
3000	DRL71S4	2.5	2.68	2.26	1.49	1.11	5	8.5	8.6	4.9
	DRL71M4	3.6	3.55	2.96	1.93	1.21	7	14	10	7.1
	DRL80S	6	4.82	4.32	2.10	1.39	10	25	11.5	14.9
	DRL80M4	8.8	6.5	5.86	2.63	1.50	14	30	15.2	21.5
	DRL90L4	14	11	9.19	5.25	1.52	25	46	22.5	43.5
	DRL100L4	21	16.6	15.4	6.35	1.36	40	85	30	68
	DRL132S4	35	25.5	24.4	10.0	1.43	80	150	45.5	190
	DRL132MC4	42	34.8	28.4	18.4	1.48	130	200	65	340
	DRL160M4	79	57	53.9	19.3	1.47	165	280	93	450
	DRL160MC4	83	59	51.8	24.3	1.60	185	320	95	590
	DRL180S	100	70.1	65.9	25.7	1.52	210	380	122	900
	DRL180M4	105	73	67.6	27.2	1.55	250	430	143	1110
	DRL180L4	130	90	83.8	35.0	1.55	320	520	154	1300
	DRL180LC4	140	105	91	41.8	1.53	420	600	163	1680
	DRL200L	165	118	112	43.3	1.47	475	680	260	2360
	DRL225S4	195	139	127	56.0	1.53	520	770	295	2930
	DRL225MC4	220	188	156	76	1.41	770	1100	330	4330

4-pole DRL.. servomotors/brakemotors for 400 V, 50 Hz

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} kgm²
1200	DRL71S4	2.7	1.18	BE05	5	5	11	6.2
	DRL71M4	4	1.6	BE1	7	10	12.6	8.4
	DRL80S	6.5	2.15	BE2	10	20	15.2	19.4
	DRL80M4	9.5	2.9	BE2	14	20	18.9	26
	DRL90L4	15	4.8	BE5	20	40	28.5	49.5
	DRL100L4	26	8.5	BE5	40	55	36	74
	DRL132S4	42	12.6	BE11	80	110	60	200
	DRL132MC4	56	17.6	BE11	110	110	79	355
	DRL160M4	85	25.5	BE20	150	200	120	500
	DRL160MC4	90	28	BE20	150	200	122	640
	DRL180S	120	34.5	BE30	200	300	162	1030
	DRL180M4	135	38	BE30	200	300	183	1250
	DRL180L4	165	47	BE30	300	300	194	1440
	DRL180LC4	175	52	BE32	400	400	210	1910
	DRL200L	200	58.5	BE32	400	600	315	2590
	DRL225S4	250	72	BE32	500	500	350	3160
	DRL225MC4	290	89	BE32	600	600	385	4560
1700	DRL71S4	2.7	1.63	BE05	5	5	11	6.2
	DRL71M4	4	2.2	BE1	7	10	12.6	8.4
	DRL80S	6.5	2.96	BE2	10	20	15.2	19.4
	DRL80M4	9.5	4	BE2	14	20	18.9	26
	DRL90L4	15	6.6	BE5	20	40	28.5	49.5
	DRL100L4	26	11.4	BE5	40	55	36	74
	DRL132S4	42	17.8	BE11	80	110	60	200
	DRL132MC4	56	24.9	BE11	110	110	79	355
	DRL160M4	85	35	BE20	150	200	120	500
	DRL160MC4	90	36	BE20	150	200	122	640
	DRL180S	120	47.5	BE30	200	300	162	1030
	DRL180M4	135	52	BE30	200	300	183	1250
	DRL180L4	165	63	BE30	300	300	194	1440
	DRL180LC4	175	72	BE32	400	400	210	1910
	DRL200L	200	80.6	BE32	400	600	315	2590
	DRL225S4	245	97	BE32	500	500	350	3160
	DRL225MC4	280	130	BE32	600	600	385	4560
2100	DRL71S4	2.6	2	BE05	5	5	11	6.2
	DRL71M4	3.8	2.7	BE1	7	10	12.6	8.4
	DRL80S	6.2	3.59	BE2	10	20	15.2	19.4
	DRL80M4	9.5	5	BE2	14	20	18.9	26
	DRL90L4	15	8.4	BE5	20	40	28.5	49.5
	DRL100L4	25	14	BE5	40	55	36	74
	DRL132S4	41	21.4	BE11	80	110	60	200
	DRL132MC4	52	28.8	BE11	110	110	79	355
	DRL160M4	85	44	BE20	150	200	120	500
	DRL160MC4	88	48	BE20	150	200	122	640
	DRL180S	110	55.3	BE30	200	300	162	1030
	DRL180M4	130	64	BE30	200	300	183	1250
	DRL180L4	160	78	BE30	300	300	194	1440
	DRL180LC4	170	87	BE32	400	400	210	1910
	DRL200L	195	99	BE32	400	600	315	2590
	DRL225S4	235	119	BE32	500	500	350	3160
	DRL225MC4	265	142	BE32	600	600	385	4560

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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
3000	DRL71S4	2.5	2.68	BE05	5	5	11	6.2
	DRL71M4	3.6	3.55	BE1	7	10	12.6	8.4
	DRL80S	6	4.82	BE2	10	20	15.2	19.4
	DRL80M4	8.8	6.5	BE2	14	20	18.9	26
	DRL90L4	14	11	BE5	20	40	28.5	49.5
	DRL100L4	21	16.6	BE5	40	55	36	74
	DRL132S4	35	25.5	BE11	80	110	60	200
	DRL132MC4	42	34.8	BE11	110	110	79	355
	DRL160M4	79	57	BE20	150	200	120	500
	DRL160MC4	83	59	BE20	150	200	122	640
	DRL180S	100	70.1	BE30	200	300	162	1030
	DRL180M4	105	73	BE30	200	300	183	1250
	DRL180L4	130	90	BE30	300	300	194	1440
	DRL180LC4	140	105	BE32	400	400	210	1910
	DRL200L	165	118	BE32	400	600	315	2590
	DRL225S4	195	139	BE32	500	500	350	3160
	DRL225MC4	220	188	BE32	600	600	385	4560

1) Applies for foot-mounted motor with brake (DRL...BE../FI..)

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6 Drive selection

6.1 Electrical characteristics

6.1.1 Suitability for operating with an inverter

DR.. series AC motors and AC brakemotors can be operated on inverters thanks to the high quality windings and insulation material with which they are equipped as standard. Please also refer to the "Drive selection – controlled motor (→ 🗎 179)".

6.1.2 Frequency

SEW-EURODRIVE AC motors are designed for a line frequency of 50 Hz or 60 Hz on request. The technical data in this motor catalog is based on a line frequency of 50 Hz as standard.

A corresponding design is available for DRS.. and DRE.. motors that can be operated on both a 50 Hz and 60 Hz grid: the global motor. This allows different regional electrical regulations to be complied with in a single motor. In particular, it brings together the different national regulations on minimum efficiency levels. See the "The global motor" (→ 🗎 45) chapter.

6.1.3 Motor voltage

AC motors in the standard and energy efficient design are available for rated voltages of 220 - 725 V.

2-, 4-, 6-pole DRS.., DRE.., DRP.. motors

The 2-, 4- or 6-pole motors with power ratings up to 5.5 kW are usually delivered in the following voltage designs:

- for voltage range 220 – 242 V △ / 380 – 420 V ⅄ , 50 Hz

  or

- for nominal voltage 230 V △ / 400 V ⅄ , 50 Hz.

These voltage ranges are available up to the following power ratings / motor sizes:

- 75 kW in energy efficiency classes IE1 and IE2 in size 280S
- 75 kW in energy efficiency class IE3 in size 280M

The 2-, 4- or 6-pole motors with power ratings up to 7.5 kW are usually delivered in the following voltage designs:

- for voltage range 380 – 420 V △ / 690 – 725 V ⅄, 50 Hz

  or

- for nominal voltage 400 V △ / 690 V ⅄ , 50 Hz.

These voltage ranges are available up to the following power rating / motor size:

- 0.18 kW in size 71S

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The other optional motor voltages available as standard are listed in the following table.

Motors		Motor sizes up to 5.5 kW	Motor sizes from 7.5 kW	
2-pole motors				
Standard	**IE1**	**DRS71S2 – 132S2**	**DRS132M2 – 132MC2**	**-**
High	**IE2**	**DRE80M2 – 132M2**	**DRE132MC2**	**-**
Premium	**IE3**	**DRP80M2 – 132M2**	**-**	**-**
4-pole motors				
Standard	**IE1**	**DRS71S4 – 132S4**	**DRS132M4 – 280S4**	**DRS280M4 – 315L4**
High	**IE2**	**DRE80S4 – 132M4**	**DRE132MC4 – 280S4**	**DRE280M4 – 315L4**
Premium	**IE3**	**DRP90M4 – 160S4**	**DRP160MC4 – 280M4**	**DRP315K4 – 315L4**
6-pole motors				
Standard	**IE1**	**DRS71S6 – 160S6**	**DRS160M6**	**-**
High	**IE2**	**DRE71M6 – 160M6**	**-**	**-**
Premium	**IE3**	**DRP90L6 – 160M6**	**-**	**-**
Voltage range	△/⅄	AC 220 – 242 / 380 – 420 V	AC 380 – 420 / 690 – 725 V	
Nominal voltage	△/⅄	**AC 230 / 400V**		-
	△/⅄	**AC 290 / 500 V**		**AC 290 / 500 V**
	△/⅄	**AC 400 / 690 V**		**AC 400 / 690 V**
	△/⅄	**AC 500 / -**		**AC 500 / -**

The table with the brake voltages is located in the "Brake voltage" (→ 126) chapter.

Motors and brakes for AC 230 / 400 V and motors for AC 690 V may also be operated on supply systems with a rated voltage of AC 220 / 380 V or AC 660 V respectively. The voltage-dependent data will change slightly.

The technical data for motor size DR.250 – DR.315 only refers to a rated voltage of 400 / 690 V. Please consult SEW-EURODRIVE for other voltages.

4/2- and 8/4-pole DRS.. motors with Dahlander windings

Multi-speed AC motors with Dahlander windings are available for nominal voltages of 220 V – 720 V.

They are generally available in the following voltage types for a power rating of up to 5.5 kW in one of the two pole numbers:

- Nominal voltage 400 V △ / ⅄⅄, 50 Hz

Dahlander winding motors with a power rating over 5.5 kW in one of the two pole numbers are generally available with star topology capacity at low speed in the following voltage types:

- Nominal voltage 400 V △- ⅄/⅄⅄ , 50 Hz

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The other motor voltages available as standard are listed in the following table.

		Motor sizes		
		up to 5.5 kW		**over 5.5 kW**
		4/2-pole motors		
Standard		**DRS71S4/2 – 132M4/2**	**-**	**DRS160S4/2 – 180L4/2**
		8/4-pole motors		
Standard		**DRS71S8/4 – 100L8/4**	**DRS112M8/4 – 132M8/4**	**DRS160S8/4 – 225M8/4**
Nominal voltage (AC)	△ /⅄⅄	400 V		
	△- ⅄/⅄⅄	-	400 V	

If not specified in the order, the motors are designed for a nominal voltage of 50 Hz in the above-mentioned voltages.

8/2-pole DRS.. motors with separate windings

Multi-speed AC motors with separate windings are available for nominal voltages of 220 V – 690 V.

The following connection and voltage types are the only ones available for all motor sizes:

- Nominal voltage 400 V ⅄ / ⅄, 50 Hz

If not specified in the order, the motors are designed for a nominal voltage of 50 Hz in the above-mentioned voltage.

12-pole DRM.. torque motors

DRM.. torque motors are only available in nominal voltage.

All sizes up to 346 V △ / 600 V ⅄, 50 Hz can be constructed in the S1 design, besides the DRM71S12. The S1 limit voltage for the DRM71S12 is 277 V △ / 480 V ⅄ in the 50 Hz grid. The smallest design voltage amounts to 88 V △ / 153 V ⅄, 50 Hz for all S1-DRM.. sizes.

All sizes up to 346 V △ / 600 V ⅄, 50 Hz can be constructed in the S3 / 15% design. The smallest design voltage amounts to 153 V △ / 266 V ⅄, 50 Hz for all S3 / 15% DRM.. sizes.

The standard voltage for the torque motors is 230 / 400 V, 50 Hz.

If not specified in the order, the S1 or S3 / 15% torque motors are designed for a nominal voltage of 50 Hz in the above-mentioned voltage.

The torque motor values for operation on the 60 Hz grid are available separately. Please contact SEW-EURODRIVE in this case.

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6.1.4 Voltage for the global motors

The global motors are available in three voltage blocks in the standard ≤ 0.55 kW design as motor type DRS.. and in the energy saving design ≥ 0.75 kW as motor type DRE.., please refer to the "The global motor" (→ 🗎 45) chapter. The design as a voltage range cannot be changed and nominal voltage data cannot be provided.

The 2-, 4- and 6-pole DRS.. and DRE.. motors with power ratings of up to 5.5 kW are available in the following variants as standard:

- voltage range 220 – 242 V △ / 380 – 420 V ⅄, 50 Hz

  voltage range of 254 – 277 V △ / 440 – 480 V ⅄, 60 Hz

This voltage range version is available up to the following power rating / motor size:

- 45 kW in energy efficiency class IE2 size DRE225M4

The 2-, 4- and 6-pole DRE.. motors with power ratings of over 7.5 kW are available in the following variants as standard:

- voltage range 380 – 420 V △ / 690 – 725 V ⅄, 50 Hz

  voltage range of 440 – 480 V △, 60 Hz

This voltage range version is available up to the following power rating / motor size:

- 0.18 kW in size DRS71S

The other motor voltages available as standard are listed in the following table.

Energy efficiency class		**Motor sizes**	
		up to 5.5 kW	**from 7.5 kW**
		2-pole motors	
Standard	**IE1**	**DRS71S2**	**-**
High Efficiency	**IE2**	**DRE80M2 – 132M2**	**DRE132MC2**
		4-pole motors	
Standard	**IE1**	**DRS71S4 – 71M4**	**-**
High Efficiency	**IE2**	**DRE80M4 – 132M4**	**DRE132MC4 – 250M4**
		6-pole motors	
Standard	**IE1**	**DRS71S6**	**-**
High Efficiency	**IE2**	**DRE71M6 – 160M6**	**-**
Voltage range (AC)	50 Hz	220 – 242 V / 380 – 420 V	
	60 Hz	254 – 277 V / 440 – 480 V	
Voltage range (AC)	50 Hz	380 – 420 V / 690 – 725 V	
	60 Hz	440 – 480 V / -	

75 and 90 kW	**Voltage at 50 Hz**	**Voltage at 60 Hz**
DRE280S and 280M	380 – 420 V / 660 – 725 V	460 V

If not specified in the order, the global motors are delivered for the combined 50 Hz / 60 Hz voltage range in the standard designs mentioned above.

The DRE315 motor size is not available in the combined 50 Hz and 60 Hz global motor voltage range. The 50 Hz voltage range is possible, please refer to the "Motor voltage" (→ 🗎 121) chapter.

6.1.5 Forced cooling fan voltage

The forced cooling fan for the DR.. motor series can either be delivered in two three-phase current-AC voltage ranges or in a DC voltage design.

The three-phase current-AC voltage designs are also able to operate in the 50 Hz as well as the 60 Hz grid and up to three versions can be operated by switching the connection type.

The capacitor required for the AC voltage operation in a Steinmetz circuit is included in the delivery by SEW-EURODRIVE and is located in the forced cooling fan's wiring space.

The following table shows the possible voltage designs.

Forced cooling fan			**Motor sizes**		
			DR.71 – 132	**DR.160 – 180**	**DR.200 – 315**
DC 24 V		+ / -	1 × 24 V	-	-
AC 120 V	50 Hz	△ with capacitor	1 × 100 – 127 V	-	-
		△	3 × 100 – 127 V	-	-
		⅄	3 × 175 – 220 V	-	-
	60 Hz	△ with capacitor	1 × 100 – 135 V	-	-
		△	3 × 100 – 135 V	-	-
		⅄	3 × 175 – 230 V	-	-
AC 230 V	50 Hz	△ with capacitor	1 × 230 – 277 V		-
		△	3 × 200 – 290 V		
		⅄	3 × 346 – 500 V		
	60 Hz	△ with capacitor	1 × 200 – 277 V		-
		△	3 × 220 – 330 V		
		⅄	3 × 380 – 575 V		

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6.1.6 Brake voltage

The BE brake is available in voltage designs of AC 120 V – 575 V and DC 24 V / AC 60 V.

The standard brake voltage design is

- nominal voltage AC 230 V: DR.71 BE05 – DR.132 BE11

  and

- nominal voltage AC 400 V: DR.160 BE11 – DR.315 BE122

If not specified in the order, the brakes are delivered for the above mentioned voltages as standard.

The following rules also apply:

- The brake voltage is also confirmed as a voltage range for motors that are designed in the voltage range.
- The brake voltage is also indicated as a nominal voltage for motors with a confirmed nominal voltage.

The other optional motor voltages available as standard for the brake voltage of BE brakes are listed in the following table.

Design		**Motor sizes and brake sizes**		
		DR.71 – 132	**DR.160 – 180**	**DR.180 – 315**
		BE05 – BE11	**BE11 – BE20**	**BE30 – 122**
Voltage range	AC	220 – 242 V		
	AC	380 – 420 V		
Nominal voltage	AC	230 V		
	AC	400 V		
	DC	24 V		-

An extended voltage range applies for the supply voltage of brakes for the global motors:

Design		**Motor sizes and brake sizes**		
		DR.71 – 132	**DR.160 – 180**	**DR.180 – 225**
		BE05 – BE11	**BE11 - BE20**	**BE30 – 32**
Voltage range	AC	220 – 277 V		
	AC	380 – 480 V		

The permanent operation of the brake on the global motor with a connection voltage above AC 254 V or AC 440 V is only permitted with the simultaneous operation of the global motor, as otherwise the brake ventilation cannot be guaranteed.

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6.1.7 Standard 50 Hz connections

The standard motor connections are defined depending on the number of poles. The following table provides an overview as well as the theoretical synchronous speed on the 50 Hz grid based on the number of poles.

Number of poles	Connection	Synchronous speed n_{syn} on the 50 Hz grid
2-pole	△ / ⅄	3000
4-pole	△ / ⅄	1500
6-pole	△ / ⅄	1000
12-pole	△ / ⅄	0 (500)
	△ [1] / ⅄	
4/2-pole	△ / ⅄⅄	1500 / 3000
	⅄ - △ / ⅄⅄	
8/4-pole	△ / ⅄⅄	750 / 1500
	⅄ - △ / ⅄⅄	
8/2-pole	⅄ / ⅄	750 / 3000

1) Torque motors with tapped winding in the delta connection to limit the torque to a maximum of 3 times the value of the star connection are available on request.

6.1.8 50 Hz motors on 60 Hz grids

The rated data of motors designed for 50 Hz grids differ as follows when the motors are operated on 60 Hz supply systems:

Motor voltage at 50 Hz	Connection	Voltage at 60 Hz	Modified rated data			
			Speed	Power	torque limit	Starting torque
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 grid, please consult SEW-EURODRIVE. Some countries and regions provide regulations for the efficiency of motors for 50 Hz grids, even though only 60 Hz grids are available.

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6.1.9 60 Hz motors

This motor catalog contains technical information on motors for grids with a frequency of 50 Hz.

The motors are also available for grids with a frequency of 60 Hz. The standard and energy-efficient designs are implemented in precisely the same manner.

Regional regulations, such as NEMA MG1 (USA), CSA C22.2 (Canada) or ABNT (Brazil) and others are complied with.

The power assignment differs between the 60 Hz and 50 Hz motors for some sizes.

Power ratings with a local market significance and which are outside of the IEC series are taken into account. Example: a motor with 3.7 kW / 5 hp is included as well as a 4.5 kW / 6 hp motor.

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6.2 Thermal characteristics

6.2.1 Thermal classes pursuant to IEC / EN60034-1 and IEC 62114

In addition to motor standard IEC / EN 60034-1, the IEC 62114 also describes the thermal class designs and identifications. They define the limit overtemperature based on a maximum ambient temperature of +40 °C and a reserve of 10 K or 15 K for potential voltage tolerances.

A number identification is required. The addition of a long-standing letter in brackets is permitted. SEW-EURODRIVE identifies the motors using a combination of numbers and letters.

Thermal class	SEW identification	Limit overtemperature in K (permitted heating at the rated torque)
130	130 (B)	80 K
155	155 (F)	105 K
180	180 (H)	125 K

The various motor measurements result in different basic thermal class designs.

Motor design	Basic thermal class design
DRS.. (one speed)	130 (B) with copper rotor 155 (F)
DRS.. (two speed)	Dahlander winding 130 (B), occasionally 155 (F) separate winding 130 (B)
DRE.. and DRP..	130 (B)
DRL..	155 (F)
DRM..	155 (F)

The DRS.., DRE.. and DRP.. motors can also be built and delivered in higher thermal classes 155 (F) and 180 (H). In some cases, mounted options require a higher basic thermal class design.

DRL.. servomotors and DRM.. torque motors are not available in thermal class 180 (H), as the entire motor would then reach prohibited temperatures in the gaskets, ball bearings and bearing lubricants. The reasons for this decision are as follows:

- the non-ventilated rated operation at a standstill for the DRM.. torque motors
- the constant ventilation of the fan-cooled DRL.. servomotors in inverter mode.

6.2.2 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 1,000 m above sea level. The rated power must be reduced according to the following formula in the case of higher ambient temperatures or altitudes:

$$\mathbf{P_{Nred} = P_N \times f_T \times f_H}$$

The following diagrams show the power reduction depending on the ambient temperature and installation altitude.

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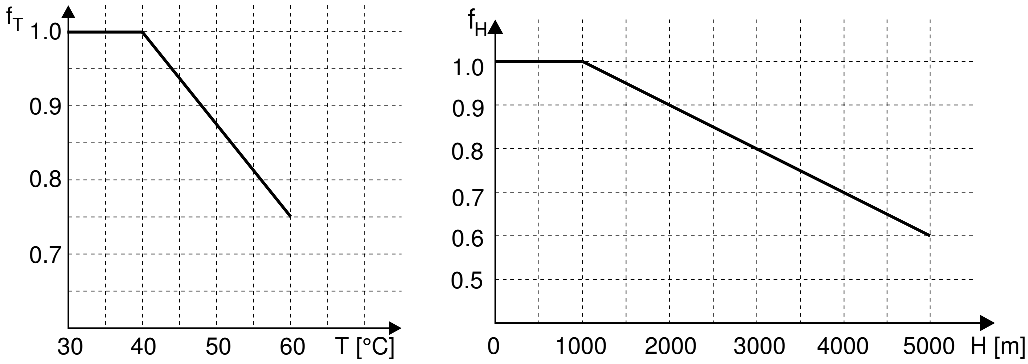
The factors f_T and f_H apply for the motors:



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T = ambient temperature

H= Installation altitude above sea level

Please contact SEW-EURODRIVE for ambient temperatures above 60 °C and installation altitudes over 5000 m.

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6.2.3 Operating modes

Motor standard IEC / EN 60034-1: 2011-02 defines the following operating modes, among other things.

Designation of the operating mode	Text explanation
S1	Continuous duty: Operation with a constant load. Operation at a constant load, with a duration long enough for the machine to reach a steady thermal condition.
S2	Short-time duty: Operation with a constant load and idling time. Operation at a constant load for a time which is less than the time required for reaching a steady thermal condition. The subsequent standstill time when the windings are de-energized is long enough for the motor temperature to deviate less than 2K from the temperature of the cooling agent. S2 is supplemented by the operating time in minutes.
S3	Periodic intermittent duty: without affecting the starting procedure. This duty is a sequence of identical duty cycles, with each cycle including a period of operation at constant load and a standstill period with de-energized windings. The starting current does not have any significant effect on the temperature rise. S3 is supplemented by the relative cyclic duration factor in %.
S6	Periodic cycle: continuous periodic operation. This duty is a sequence of identical cycles, with each cycle including a period of operation at constant load and a period of idle time. There is no standstill period in which the windings are de-energized. S6 is supplemented by the relative time under load in %.
S9	Non-periodic cycle: non-periodic load and speed changes. Operation with usually non-periodic changes in load and speed within the permitted operating range. In this cycle, overloads often occur that significantly exceed the reference load. A constant load in line with duty type S1 is selected as the reference value for the overload for this duty type.

INFORMATION

S1 continuous duty is normally assumed when operating the motor on an inverter. In the case of a high number of cycles per hour, it might be necessary to assume S9 intermittent duty.

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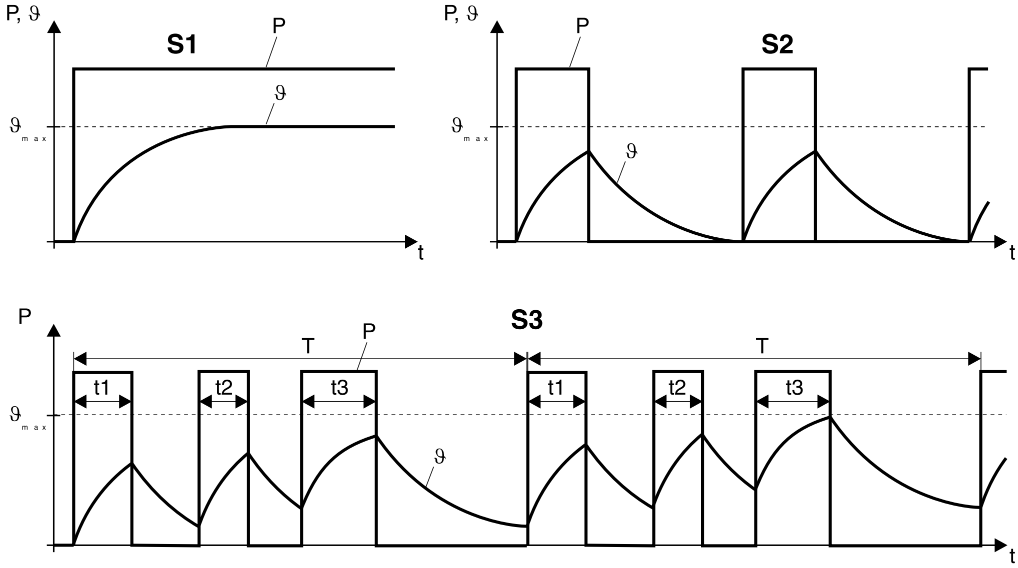
The following figure shows duty types S1, S2 and S3.



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Determining the relative CDF

The cyclic duration factor (CDF) is the ratio between the period of loading and the duration of the duty cycle. The cycle duration is the sum of the switch-on times and the de-energized rest periods. A typical value for the cycle duration is ten minutes.

$$\mathbf{cdf} = \frac{\textbf{Total number of times of operation (t1 + t2 + t3)}}{\textbf{Cycle duration (T)}} \bullet \mathbf{100\ [\%]}$$

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Power increasing factor K

Unless specified otherwise and indicated on the nameplate, the rated power of the motor refers to duty type S1 (100 % cdf) pursuant to IEC / EN 60034. If a motor designed for S1 and 100 % cdf is operated in mode S2 "short-time duty" or S3 "intermittent duty", the rated power can be multiplied by the power increasing factor "K" specified on the nameplate and the motor can be loaded beyond the rated points accordingly.

Duty type			Power increasing factor K
S2	Operating time	60 min	1.1
		30 min	1.2
		10 min	1.4
S3	Relative cyclic duration factor (cdf)	75 %	1.1
		40 %	1.15
		25 %	1.3
		15 %	1.4
S4 – S10	The following information must be specified to determine the rated power and the duty type: number and type of cycles per hour, run-up time, time at load, braking type, braking time, idle time, cycle duration, period at rest and power demand.		On request

In the case of high counter-torques and high mass moments of inertia (heavy starting), please contact SEW-EURODRIVE with exact information about the technical data when changing the duty type.

6.2.4 Thermal monitoring

In accordance with the standard, two fundamental states are taken into account when monitoring a motor against thermal overload.

Thermal overload with gradual change

If a motor is exposed to a thermal overload with a gradual rise in temperature, the thermal protection system must prevent a rise in the winding temperature over the following values.

Thermal classification	Maximum winding temperature
130 (B)	145 °C
155 (F)	170 °C
180 (H)	195 °C

Possible causes could be:

- Failure of the cooling or the cooling system due to excessive dust in the cooling ducts or the cooling fins on the motor housing.
- Reduction in the air volume due to the partial covering of the fan grille.
- Renewed drawing in of heated cooling air.
- An excessive rise in the ambient temperature or the coolant temperature.
- Gradually rising mechanical overload.

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- Voltage drop, overvoltage or asymmetry in the motor supply over an extended period.
- Excessive operating time for a motor rated for intermittent duty.
- Frequency deviations.

Thermal overload with rapid change

If a motor is exposed to a thermal overload with a rapid rise in temperature, the thermal protection system must prevent a rise in the winding temperature over the following values.

Thermal classification	Maximum winding temperature
130 (B)	225 °C
155 (F)	240 °C
180 (H)	260 °C

Possible causes could be:

- Motor blockage.
- Phase failure.
- Start-up under abnormal conditions, e.g. with excess mass moment of inertia, insufficient voltage or abnormally high load torque.
- Sudden and marked rise in the load.
- Repeated start-up within a short space of time.

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Determining the right motor protection

Selecting the correct protection device is a significant factor in determining the operational reliability of the motor. We distinguish between protection devices that are current-dependent and those that depend on the motor temperature.

Current-dependent protection devices that are generally operated from the control cabinet, include:

- Fuses

  or
- Motor overload circuit breakers.

Temperature-dependent protection devices in the winding are

- PTC thermistors (thermistor sensors)

  or
- Bimetallic switches (thermostats).

PTC thermistors or bimetallic switches respond when the maximum permitted winding temperature is reached. The advantage is that temperatures are recorded where they actually occur.

Fuses	Fuses do not protect the motor from overload. They are exclusively used as short-circuit protection and may detect a motor blockage, as this condition is similar to a short-circuit on the terminals.
Motor overload circuit breaker	Motor circuit breakers offer adequate protection against overload in standard operation with a low starting frequency, brief start-ups and starting currents that are not excessive. The motor circuit breaker is set to the rated motor current. Motor protection switches are not adequate as the sole means of protection given switching operation with a high starting frequency (> 60 / h) and for heavy starting. In these cases we recommend to use a positive temperature coefficient thermistor TF in addition.
PTC thermistor	Three positive temperature coefficient (PTC) thermistors TF (PTC, characteristic curve according to DIN 44080) are connected in series in the motor and connected from the terminal box to an inverter input or to a trip switch in the control cabinet. Motor protection with positive temperature coefficient (PTC) thermistors (SEW designation /TF) provide comprehensive protection against thermal overload. Motors protected in this way can be used for high inertia starting, switching and braking operation as well as with fluctuating power supplies. A motor circuit breaker is usually installed in addition to the TF. SEW-EURODRIVE recommends using motors equipped with TF for inverter operation.
Bimetallic switch	Three bimetallic switches (SEW designation /TH), connected in series in the motor, are integrated directly into the motor monitoring circuit from the terminal box. Due to the size and the insulation required for the motor winding, the TH does not reach the reaction speed of the PTC thermistor. The switching hysteresis may not permit a motor switching frequency depending on the design.
MOVIMOT® protection devices	MOVIMOT® drives contain integrated protection devices to prevent thermal damage. No other external devices are required for motor protection.

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Comparison of the safety mechanisms

The following tables show the qualification of the various protection devices for different causes of tripping.

Key:

Scope of protection	Icon
Comprehensive protection	x
Limited protection	•
No protection	-

Reason for the additional thermal load	Current-dependent protection device		Temperature-dependent protection device	
	Fuse	Motor overload circuit breaker	PTC thermistor /TF	/TH bimetallic switch
Over-currents up to 200 % I_N	-	x	x	x
Heavy start	-	•	x	•
Direct switching of the direction of rotation	-	•	x	•
Switching operation up to Z = 30 1/h	-	•	x	x
Stalling	•	•	•	•
Phase failure	-	•	x	x
Voltage deviation (greater than tolerance B)	-	x	x	x
Frequency deviation (greater than tolerance B)	-	x	x	x
Insufficient motor cooling	-	-	x	x

6.3 Starting frequency

A motor is usually rated according to its thermal loading. In many applications the motor is started only once (S1 = continuous running duty = 100 % cyclic duration factor).

The power demand calculated from the load torque of the driven machine is the same as the rated motor power.

6.3.1 High starting frequency

Many applications call for a high starting frequency at low counter-torque, such as for a travel drive. In this case, it is not the power demand that is the decisive factor in determining the size of the motor, but rather the number of times the motor has to start up. Frequent starting means the high starting current flows every time, leading to disproportionate heating of the motor.

The windings become overheated if the heat absorbed is greater than the heat dissipated by the motor ventilation system. The thermal load capacity of the motor can be increased by selecting a suitable thermal classification or by means of forced cooling (see the "Thermal characteristics" (→ 🗎 129) chapter).

6.3.2 No-load starting frequency Z_0

SEW-EURODRIVE specifies the permitted starting frequency of a 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 speed without counter-torque at 50 % cyclic duration factor.

If an additional mass moment of inertia of a load has to be accelerated or if an additional load torque occurs, the run-up time of the motor will increase. Increased current flows during this run-up time. This means the motor is subjected to increased thermal load and the permitted starting frequency is reduced.

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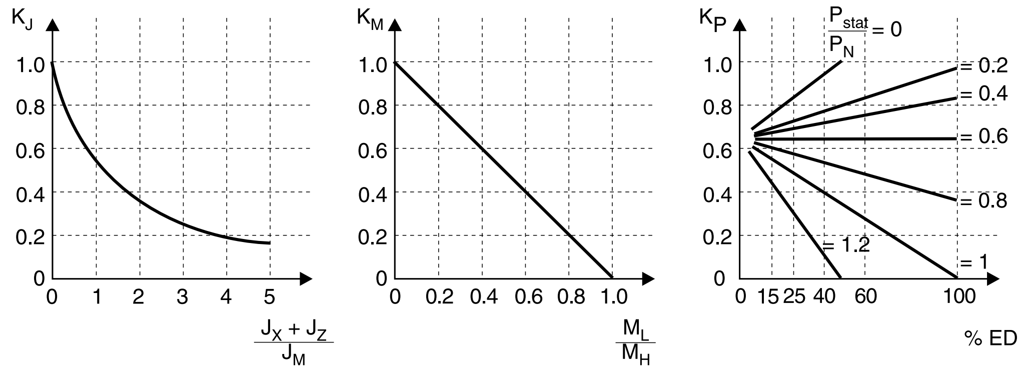
6.3.3 Permitted starting frequency of the motor

The permitted starting frequency Z of a motor in cycles/hour can be calculated using the following formula:

$\mathbf{Z = Z_0 \times K_J \times K_M \times K_P}$

You can determine the factors K_J, K_M and K_P using the following diagrams:

Depending on the additional moment of inertia	Depending on the counter-torque at startup	Depending on the static power and the cyclic duration factor (cdf)



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J_X =	Total of all external mass moments of inertia in relation to the motor axis	M_H =	Acceleration torque motor
J_Z =	Mass moment of inertia flywheel fan	P_{stat} =	Power requirement after start-up (static power)
J_M =	Mass moment of inertia of the motor	P_N =	Rated motor power
M_L =	Counter-torque during startup	%cdf =	cyclic duration factor

Example

Brakemotor: DRS71M4 BE1

No-load starting frequency Z_0 = 11000 1/h

1. $(J_X + J_Z) / J_M = 3.5 : K_J = 0.2$
2. $M_L / M_H = 0.6 : K_M = 0.4$
3. $P_{stat} / P_N = 0.6$ and 60 % cdf : $K_P = 0.65$

$Z = Z_0 \times K_J \times K_M \times K_P = 11000\ 1/h \times 0.2 \times 0.4 \times 0.65 = 572\ 1/h$

The cycle duration amounts to 6.3 s.

The switch-on time amounts to 3.8 s.

6.3.4 Permitted work done by the brake

If you are using a brakemotor, you have to check whether the brake is approved for use with the required duty type. Please also refer to the information in the "Permitted braking work of the BE brake during working brake actions (→ 🗎 376)" or the "Permitted braking work of the BE brake in case of an emergency stop (→ 🗎 385)" chapters.

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6.4 Mechanical designs

6.4.1 Degrees of protection pursuant to EN /IEC 60034-5

Designs

AC motors and AC brakemotors are available with degree of protection IP54 as standard. Degrees of protection IP55, IP56, IP65 or IP66 are available upon request.

IP	1. digit		2. digit
	Touch guard	**Protection against foreign objects**	**Protection against water**
0	No protection	No protection	No protection
1	Protected against access to hazardous parts with the back of your hand	Protection against solid foreign objects Ø 50 mm and larger	Protected against dripping water
2	Protected against access to hazardous parts with a finger	Protection against solid foreign objects Ø 12 mm and larger	Protection against dripping water when tilted up to 15°
3	Protected against access to hazardous parts with a tool	Protection against solid foreign objects Ø 2.5 mm and larger	Protected against spraying water
4	Protected against access to hazardous parts with a wire	Protected against solid foreign objects Ø 1 mm and larger	Protected against splashing water
5		Dust-proof	Protection against water jets
6		Dust-proof	Protection against powerful water jets
7	-	-	Protection against temporary immersion in water
8	-	-	Protection against permanent immersion in water

In addition to the protection classification using the above code, further identification with more information may be required pursuant to the standard.

SEW-EURODRIVE uses the additional designation with the letter "W" to identify internal corrosion protection.

Example:

- IP55: Dust- and water jet-resistant
- IP55W: Corrosion- Dust- and water jet-resistant

6.4.2 Vibration class

The motors comply with vibration class A. If special requirements for the mechanical running smoothness exist, 2-, 4-, or 6-pole motors without add-ons (no brake, forced cooling fan, encoder, etc.) can be delivered in a low-vibration design in vibration class B.

For vibration classes A or B, the motor rotors are always dynamically balanced with a half key.

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6.4.3 Vibration stress

The normal motor setup requires a vibration-free attachment and duty type. Make sure that the supports are even, the foot or flange mounting is correct and if there is direct coupling, align with precision. Resonances between the rotational frequency and the double network frequency caused by the structure are to be avoided.

Only install the (gear)motor in the mounting position specified on the nameplate on a level, vibration-free and torsionally rigid support structure. Align the (gear)motor and the driven machine carefully in order to prevent the output shaft from being exposed to unacceptable strain. Pay attention to the permitted overhung and axial loads and avoid impacts on the shaft end when applying transmission elements. We recommend heating the elements prior to assembly.

If all of these requirements cannot be ensured in the application, the motors can be delivered in a design for vibration stress.

Vibration level 1 (VL1) ensures that the motors are able to deal with an external influence. The values in the following table are based on standardized information pursuant to DIN ISO 10816-1.

Motor size	Periodic vibrations	Shock stress 1g = 9.81 m/s²
DR.71 – DR.132	Effective vibration speed ≤ 4.5 mm/s	Maximum acceleration = 10 g
DR.160 – DR.315	Effective vibration speed ≤ 7.1 mm/s	Maximum acceleration = 15 g

If you require a drive in line with VL1, or if the required values exceed the information for VL1, please contact SE-EURODRIVE.

The following design types and options are not available for vibration stress:

Term	Designation
Brake monitoring	/DUB
Built-in encoder	/EI7.
Air filter	/LF
Forced cooling fan	/V
MOVIMOT®	/MM
MOVI-SWITCH®	/MSW
Foot-mounted motors DR.71 – DR.132	/FI

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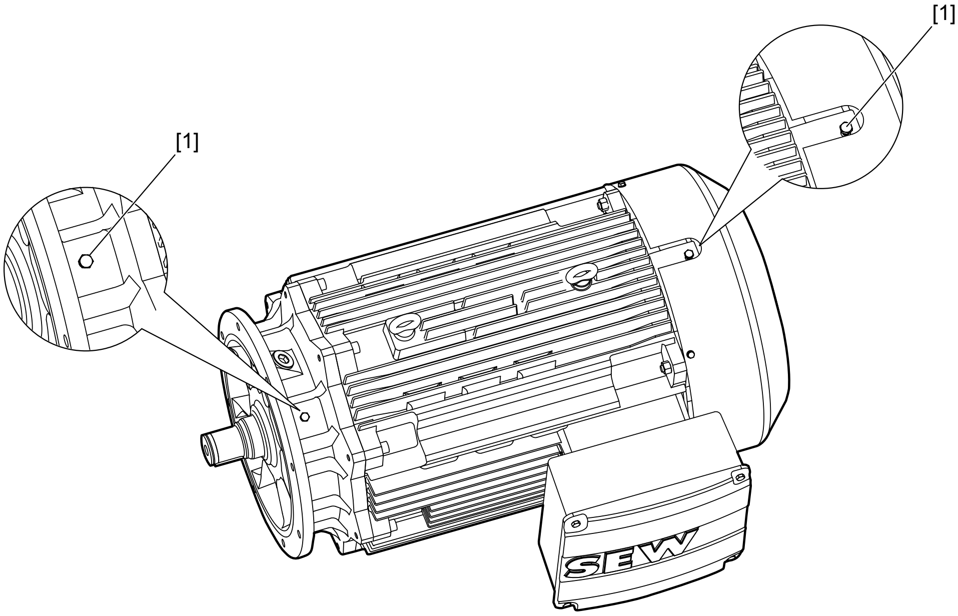
6.4.4 Vibration monitoring

External influences can gradually lead to the failure of important motor functions, such as defects in the bearings. In particular, for motors with higher power ratings, the investments can be maintained by preventive maintenance and inspection. Vibration monitoring supports the timely detection of the need for maintenance.

SEW-EURODRIVE provides a mounting adapter for vibration recorders and tapped holes for SPM measuring nipples.

Tapped holes to mount the measuring nipple can be applied on the A- and B-side in the flanges and covers of motor sizes DR.160 – 315.



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The SEW-EURODRIVE delivery components may include:

- only the bores
- the bores and the mounted measuring nipple.

Please contact SEW-EURODRIVE if required.

6.4.5 Shaft ends

The A-side shaft ends of the foot- and/or flange-mounted motor design are usually delivered with a keyway pursuant to DIN 6885 Sheet 1 (ISO 773). The shaft ends can also be delivered smooth and without a key and keyway on request.

Motors are balanced with a half key as standard, please also refer to the "Vibration class" (→ 🗎 139) chapter.

In particular, when replacing older motors, there may be a need to balance the motors with a full key in order to continue using the existing transmission and connecting elements, such as couplings.

The full-key balancing must be specified in the order if required. SEW-EURODRIVE identifies motor rotors balanced in this manner with a "V" on the front shaft end face in line with the standard regulations.

Whether balanced with a full- or half-key, the motors are always delivered with full keys, which are secured against loss during transport.

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The special form of the A-side shaft end for direct mounting to the SEW gear units is the pinion shaft end. A standardized diameter is provided depending on the number of poles, power and motor size. Smaller dimensions must be precisely inspected with the application data. Larger pinion shaft ends limit the potential reduction ratio variations, but are required in rare cases due to the high dynamic loads.

6.4.6 Integral motors

If the motor or gear unit is replaced for a SEW-EURODRIVE gearmotor, the following needs to be observed:

To ensure an oil-tight reassembly, SEW-EURODRIVE recommends using the sealant included in the delivery.

Both the gear unit housing and the motor flange are made from aluminum as well as gray cast iron. This must be noted during assembly.

6.4.7 Flange-mounted motors

The flange-mounted motors in the DR.. modular motor system are available in three different specifications.

- Flange-mounted design with metric through bore, also referred to as B5 motors in the standard for the basic design.
- Flange-mounted design with metric thread, also referred to as B14 motors in the standard for the basic design.
- Flange-mounted design with inch thread, also referred to as C-Face in the US standard for the basic design.

The regulations for the metric flange dimensions are provided in IEC 72-1, while the dimensions for inch flanges are provided in MENA MG1.

Flange-mounted motor in	possible sizes
IM B5 design	DR.71 – DR.315
IM B14 design	DR.71 – DR.100
C-Face design	DR.71 – DR.80

All motor flanges pursuant to standard IEC 72-1, also generally referred to as IEC motors, are produced from gray cast iron (GG20).

If the dimensions of the metric flange are also designed for the respective motor power in the size in line with EN 50347, this is indicated as follows in the catalog designation:

- For B5 motors, with /FF.
- For B14 motors, with /FT.
- For flanges that deviate from EN, with /FL.

The inch flanges pursuant to C-Face are identified with /FC in the SEW catalog designation.

The parallel design as a flange- and foot-mounted design is possible for flanges with metric measurements. These combinations have their own type and catalog designations.

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6.4.8 Foot-mounted motors

The foot-mounted motor design follows a range of construction principles:

- Aluminum bed plates for sizes DR.71 – DR.132.
- Two single gray cast iron feet for sizes DR.160 – DR.315.

As standard, the only parts of the motor that are treated are the sides and surfaces to which the bed plate/feet are connected. A retroactive modification to attach the bed plate/feet to another side of the motor is generally not possible without great expense.

If the required position of the bed plate/feet is not in place when ordering, all sides of the motor can be machined to attach the bed plate/feet at the factory for DR.71 – 132 and DR.250/280 motors. This means that the customer can freely select the position of the bed plate/feet.

When ordering the DR.250/280, it is possible to specify if the feet should be delivered unattached or attached. SEW-EURODRIVE identifies this decision by attaching the letter A or B to the selected foot-mounted design.

Example:

Designation	Type	Explanation
/FE	Foot- and flange-mounted design	A position machined, feet attached
/FEA		Three positions machined, feet delivered unattached
/FEB		Three positions machined, feet attached to a position

6.4.9 Oil seals

The motors are constructed as flange-mounted motors, gearmotors or integral motors with oil seals. In the standard designs, nitrite butadiene rubber (NBR) oil seals are used.

Fluorocarbon rubber (FKM) oil seals can also be used up to a lower temperature limit of -25 °C.

The following motors are constructed using fluorocarbon rubber (FKM) oil seals in the series design up to a minimum temperature of -20 °C.

- 2-pole motors
- 4-pole motors

For gearmotors, the lubricant also influences the oil seal.

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6.5 Mounting positions

The motor standard IEC 60034-7 only recognizes mounting positions that are rotated or tilted within a 90° grid, please also refer to the "Motor design designation" (→ 🗎 89) chapter.

6.5.1 Inclined mounting positions

In most cases, the defined and established positions in line with the standard are sufficient. The standard does not recognize inclined mounting positions.

The motors are also available for inclined mounting positions if the initial design, target design and the angle are specified. There is a restriction for two position specifications. Further rotation towards a third position is not possible.

Example: IM B3 → IM V5: with an angle of 40°

SEW-EURODRIVE confirms the permissibility of the inclined mounting position by providing the following information on the nameplate and the order confirmation in line with the data specified by the customer:

B3/V5/40°

The mounting position-dependent designs on the motor side are identified, defined and attached depending on this information, e.g. the condensation drain holes.

If a gearmotor is delivered for an inclined mounting position, the lubricant quantities and the placement of the oil fittings are adapted accordingly.

Any application that deviates from the specification may only be performed in coordination with SEW-EURODRIVE.

6.5.2 Moving mounting position

Depending on the application, it may be necessary for the DR. motor to cyclically and/or permanently switch between two mounting positions. This situation is also not described in the standard.

The motors are also available for moving mounting positions if the initial design, target design and the angle are specified. There is a restriction for two position specifications. A further switching movement towards a third position is not possible.

Example: IM B3 → IM V5: with a starting angle of 10°, with an end angle of 80°

SEW-EURODRIVE confirms the permissibility of the moving mounting position by providing the following information on the nameplate and the order confirmation in line with the data specified by the customer:

B3/V5/10-80°

The mounting position-dependent designs on the motor side are identified, defined and attached in multiple position, if necessary, depending on this information, e.g. the condensation drain holes.

If a gearmotor is delivered for a moving mounting position, the lubricant quantities and the placement of the oil fittings are adapted accordingly.

Any application that deviates from the specification may only be performed in coordination with SEW-EURODRIVE.

Please also contact SEW-EURODRIVE for moving mounting positions with angles over 90°.

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6.6 Maximum speeds

The duty cycle of motors and gearmotors on the 50 Hz and 60 Hz grid will never reach a critical value, if you follow the information and regulations described in this chapter.

The maximum speed is irrelevant for multi-speed motors and brakemotors. The "Drive selection of pole-changing motors" (→ 🗎 170) chapter covers the torque behavior of this drive type.

For electric motors that operate on a frequency inverter, the maximum torque and the maximum speed must be viewed as mechanical limits.

The maximum torque is based on the load limit of the mechanical design of the shaft, the bearings and the shaft sealing system.

Motors in the DRL.. design can be briefly and dynamically operated and loaded with a higher torque due to their better dimensioned mechanical design. Please also refer to the "Drive selection – DRL.. motors" (→ 🗎 186) chapter.

Additional loads that arise at the customer's location must be taken into account for all DR. motors, e.g. additionally occurring overhung or axial loads due to belt drives.

The motor's maximum speed must not be exceeded. The following table displays these values for standard motors. They apply to motors with fluorocarbon rubber oil seals (FKM).

Additional motor options will influence these speeds. Please contact SEW-EURODRIVE in such cases.

Please also pay attention to the following for brakemotors:

- The applicable drive selection regulations with regard to the braking work.
- Braking from speeds of over 1800 rpm is not permitted for brake sizes BE30 and above. Use the controller to reduce the speed before activating the mechanical brake.
- For 4/2-pole brakemotors with brake sizes BE30 and BE32, first switch from the 2-pole speed to the 4-pole speed. The motor can then be switched off and the brake activated when the 4-pole speed is reached.

Motor size	**Mounted brakes**	**Maximum mechanical speed n_{max} in rpm**	
		Motor	**Brakemotor**
DT56	BMG02	6000	4500
DR 63	BR03	6000	4500
DR.71	BE05 or BE1	6000	4500
DR.80	BE05, BE1 or BE2	6000	4500
DR.90	BE1, BE2 or BE5	6000	4500
DR.100	BE2 or BE5	6000	3600
DR.112	BE5 or BE11	5000	3600
DR.132	BE5 or BE11	5000	3600
DR.160	BE11 or BE20	4500	3600
DR.180	BE20, BE30 or BE32	4500	3600
DR.200	BE30 or BE32	3500	3600
	BE60 or BE62[1)]	2600	2500

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Motor size	Mounted brakes	Maximum mechanical speed n_{max} in rpm	
		Motor	Brakemotor
DR.225	BE30 or BE32	3500	3600
	BE60 or BE62[1)]	2600	2500
DR.250	BE60 or BE62	2600	2500
	BE120 or BE122	2500	2500
DR.280	BE60 or BE62	2600	2500
	BE120 or BE122	2500	2500
DR.315	BE120 or BE122	2500	2500

1) Please contact SEW-EURODRIVE when attaching the BE60/62 to the DR.200/225.

If a motor is equipped with a backstop, the sprag's lift-off speed represents the lower speed limit during operation on a frequency inverter. The upper speed limit is limited to 5000 rpm, please also refer to the "Backstop" (→ 🗎 471) chapter.

Motor size	Locking torque in Nm	Sprag lift-off speed in rpm	Maximum speed in rpm
DR.71	95	890	5000
DR.80	130	860	5000
DR.90	370	750	5000
DR.100	370	750	5000
DR.112	490	730	5000
DR.132	490	730	5000
DR.160	700	700	4500
DR.180	1400	610	4500
DR.200	2500	400	3500
DR.225	2500	400	3500
DR.250	2600	400	2600
DR.280	2600	400	2600
DR.315	6300	320	2500

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6.7 Bearings

6.7.1 Bearing types used

The standard motor bearings for sizes 71 – 225 are deep groove ball bearings, design 2Z-C3, on the A- and B-side.

2RS-C3 bearings are installed on the B-side for brakemotors up to motor size DR. 225.

If insufficient load values are achieved for axial and overhung loads with the deep groove ball bearings, cylindrical roller bearings (SEW designation /ERF) can be installed on the A-side instead of the deep groove ball bearings for motor sizes 250 – 315. The cylindrical roller bearings can only be used in connection with the relubrication device (SEW designation /NS).

To prevent destructive shaft currents during operation on the inverter, the standard deep groove ball bearings on the B-side for motor sizes 250 – 315 can be replaced with ball bearings with insulated bearing surface. The bearing sizes remain unchanged, but the designation changes to C3-EI or J-C3-EI.

The following tables display the bearing sizes used.

<table>
<tr><th rowspan="2">Motor type</th><th colspan="2">A-side bearings</th><th colspan="2">B-side bearings</th></tr>
<tr><th>Foot-mounted and/or Flange-mounted motor</th><th>Gearmotor</th><th>Motor</th><th>Brakemotor</th></tr>
<tr><td>DR.71</td><td>6204-2Z-J-C3</td><td>6303-2Z-J-C3</td><td>6203-2Z-J-C3</td><td>6203-2RS-J-C3</td></tr>
<tr><td>DR.80</td><td>6205-2Z-J-C3</td><td>6304-2Z-J-C3</td><td>6304-2Z-J-C3</td><td>6304-2RS-J-C3</td></tr>
<tr><td>DR.90/100</td><td colspan="2">6306-2Z-J-C3</td><td>6205-2Z-J-C3</td><td>6205-2RS-J-C3</td></tr>
<tr><td>DR.112/132</td><td colspan="2">6308-2Z-J-C3</td><td>6207-2Z-J-C3</td><td>6207-2RS-J-C3</td></tr>
<tr><td>DR.160</td><td colspan="2">6309-2Z-J-C3</td><td>6209-2Z-J-C3</td><td>6209-2RS-J-C3</td></tr>
<tr><td>DR.180</td><td colspan="2">6312-2Z-J-C3</td><td>6213-2Z-J-C3</td><td>6213-2RS-J-C3</td></tr>
<tr><td>DR.200/225</td><td colspan="2">6314-2Z-J-C3</td><td>6214-2Z-J-C3</td><td>6214-2RS-J-C3</td></tr>
</table>

<table>
<tr><th rowspan="2">Motor type</th><th colspan="2">A-side bearings</th><th colspan="2">A-side bearings</th></tr>
<tr><th>Foot-mounted and/or Flange-mounted motor</th><th>Gearmotor</th><th>Foot-mounted and/or Flange-mounted motor</th><th>Gearmotor</th></tr>
<tr><td>DR.250</td><td colspan="2" rowspan="2">6317-2Z-C4</td><td colspan="2" rowspan="2">6315-2Z-C3</td></tr>
<tr><td>DR.280</td></tr>
<tr><td>DR.250../NS</td><td colspan="2" rowspan="2">6317-C4</td><td colspan="2" rowspan="4">6315-C3</td></tr>
<tr><td>DR.280../NS</td></tr>
<tr><td>DR.250../ERF/NS</td><td colspan="2" rowspan="2">NU 317 E C3</td></tr>
<tr><td>DR.280../ERF/NS</td></tr>
</table>

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Motor type	A-side bearings		A-side bearings	
	Foot-mounted and/or Flange-mounted motor	Gearmotor	Foot-mounted and/or Flange-mounted motor	Gearmotor
DR.315K DR.315K../NS	6319-J-C3	6319-J-C3	6319-J-C3	6319-J-C3
DR.315S DR.315S../NS	6319-J-C3	6319-J-C3	6319-J-C3	6319-J-C3
DR.315M DR.315M../NS	6319-J-C3	6322-J-C3	6319-J-C3	6322-J-C3
DR.315L DR.315L../NS	6319-J-C3	6322-J-C3	6319-J-C3	6322-J-C3
DR.315K../ERF/NS	NU 319 E		6319-J-C3	6319-J-C3
DR.315S../ERF/NS	NU 319 E		6319-J-C3	6319-J-C3
DR.315M../ERF/NS	NU 319 E		6319-J-C3	6322-J-C3
DR.315L../ERF/NS	NU 319 E		6319-J-C3	6322-J-C3

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6.8 Ventilation on the motor

6.8.1 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.

Motor size	Mounted brakes	Free space required	
		Axial for normal motor fan guards in mm	Axial for normal brakemotor fan guards in mm
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
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

6.8.2 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.

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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.

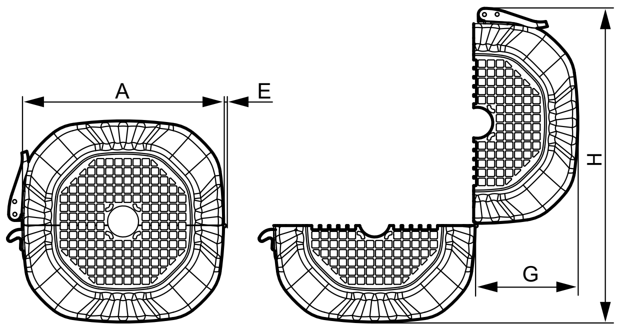
6.8.3 Axially separable fan guards on the brakemotor, brakemotor with encoder or with a second shaft end

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

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Motor size	Mounted brakes	Free space required	
		Axial for normal brakemotor fan guards in mm	Radial for separa-ted brakemotor fan guards (A+E+G) × H in mm × mm
DR.250	BE60, BE62, BE120 or BE122	510	-
DR.280	BE60, BE62, BE120 or BE122	510	-
DR.315	BE120 or BE122	624	-

1) Please contact SEW-EURODRIVE when attaching the BE60/62 to the DR.200/225.

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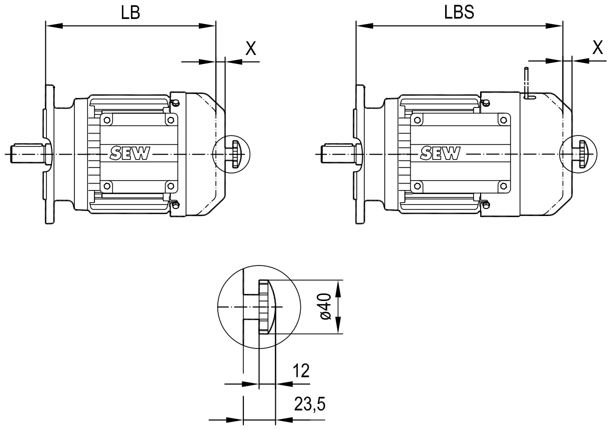
6.8.4 Air filter

In an environment with high amounts of dust or suspended particles, the air required to cool the motor blows these dirt particles around. In unfavorable conditions, this leads to the constant increase in particle deposits between the cooling fins, so that the dirt can no longer be blown away by the cooling air flow. In the worst case, the space between the cooling fins is completely filled and the motor is no longer cooled, resulting in the thermal risk that the motor may be destroyed.

In these cases, an air filter can prevent this swirling effect and the resulting damage to the motor. Conversely, the filtered particles must continuously be removed from the filter, as otherwise ventilation can no longer take place.

As a result, the air filter is fastened to the inner guard by an additional external guard using a single bolt.

When using an air filter, please consider the space required to remove the additional filter guard.



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Motor size	Mounted brakes	Free space required	
		Additional length X (LB or LBS, see dimension sheet) in mm	Axial for disassembling the attachment guard in mm
DR.71	BE05 or BE1	10	70
DR.80	BE05, BE1 or BE2	13	78
DR.90	BE1, BE2 or BE5	17	90
DR.100	BE2 or BE5	16	99
DR.112	BE5 or BE11	23	111
DR.132	BE5 or BE11	23	111

6.8.5 Non-ventilated motors – without fan

The improvements described in the "Air filter" (→ 🗎 152) chapter can also be achieved by not installing a fan. 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 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 all countries. As a result, non-ventilated motors are generally selected based on the DRS.. motor types.

6.8.6 Non-ventilated motors – closed B-side

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.

6.8.7 Canopy

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 the "Dimension sheets" (→ 🗎 199) chapter.

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.

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6.9 Second shaft end

The motors are also available with a B-side shaft end. This so-called second shaft end is constructed with a traditional keyway and key in accordance with DIN 6885 Sheet 1 (ISO 773).

These are available in the following designs for the series:

- with a cover for motors/brakemotors DR.71 – DR.132
- without a cover for motors/brakemotors DR.160 – DR.315, as the diameter of the second shaft end is so large that damage during transport is unlikely.

  A cover can be ordered for these sizes as an additional option.

6.9.1 Standard design

The standard design of the second shaft end for motors is generally smaller than described in EN 50347 for each number of poles and power.

SEW-EURODRIVE has decided to take this path in order to meet the demand for combination with different brake sizes.

6.9.2 Reinforced design

The reinforced design of the second shaft end was developed as an alternative. This design considers the maximum possible dimension of the second shaft end and can only be combined with one brake size.

6.9.3 Second shaft end combinations with other design types

The second shaft end can be combined with the following design types and options.

Brakes

- With 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.

	BE05	BE1	BE2	BE5	BE11	BE20	BE30	BE32
DR.71S	•	•						
DR.71M	•	•						
DR.80S	•	•	•					
DR.80M	x	x	•					
DR.90M		x	x	•				
DR.90L		x	x	•				
DR.100M			x	•				
DR.100L			x	•				
DR.100LC			x	•				
DR.112M				x	•			
DR.132S				x	•			
DR.132M				x	•			

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	BE05	BE1	BE2	BE5	BE11	BE20	BE30	BE32
DR.132MC				x	•			
DR.160S					x	•		
DR.160M					x	•		
DR.160MC					x	•		
DR.180S						x	•	•
DR.180M						x	•	•
DR.180L						x	•	•
DR.180LC							•	•
DR.200L							•	•
DR.225S							•	•
DR.225M							•	•
DR.225MC							•	•

Built-in encoder

Built-in encoders EI71, EI72, EI76 or EI7C can only be combined with the standard design of the second shaft end, not with the reinforced second shaft end.

Fan guards

The second shaft end can be combined with normal fan guards for motors and brakemotors or the separated fan guards for the brakemotor.

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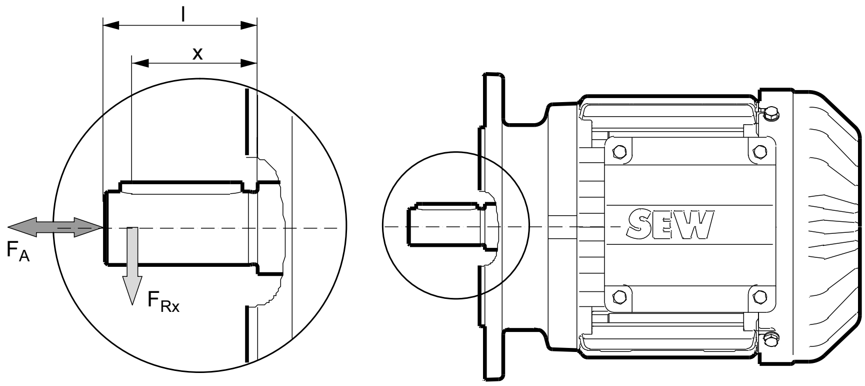
6.10 Overhung and axial loads

Refer to the following diagrams for the permitted overhung load F_{Rx} for AC motors/ brakemotors. In order to read the permitted overhung load from the diagram, you must know what the distance x is between the force application point of the overhung load F_R and the shaft shoulder.

All overhung load diagrams are designed for a bearing service life of 20000 hours. A detailed bearing service life calculations 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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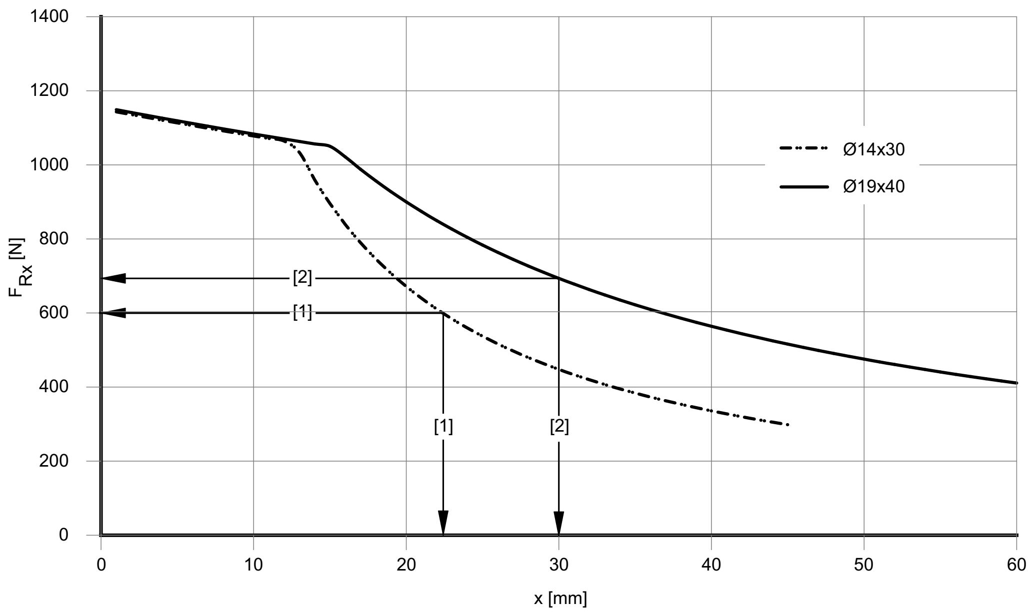
- l = Length of the shaft end
- x = Distance between overhung load application point and shaft shoulder
- F_{Rx} = Overhung load at force application point
- F_A = Axial force

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

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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	Comments
Direct drive	1.0	–
Gears	1.0	≥ 17 teeth
Gears	1.15	< 17 teeth
Sprockets	1.0	≥ 20 teeth
Sprockets	1.25	< 20 teeth
Narrow V-belt	1.75	Influence of the pre-tensioning force
Flat belt	2.50	Influence of the pre-tensioning force
Toothed belt	1.50	Influence of the pre-tensioning 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:

$F_R = f_z \times F_{Rx}$

6.10.1 Permitted overhung load – 2-, 4-, 6-, 12-pole motors

The permitted overhung loads for 2-, 4-, 6- and 12-pole motors are displayed in the individual size diagrams in the "Overhung load diagrams for 2-, 4-, 6- and 12-pole motors" (→ 🗎 159) chapter.

Only the sizes, not the design lengths, are displayed separately. The different shaft ends are shown as separate curves, parallel in the diagram, if available.

6.10.2 Permitted overhung load – pole-changing motors

The determined F_{Rx} value for the motors is multiplied by a factor of 0.8 in order to define the permitted overhung load $F_{Rx\text{-}DRx/y}$ for the relevant pole-changing motors.

$F_{Rx\text{-}DRx/y} = 0.8 \times F_{Rx}$

The assignment for the conversion is as follows:

- 2-pole motors are used for the
  - 4/2-pole motors with Dahlander winding
  - 8/2-pole motors with separate winding
- 4-pole motors are used for the
  - 8/4-pole motors with Dahlander winding

6.10.3 Permitted overhung load of DRL.. motors

The determined F_{Rx} value for the 4-pole DRL.. motors of the same size is multiplied by a factor of 0.8 in order to define the permitted overhung load $F_{Rx\text{-}DRL}$ for the 4-pole DRL.. motors.

$F_{Rx\text{-}DRL} = 0.8 \times F_{Rx}$

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6.10.4 Permitted overhung load of DRM.. motors

The permitted overhung loads for the 12-pole torque motors are identical to the overhung loads for the 6-pole motors, please refer to the "Overhung load diagrams for 2-, 4-, 6-, 12-pole motors" (→ 🗎 159).

6.10.5 Permitted axial load

The permitted axial load F_A is calculated by multiplying the determined overhung load F_{Rx} by a factor of 0.2 for all DR.. series motor types:

- $F_A = 0.2 \times F_{Rx}$

The axial load F_A can load the motor's shaft end at the same time as the calculated overhung load F_R.

6.10.6 Overhung and axial loads at the second shaft end

The "Overhung load diagrams for 2-, 4-, 6-, 12-pole motors" (→ 🗎 159) also displays the diagrams for the permitted overhung loads at the second shaft end for every motor size. A distinction is made between motors and brakemotors as well as between standard and reinforced second shaft ends.

Axial loads at the second shaft end may not exceed the information from the "Permitted axial load" (→ 🗎 158) chapter based on a directional addition.

6.10.7 Torques and duty types

The customer's motor shaft and bearings are designed for the overhung and axial loads in the following diagrams in this chapter. The information is based on the nominal speed n_N and the superimposed nominal torque M_N in S1, S2 and S3 motor operation.

The second shaft end of the motor, shown as /2W in the diagrams, can transfer a maximum of the motor's nominal torque M_N in S1 operation.

If conditions occur which are not considered in the descriptions or diagrams in this chapter, consult SEW-EURODRIVE.

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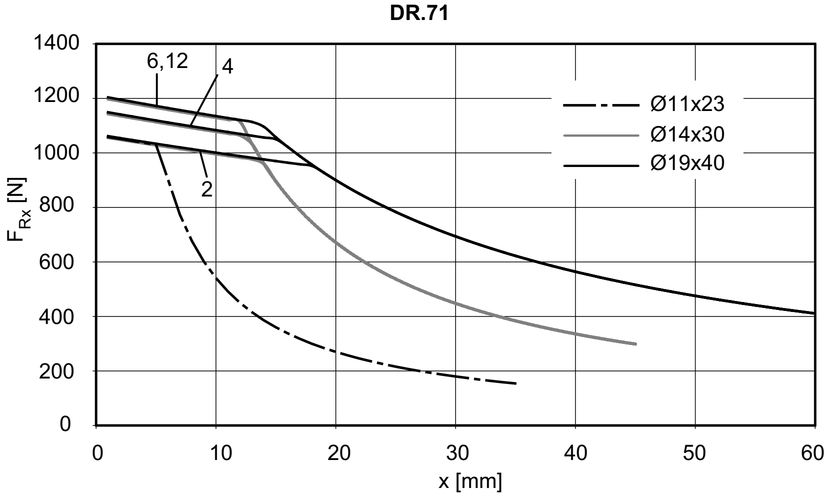
6.10.8 Overhung load diagrams for 2-, 4-, 6-, 12-pole motors

Overhung load diagram for DR.71

Overhung load diagrams for 2-, 4-, 6-, 12-pole DR.71 motors:



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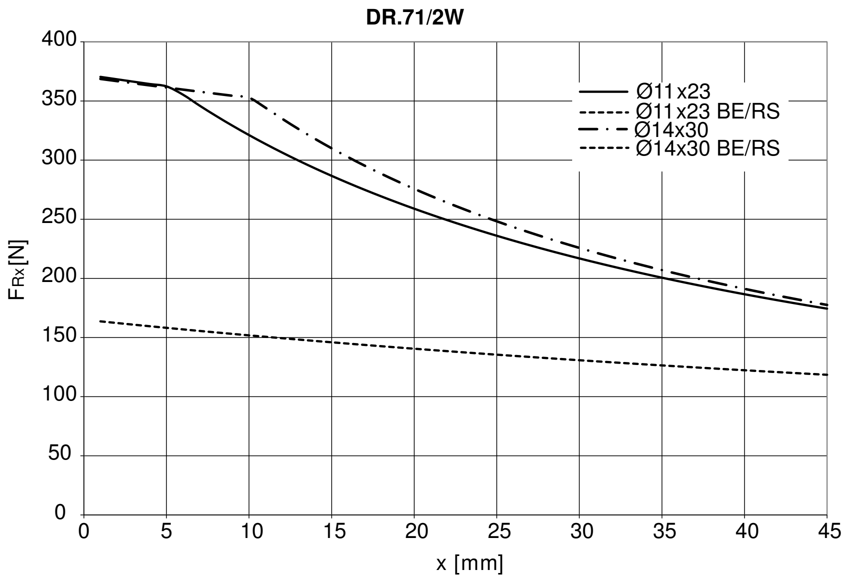
2: 2-pole 4: 4-pole 6, 12: 6- and 12-pole

Overhung load diagram for DR.71 at the second shaft end

Overhung load diagram for 2-, 4-, 6-, 12-pole DR.71 motors at the second shaft end:



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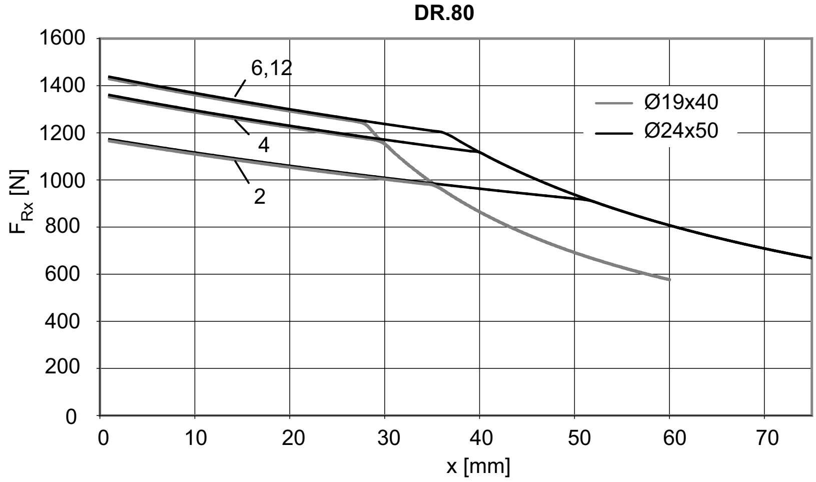
Overhung load diagram for DR.80

Overhung load diagram for 2-, 4-, 6-, 12-pole DR.80 motors:

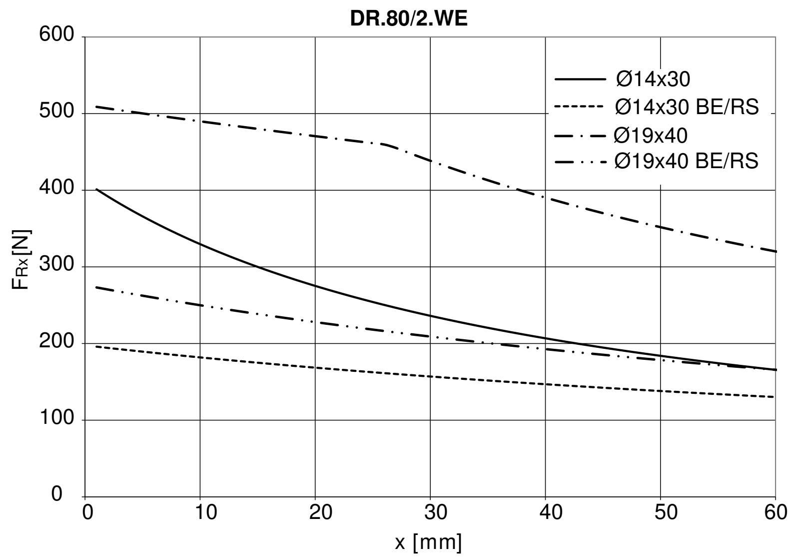


9007203235245707

2: 2-pole 4: 4-pole 6, 12: 6- and 12-pole

Overhung load diagram for DR.80 at the second shaft end

Overhung load diagram for 2-, 4-, 6-, 12-pole DR.80 motors at the second shaft end:



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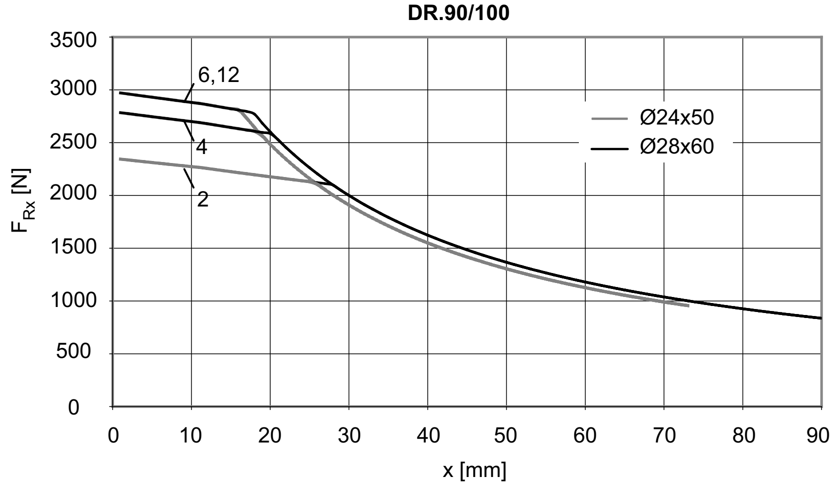
Overhung load diagram for DR.90 and DR.100

Overhung load diagram for 2-, 4-, 6-, 12-pole DR.90 and DR.100 motors:

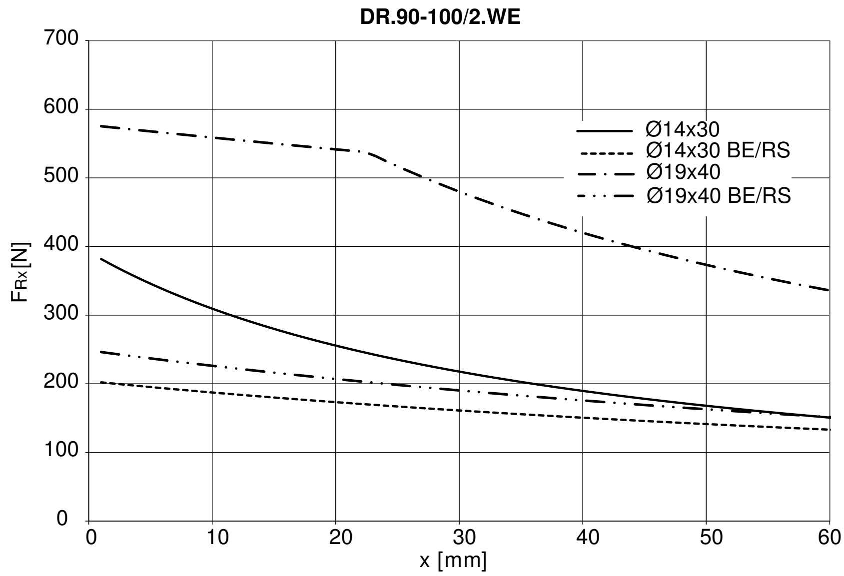


9007203235251083

2: 2-pole   4: 4-pole   6, 12: 6- and 12-pole

Overhung load diagram for DR.90 and DR.100 at the second shaft end

Overhung load diagram for 2-, 4-, 6-, 12-pole DR.90 and DR.100 motors at the second shaft end:



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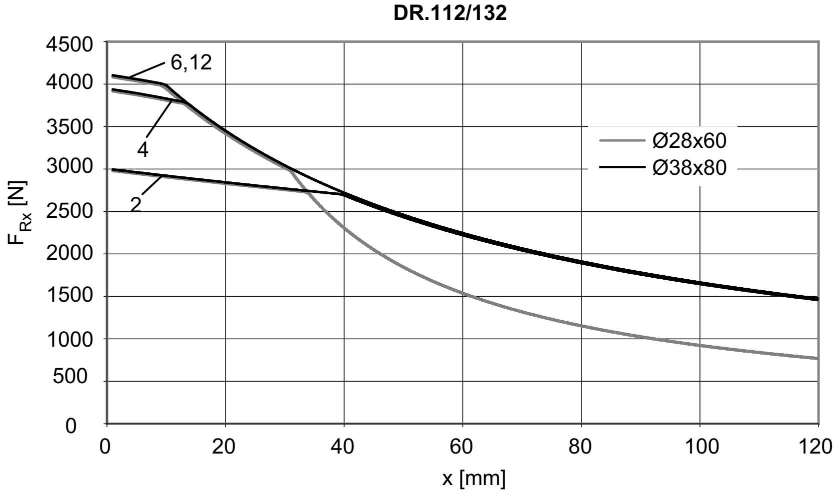
Overhung load diagram for DR.112 and DR.132

Overhung load diagram for 2-, 4-, 6-, 12-pole DR.112 and DR.132 motors:

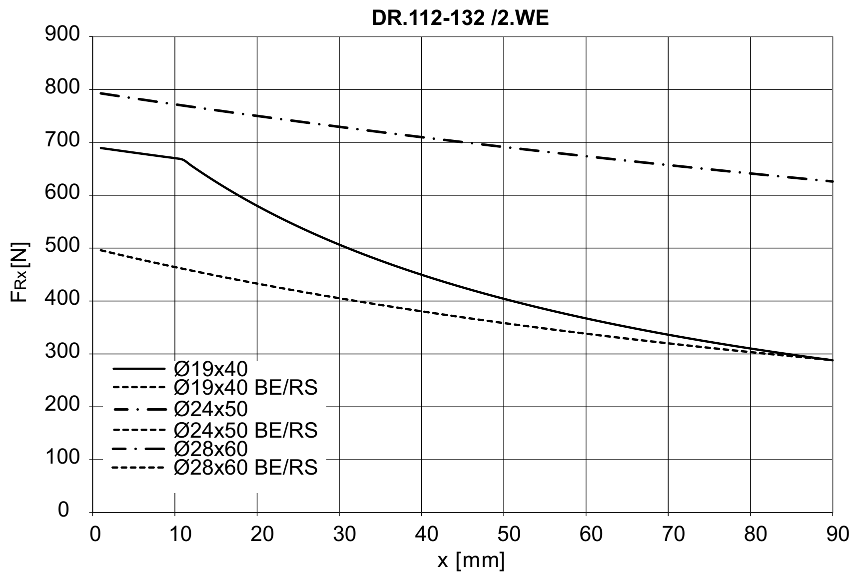


9007203235256459

2: 2-pole 4: 4-pole 6, 12: 6- and 12-pole

Overhung load diagram for DR.112 and DR.132 at the second shaft end

Overhung load diagram for 2-, 4-, 6-, 12-pole DR.112 and DR.132 motors at the second shaft end:



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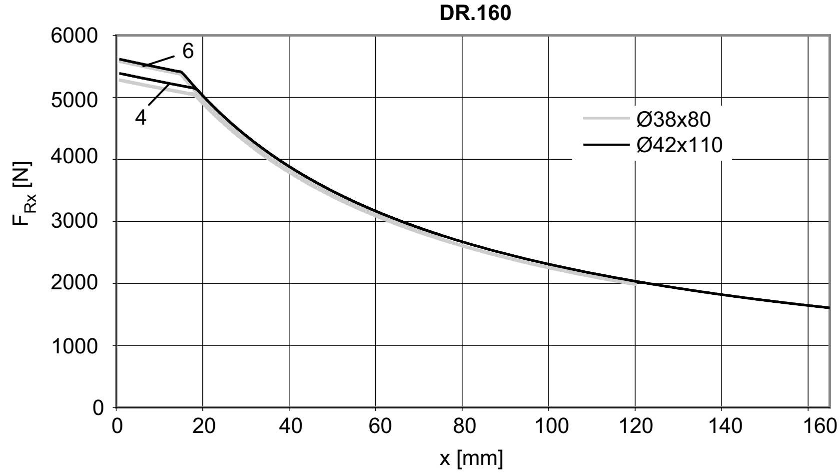
Overhung load diagram for DR.160

Overhung load diagram for 4- and 6-pole DR.160 motors:



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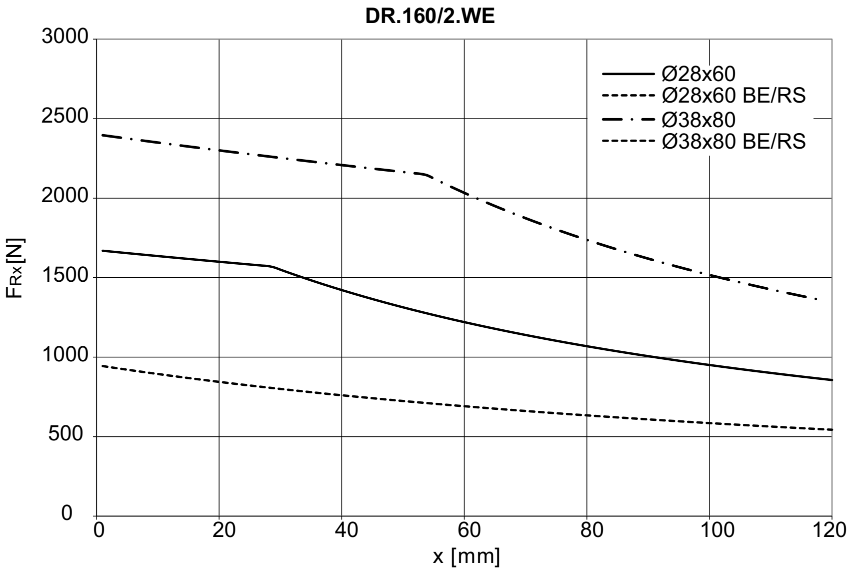
4: 4-pole 6: 6-pole

Overhung load diagram for DR.160 at the second shaft end

Overhung load diagram for 4- and 6-pole DR.160 motors at the second shaft end:



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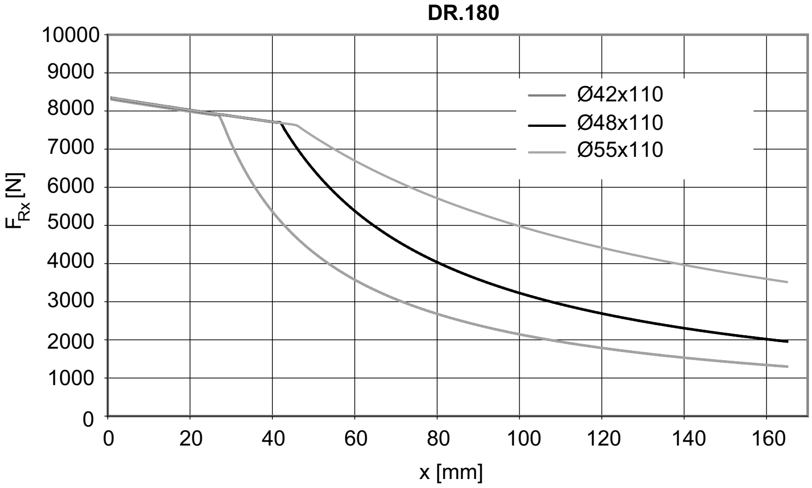
Overhung load diagram for DR.180

Overhung load diagram for 4-pole DR.180 motors:



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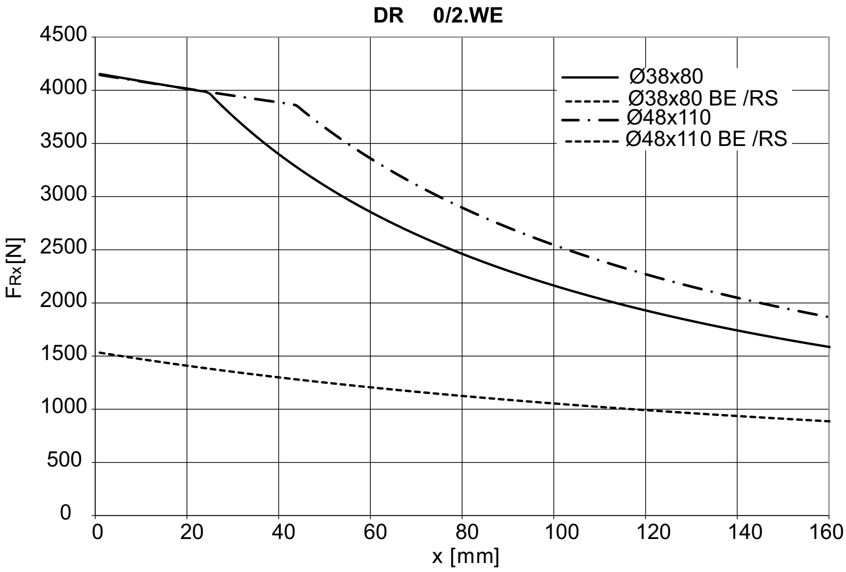
Overhung load diagram for DR.180 at the second shaft end

Overhung load diagram for 4-pole DR.180 motors at the second shaft end:



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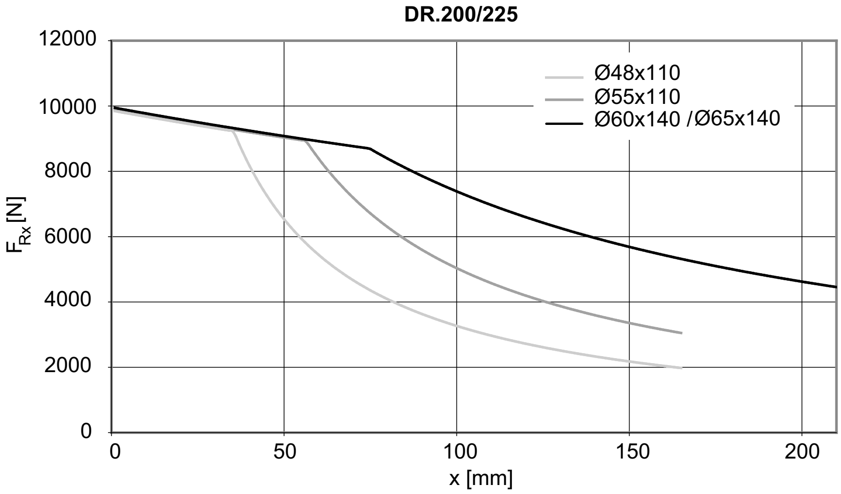
Overhung load diagram for DR.200 and DR.225

Overhung load diagram for 4-pole DR.200 and DR.250 motors:



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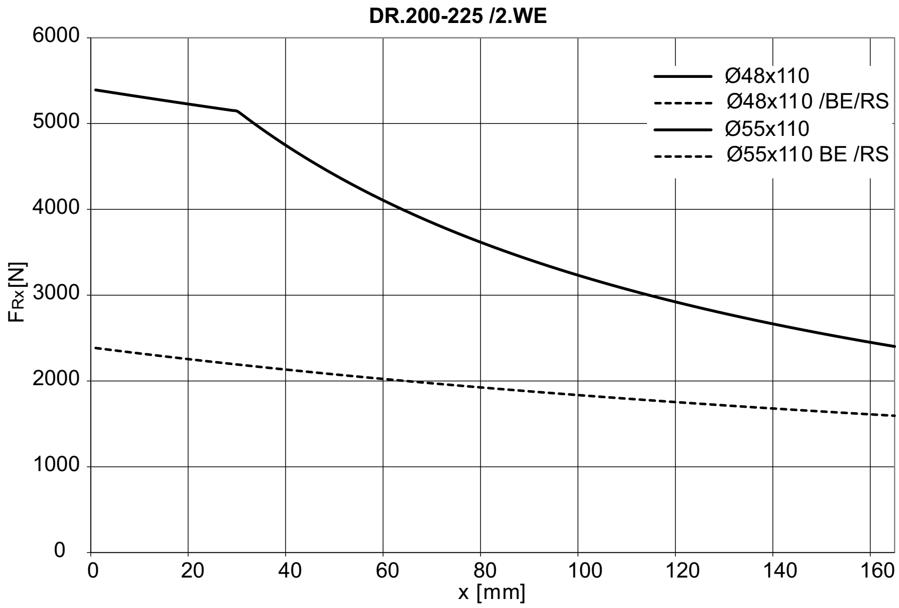
Overhung load diagram for DR.200 and DR.225 at the second shaft end

Overhung load diagram for 4-pole DR.200 and DR.225 motors at the second shaft end:



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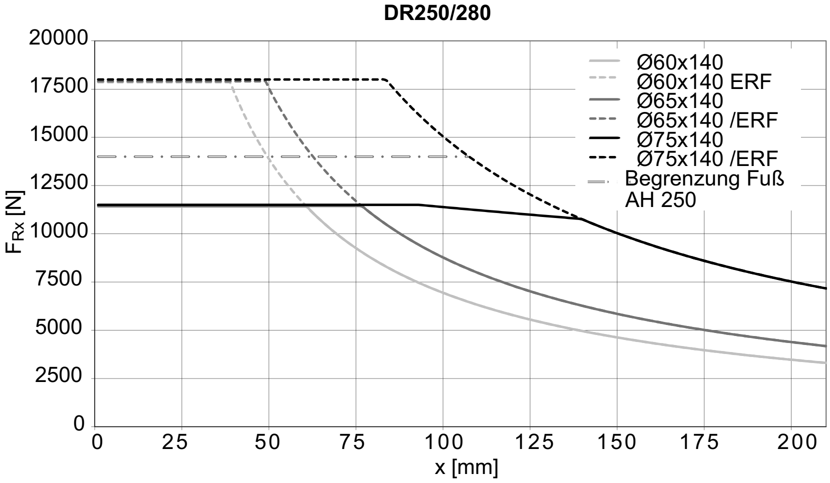
Overhung load diagram for DR.250 and DR.280

Overhung load diagram for 4-pole DR.250 and DR.280 motors:



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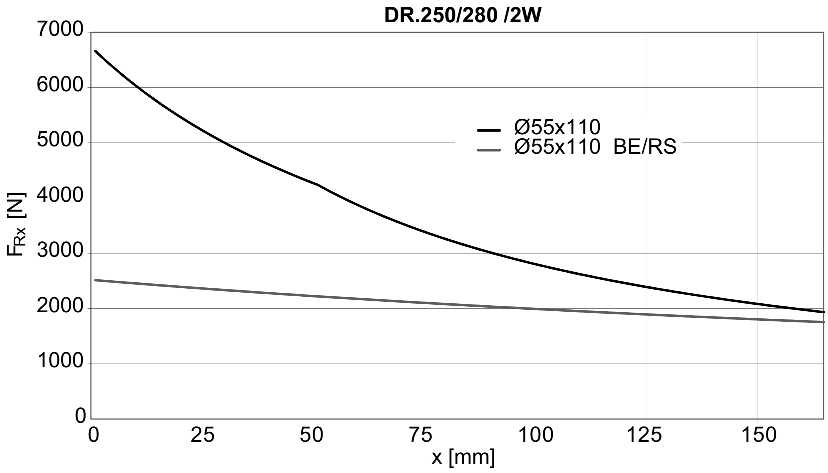
Overhung load diagram for DR.250 and DR.280 at the second shaft end

Overhung load diagram for 4-pole DR.250 and DR.280 motors at the second shaft end:



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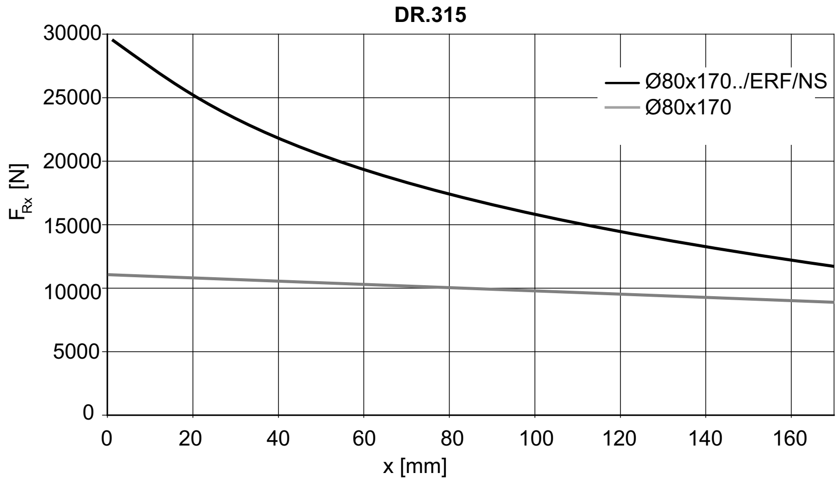
Overhung load diagram for DR.315

Overhung load diagram for 4-pole DR.315 motors:



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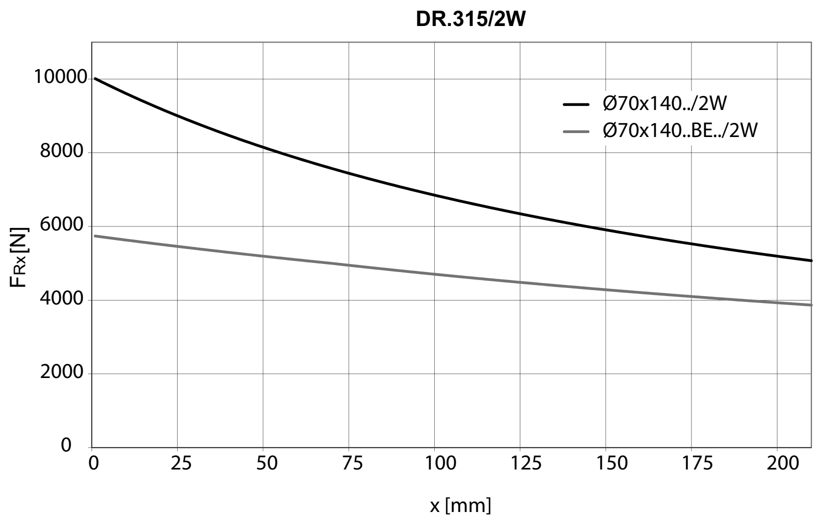
INFORMATION

The conversion of the overhung load into the axial load (→ 🗎 158) must not be used with reinforced bearings (../ERF).

The standard bearing value (lower curve) at point x is used for the conversion instead of the value for /ERF (upper curve).

Overhung load diagram for DR.315 at second shaft end

Overhung load diagram for 4-pole DR.315 motors at the second shaft end:



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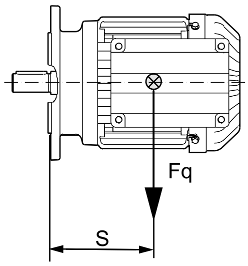
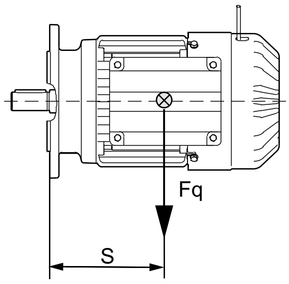
6.11 Center of gravity of motors

The center of gravity of a motor is a theoretical variable which assumes 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 motor data" (→ 🗎 91).

The center of gravity of the motor must also be taken into account when combining gear units with flange motors and, if applicable, with feet attached with the aid of adapters.

Motor type	Center of gravity S in mm	Brakemotor type	Brake	Center of gravity S in mm
 3980543755		 3980546443		
DR.71S	86	DR.71S	BE05	108
DR.71M	92	DR.71M	BE1	112
DR.80S	106	DR.80S	BE1	148
DR.80M	119	DR.80M	BE2	150
DR.90M	118	DR.90M	BE2	142
DR.90L	124	DR.90L	BE5	151
DR.100M	137	DR.100M	BE5	165
DRP100M	140			
DR.100L / LC	153	DR.100L / LC	BE5	180
DR.112M	153	DR.112M	BE5	179
DR.132S	167	DR.132S	BE11	202
DR.132M / MC	193	DR.132M / MC	BE11	226
DR.160S	205	DR.160S	BE20	265
DR.160M / MC	205	DR.160M / MC	BE20	255
DR.180S	224	DR.180S	BE20	287
DR.180M	224	DR.180M	BE30	302
DR.180L	237	DR.180L	BE32	321
DR.180LC	237	DR.180LC	BE32	318
DR.200L	228	DR.200L	BE32	340
DR.225S	250	DR.225S	BE32	340
DR.225M	264	DR.225M	BE32	363
DR.225MC	264	DR.225MC	BE32	354
DR.250M	321	DR.250M	BE62	420
DR.280S	341	DR.280S	BE62	433
DR.280M	341	DR.280M	BE122	442
DR.315K / S	419	DR.315K / S	BE122	489
DR.315M / L	505	DR.315M / L	BE122	550

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6.12 Drive selection – non-controlled motor

The following flow diagram illustrates the project planning procedure for a non-controlled drive. The drive consists of a gearmotor operated on the grid.

6.12.1 Flow diagram

Necessary information on the machine to be driven
- Technical data and environmental conditions
- Positioning accuracy
- Speed setting range
- Calculation of the travel cycle

↓

Calculation of the relevant application data
- Travel diagram
- Speeds on 50 Hz or 60 Hz supply system
- Static, dynamic torques
- Regenerative power

↓

Gear unit selection
- Define gear unit size, gear unit ratio, and gear unit type
- Check positioning accuracy
- Check gear unit utilization ($M_{a\,max} \geq M_{a\,(t)}$)
- Check input speed (churning losses)

↓

Motor selection
- Maximum torque
- With dynamic drives: effective torque at medium speed
- Maximum speed
- Determine energy efficiency class IE
- Observe dynamic and thermal torque curves
- Select the correct encoder
- Motor equipment (brake, plug connector, thermal motor protection, etc.)

↓

Braking resistor selection
- Based on the calculated regenerative power, cdf, and peak breaking power.

↓

Make sure that all requirements have been met.

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6.12.2 Drive selection for pole-changing motors

The following windings are distinguished for pole-changing motors:

- Separate winding: 8/2-pole DRS.. motors
- Dahlander winding: 4/2, 8/4-pole DRS.. motors

Description of switching torque

The functioning of the switchover from the 2-pole to the 8-pole winding is explained on the basis of the 8/2 pole motor.

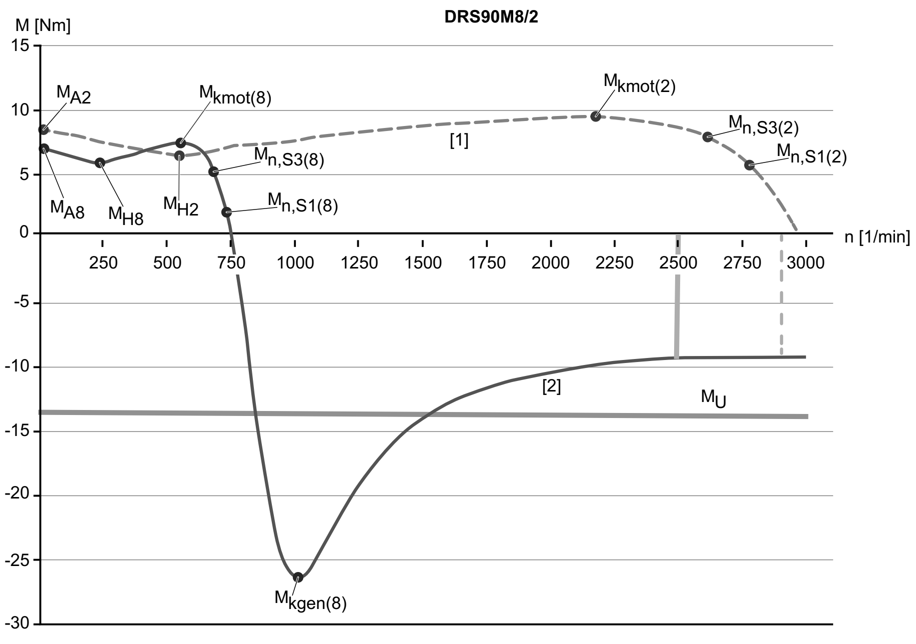
If the 8-pole winding is connected to the supply system from the operation of the 2-pole speed, with virtually no period of no-load operation, the motor briefly functions as a generator due to the above-synchronous speed. The transformation of kinetic energy into electrical energy decelerates it to the lower speed in a low-loss, wear-free manner.

To be able to calculate the mean switching torque as a first approximation, the available kinematic data is employed.

$M_U = f_U \times M_{A8}$

M_U =	geometrically averaged switching torque from high to low speed in Nm.
M_{A8} =	starting torque in low speed in Nm.
f_U =	averaged factor of 8-pole winding's regenerative torque curve.

If the switching torque is too high, SEW-EURODRIVE recommends the use of the WPU smooth-pole change unit.



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[1]	Characteristic curve: 2-pole	M_{kmot} =	motor breakdown torque
[2]	Characteristic curve: 8-pole	M_{kgen} =	regenerative breakdown torque
M_{A8} =	starting torque: 8-pole	M_H =	acceleration torque
M_{A2} =	starting torque: 2-pole	M_U =	mean switching torque from high to low speed

M_U values of 8/4 pole motors (S1)

The following table shows the factors f_U and the MU torques of the 8/4-pole motors.

Motor type	M_{A8} in Nm	f_U	M_U in Nm
DRS71S8/4	2.3	2.4	5.5
DRS71M8/4	3.8	2.4	9.1
DRS80M8/4	5.3	2.3	12.3
DRS90M8/4	8.5	2.2	18.6
DRS90L8/4	10.8	2.2	23.8
DRS100M8/4	15.5	2.0	31.0
DRS100L8/4	21.3	2.0	42.5
DRS112M8/4	32.3	2.0	64.6
DRS132S8/4	45.0	2.0	90.0
DRS132M8/4	56.0	2.0	112
DRS160S8/4	74.8	2.0	150
DRS160M8/4	99.4	2.0	199
DRS180S8/4	158	2.0	316
DRS180L8/4	234	2.0	468
DRS200L8/4	343	2.0	686
DRS225S8/4	455	2.0	910
DRS225M8/4	557	2.0	1114

M_U values of 8/2 pole motors

The following table shows the factors f_U and the M_U torques of the 8/2-pole motors.

Motor type (S3/40/60%)	M_{A8} in Nm	f_U	M_U in Nm
DRS71S8/2	1.42	2.1	2.98
DRS71M8/2	2.29	2.5	5.72
DRS80S8/2	3.26	2.3	7.49
DRS80M8/2	5.25	2.1	11.0
DRS90M8/2	5.64	2.3	13.0
DRS90L8/2	8.36	1.8	15.0
DRS100M8/2	12.0	1.8	21.6
DRS112M8/2	16.2	1.8	29.2
DRS132M8/2	22.2	2.2	48.8

Motor type (S1)	M_{A8} in Nm	f_U	M_U in Nm
DRS71S8/2	1.04	2.1	2.19
DRS80S8/2	3.26	2.3	7.49
DRS80M8/2	5.25	2.1	11.0
DRS90L8/2	7.47	1.8	13.5
DRS100M8/2	10.0	1.8	18.0
DRS132M8/2	22.2	2.2	48.8

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M_U values of 4/2 pole motors

The following table shows the factors f_U and the M_U torques of the 4/2-pole motors.

Motor type	M_{A4} in Nm	f_U	M_U in Nm
DRS71S4/2	2.57	3.1	7.95
DRS71M4/2	4.43	3.1	13.7
DRS80M4/2	10.1	3.4	34.4
DRS90M4/2	14.7	3.3	48.5
DRS90M4/2	19.1	3.3	63.0
DRS100M4/2	27.0	3.5	94.5
DRS100L4/2	37.6	3.5	132
DRS132S4/2	39.1	2.0	78.1
DRS132M4/2	54.9	2.0	110
DRS160S4/2	97.5	2.0	195
DRS160M4/2	126	2.0	253
DRS180L4/2	219	2.0	440
DRS180L4/2	288	2.0	575

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6.13 Drive selection – global motor

When selecting a global motor, the following properties should be taken into account.

6.13.1 Gear unit reduction ratios for the global motor

The global motor is supplied with the electrical specifications for 50 Hz and 60 Hz. If the motor is combined with an additional transmission or a gear unit, it should be noted that the reduction ratio is generally only determined for one of the two frequencies.

If the reduction ratio is calculated for 50 Hz and the gear unit configured accordingly, this results in the behavioral changes described in the chapter "50 Hz motors on 60 Hz supply systems" (→ 🗎 127) when operated on a 60 Hz system.

If operation on the 60 Hz supply system represents the initial situation, the ratios from the chapter "50 Hz motors on 60 Hz supply systems" (→ 🗎 127) are reversed.

These ratio changes must be taken into account when designing machines and systems.

6.13.2 Identification of degrees of protection

SEW-EURODRIVE classifies the motor degrees of protection according to the international standard IEC 60034-5; see chapter "Degrees of protection to EN/IEC 60034-5" (→ 🗎 139).

In North America, on the other hand, identification of a different degree of protection is required by the relevant standards.

The degree of protection is represented by an abbreviation made up of four characters. 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
TEFC	Totally Enclosed Fan Cooled	völlig geschlossen, Lüfter gekühlt
TEBC	Totally Enclosed Blower Cooled	völlig geschlossen, Fremdlüfter gekühlt

In NEMA MG1, degrees of protection IP54 to IP66 are all classified as fully enclosed.

6.13.3 Voltage tolerances

If multiple voltages are included on a motor nameplate, the actual limit values and tolerances must be considered.

The motor standard IEC 60034 comprises two tolerance ranges. If no tolerance is specified on the nameplate, a voltage tolerance of ± 5% applies. For more information, refer to the chapter "Motor standard IEC 60034" (→ 🗎 25).

The voltages in 50 Hz supply systems are generally based on the standard IEC 38. Here, the tolerance range is ±10%.

In 60 Hz systems, the usual tolerance is ±10 % and normally indicated without additional information on the nameplate.

In order to implement motor and supply system standards for products such as the global motor, the voltage range was created.

The specification of an upper and lower voltage, each with a ± 5% tolerance, results in a combined tolerance of ± 10% for the median voltage.

This procedure is employed for the tolerances of the voltage blocks specified in the chapter "Global motor" (→ 🗎 45).

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6.13.4 Global motor with brake

In many drive situations and applications, it is sufficient to tap the brake voltage from the supply voltage of the motor.

If the motor is configured for the 50 Hz and 60 Hz voltage range, the brake voltage covers a very large range.

As described in the chapter "Brake voltage" (→ 🗎 126), the brake must not be released at the upper voltages in these cases without activating the motor in order to cool the brake with the motor cooling air.

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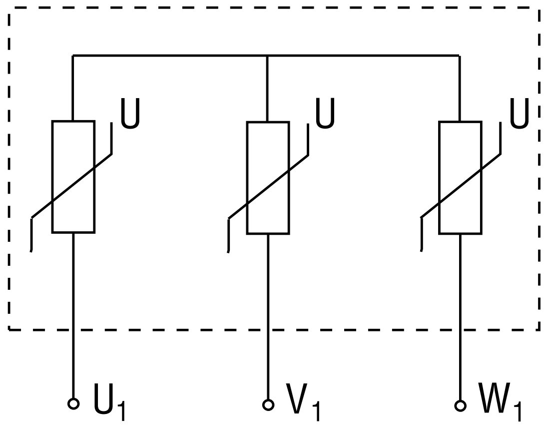
6.14 Drive selection – DRM.. torque motors

6.14.1 Special aspects of torque motors and low-speed motors

Due to the design of torque motors and low-speed motors, very high induction voltages may be generated when they are switched off. SEW-EURODRIVE recommends using the varistor circuit shown below for protection. The size of the varistors depends, amongst other factors, on the starting frequency. This must be taken into account during project planning.



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The varistor protection circuit can be obtained from SEW-EURODRIVE. Please specify the desired starting frequency with your order.

6.14.2 R13 wiring diagram

The conventional torque motor operation is measured in a star connection in S1 continuous duty.

If the same torque motor is used in a delta connection, the usual factor of 3 for AC motors no longer applies due to the weak magnetic field saturation of the star connection. The influence of the magnetic stray fields in the star or delta connection is no longer proportional. As a result, the torque motor in the delta connection develops a higher torque than that produced by the factor of 3. In return, the operating time must be reduced to S3/15%.

Alternatively, the reduction of the operating time can be compensated by means of a forced cooling fan.

6.14.3 R23 wiring diagram

For applications that use the two connection types star and delta alternately and must not have more than the 3 times the torque of the star connection in the delta connection, SEW-EURODRIVE offers the connection type R23. Only part of the winding is activated in the case of the delta connection.

Please consult SEW-EURODRIVE if necessary.

6.14.4 Restrictions due to combinations with options and variations

As a result of the non-ventilated operation, the components and component parts of the torque motors are subject to greater thermal stress at a standstill than a normal AC motor.

Therefore, all variations and options that cannot be subjected to high thermal loads must be excluded from the combination with torque motors.

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These include:

- The backstop: The grease used within the backstop to ensure the mobility of the blocking bodies reaches impermissibly high temperatures, which can affect the torque motor when at a standstill.
- The EI7 built-in encoders: When used with a torque motor, the installation space before the fan and behind the B-side flange is heated to a point that the electronic components of the sensor technology may be damaged.
- The EI7 built-in encoders are only approved for use in combination with the optional /V forced cooling fan. Without additional cooling, the rise in temperature before the fan and behind the B-side flange is too high.
- The add-on encoders with direct shaft-shaft connection: Due to the transfer of heat energy from the rotor to the shaft of the encoder, the latter reaches impermissibly high temperatures. The use of a coupling for the encoder mounting, as a means of interrupting the heat transfer, is permitted.
- The thermal class 180 (H): Use of the thermal class 180 (H) would stress the gaskets, bearings, and bearing lubricants beyond the permitted temperature thresholds.

6.14.5 Flow diagram

The following diagram illustrates the basic drive selection process for a geared torque motor.

INFORMATION

SEW-EURODRIVE recommends the use of a /TF temperature sensor in duty type S3/15% cdf or when operated with a /V forced cooling fan.

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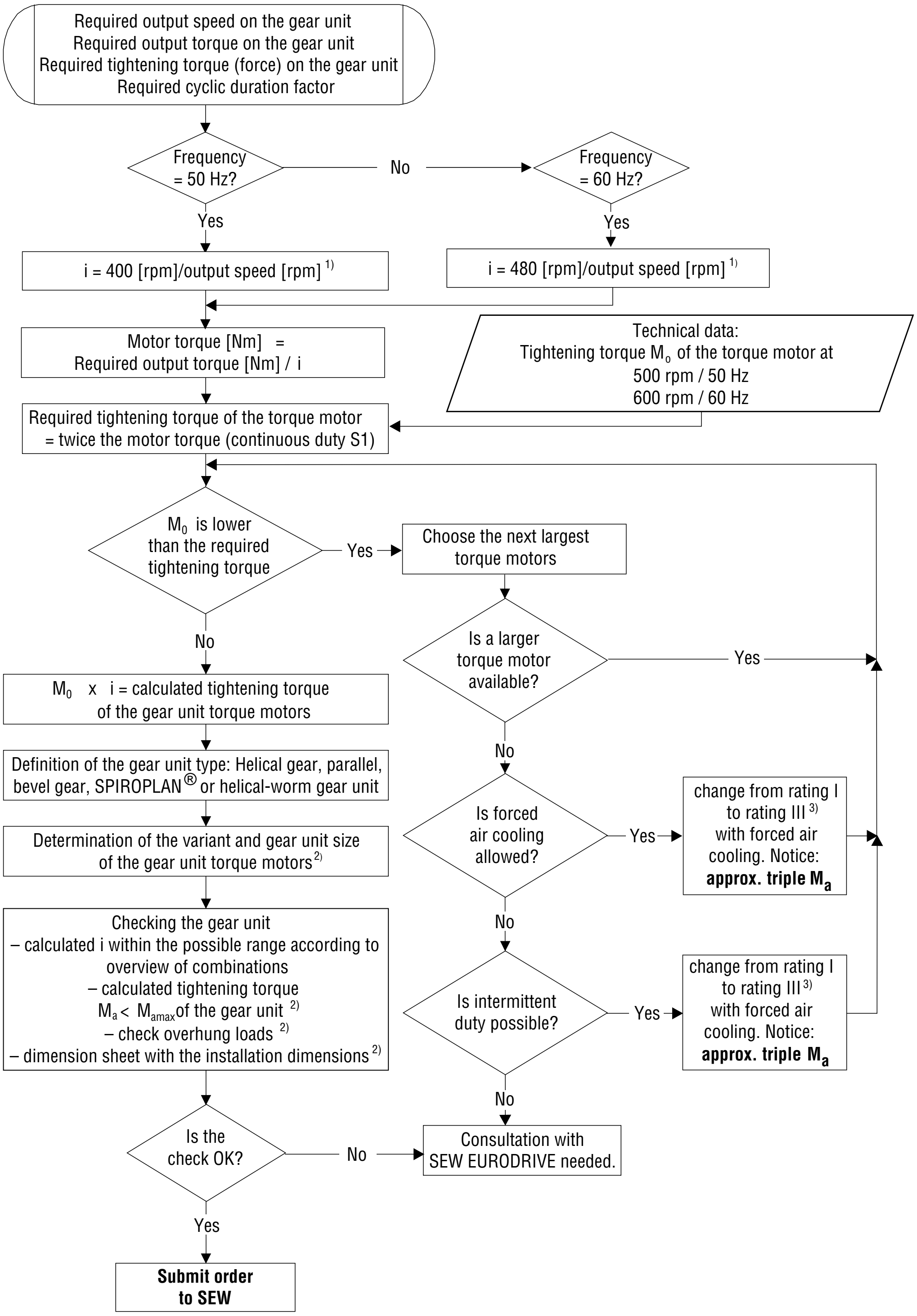

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1) The speeds of 400 and 480 rpm during operation with approx. half the initial torque only serve to calculate the required gear ratio

2) See "Geared torque motor" catalog

3) **Rating I**: duty type S1/100% cdf;

Rating II: duty type S3/15% cdf: 3x to 5x standstill torque (R13)

Rating III: duty type S3/15% cdf: 3x standstill torque (R23)

Rating IV: duty type S1 with /V forced cooling fan

6.15 Drive selection – controlled motor

6.15.1 Flow diagram

The following flow diagram illustrates the drive selection procedure for a positioning drive. The drive consists of a gearmotor that is powered by an inverter.

Necessary information on the machine to be driven
- Technical data and environmental conditions
- Positioning accuracy
- Speed setting range
- Calculation of the travel cycle

↓

Calculation of the relevant application data
- Travel diagram
- Speeds on 50 Hz or 60 Hz supply system
- Static, dynamic torques
- Regenerative power

↓

Gear unit selection
- Define gear unit size, gear unit ratio, and gear unit type
- Check positioning accuracy
- Check gear unit utilization ($M_{a\ max} \geq M_{a\ (t)}$)
- Check input speed (churning losses)

↓

Motor selection
- Maximum torque
- With dynamic drives: effective torque at medium speed
- Maximum speed
- Determine the necessary energy efficiency class IE
- Observe dynamic and thermal torque curves
- Select the correct encoder based on the required positioning
- Motor equipment (brake, plug connector, thermal motor protection, etc.)

↓

Inverter selection
- Motor/inverter assignment
- Continuous current and peak current for current-controlled inverters/axes

↓

Braking resistor selection
- Based on the calculated regenerative power, cdf
- Based on the cyclic duration factor and peak braking power

↓

Options

- EMC measures
- Operation/communication
- Additional functions

↓

Make sure that all requirements have been met.

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6.15.2 Inverter operation in VFC and VFC-n mode

SEW frequency inverter range

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

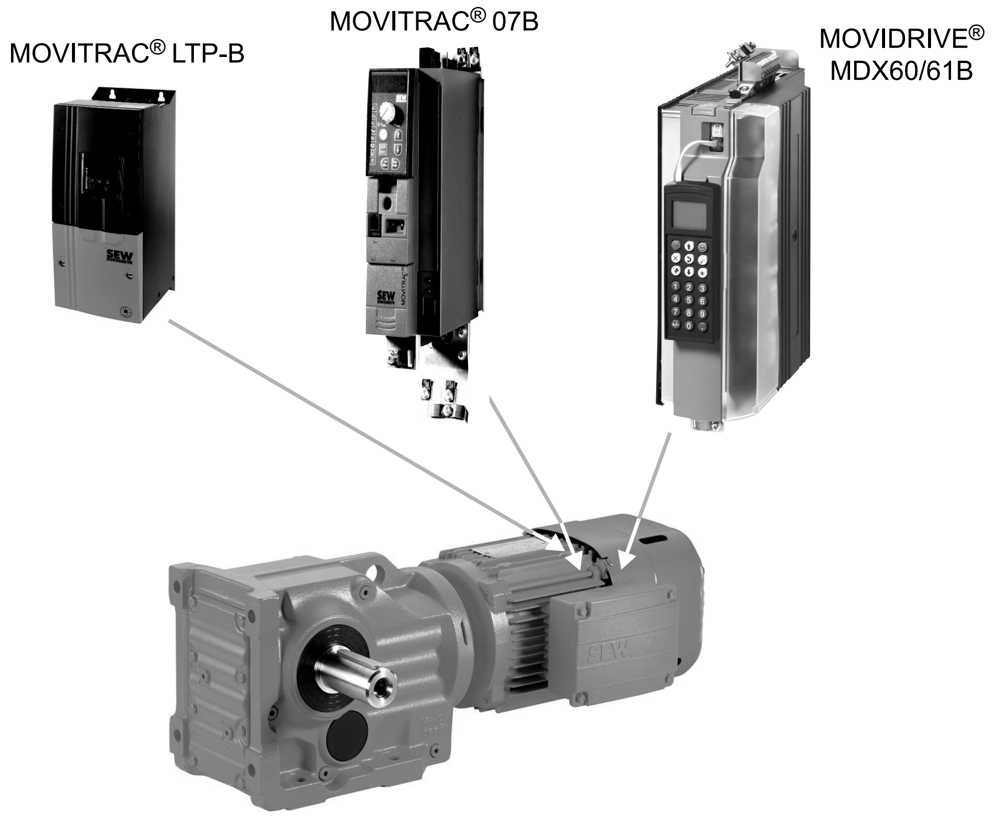
The following inverters are available for voltage-controlled flux vector control (VFC):

- **MOVITRAC® LTP-B:** Simple and inexpensive frequency inverter for the 0.75 – 160 kW power range. Single-phase line connection for 230 V AC (up to 2.2 kW power rating) and three-phase 200 – 240 V AC / 380 – 480 V AC / 500 – 600 V AC (as of 0.75 kW power rating).
- **MOVITRAC® 07B:** Compact and inexpensive frequency inverter for the 0.25 – 160 kW power range. Single-phase and three-phase line connection for 230 V AC and three-phase line connection for 400 – 500 V AC.
- **MOVIDRIVE® MDX60/61B:** High-performance drive inverter for dynamic drives in the 0.55 – 250 kW power range. Great diversity of applications due to extensive expansion options with technology and communication options. Three-phase line connection for 230 V AC and 400 – 500 V AC.

The following inverter is available for voltage-controlled flux vector control with speed feedback (VFC-n):

- **MOVIDRIVE® MDX60/61B:** High-performance drive inverter for dynamic drives in the 0.55 – 250 kW power range. Great diversity of applications due to extensive expansion options with technology and communication options. Three-phase line connection for 230 V AC and 400 – 500 V AC

The DRS.., DRE.., DRP.. AC motors can be operated with the inverters listed above.



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Product characteristics of inverters

The following table lists the most important product characteristics for the various inverter series. You can choose the inverter series matching your application based on these product characteristics.

Product characteristics	MOVITRAC® LTP-B	MOVITRAC® 07B	MOVIDRIVE® MDX60/61B
Voltage range	1 × 200 – 240 V AC (0.75 to 2.2 kW) 3 × 200 – 240 V AC (0.75 to 75 kW) 3 × 380 – 480 V AC (0.75 to 160 kW) 3 × 500 – 600 V AC (0.75 to 110 kW)	1 × 200 – 240 V AC (limited power range) 3 × 200 – 240 V AC (limited power range) 3 × 380 – 500 V AC	3 × 200 – 240 V AC (limited power range) 3 × 380 – 500 V AC
Power range	0.75 – 15 kW (IP20) 0.75 – 160 kW (IP55)	0.25 – 75 kW	0.55 – 250 kW
Nominal current range of the axis modules	–		4 – 250 A
Overload capacity	150% I_N for 60 seconds 175% I_N for 2 seconds	150% I_N 1) briefly and 125% I_N continuously in operation without overload	
4Q capable	Yes, with integrated brake chopper as standard.		
Integrated line filter	At 1 × 200 – 240 V AC: according to limit value class B At 3 × 200 – 240 V AC and 3 × 380 – 480 V AC: according to limit value class A	At 1 × 200 – 240 V AC: according to limit value class B At 3 × 200 – 240 V AC and 3 × 380 – 500 V AC: according to limit value class A for sizes 0, 1, and 2	According to limit value class A for sizes 0, 1, and 2
TF input	Yes		
Control modes	U/f or voltage-controlled flux vector control (VFC)	U/f or voltage-controlled flux vector control (VFC)	U/f or voltage-controlled flux vector control (VFC), with speed feedback speed control and current-controlled flux vector control (CFC).
Speed feedback	Option in preparation	No	Option
Integrated positioning and sequence control system	No	No	Standard
Serial interfaces	System bus (SBus) and RS485		

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Product characteristics	MOVITRAC® LTP-B	MOVITRAC® 07B	MOVIDRIVE® MDX60/61B
Fieldbus interfaces	CANopen, Modbus RTU, optional via gateway PROFIBUS, EtherCAT®, PROFINET, DeviceNet, Ethernet/IP	Optional via gateway PROFIBUS, INTERBUS, CANopen, DeviceNet, Ethernet	Optional PROFIBUS-DP, INTERBUS, INTERBUS LWL, CANopen, DeviceNet, Ethernet
Technology options	No	IEC-61131 control	Input/output card Synchronous operation Absolute encoder card IEC-61131 control
Max. speed	30,000 rpm at 500 Hz	5,500 rpm	6,000 rpm
STO – Safe Torque Off	Yes	Yes	Yes
Approvals	UL and cUL approval, C-Tick		

1) Only for MOVIDRIVE® MDX60/61B: The temporary overload capacity of size 0 units (0005 – 0014) is 200% IN.

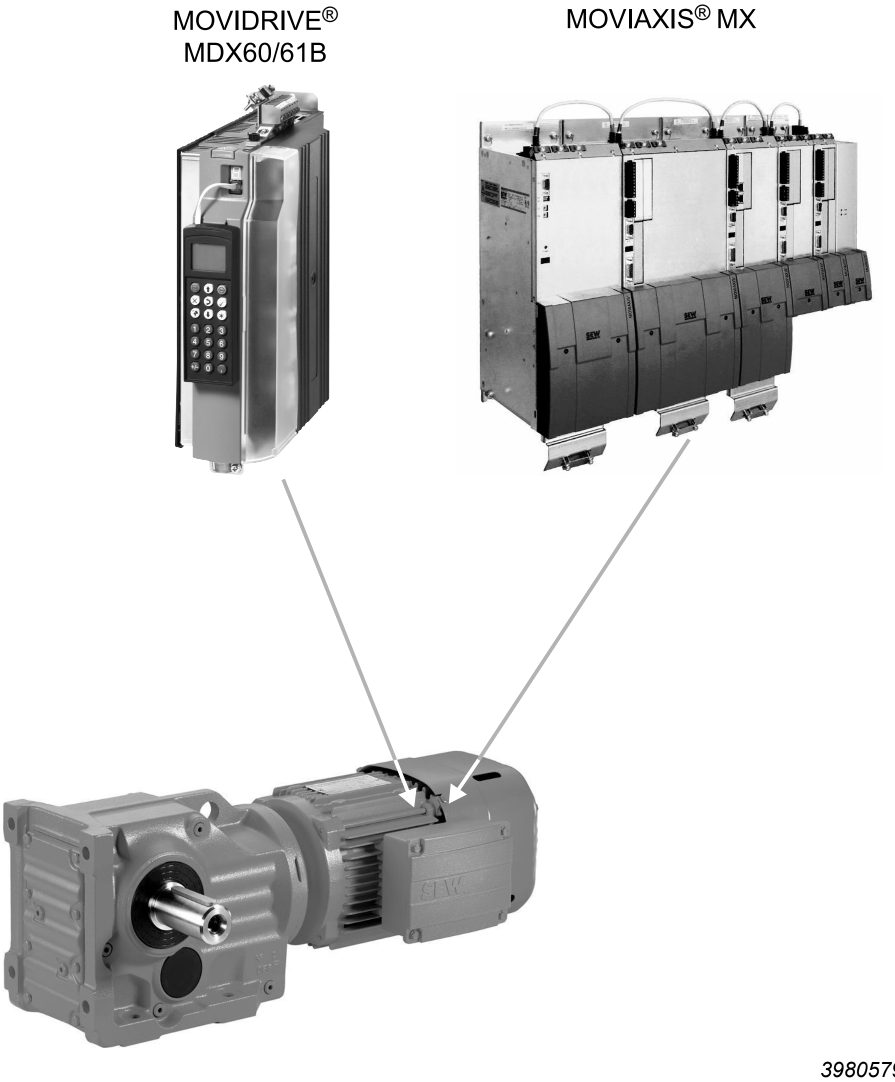
6.15.3 Inverter operation of DRL.. motors in CFC mode

Range of products

The extensive product range of SEW-EURODRIVE inverters is available for designing electronically controlled drives with current-controlled flux vector control (CFC).

- **MOVIDRIVE® MDX60/61B:** High-performance drive inverter for dynamic drives in the 0.55 – 250 kW power range. Great diversity of applications due to extensive expansion options with technology and communication options. Three-phase line connection for 230 V AC and 400 – 500 V AC.
- **MOVIAXIS® MX:** Powerful and versatile multi-axis servo inverter with axis module nominal currents of 2 – 133 A. Great diversity of applications thanks to extensive expansion options with technology and communication options, as well as optional sinusoidal or block-shaped regenerative power supply. Three-phase line connection for 380 – 500 V AC.

The asynchronous DRL.. servomotors can be operated with the inverters listed above.



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Product characteristics

The following table lists the most important product characteristics for the various inverter series. You can choose the inverter series matching your application based on these product characteristics.

Product characteristics	MOVIDRIVE® MDX60/61B	MOVIAXIS® MX
Voltage range	3 × 200 – 240 V AC (1.5 to 30 kW) 3 × 380 – 500 V AC (0.55 to 250 kW)	3 × 380 – 500 V AC
Power range	0.55 – 250 kW	10 – 75 kW
Nominal current range of the axis modules	4 – 250 A	2 – 133 A
Overload capacity	150 % I_N [1] briefly and 125% I_N continuously in operation without overload	250% for max. 1 second
4Q capable	Yes, with integrated brake chopper as standard.	
Integrated line filter	Sizes 0, 1, and 2 according to limit value class A	External line filter
TF input	Yes	
Control modes	U/f or voltage-controlled flux vector control (VFC), with speed feedback speed control and current-controlled flux vector control (CFC).	Current-controlled flux vector control
Speed feedback	Option	Integrated in basic unit
Integrated positioning and sequence control system	Standard	
Serial interfaces	System bus (SBus) and RS485	CAN-based system bus, optional EtherCAT®-compatible system bus
Fieldbus interfaces	Optional PROFIBUS-DP, INTERBUS, INTERBUS LWL, CANopen, DeviceNet, Ethernet	Optional PROFIBUS-DP, EtherCAT®
Technology options	Input/output card Synchronous operation Absolute encoder card IEC-61131 control	Synchronous operation, electronic gear unit, touch probe, event control, electronic cam, virtual encoder, single-axis positioning
Max. speed	6,000 rpm	10,000 rpm
STO – Safe Torque Off	Yes	Option

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Product characteristics	MOVIDRIVE® MDX60/61B	MOVIAXIS® MX
Approvals	UL and cUL approval, C-Tick	

1) The temporary overload capacity of size 0 units (0005 – 0014) is 200% IN.

6.15.4 Drive selection –DRL.. motors

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

The schematic procedure is detailed in the chapter "Drive selection – controlled motor" (→ 🗎 179).

Dynamics package D1 or D2

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

Predeterminations will then be made on this basis, particularly with regard to the size of the inverter.

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

For detailed information, refer to the chapter "Product description – asynchronous servomotors of the DRL.. series" (→ 🗎 50).

The technical data for the DRL.. motors and the limit values of the D1 or D2 dynamics packages are provided in the chapter "Technical data – DRL.. asynchronous servomotors.." (→ 🗎 117).

Sine encoder

The standard drive package of the of the DRL.. motors includes a sine encoder:

- DRL71 – DRL132 with ES7S
- DRL160 – DRL225 with EG7S

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 rpm.

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

Detailed information can be found in the chapter "Encoders" (→ 🗎 431).

Absolute encoder

Instead of the sine encoder, an absolute encoder can be installed at the same location without additional length.

- DRL71 – DRL132 with AS7W or AS7Y
- DRL160 – DRL225 with AG7W or AG7Y

The SSI encoder (A.7**Y**) establishes the connection to the functional safety elements in the control cabinet.

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

Detailed information can be found in the chapter "Encoders" (→ 🗎 431).

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Forced cooling fan

The use of a /V forced cooling fan prevents the reduction in permissible load torque at speeds below 900 rpm.

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.

Detailed information can be found in the chapter "Forced cooling fans" (→ 🗎 503).

The limit characteristic curves of the DRL.. motors are covered separately in the manual "AC motors – inverter assignments and characteristic curves".

Inverter utilization

When selecting the drive for an asynchronous servomotor, the following variables apply:

- The mean (effective) speed
- The mean (effective) torque
- The maximum speed
- The maximum dynamic torque

To select a suitable inverter, you must check the thermally decisive elements in the limit characteristic curves with 100% I_N and the peak values in the diagrams with 150%/200% I_N.

Technical data for the DRL.. motors can be found in the chapter "Technical data – asynchronous DRL.. servomotors" (→ 🗎 117).

The combinations and limit characteristic curves of the DRL.. motors with MOVIDRIVE® and MOVIAXIS® are covered in full in the manual "AC motors – inverter assignments and characteristic curves".

The maximum speeds of the motors are specified in the chapter "Maximum speeds" (→ 🗎 145).

6.15.5 Drive selection example – asynchronous DRL.. servomotor

The schematic drive selection procedure is detailed below using the example of a vehicle.

Description of the application

The following data is provided.

Description	Symbol	Value	Unit
Mass of the load	m_L	300	kg
Mass of the carriage	m_W	800	kg
Traveling velocity	v	2	m/s
Acceleration	a_1	2	m/s^2
Deceleration	a_2	2	m/s^2
Diameter of gear rack pinion	D_0	80	mm
Resistance to vehicle motion	FF	90	N/t
Efficiency of the system	η	90	%

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This results in the following data.

Description	Symbol	Value	Unit
Maximum output torque	M	102.2	Nm
Maximum output speed	n	477.5	rpm

Gear unit selection

The following data is provided:

Description	Symbol	Value	Unit
Gear unit ratio	i_{target}	6.28	-

Selecting the gear unit size and reduction ratio:

Description	Symbol	Value	Unit
Gear unit size	K47	-	-
Gear unit ratio	i_{actual}	5.81	-

INFORMATION

The overhung load is too high with the recommended transmission element factor for gear rack pinions of f_z = 2 (F_R = 5437 N); see section "Overhung and axial loads" (→ 🗎 156). This must either be compensated by a suitable bearing for the gear rack pinion, or a larger gear unit must be selected.

Motor selection

Maximum operating point

Conversion of the torque to the motor side:

$M_{max} = M / \eta / i_{actual}$

M_{max} = 102.2 Nm / 0.9 / 5.81

M_{max} = 19.56 Nm

Conversion of the speed to the motor side:

$n_{max} = n \times i_{actual}$

n_{max} = 477.5 rpm × 5.81

n_{max} = 2774 rpm

M_{max} and n_{max} denote the maximum operating point; in this case, M_{max} is required at n_{max}.

Effective operating point

The effective operating point was calculated as

M_{eff} = 8.26 Nm

at a speed of

n_n = 1981 rpm

Motor preselection

The motor size DRL90L4 was preselected.

M_{base} = 19.9 Nm

n_{base} = 2683 rpm

Checking the relationship of the mass moment of inertia results in the following:

J_{ext}/J_{mot} = 12.03

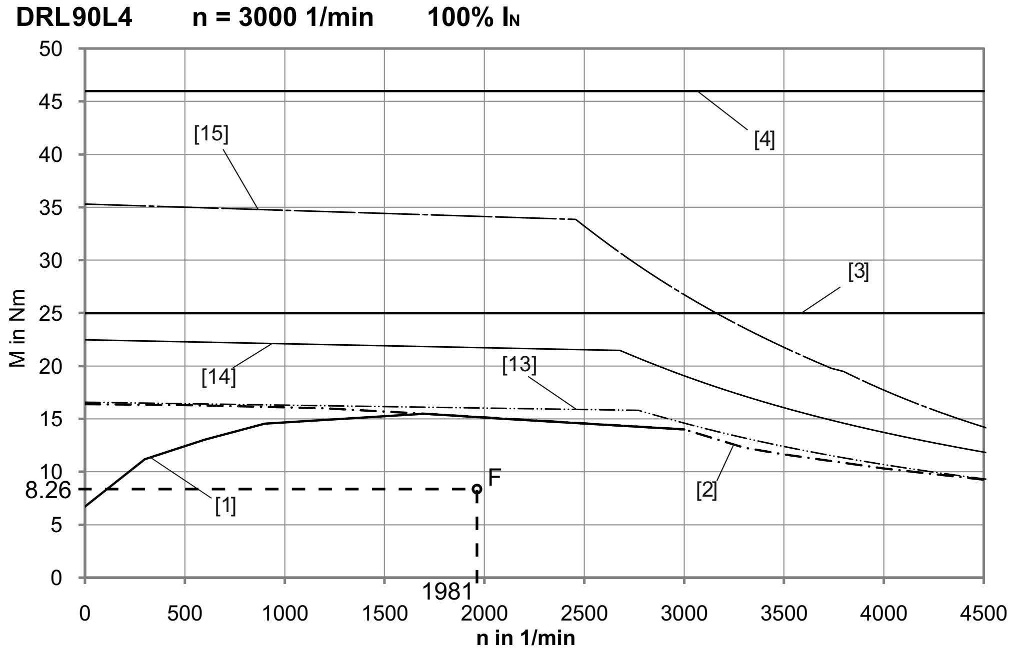
The ratio of 12.03 is acceptable for a dynamic vehicle drive.

MOVIDRIVE® B inverter selection

- The effective operating point (F) for the motor must be below the S_1 limit curve. The thermal load on the motor is thus within the permitted range.
- The effective operating point (F) in the speed/torque diagram for 100% inverter utilization must be below the characteristic curve for the motor/inverter combination to be selected. The load on the inverter (continuous duty) is thus within the permitted range.
- In the speed/torque diagram for 150% inverter utilization, the maximum operating point (M) (possibly two different points for maximum speed and maximum torque) must be below the characteristic curve for the motor/inverter combination to be selected. The load on the inverter (maximum operation) is thus within the permitted range.

DRL90L4, n_N = 3000 rpm, 100% I_N

Determining the effective operating point:

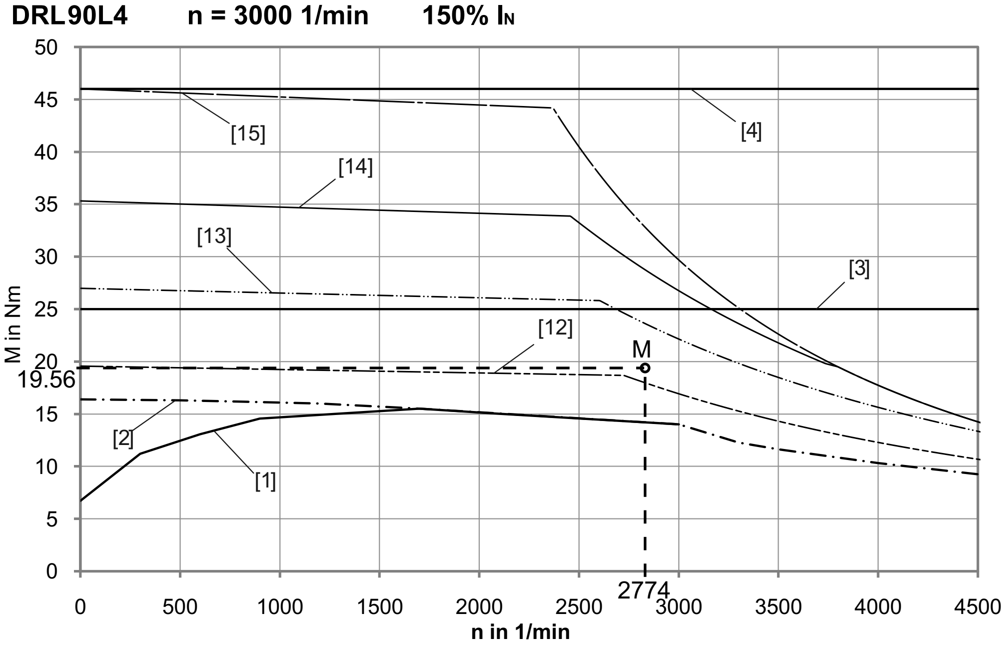


9007203235308555

[1]	S1 characteristic curve	[13]	5.5 kW inverter power
[2]	S1 characteristic curve with forced cooling fan	[14]	7.5 kW inverter power
[3]	Maximum limit torque of dynamics package 1	[15]	11 kW inverter power
[4]	Maximum limit torque of dynamics package 2		

DRL90L4, n_N = 3000 rpm, 150% I_N

Determining the maximum operating point:



9007203235312267

[1]	S1 characteristic curve	[12]	4 kW inverter power
[2]	S1 characteristic curve with forced cooling fan	[13]	5.5 kW inverter power
[3]	Maximum limit torque of dynamics package 1	[14]	7.5 kW inverter power
[4]	Maximum limit torque of dynamics package 2	[15]	11 kW inverter power

INFORMATION

The inverter current at motor standstill should be less than 70% of the nominal motor current.

The required drive inverter has thus been determined:

- MDX61B0055-5A3

Result of the drive selection

Selected gearmotor in dynamics package 1 and speed class 3000 rpm:

- K47 DRL90L4/F./TF/ES7S

Selected drive inverter:

- MDX61B0055-5A3 with 5.5 kW inverter power

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6.15.6 Reinforced insulation for inverter operation > 500 V AC

Standard insulation

The operation of an AC asynchronous motor with a frequency inverter places a much greater load on the winding than in the case of non-controlled operation.

The inverters pulse 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, 16 kHz.

The standard windings of the motors are constructed with copper wires and surface insulating materials, which can easily withstand the voltage peaks specified below.

- Line-to-line voltages U_{LL} = 1560 V
- Line-to-ground voltages U_{LG} = 1100 V

The DR. motors can therefore be used with the normal winding on frequency inverters with up to 500 V.

If a DR. motor is operated with a frequency inverter supplied with 600 V or 690 V, or the DC link voltage of which is raised to over 742.5 V DC, the double voltage pulse can exceed the maximum permissible value of the standard winding of 1560 V.

Design measures must therefore be taken to protect the motor from these high voltages.

Reinforced insulation (/RI)

The electric strength of the winding insulation is achieved by reinforcing the coat thickness of the inner layer for the copper wires.

This insulating system for motors carries the type and catalog designation /RI.

The standard surface insulating materials are sufficient for line-to-line and line-to-ground insulation.

The RI windings of the motors withstand voltage peaks of up to

- Line-to-line voltages U_{LL} = 1800 V
- Line-to-ground voltages U_{LG} = 1250 V

See also chapter "DR.. AC motors on non-SEW inverters" (→ 🗎 198).

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Reinforced insulation with increased resistance against partial discharge (/RI2)

If the voltage peaks exceed the 1800 V threshold, enameled wires with higher resistance against partial discharge must be used. This higher resistance is achieved by the addition of inorganic additives to the coating of the inner layer.

The standard surface insulating materials for line-to-line and line-to-ground separation are also no longer sufficient. To protect against these very high voltages, thicker surface insulating materials and enhanced impregnation must be used.

This insulating system for DR.. motors carries the type and catalog designation /RI2.

The RI2 windings of the DR.. motors easily withstand voltage peaks of up to

- Line-to-line voltages U_{LL} = 2150 V
- Line-to-ground voltages U_{LG} = 1800 V

See also chapter "DR.. AC motors on non-SEW inverters" (→ 🗎 198).

6.15.7 Limit characteristic curves of the motors in inverter operation

The thermal curves for the asynchronous AC motors of the DR.. series are distinguished with regard to their energy efficiency class.

The asynchronous servomotors are distinguished according to their speed class.

Thermally permitted torques – DRS.. motors

When DRS.. motors are used with inverters, the thermally permitted torque must be observed during the drive selection. The following factors determine the thermally permitted torque:

- Energy efficiency class: none or IE1
- Operating mode
- Type of cooling: Self-cooling or forced cooling
- Base frequency: f_{base} = 50 Hz (400 V ⅄) or f_{base} = 87 Hz (400 V △)

You can determine the thermally permitted torque on the basis of torque limit curves. The effective torque calculated during project planning must be below the limit curve with regard to the mean speed.

Below are the limit curves for 4-pole DRS.. motors with the following line frequencies:

- f_{base} = 50 Hz
- f_{base} = 87 Hz

The following conditions apply to the shown limit curves:

- Motor in duty type S1 on 50 Hz supply system
- Line voltage of motor 230 V △ / 400 V ⅄ or corresponding voltage range
- Supply voltage of the inverter U_{line} = 3 × 400 V AC
- Motor in thermal class 155 (F)

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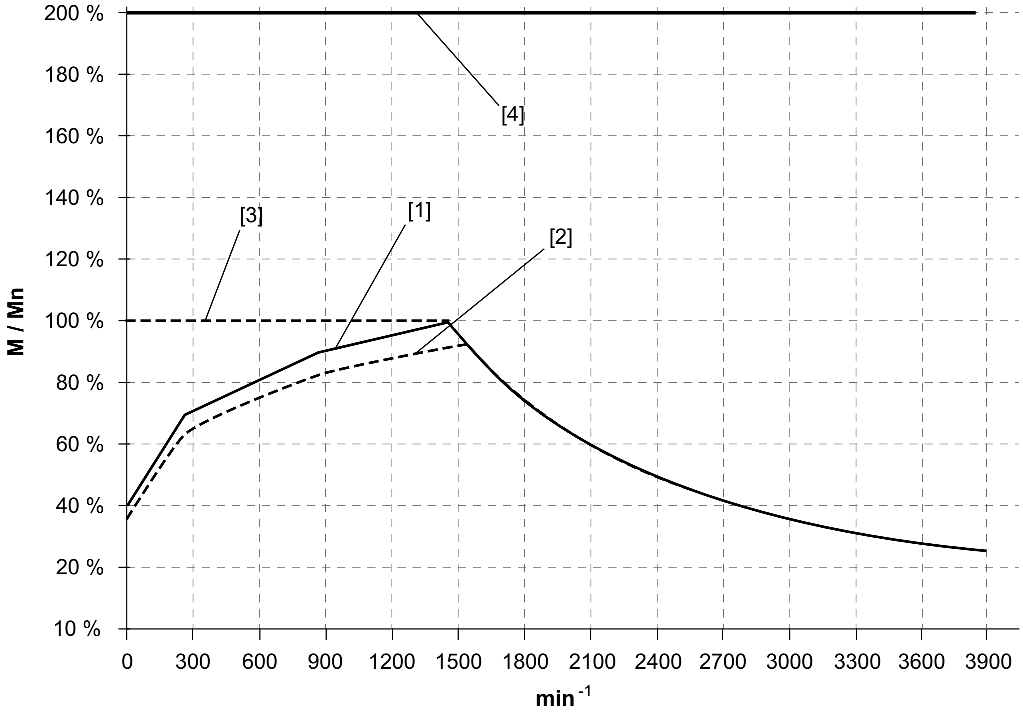
f_{base} = 50 Hz (400 V ⅄, 50 Hz) – DRS.. motor

The following diagram shows the limit curves of the DRS.. motor for operation at base frequency f_{base} = 50 Hz. Separate curves are provided for motors with self-cooling and forced cooling (optional /V forced cooling fan).



9007208204121099

[1] S1 operation with self-cooling (= without optional forced cooling fan)

[2] S1 operation with self-cooling (= without optional forced cooling fan) for DRS280M4

[3] S1 operation with forced cooling (= with optional forced cooling fan)

[4] Mechanical limitations for gearmotors

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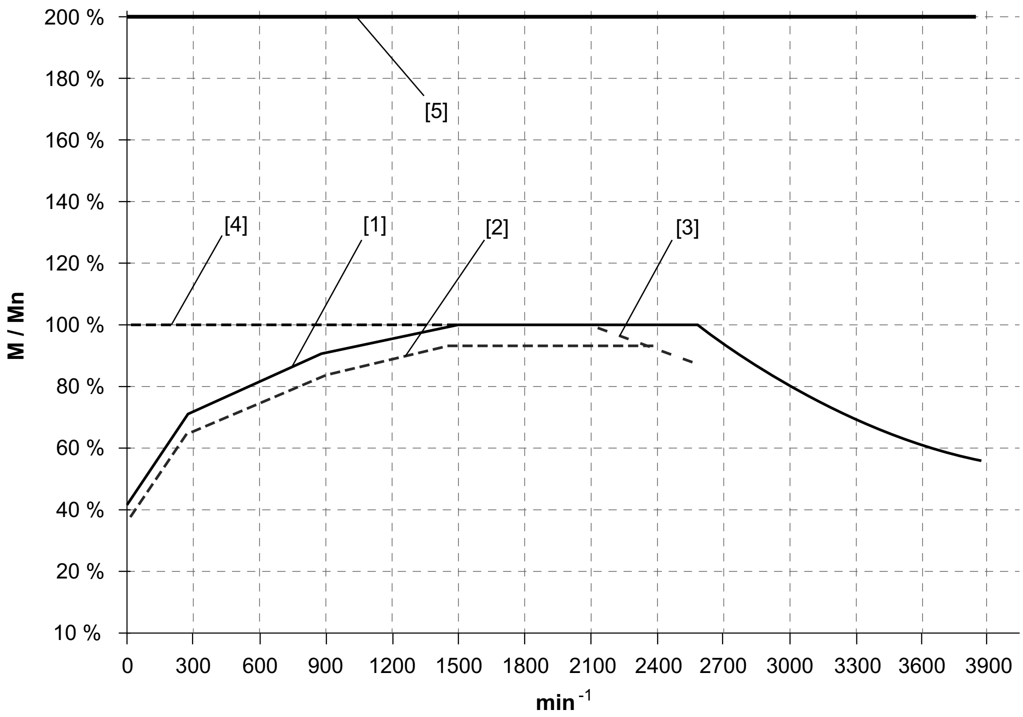
f_{base} = 87 Hz (400 V △, 50 Hz) – DRS.. motor

The following diagram shows the limit curves of the DRS.. motor for operation at base frequency f_{base} = 87 Hz. Separate curves are provided for motors with self-cooling and forced cooling (optional /V forced cooling fan).



9007208204123531

[1] S1 operation with self-cooling (= without optional forced cooling fan)

[2] S1 operation with self-cooling (= without optional forced cooling fan) for DRS280M4

[3] S1 operation with forced cooling (= with optional forced cooling fan) for DRS250 – 315

[4] S1 operation with forced cooling (= with optional forced cooling fan)

[5] Mechanical limitations for gearmotors

Thermally permitted torques – DRE.. and DRP.. motors

When DRE.. or DRP.. motors are used with inverters, the thermally permitted torque must be observed during the drive selection. The following factors determine the thermally permitted torque:

- Energy efficiency class: IE2 or IE3
- Operating mode
- Type of cooling: Self-cooling or forced cooling
- Base frequency: f_{base} = 50 Hz (400 V ⅄) or f_{base} = 87 Hz (400 V △)

Due to the lower thermal load of the IE2/IE3 design, the nominal torque of the motor on the supply system can be subjected to a constant load down to approx 20 Hz.

The thermally permitted torque is determined on the basis of torque limit curves. The effective torque calculated during project planning must be below the limit curve with regard to the mean speed.

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Below are the limit curves for 4-pole DRE.. and DRP.. motors with the following line frequencies:

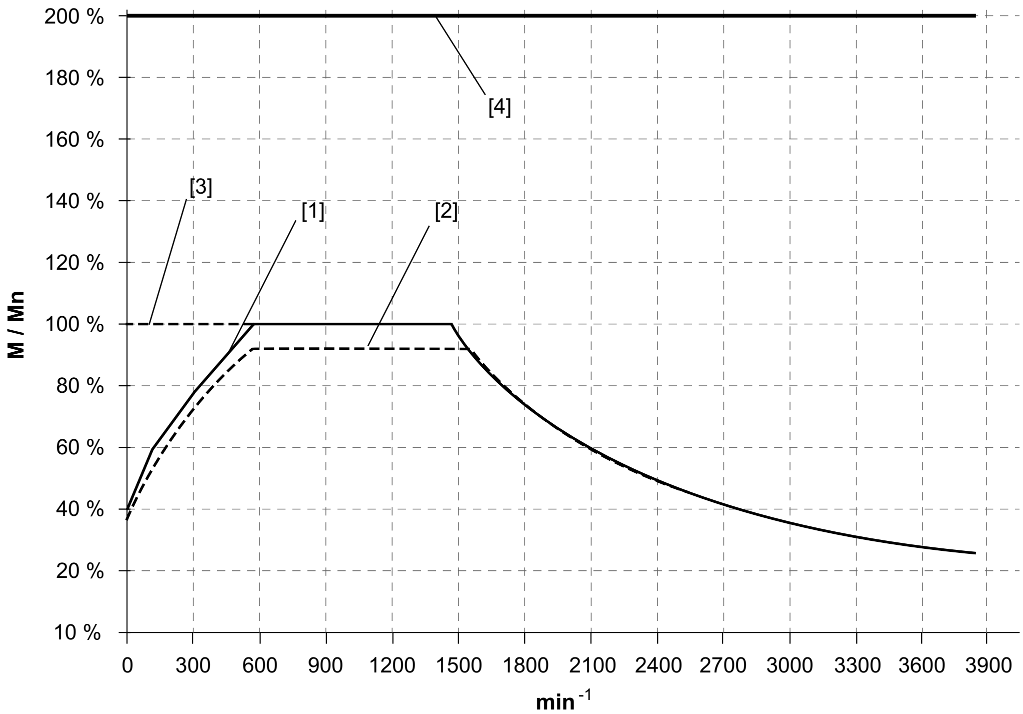
- f_{base} = 50 Hz
- f_{base} = 87 Hz

The following conditions apply to the shown limit curves:

- Motor in duty type S1 on 50 Hz supply system
- Line voltage of motor 230 V △ / 400 V ⅄ or corresponding voltage range
- Supply voltage of the inverter U_{line} = 3 × 400 V AC
- Motor in thermal class 155 (F)

f_{base} = 50 Hz (400 V ⅄ , 50 Hz) – DRE.. and DRP.. motor

The following diagram shows the limit curves of the DRE.. / DRP.. motors for operation at base frequency f_{base} = 50 Hz, star connection "⅄" at 400 V. Separate curves are provided for motors with self-cooling and forced cooling (optional /V forced cooling fan).



9007208204127243

[1] S1 operation with self-cooling (= without optional forced cooling fan)

[2] S1 operation with self-cooling (= without optional forced cooling fan) for DRE280M4

[3] S1 operation with forced cooling (= with optional forced cooling fan)

[4] Mechanical limitations for gearmotors

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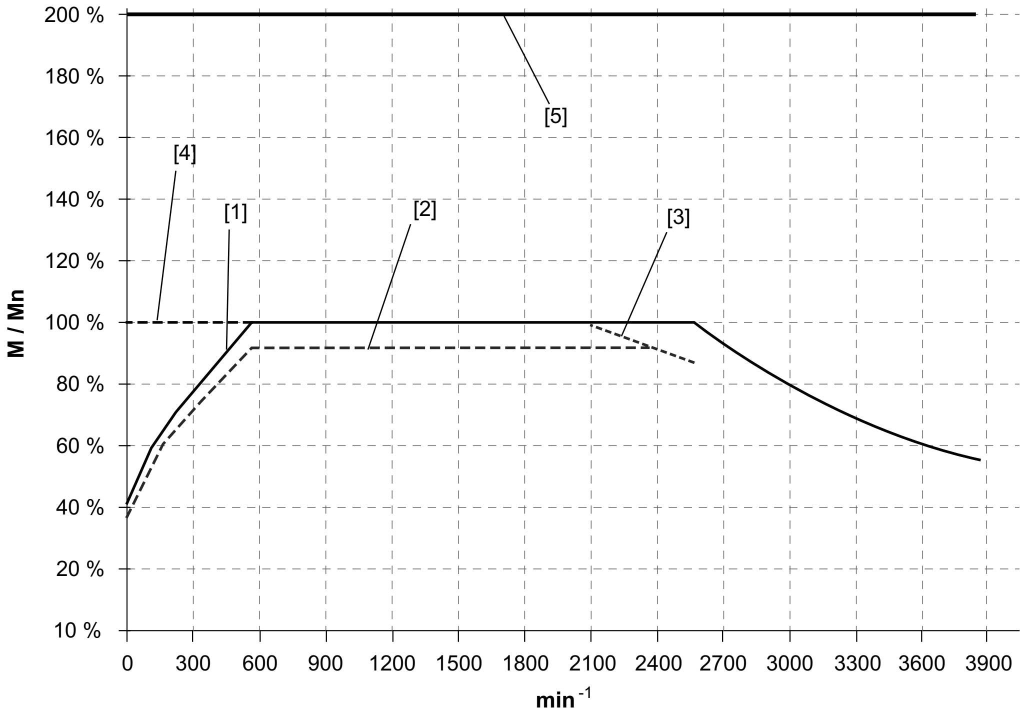
f_{base} = 87 Hz (400 V △ , 50 Hz) – DRE.. and DRP.. motor

The following diagram shows the limit curves of the DRE.. / DRP.. motors for operation at base frequency f_{base} = 87 Hz, delta connection "△" at 400 V. Separate curves are provided for motors with self-cooling and forced cooling (optional /V forced cooling fan).



9007208204180875

[1] S1 operation with self-cooling (= without optional forced cooling fan)

[2] S1 operation with self-cooling (= without optional forced cooling fan) for DRE280M4

[3] S1 operation with forced cooling (= with optional forced cooling fan) for DRE250 – 315

[4] S1 operation with forced cooling (= with optional forced cooling fan)

[5] Mechanical limitations for gearmotors

Thermally permitted torques – DRL.. motor

When asynchronous DRL.. servomotors are used with inverters, the thermally and dynamically permitted torque must be observed during the drive selection. The following factors determine the thermally permitted torque:

- Type of cooling: Self-cooling or forced cooling
- Speed class

The thermally permitted torque is determined on the basis of torque limit curves. The effective torque calculated during project planning must be below the limit curve with regard to the mean speed. The limit curves for the 4-pole asynchronous DRL.. servomotors in the following speed classes are provided in the manual "AC motors – inverter assignments and characteristic curves":

- 1200 rpm (corresponds to f_{base} of approx. 41 – 43 Hz)
- 1700 rpm (corresponds to f_{base} of approx. 58 – 61 Hz)

- 2100 rpm (corresponds to f_{base} of approx. 72 – 76 Hz)
- 3000 rpm (corresponds to f_{base} of approx. 102 – 108 Hz)

The dynamically permitted torque is limited by the following:

- The mechanical limit value according to dynamics package D1 or D2, which is independent of the selected speed class
- The dynamic maximum and temporary current of the inverter

The following conditions apply to the basic limit curves shown:

- DRL.. motor according to technical data, see chapter "Asynchronous DRL.. servomotors" (→ 🗎 117)
- Supply voltage of the inverter U_{line} = 3 × 400 V AC
- /TF thermal motor protection

The potential dynamics of the inverter and motor are illustrated by the diagram for 150% current of the inverter, while the thermal limit for the inverter and motor is shown in the diagram for 100% current of the inverter.

A separate overview of all limit curves is provided in the manual "AC motors – inverter assignments and characteristic curves".

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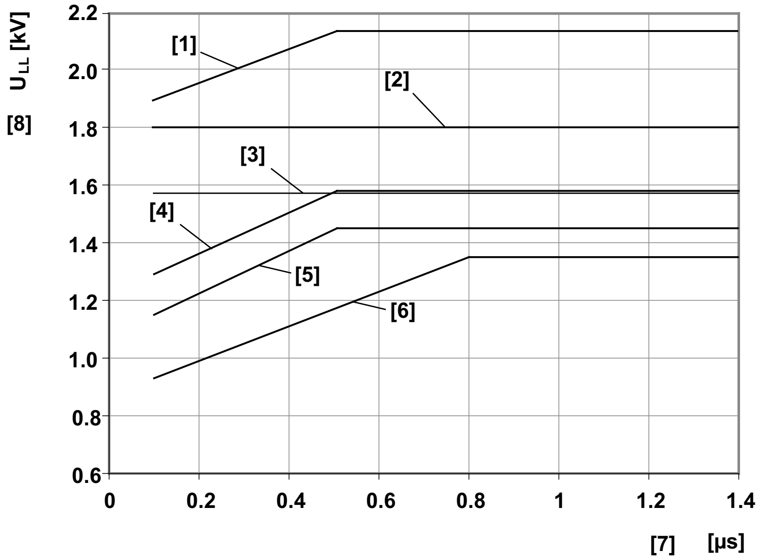
6.15.8 DR.. AC motors on non-SEW inverters

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

Operating SEW motors on non-SEW frequency inverters is permitted if the pulse voltages at the motor terminals indicated in the following figure are not exceeded.



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[1] Permitted pulse voltage for motors with reinforced insulation and increased resistance against partial discharge (/RI2)

[2] Permitted pulse voltage for motors with reinforced insulation (/RI)

[3] Permitted pulse voltage according to NEMA MG1 part 31, U_N ≤ 500 V

[4] Permitted pulse voltage according to IEC 60034-25, limit value curve A for nominal voltage U_N ≤ 500 V, star connection

[5] Permitted pulse voltage according to IEC 60034-25, limit value curve A for nominal voltage U_N ≤ 500 V, delta connection

[6] Permitted pulse voltage according to IEC 60034-17

[7] Duration of voltage increase

[8] Permitted pulse voltage

INFORMATION

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

- The supply voltage level at the non-SEW inverter
- The threshold of the brake chopper voltage
- The operating mode of the motor (motoring/regenerative operation)

→ If the permitted pulse voltage is exceeded, limiting measures, such as filters, chokes, or special motor cables must be used. Contact the manufacturer of the frequency inverter for more information.

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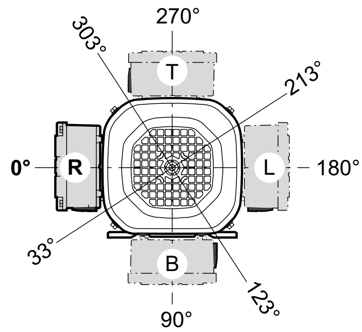
7 Dimension sheets for DR.. motors/brakemotors

7.1 Notes on the dimension sheets

Observe the following notes regarding the dimension sheets for 4-pole AC (brake)motors:

- 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.
- Leave a clearance of at least half the fan guard diameter to provide unhindered air access.
- For brakemotors, do not forget to include the space required for removing the fan guard (= fan guard diameter).
- Different positions are possible for the manual brake release, as shown in the following figure. As a rule, the four positions 33°, 123°, 213°, or 303° are 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°.



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7.1.1 Software support

Not all cable entry positions X, 1, 2, 3 and terminal box positions 0°(R), 90°(B), 180°(L), 270°(T) are possible in all cases. Some motor versions and options require a connection inside the terminal box, which is then larger than the standard terminal box due to the normative air gaps and creepage distances. The dimension sheets only depict the standard terminal box.

Dimensions not listed in the dimension sheets can be determined with the DRIVECAD software, available from DriveGate® on the SEW-EURODRIVE website.

- For registered DriveGate® users: https://portal.drivegate.biz/drivecad.
- For new users: www.sew-eurodrive.com → DriveGate® login.

7.1.2 Tolerances

Shaft heights

The following tolerances apply to the indicated dimensions:

h	≤ 250 mm	→ -0.5 mm
h	> 250 mm	→ -1 mm

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Shaft ends

Diameter tolerance:

Ø	≤ 28 mm	→ ISO j6
Ø	≤ 50 mm	→ ISO k6
Ø	> 50 mm	→ ISO m6

Centering bores in accordance with DIN 332, shape DR:

Ø	= 7 – 10 mm	→ M3
Ø	> 10 – 13 mm	→ M4
Ø	> 13 – 16 mm	→ M5
Ø	> 16 – 21 mm	→ M6
Ø	> 21 – 24 mm	→ M8
Ø	> 24 – 30 mm	→ M10
Ø	> 30 – 38 mm	→ M12
Ø	> 38 – 50 mm	→ M16
Ø	> 50 – 85 mm	→ M20
Ø	> 85 – 130 mm	→ M24
Ø	> 130 mm	→ M30

Keys: according to DIN 6885 (domed type)

Flanges

Centering shoulder tolerance:

Ø	≤ 230 mm (flange sizes A120 – A300)	→ ISO j6
Ø	> 230 mm (flange sizes A350 – A660)	→ ISO h6

Different flange dimensions are available for each AC (brake)motor size. The possible flanges for each size are shown in the relevant dimension sheets.

Eyebolts, lifting eyes

Motors up to DR.100M are delivered without special transportation fixtures.

Motors ≥ DR.100L are equipped with removable eyebolts.

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7.1.3 Motor dimensions

Motor variants and options

The motor dimensions can differ depending on the motor variants and options. Refer to the dimension drawings of the motor variants and options.

Special designs

In the case of special designs, or for specific variants and options that are connected in the terminal box, the terminal box dimensions can deviate from the standard.

Observe the notes in the order confirmation from SEW-EURODRIVE.

EN 50347, IEC 72-1

European standard EN 50347 became effective in August 2001. This standard adopts the dimension designations for three-phase AC motors for sizes 56 to 315M and flange sizes 65 to 740 from the IEC 72-1 standard.

The new dimension designations given in EN 50347/IEC 72-1 are used for the relevant dimensions in the dimension tables of the dimensions sheets.

4/2, 8/2, 8/4-pole motors

8/2, 8/4, and 4/2-pole multi-speed motors correspond in size to the standard for the 4-pole DRS.. motor.

2 and 6-pole motors

EN 50347 contains suggested dimensions based on the power rating and the number of poles. Due to the new efficiency requirements of AC motors, these values cannot always be fully adhered to.

The 2 and 6-pole motors therefore might have different flange, foot, or output shaft dimensions compared to EN 50347.

Hood covers

The encoders of types EG7. and AG7. for motor sizes DR.160 – 225 are provided with protection against external influences as standard.

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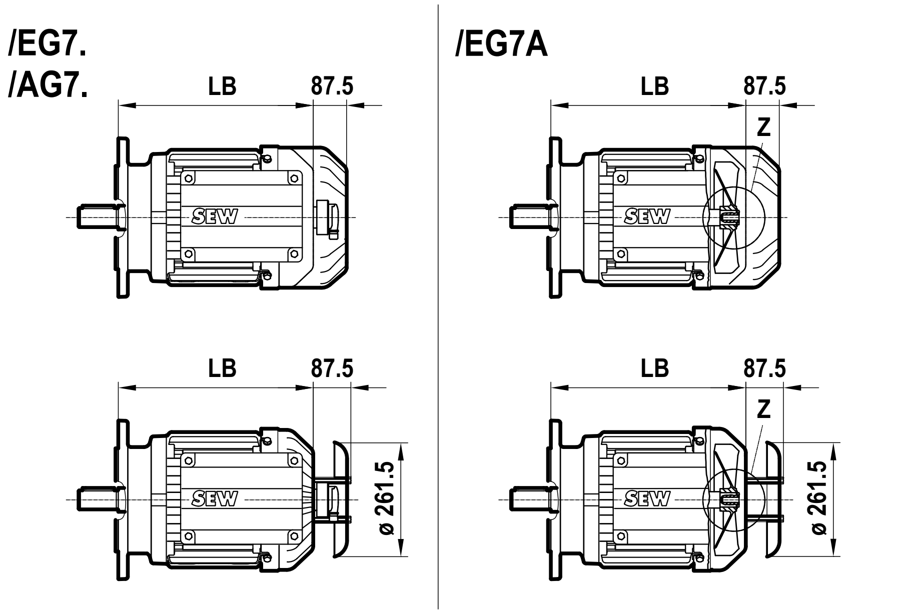
The standard cover is similar to the canopy design. Customers can choose to replace this version with an extended fan guard. The lower diagrams show the standard version, while the upper diagrams show the optional extended fan guard.



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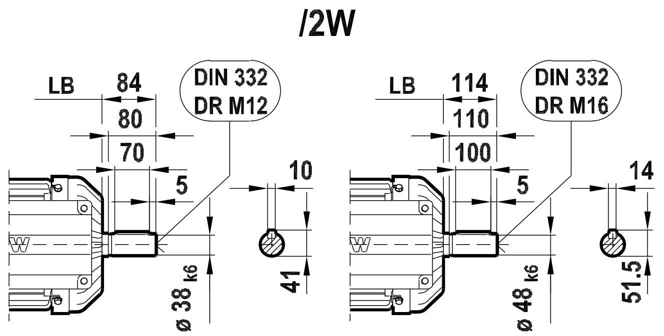
2. Shaft end

For motors DR.71 – 225, the second shaft end is available in two sizes:

- The standard version is shown on the left
- The reinforced shaft end is shown on the right



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7.1.4 Notes on the dimension sheets for DRL.. motors

Special designs

The standard brake(motors) are shown in the dimension sheets for the DRL.. motors. For other designs, please refer to the dimension sheets of the DR.. AC (brake)motors.

7.2 Dimension sheets for DR.. motors/brakemotors

DR.71S

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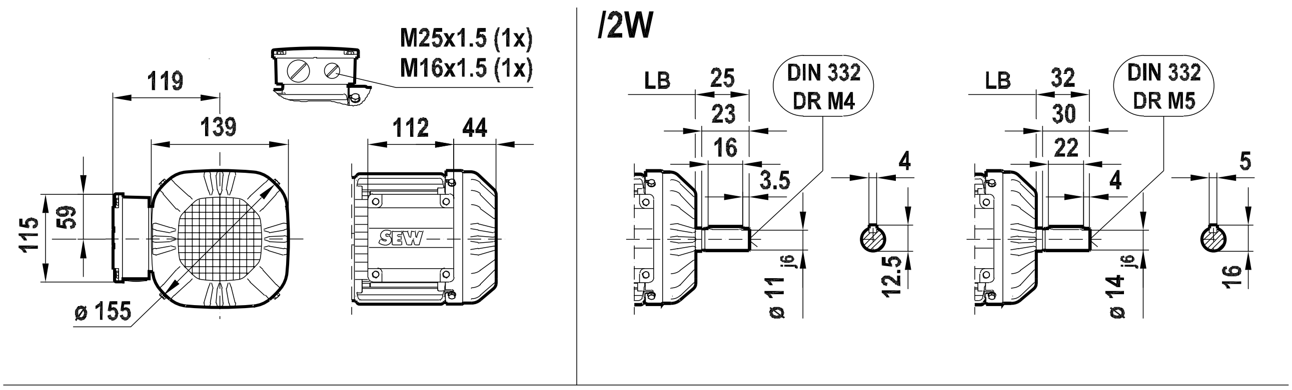
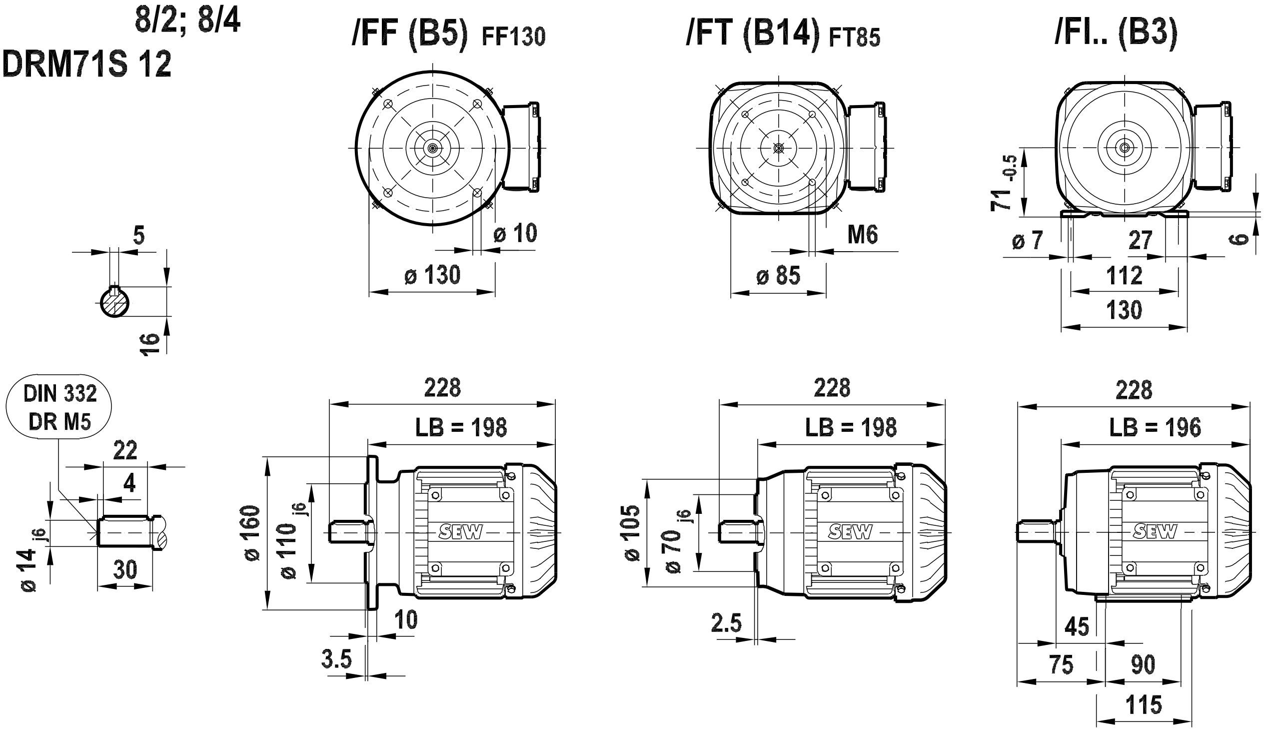
1 (2)



DRS71S 2; 4; 6; 4/2
8/2; 8/4
DRM71S 12



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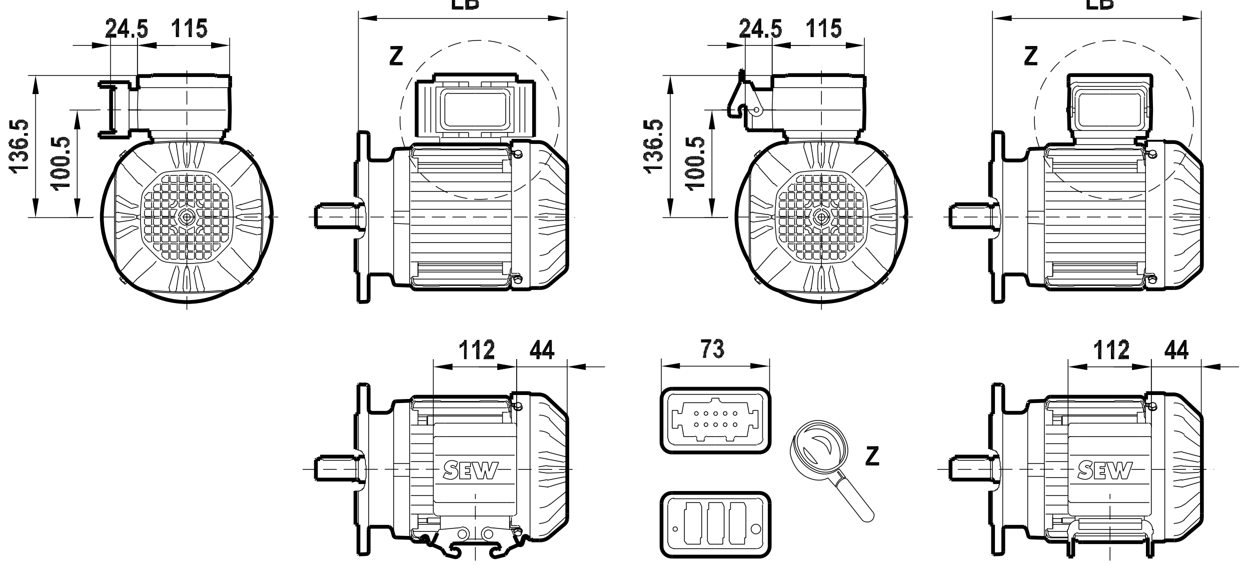
DR.71S

08 191 04 06
2 (2)

/IV



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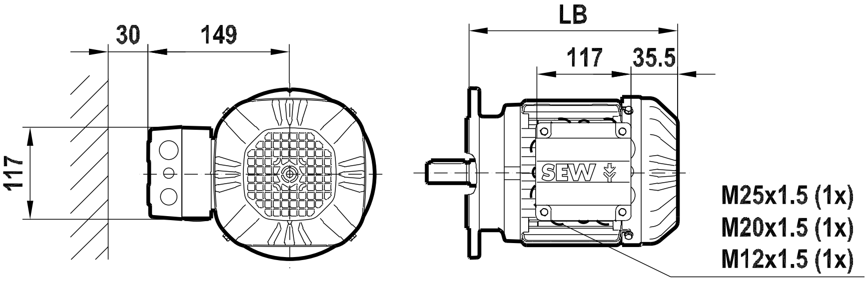

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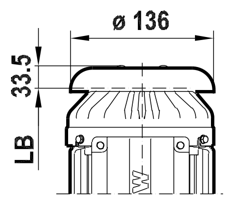

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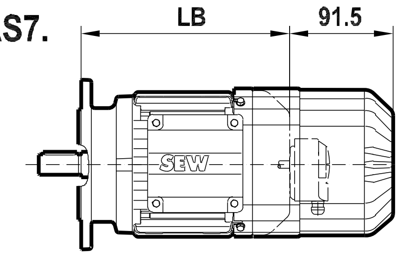

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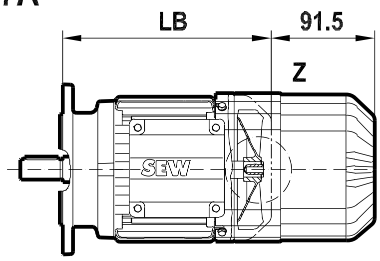

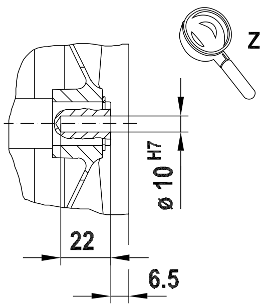

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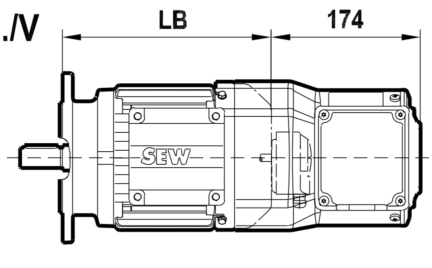

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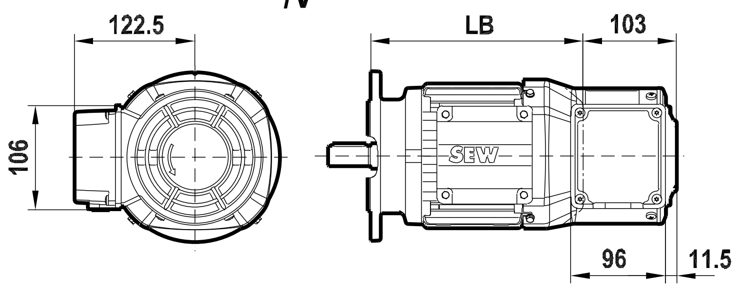

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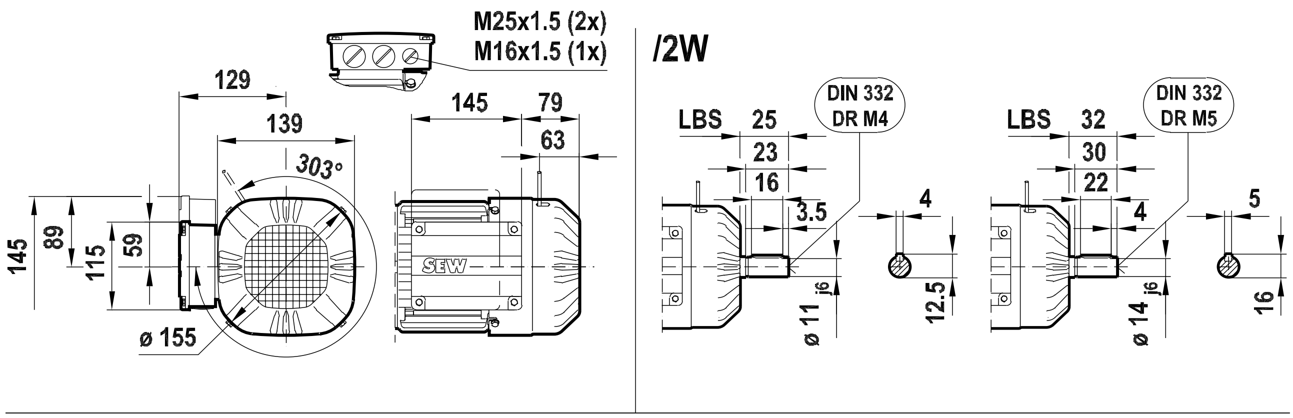
19290411/EN – 10/2014

DR.71S BE

09 151 04 06

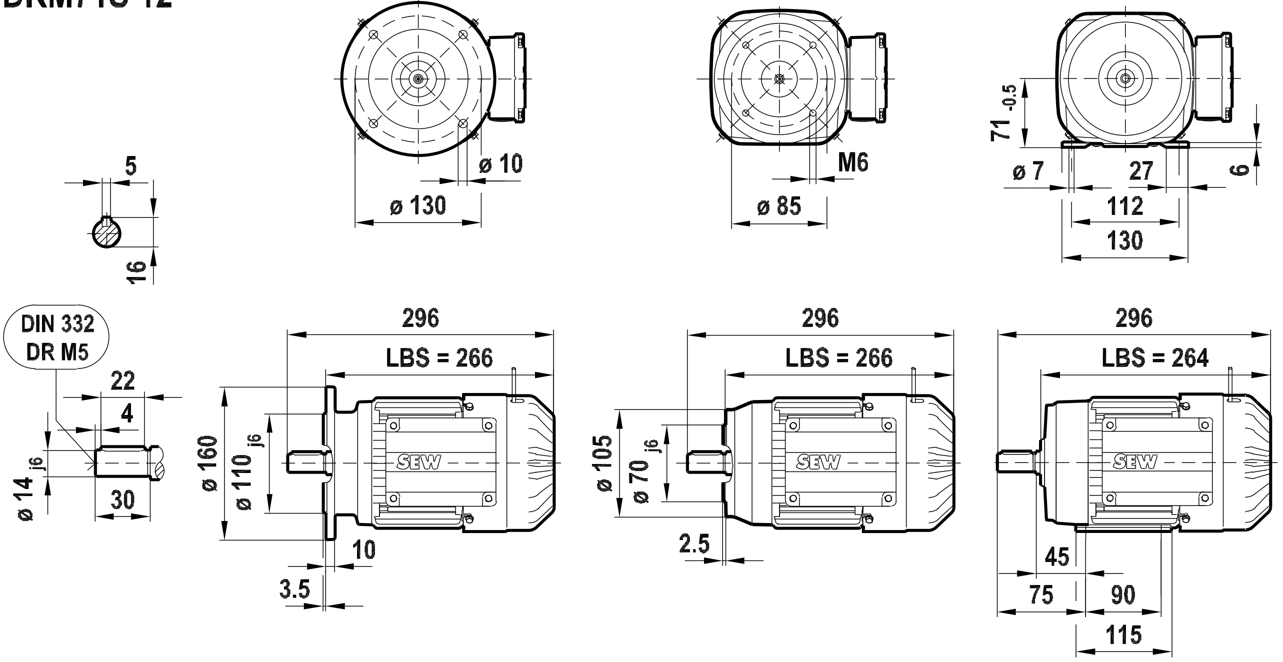


DRS71S 2; 4; 6; 4/2
8/2; 8/4
DRM71S 12

/FF (B5) FF130

/FT (B14) FT85

/FI.. (B3)



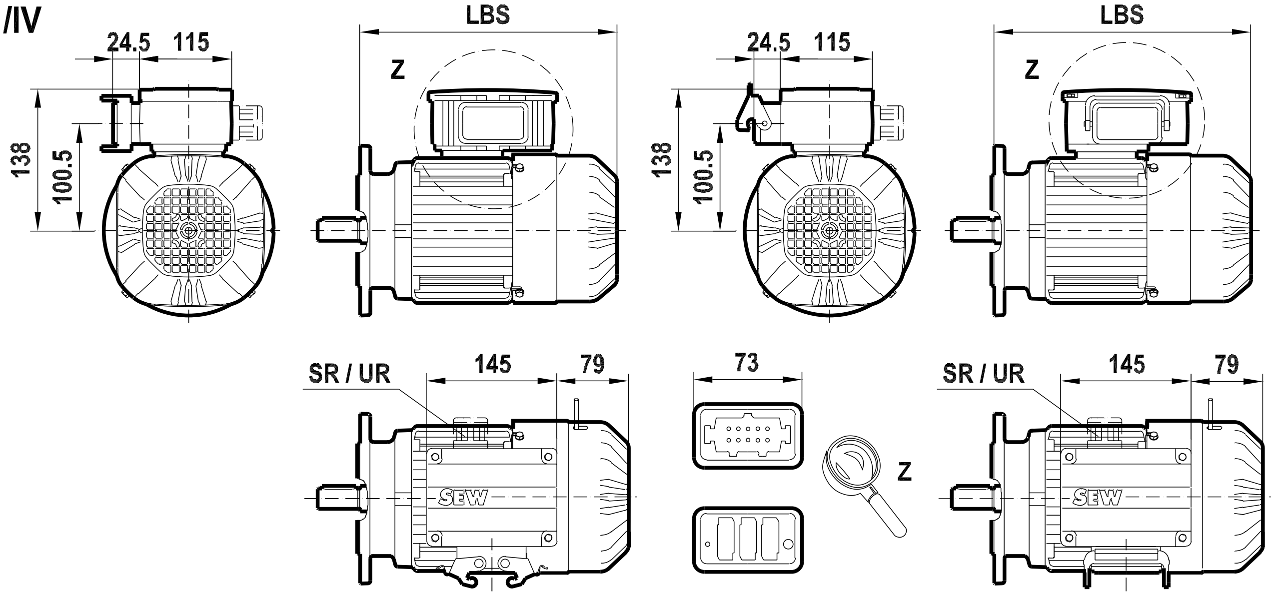
4758386443

19290411/EN – 10/2014

DR.71S BE

09 151 05 06
2 (2)

/IV



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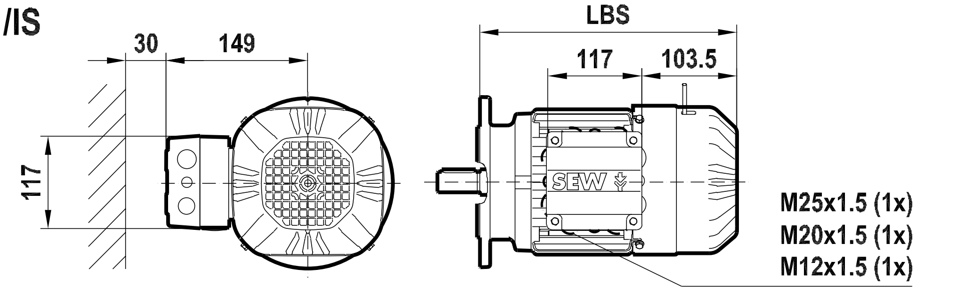

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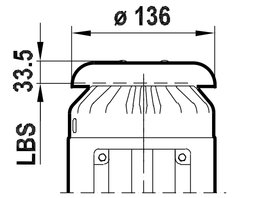

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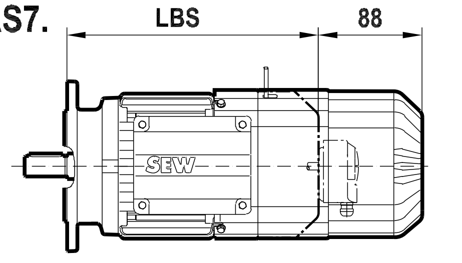

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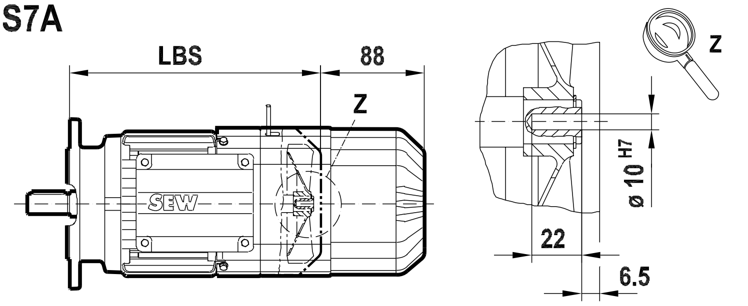

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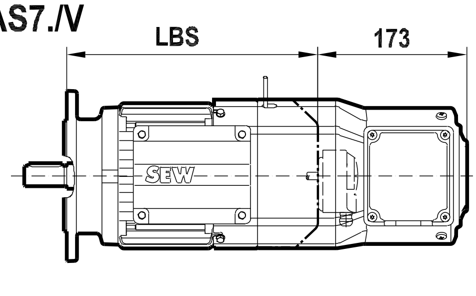

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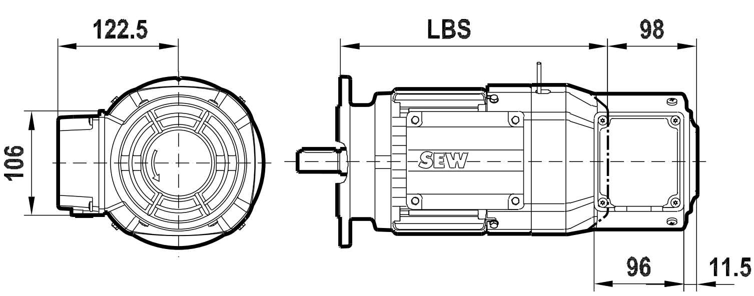

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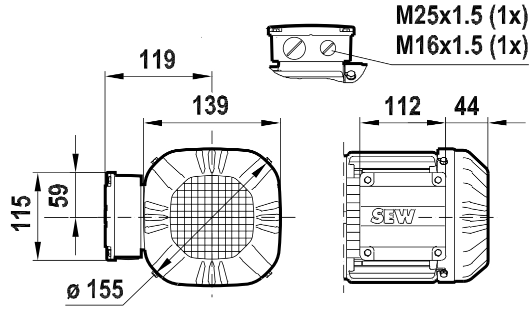
19290411/EN – 10/2014

DR.71M

08 192 03 06
1 (2)



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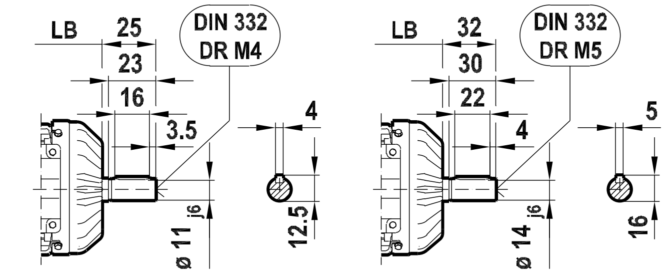
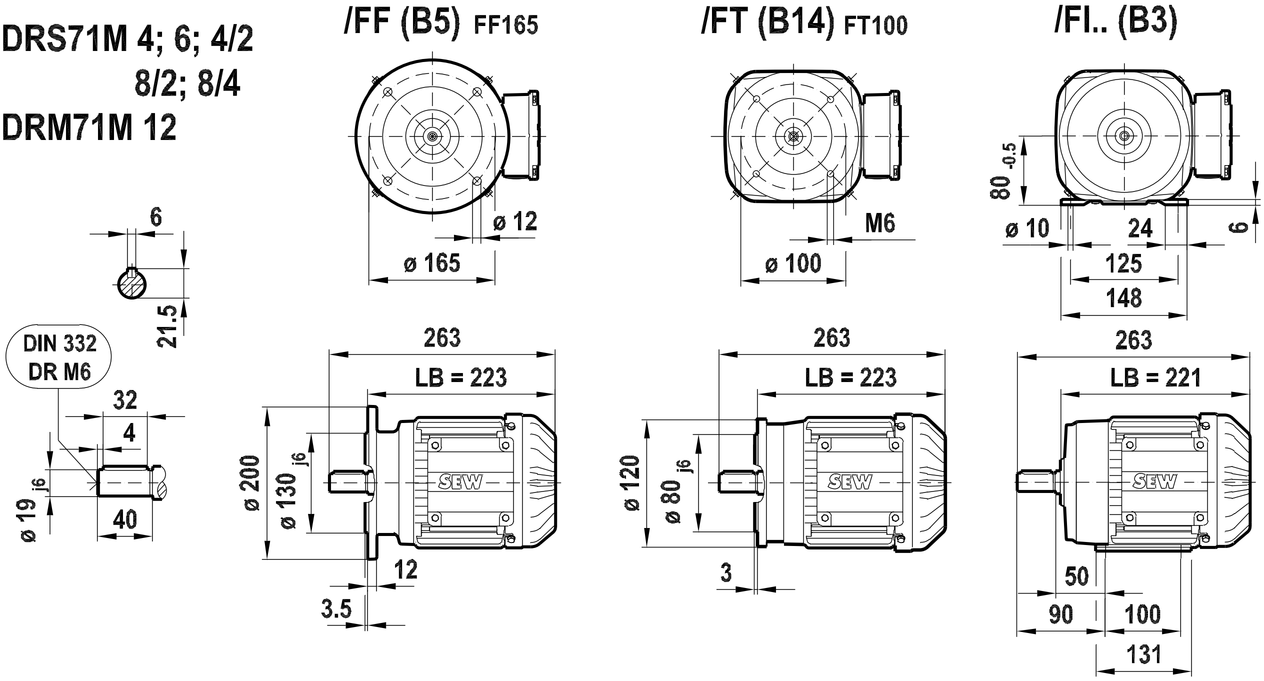
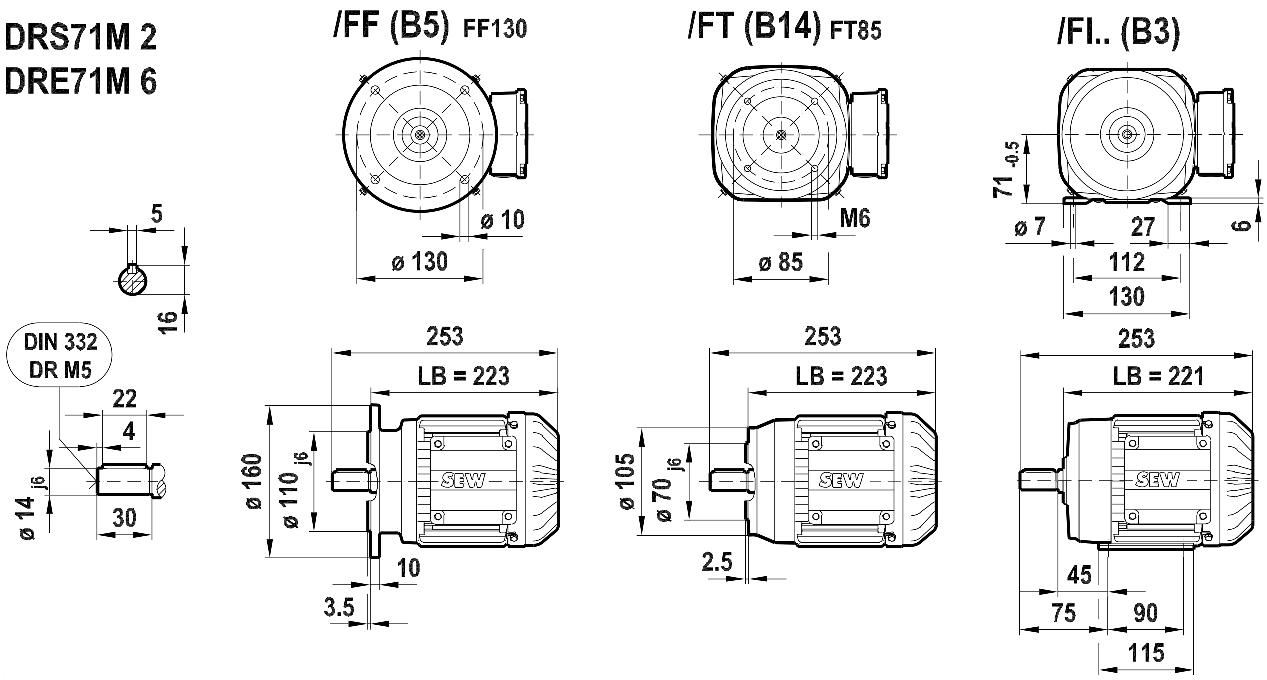


DRS71M 4; 6; 4/2 8/2; 8/4
DRM71M 12



DRS71M 2
DRE71M 6

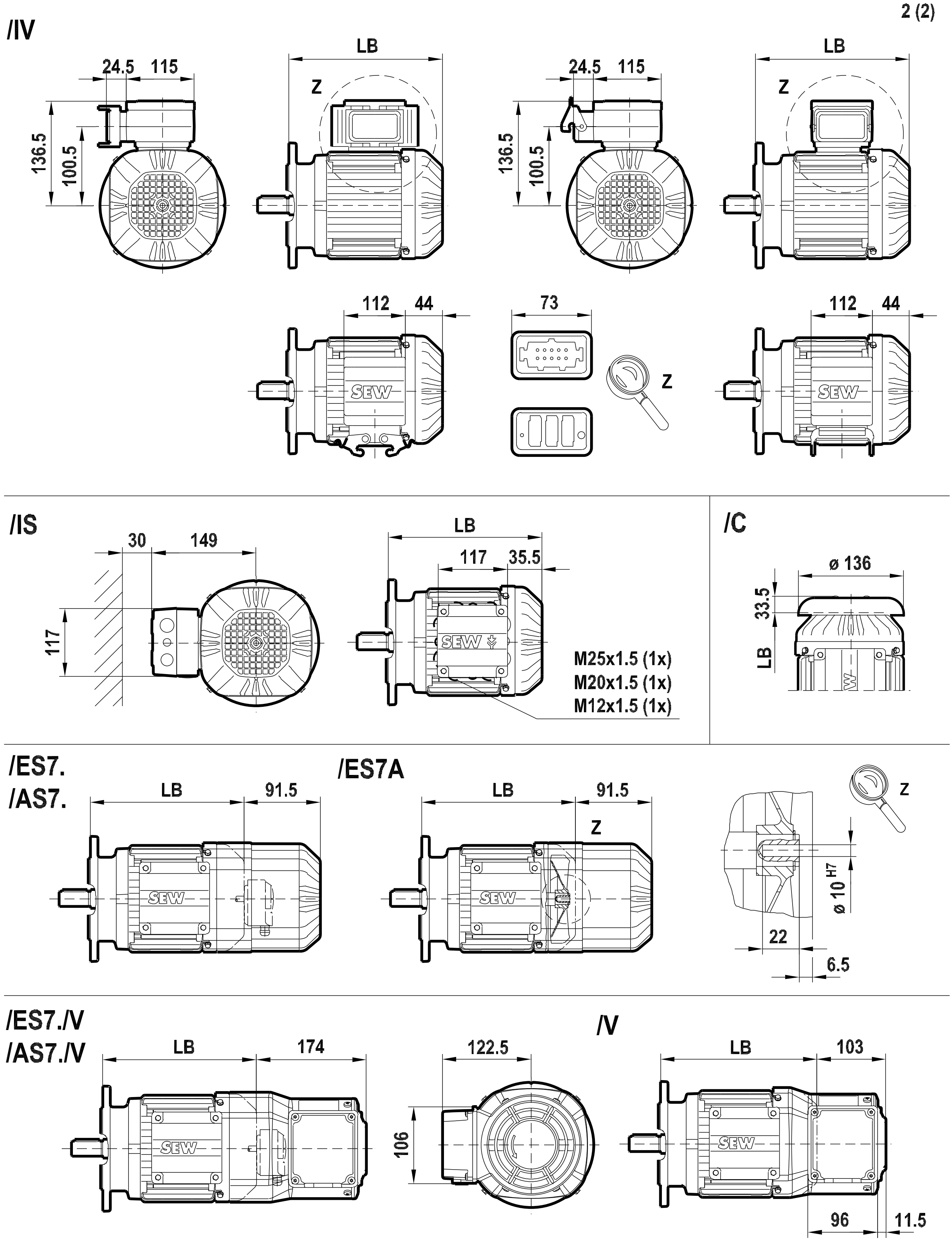


4757928843

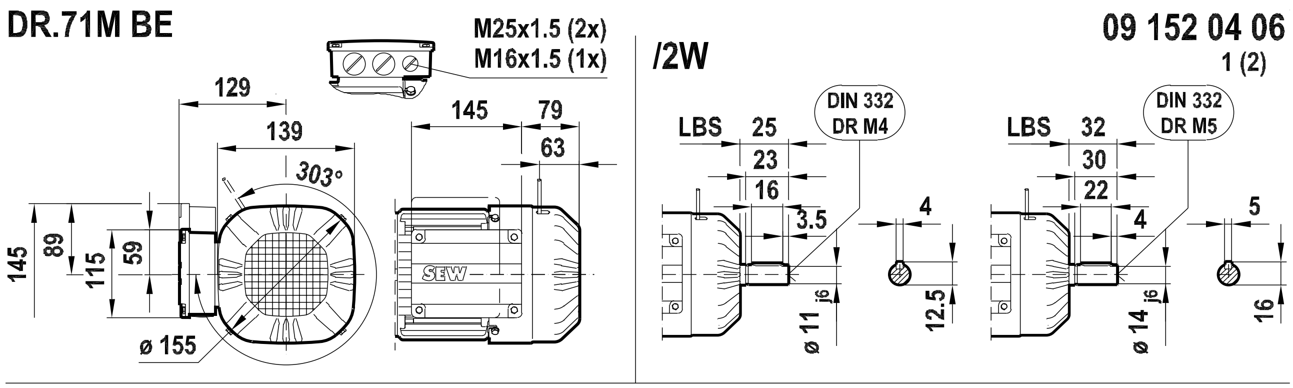
19290411/EN – 10/2014

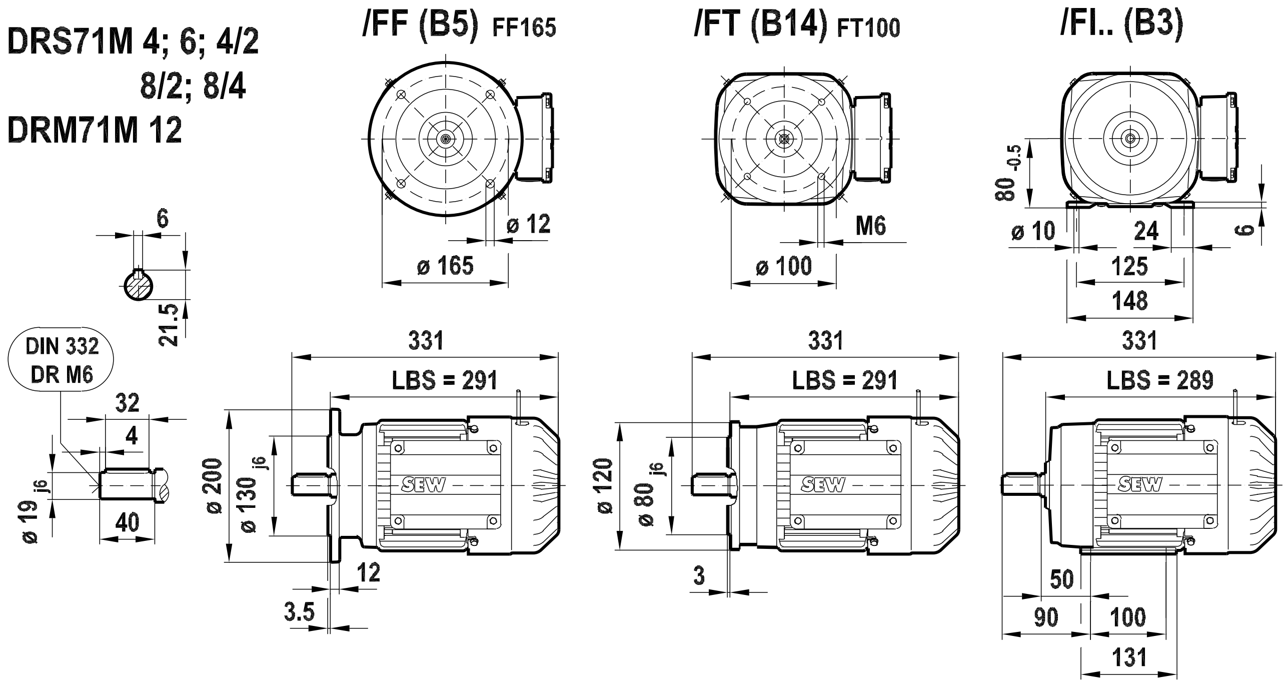
DR.71M

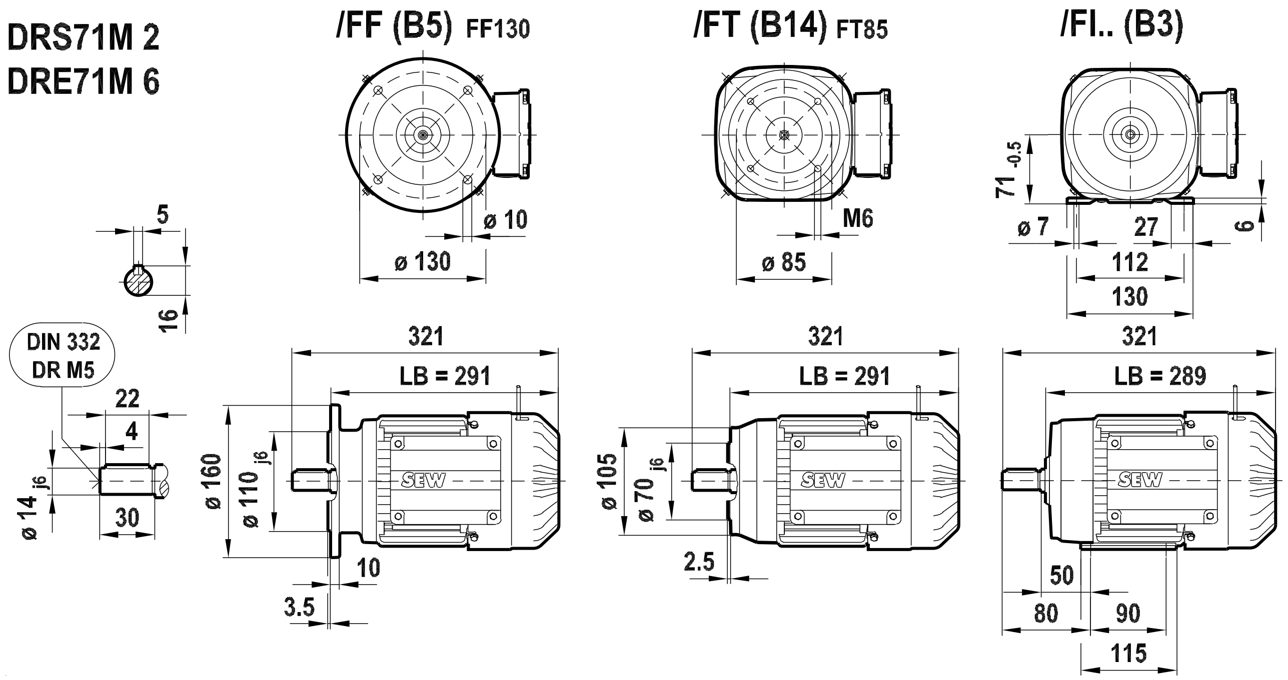
08 192 04 06
2 (2)



4757930763







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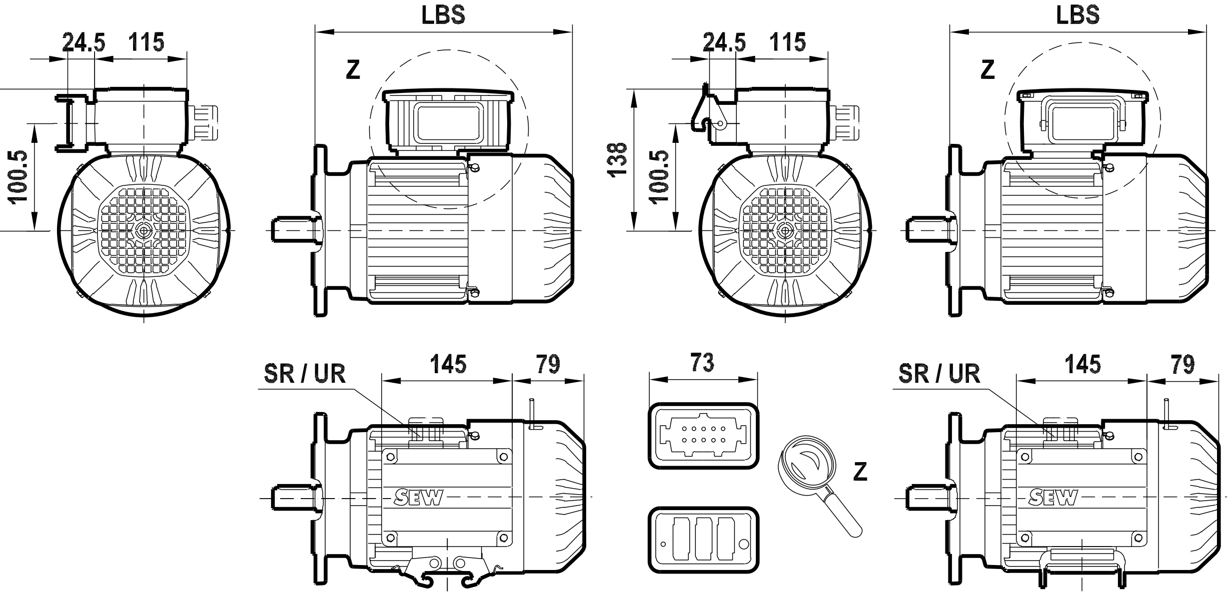
19290411/EN – 10/2014

DR.71M BE

09 152 05 06
2 (2)

/IV



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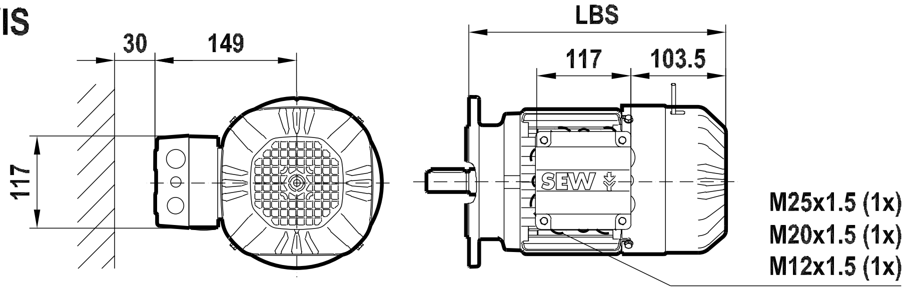

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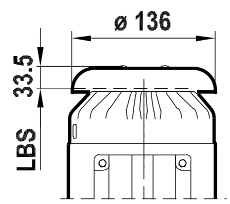

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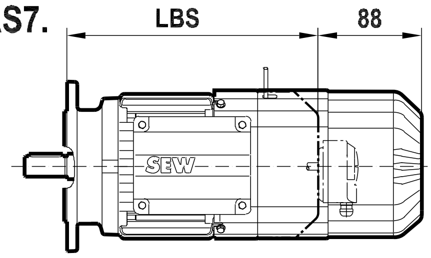

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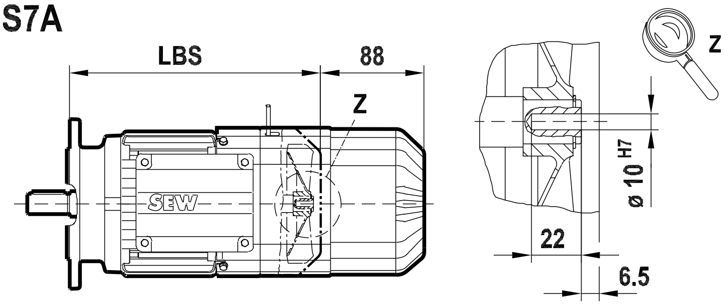

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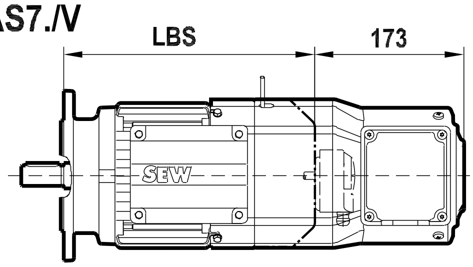

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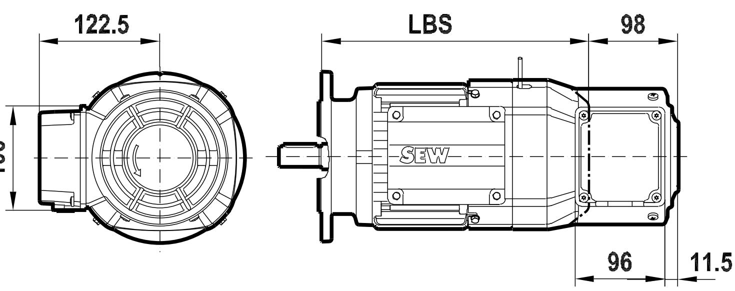

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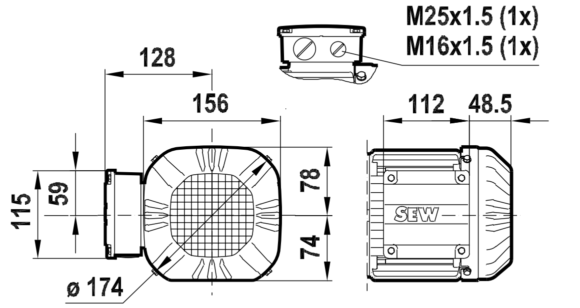
DR.80S

08 193 04 06
1 (2)



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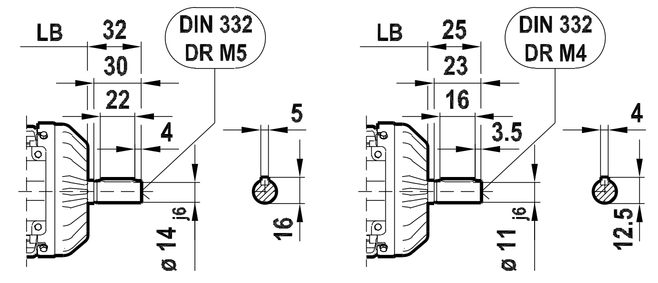
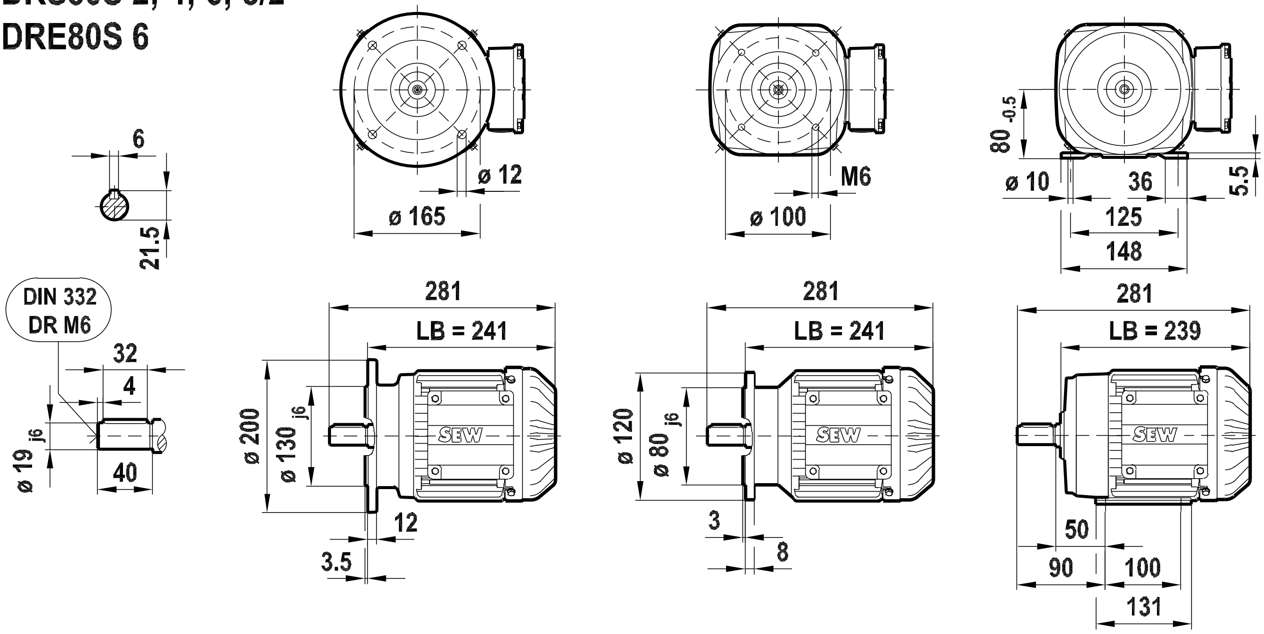


DRS80S 2; 4; 6; 8/2
DRE80S 6

/FF (B5) FF165 /FT (B14) FT100 /FI.. (B3)



DRE80S 4

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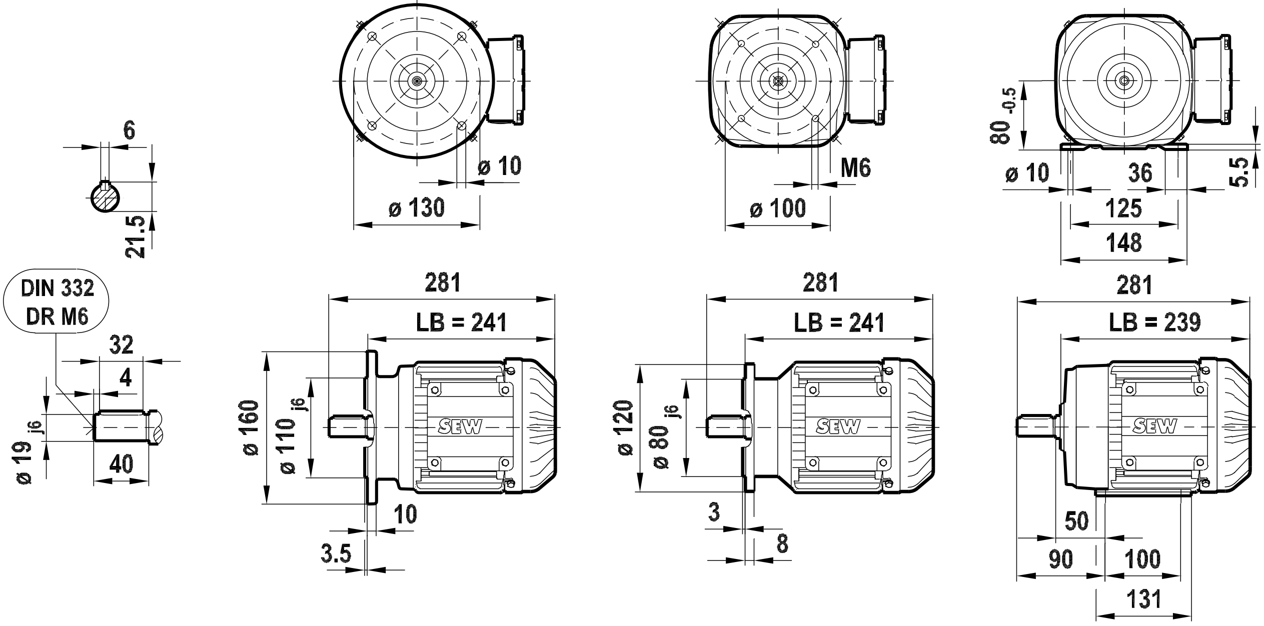

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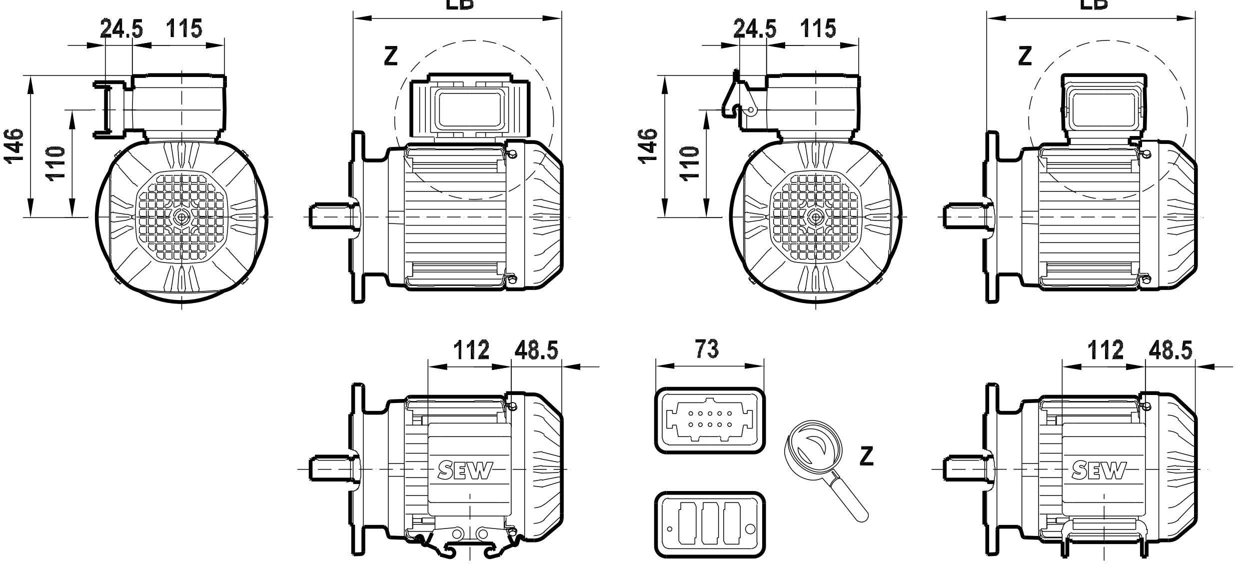
19290411/EN – 10/2014

DR.80S

08 193 04 06
2 (2)

/IV



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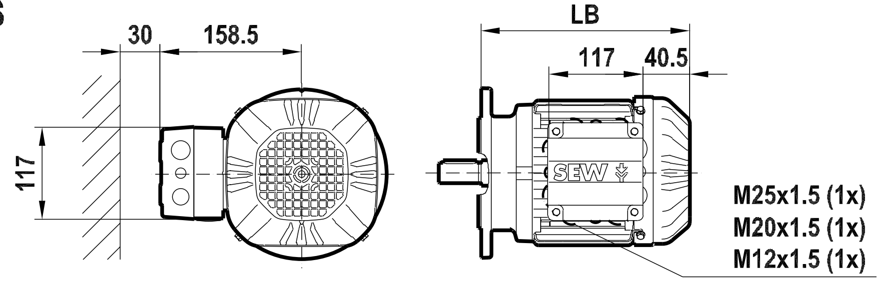

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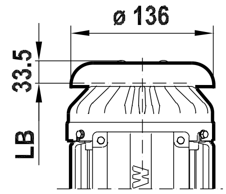

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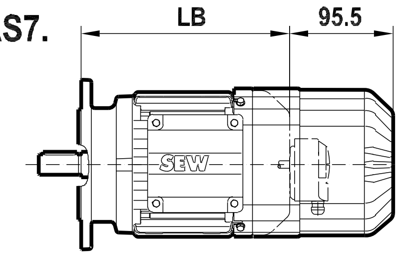

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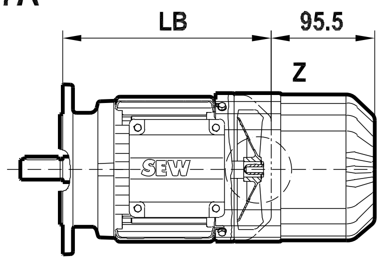

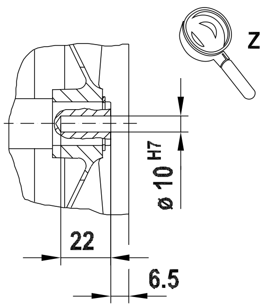

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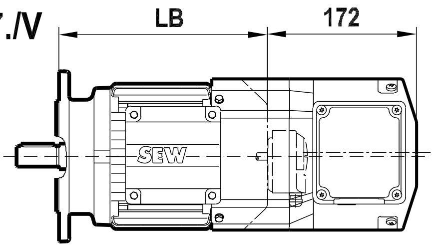

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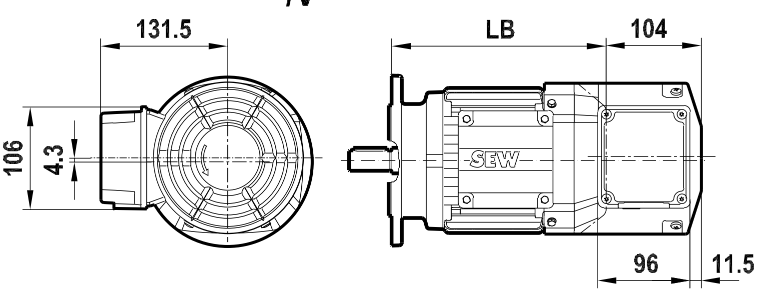

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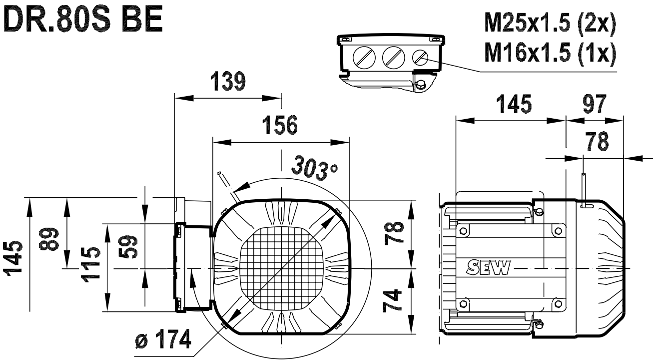
DR.80S BE

09 153 04 06
1 (2)



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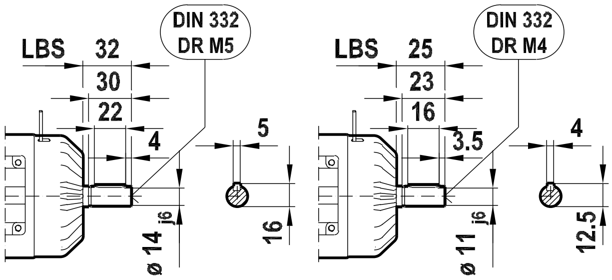

DRS80S 2; 4; 6; 8/2
DRE80S 6

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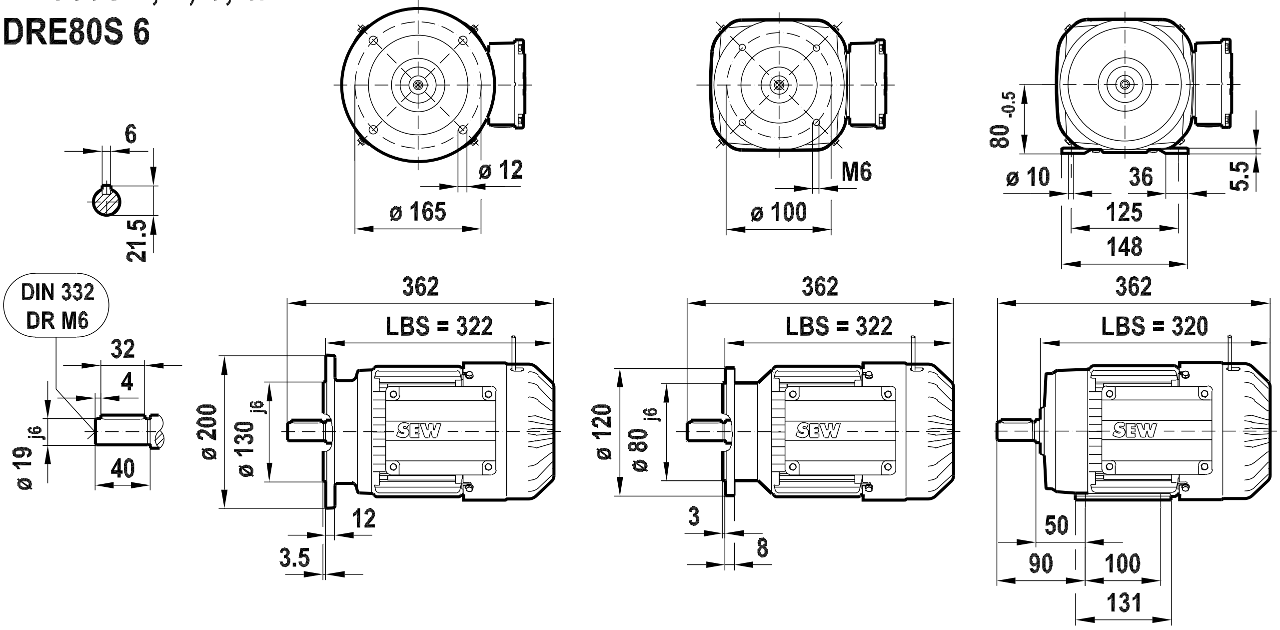

DRE80S 4

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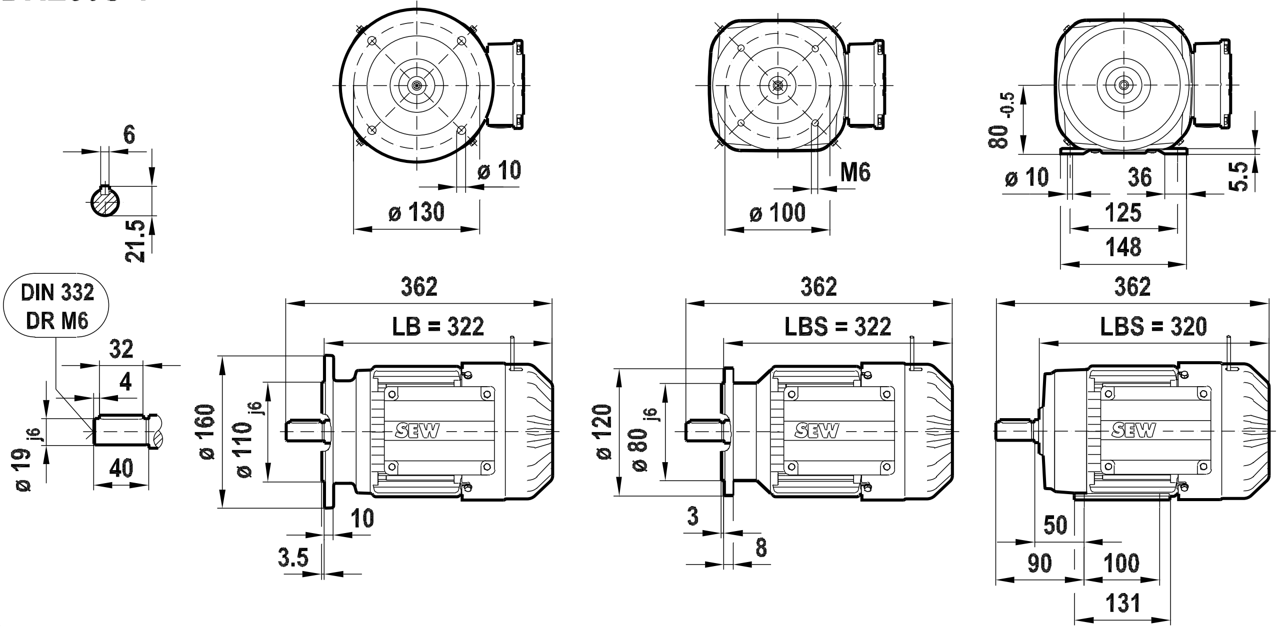

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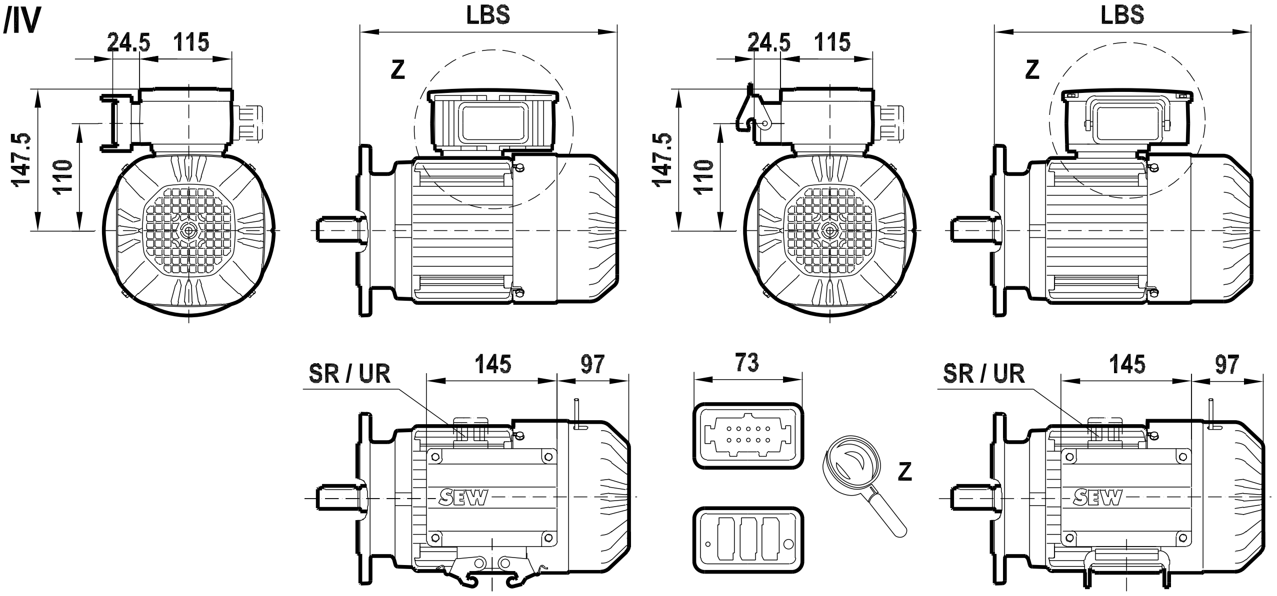
19290411/EN – 10/2014

DR.80S BE

09 153 04 06
2 (2)

/IV



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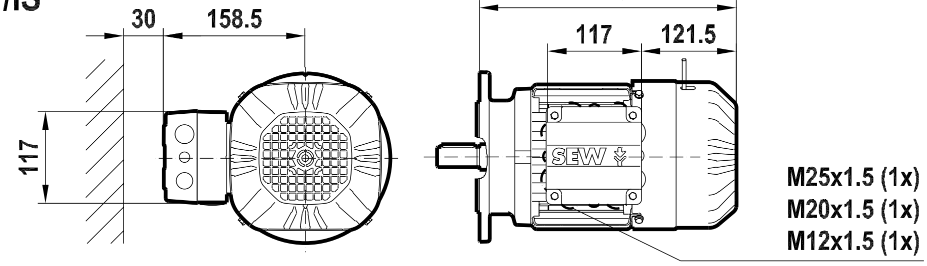

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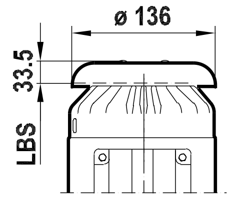

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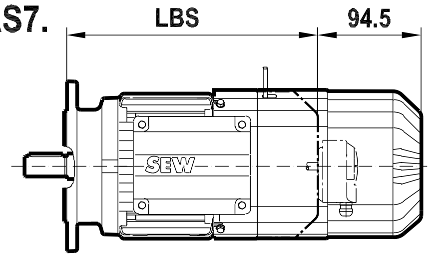

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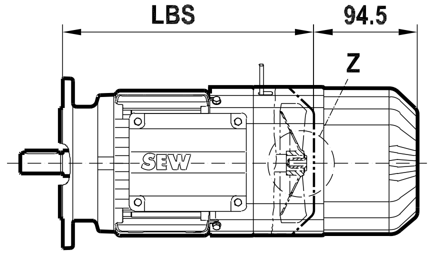

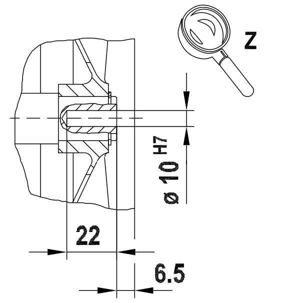

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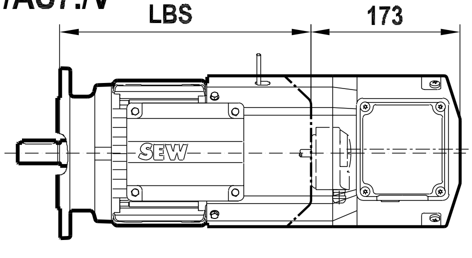

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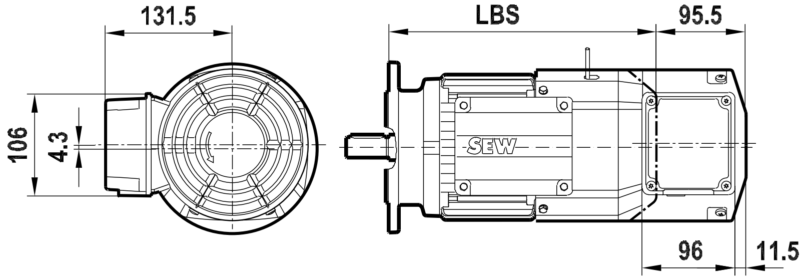

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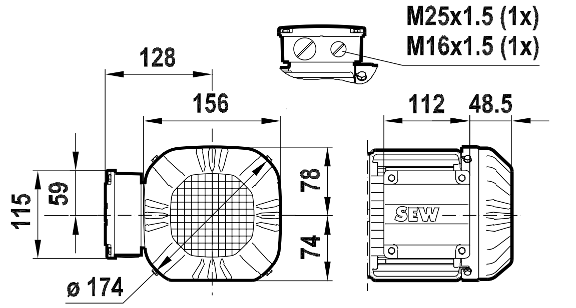
DR.80M

08 194 04 06
1 (2)



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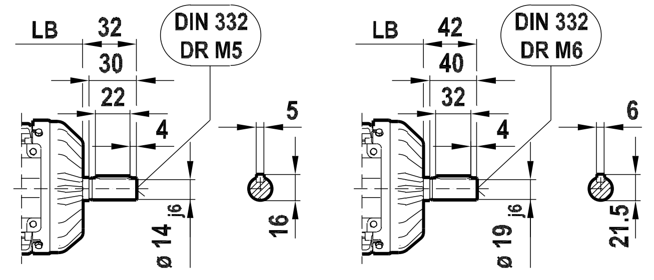

DRS80M 4; 6; 4/2 8/2; 8/4

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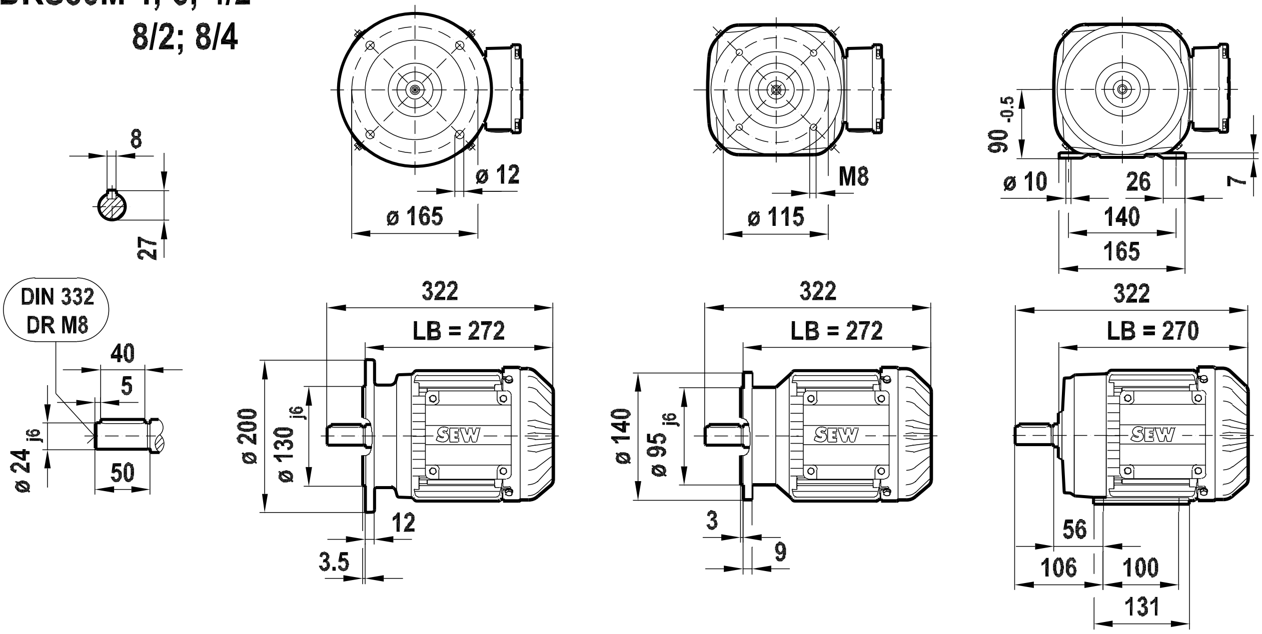
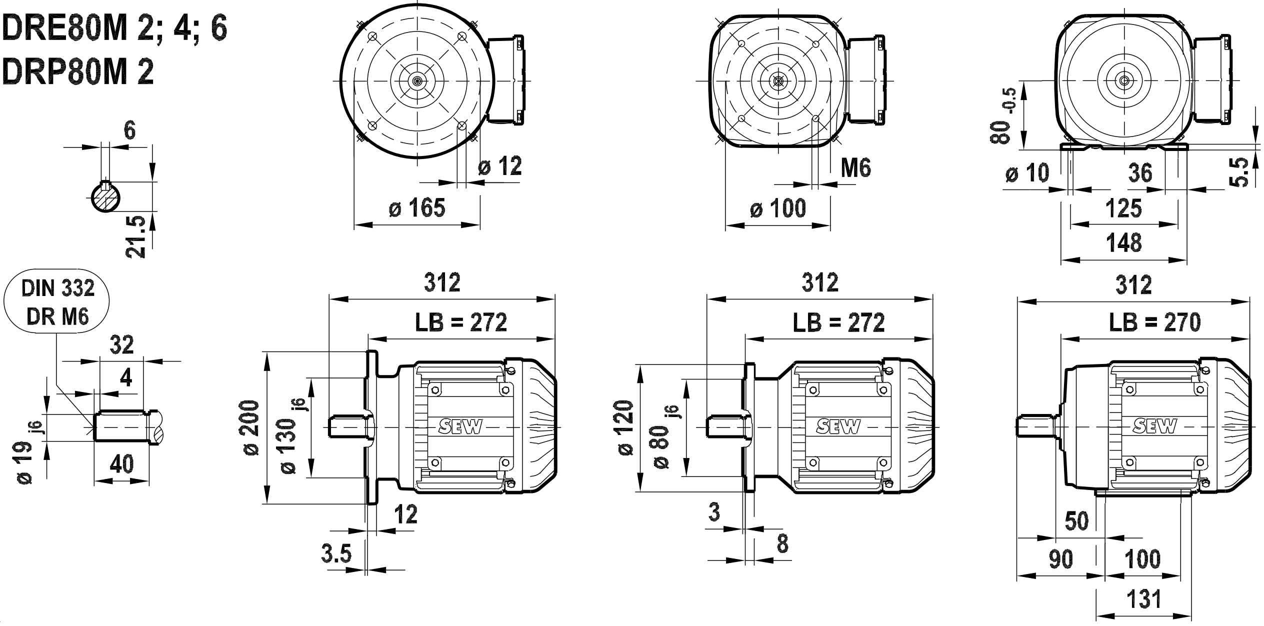


DRS80M 2
DRE80M 2; 4; 6
DRP80M 2

/FF (B5) FF165 | /FT (B14) FT100 | /FI.. (B3)



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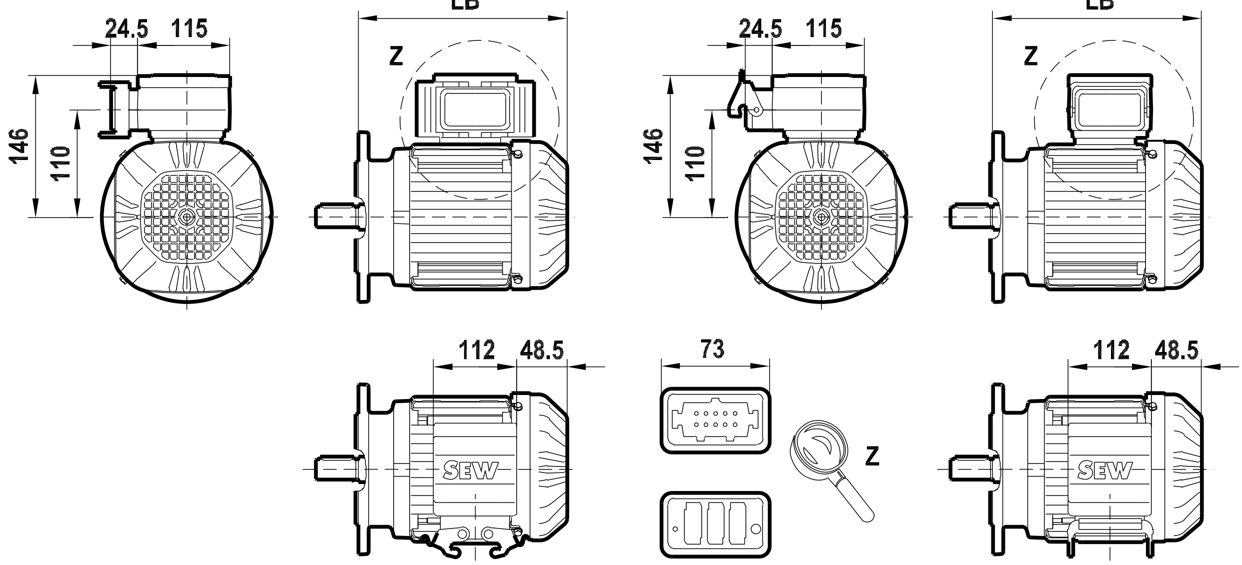
7

DR.80M

08 194 04 06
2 (2)

/IV



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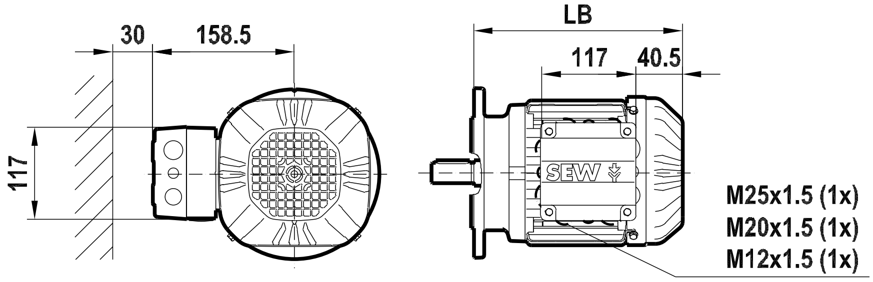

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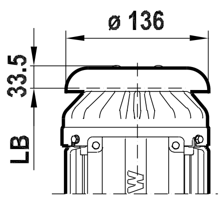

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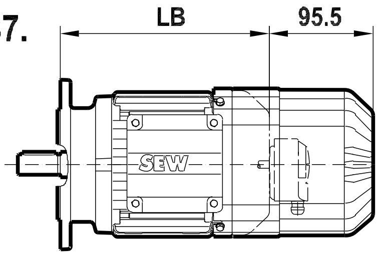

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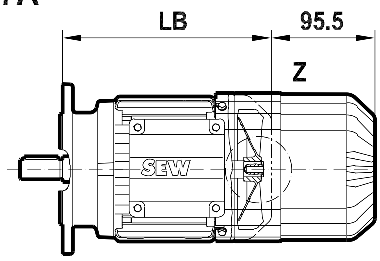

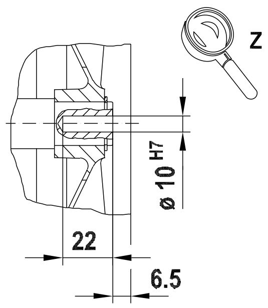

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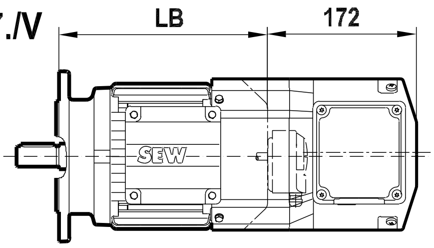

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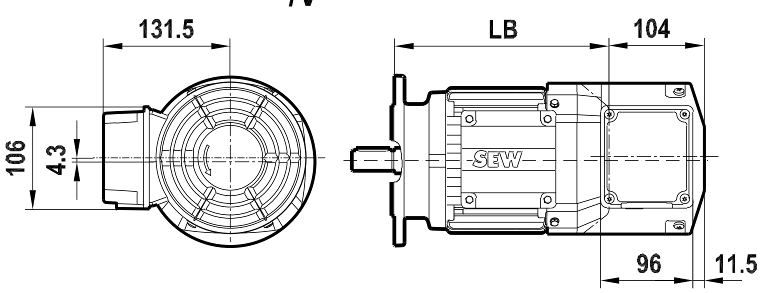

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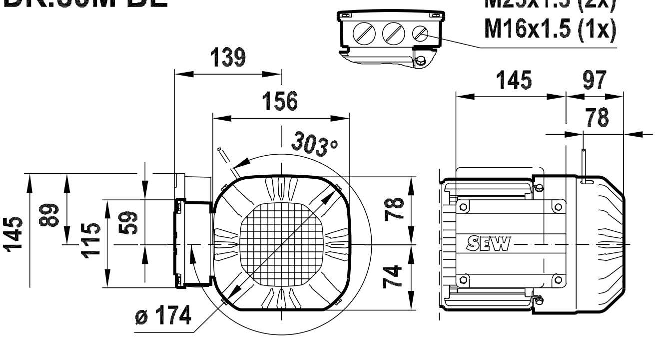
DR.80M BE

09 154 04 06
1 (2)



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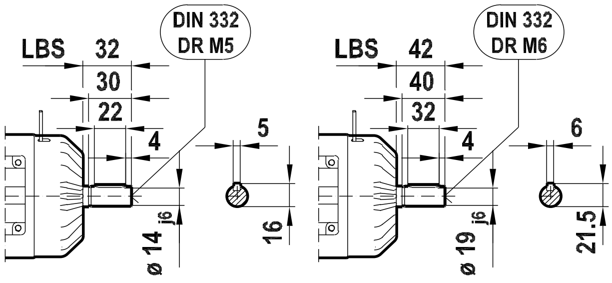

DRS80M 4; 6; 4/2 8/2; 8/4

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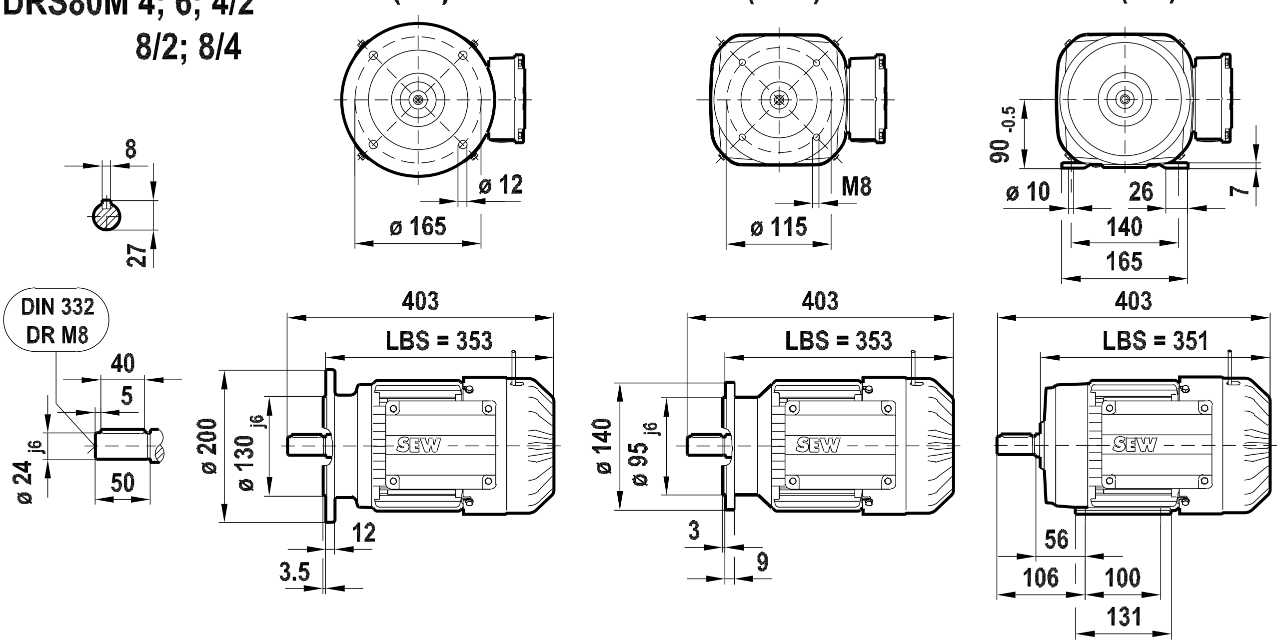

DRS80M 2
DRE80M 2; 4; 6
DRP80M 2

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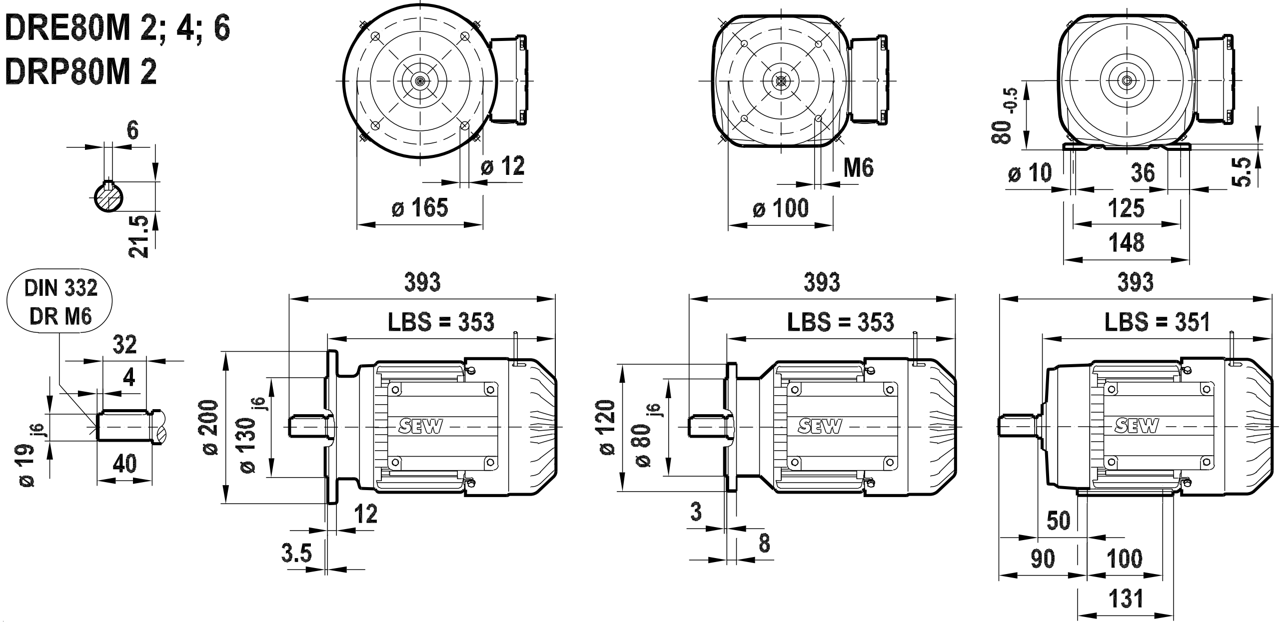

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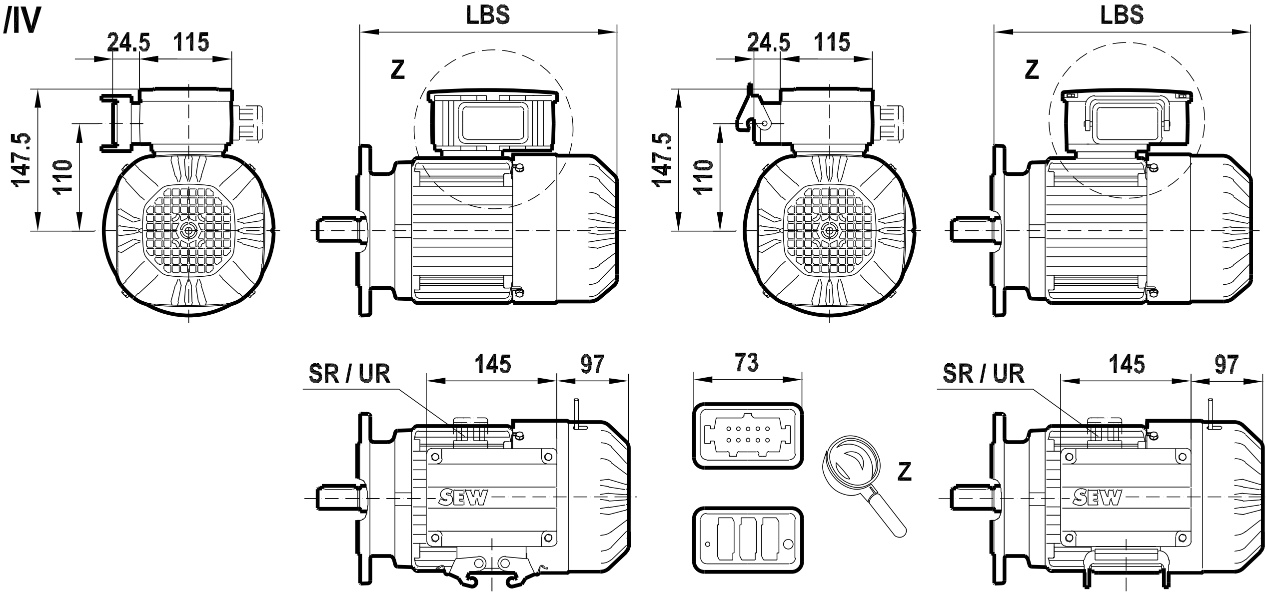
DR.80M BE

09 154 04 06
2 (2)

/IV



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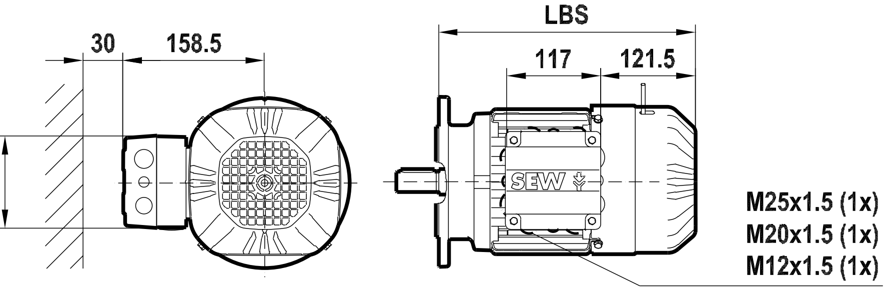

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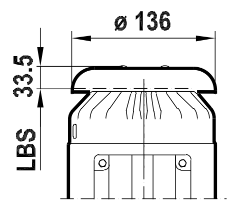

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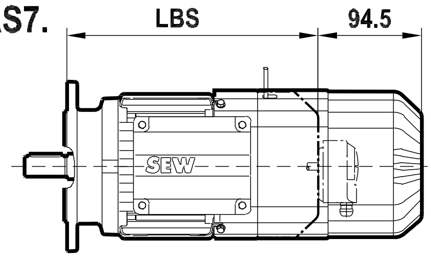

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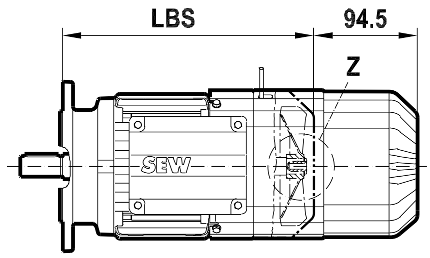

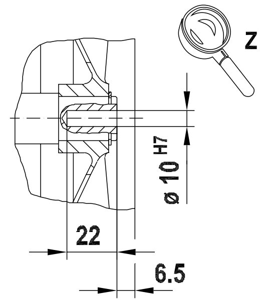

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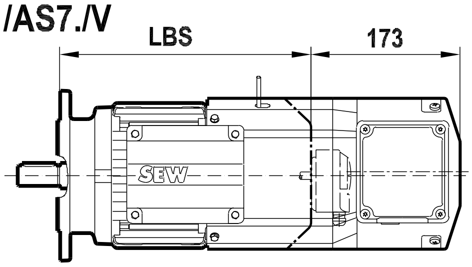

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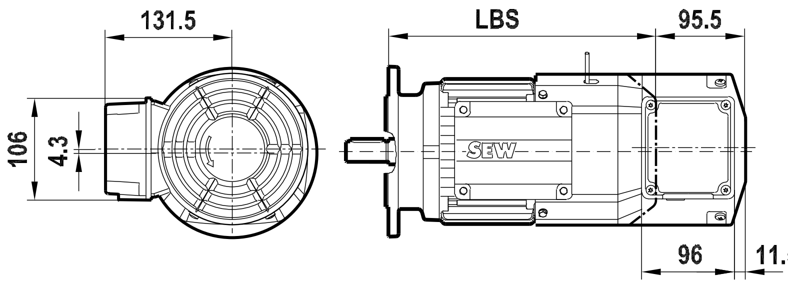

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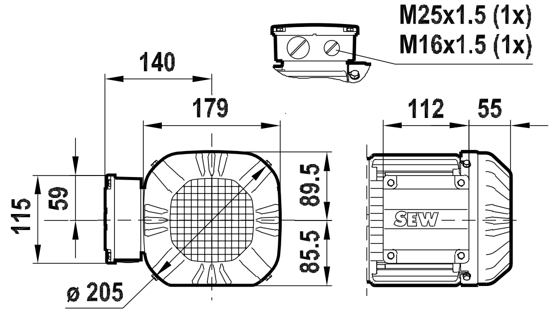
19290411/EN – 10/2014

DR.90M

08 195 04 06
1 (2)



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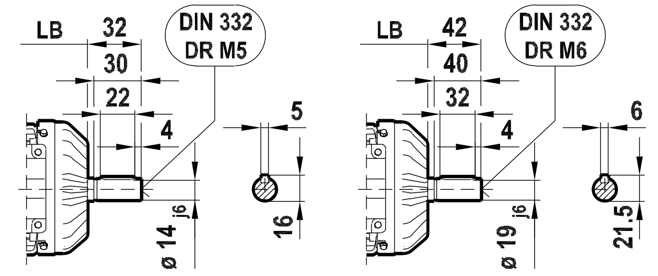
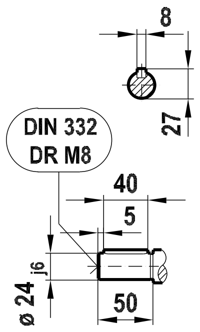


DRS90M 2; 4; 4/2 8/2; 8/4
DRE90M 2; 4
DRM90M 12



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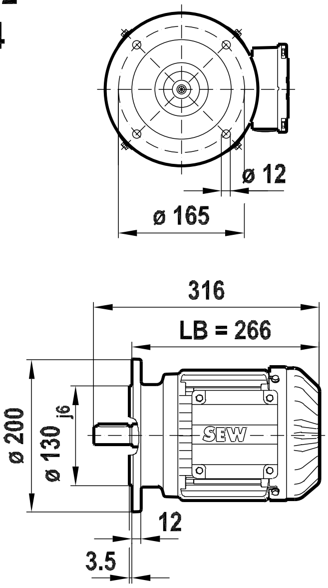

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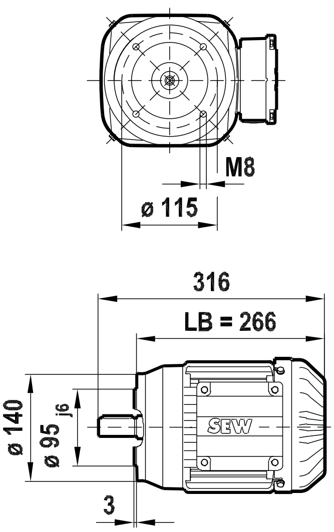

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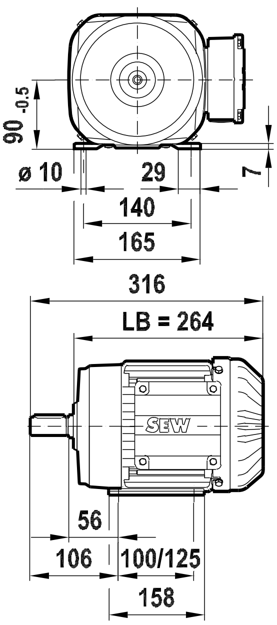
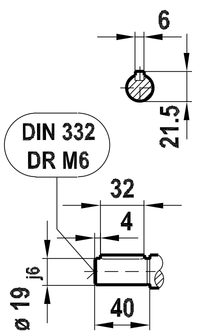


DRP90M 2;4



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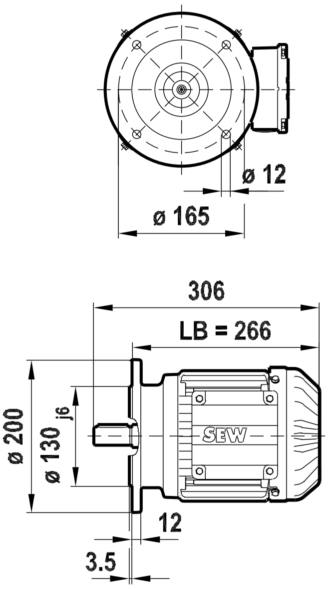

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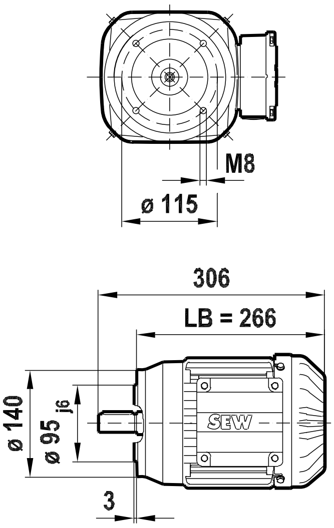

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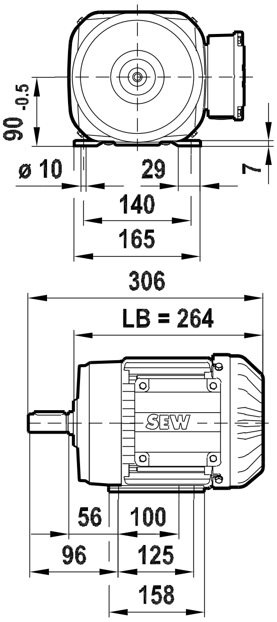

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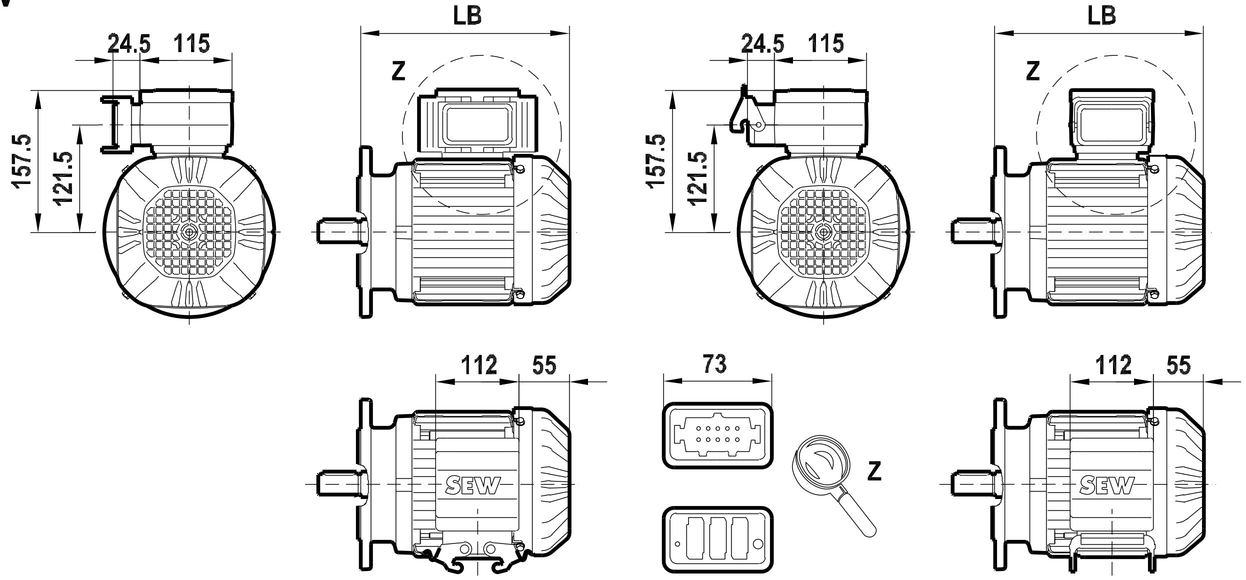
DR.90M

08 195 04 06
2 (2)

/IV



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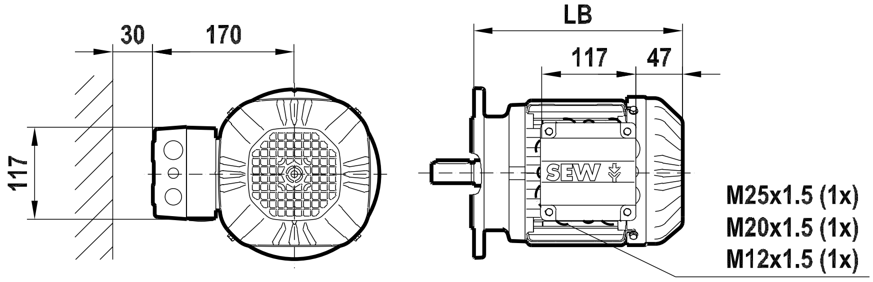

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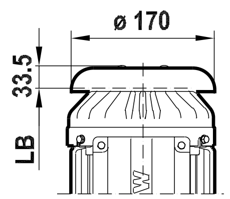

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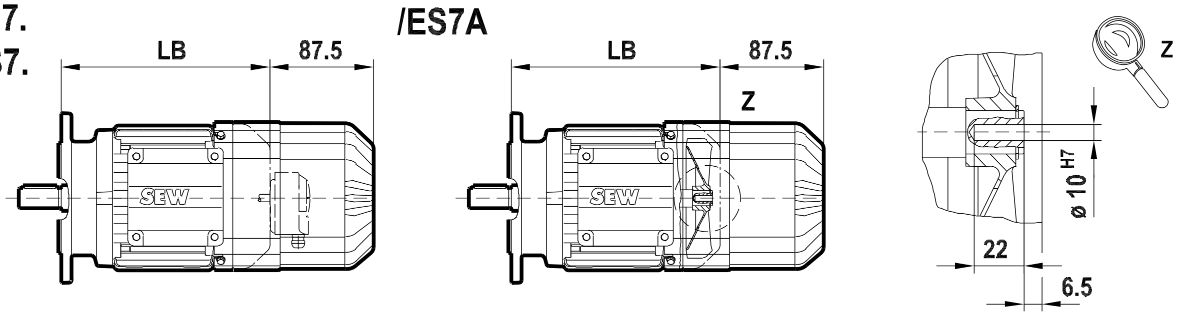

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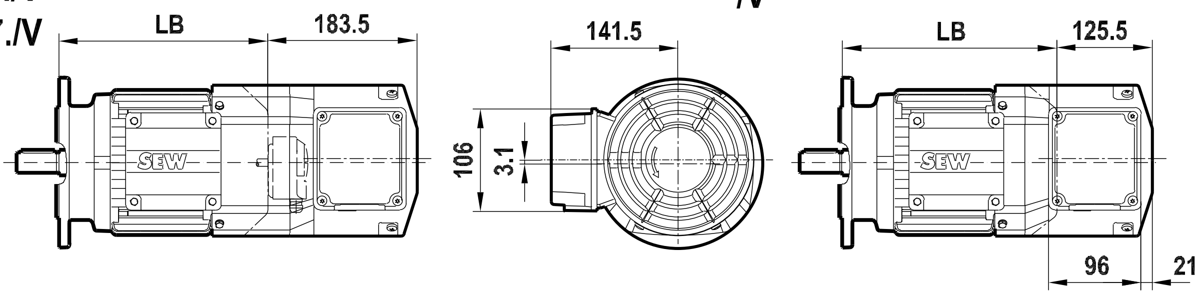

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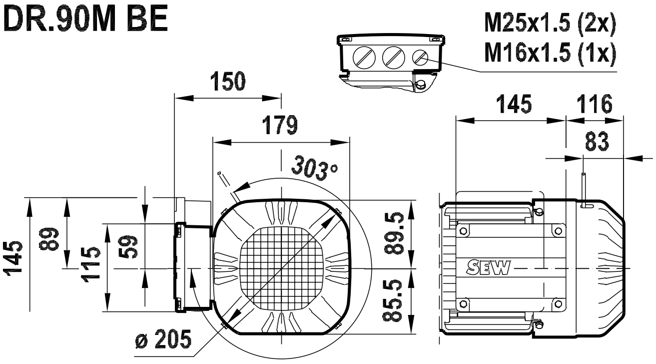
DR.90M BE

09 155 04 06
1 (2)



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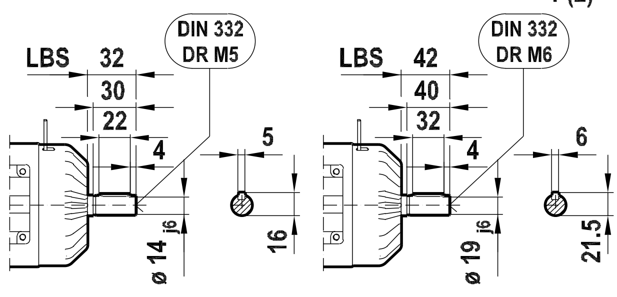
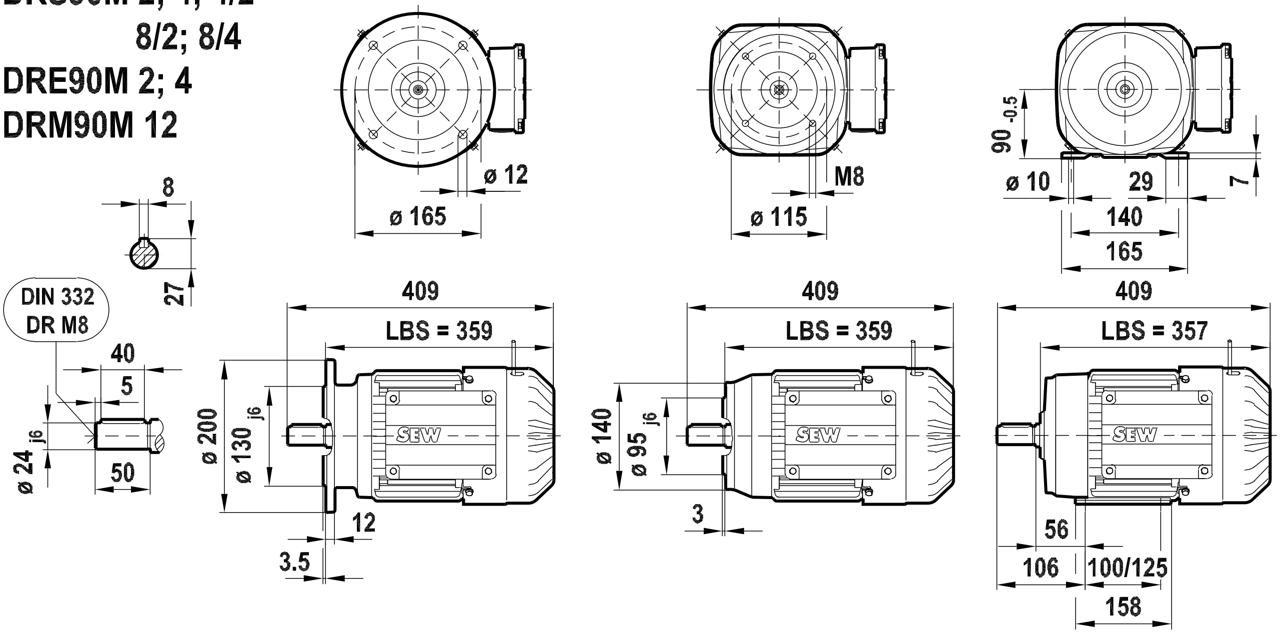


DRS90M 2; 4; 4/2 8/2; 8/4
DRE90M 2; 4
DRM90M 12

/FF (B5) FF165 — /FT (B14) FT115 — /FI.. (B3)



DRP90M 2; 4

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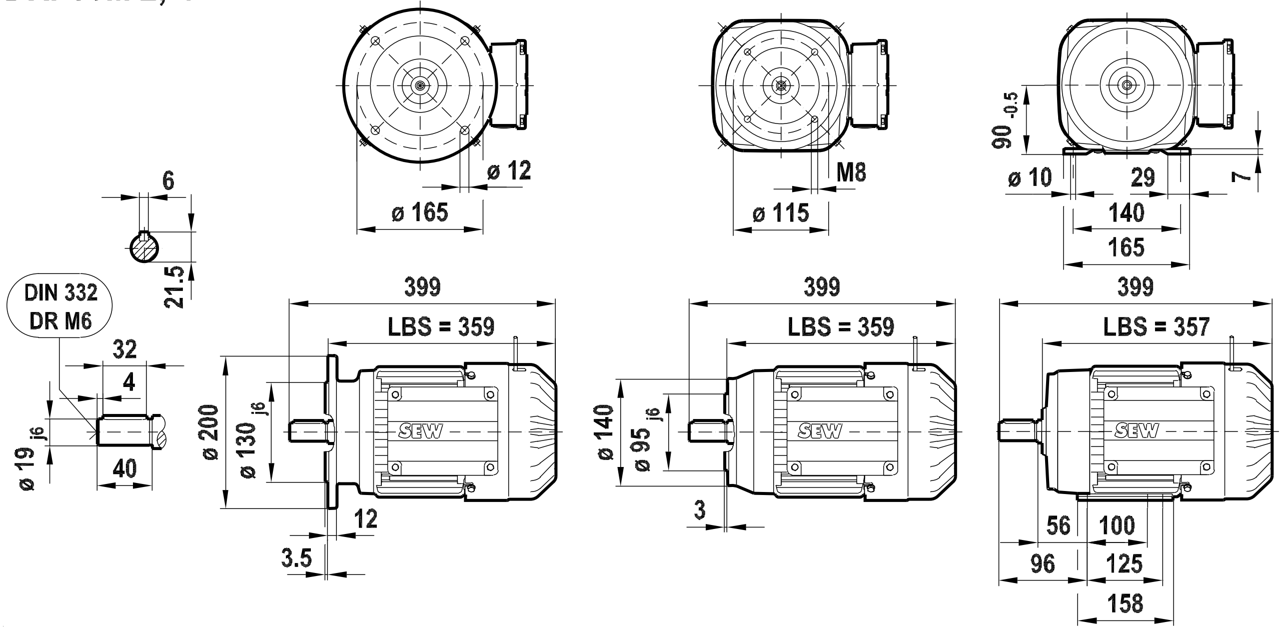

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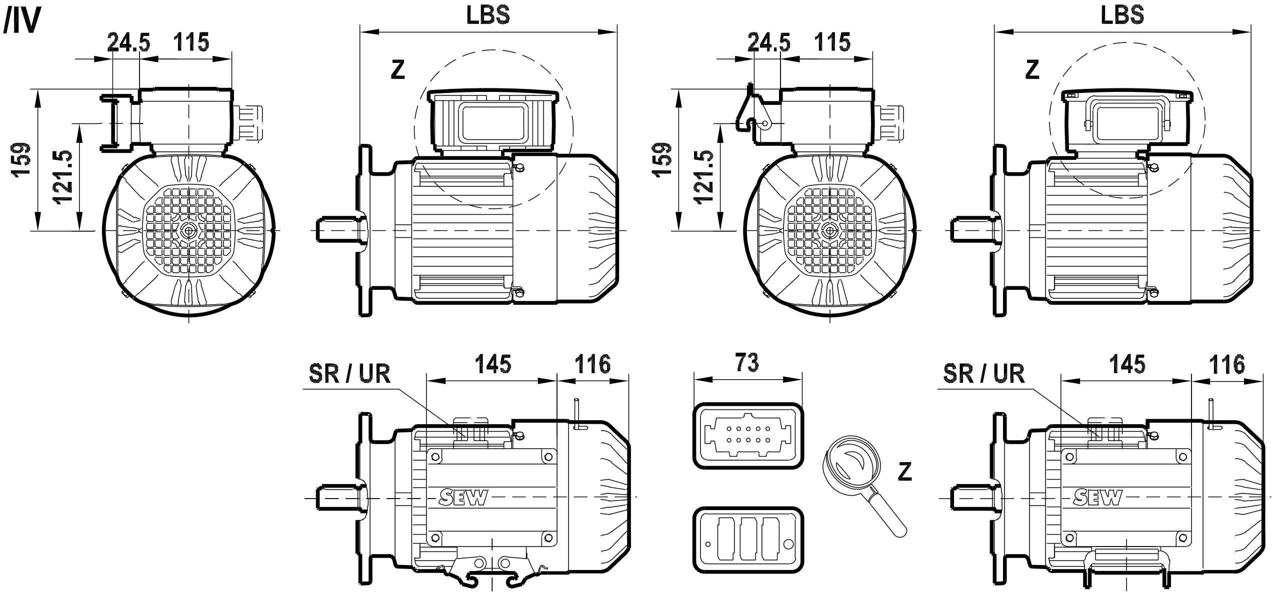
19290411/EN – 10/2014

DR.90M BE

09 155 04 06
2 (2)

/IV



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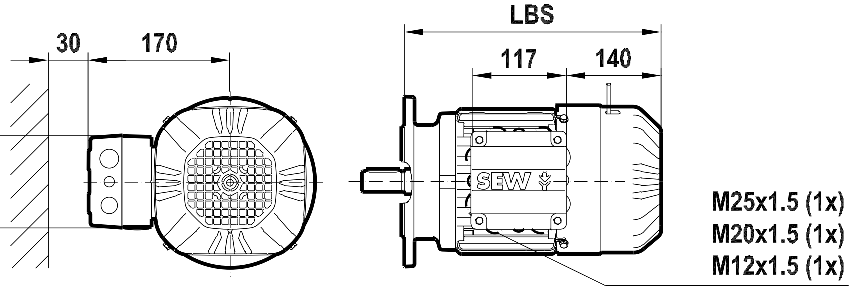

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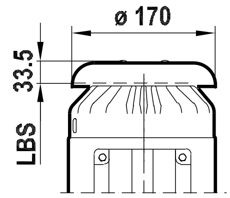

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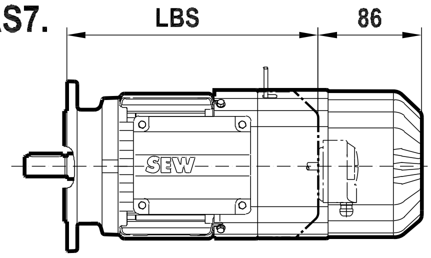

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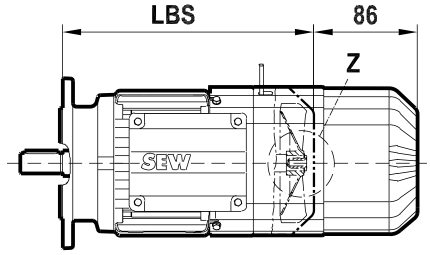

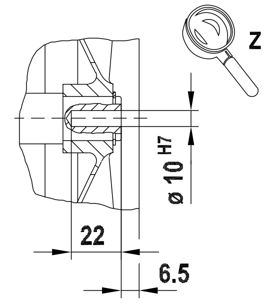

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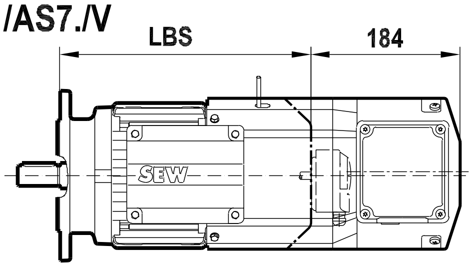

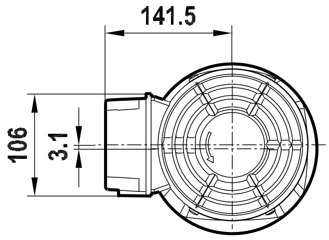

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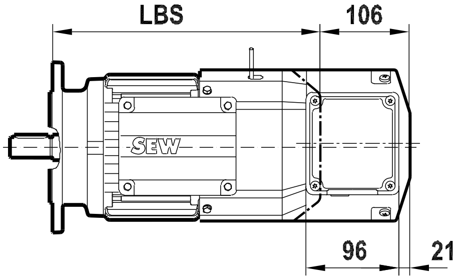

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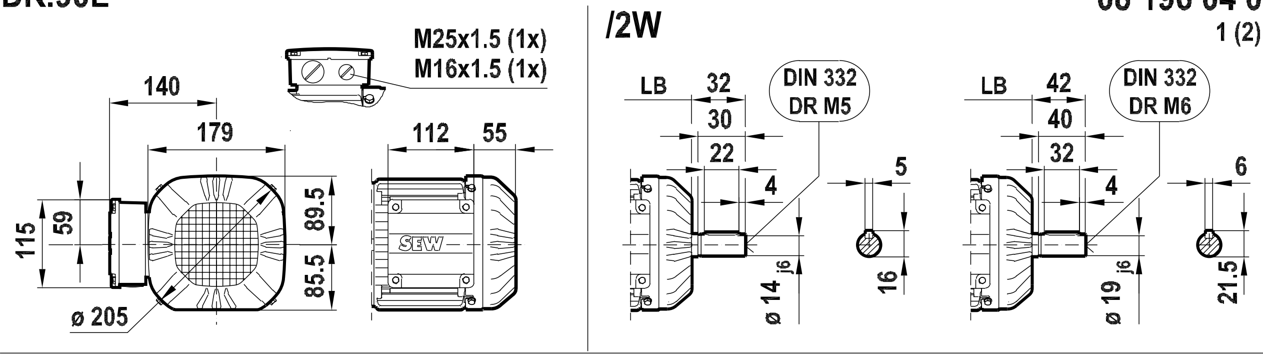
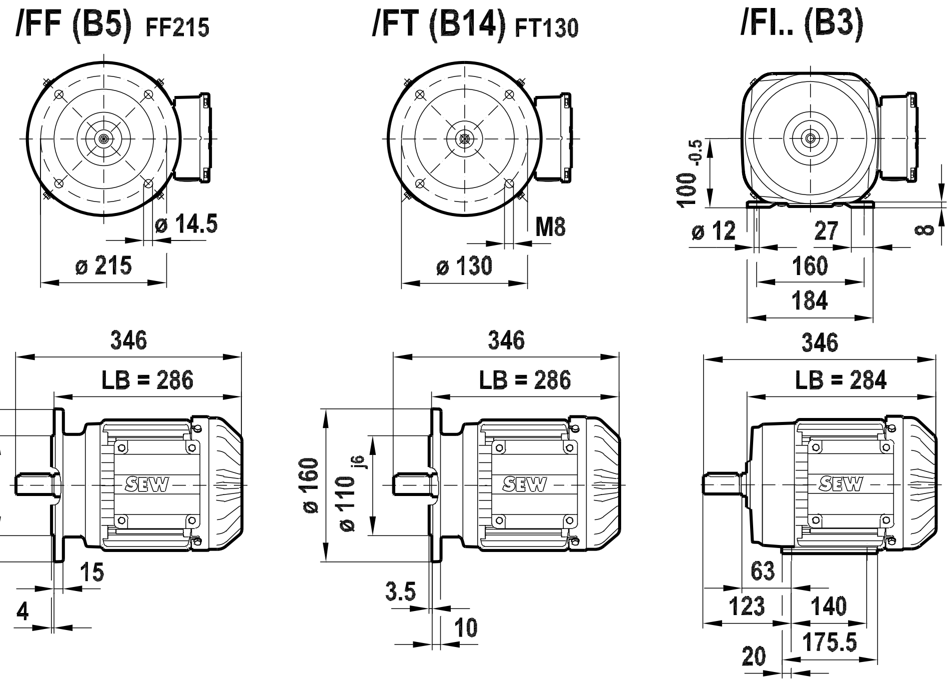
DR.90L

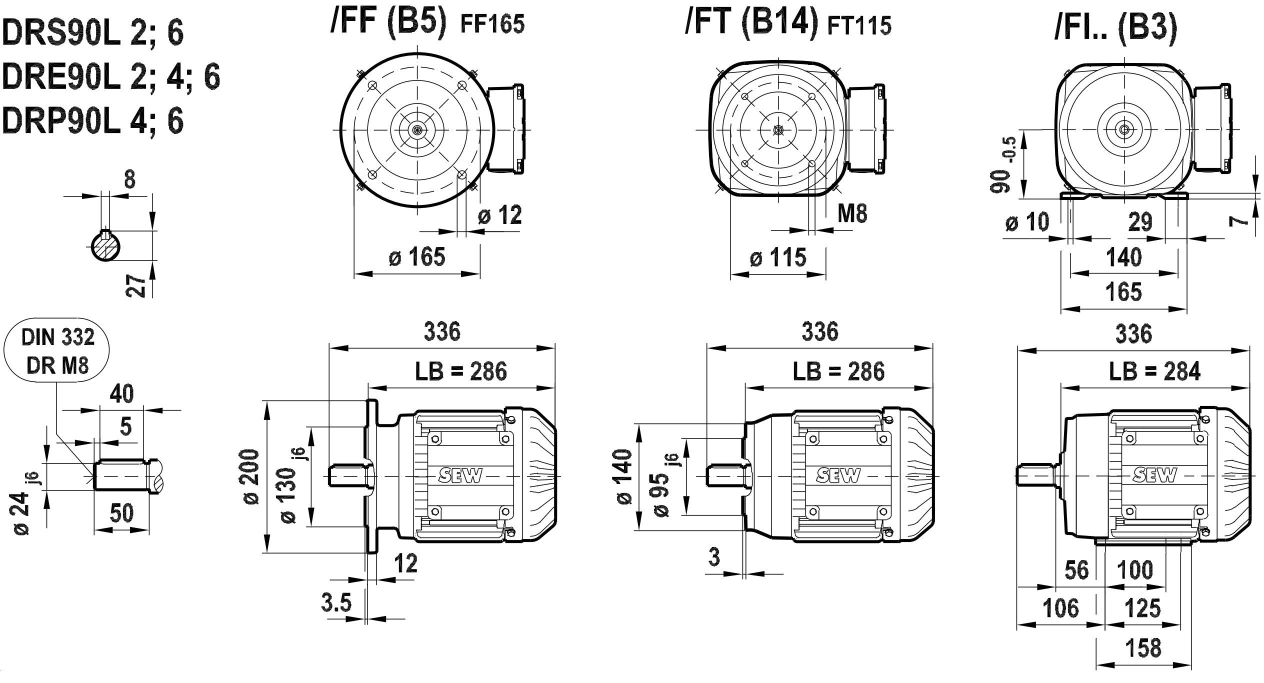
08 196 04 06
1 (2)



DRS90L 4; 8/2; 8/4



DRS90L 2; 6
DRE90L 2; 4; 6
DRP90L 4; 6



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19290411/EN – 10/2014

DR.90L

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2 (2)

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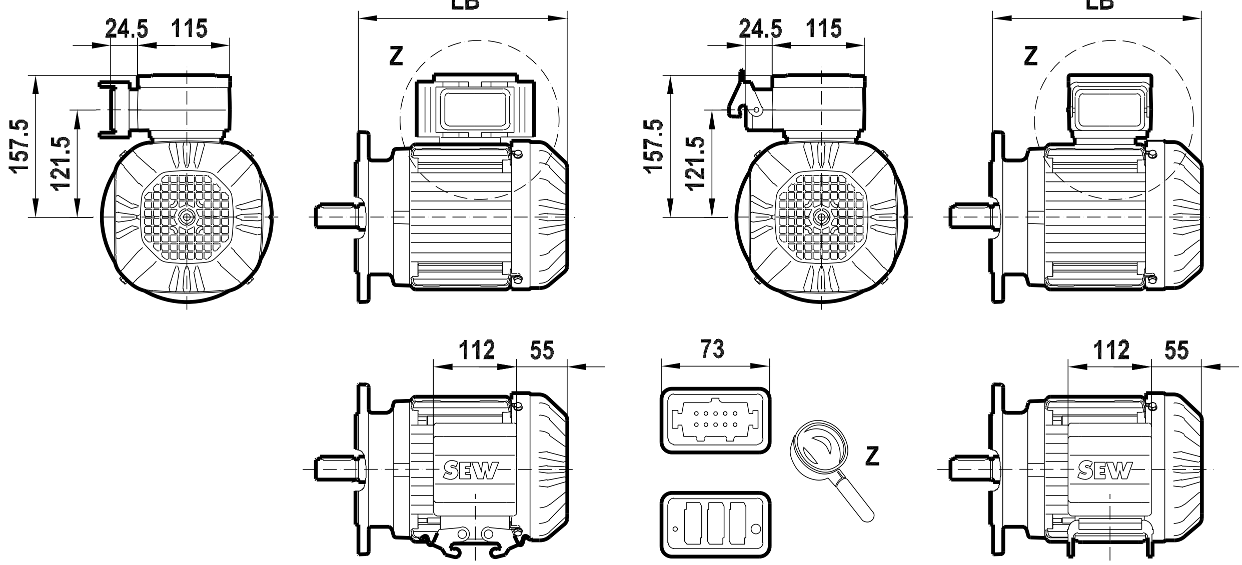

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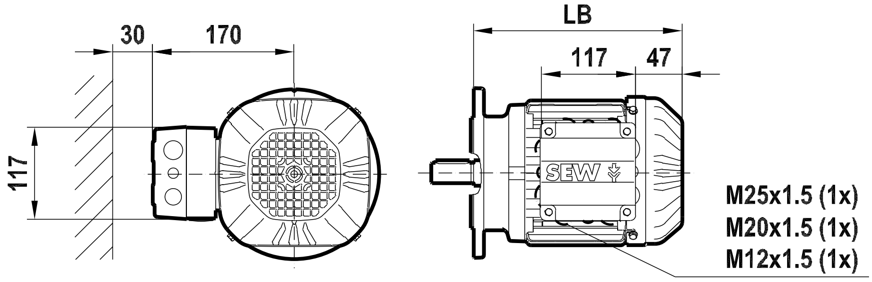

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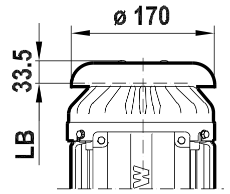

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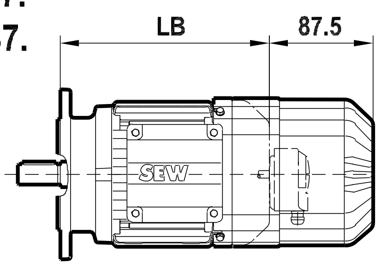

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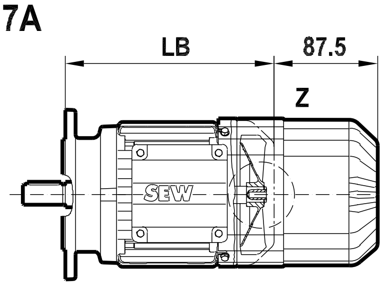

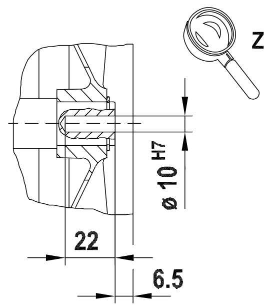

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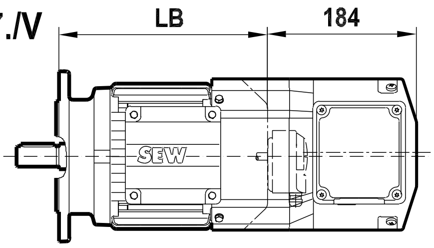

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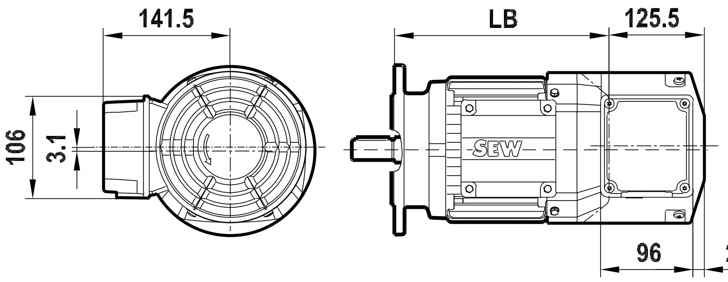

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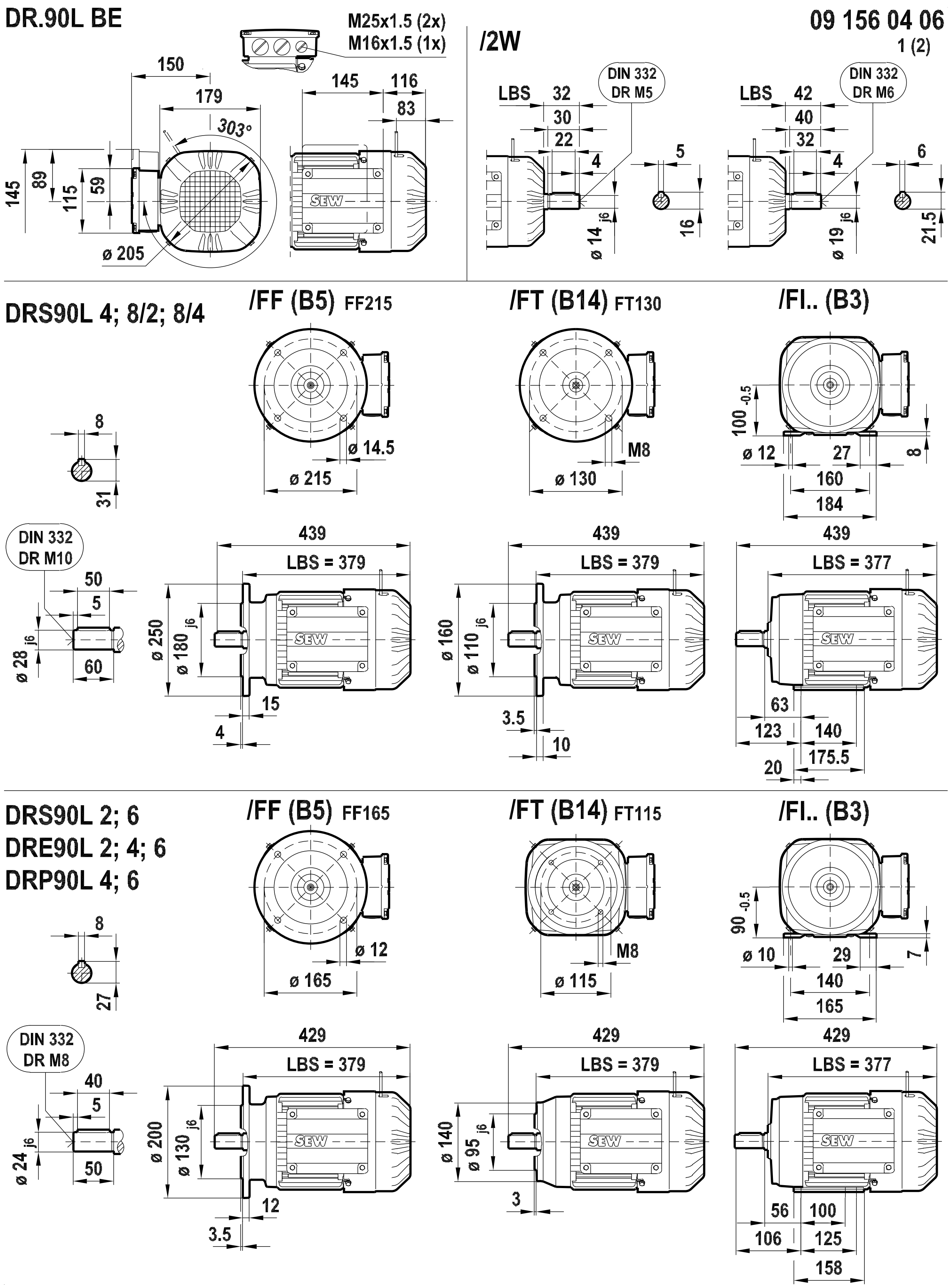

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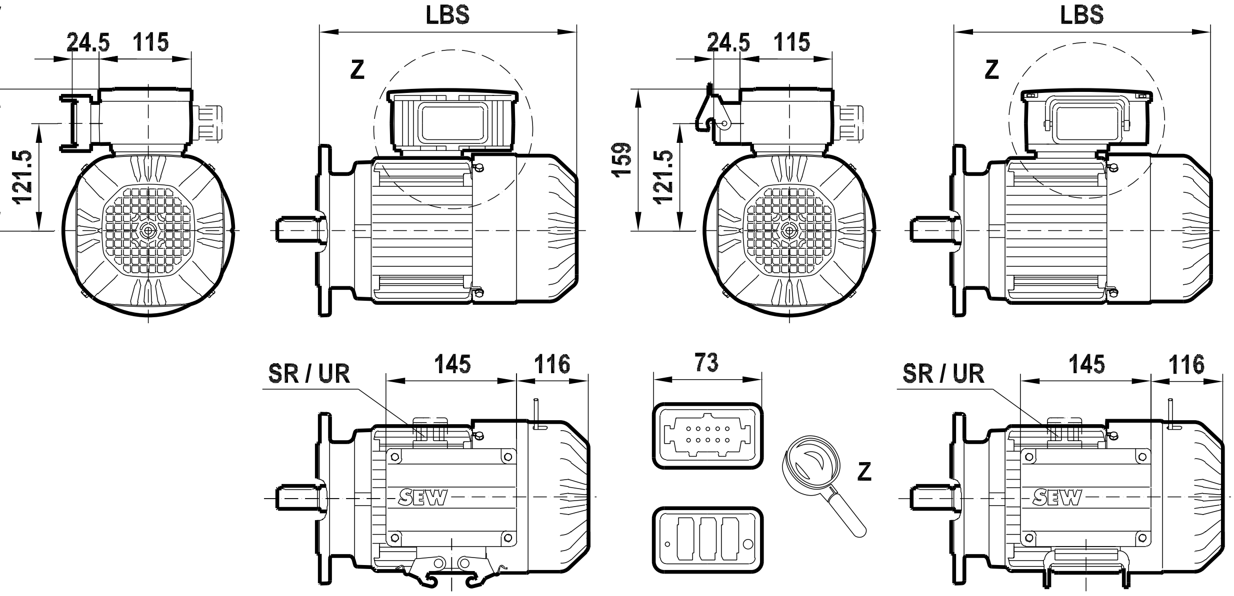
7

DR.90L BE

09 156 04 06
2 (2)

/IV



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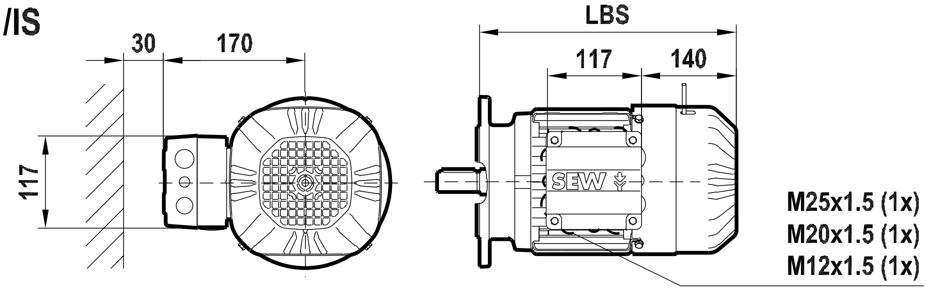

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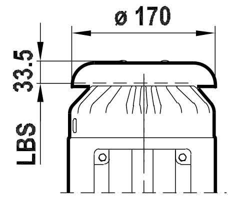

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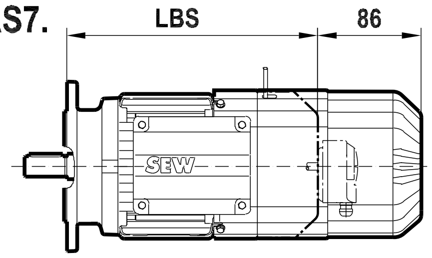

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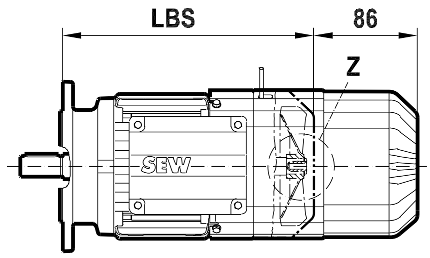

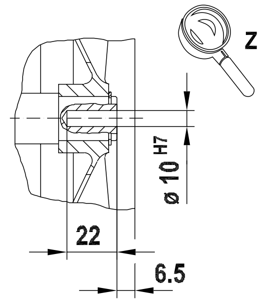

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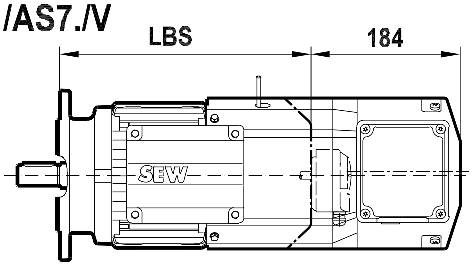
/AS7./V



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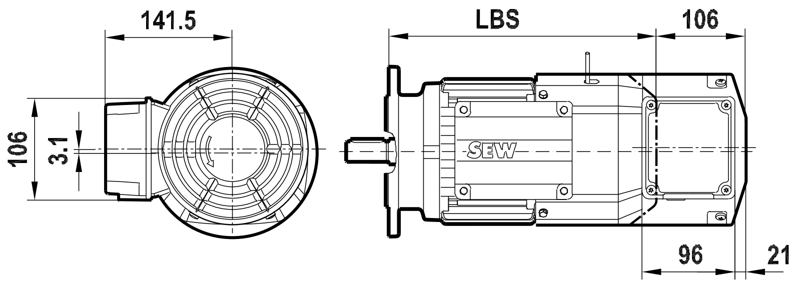

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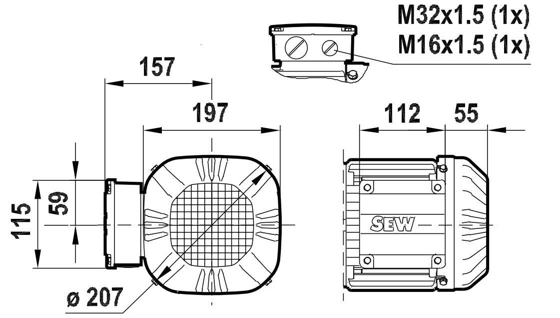
DR.100M

08 197 03 06
1 (2)



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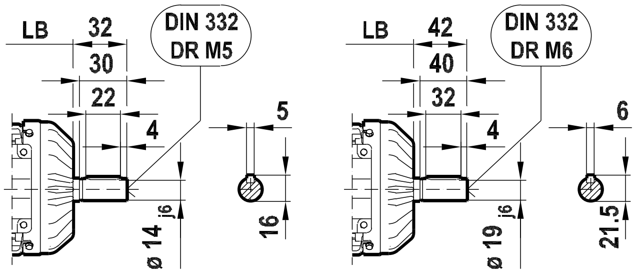

DRS100M 2; 4; 6; 4/2 8/2; 8/4
DRE100M 4
DRM100M 12

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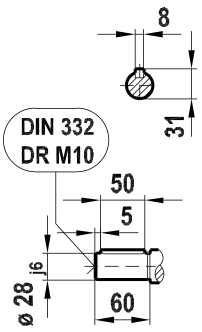
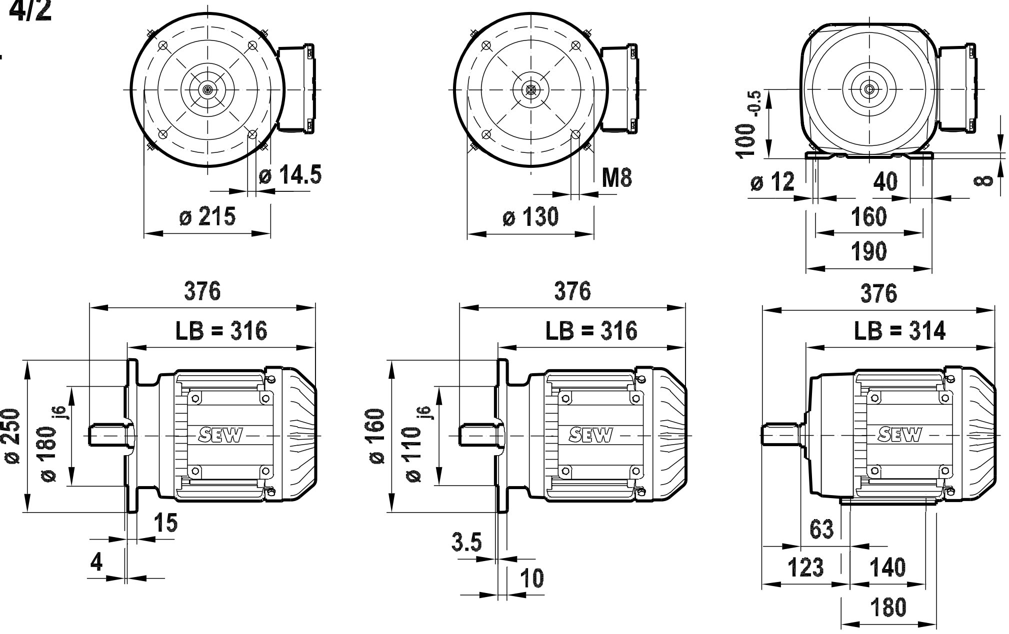
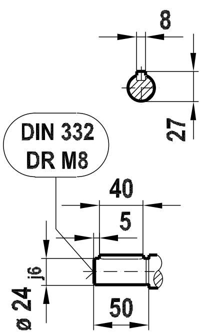
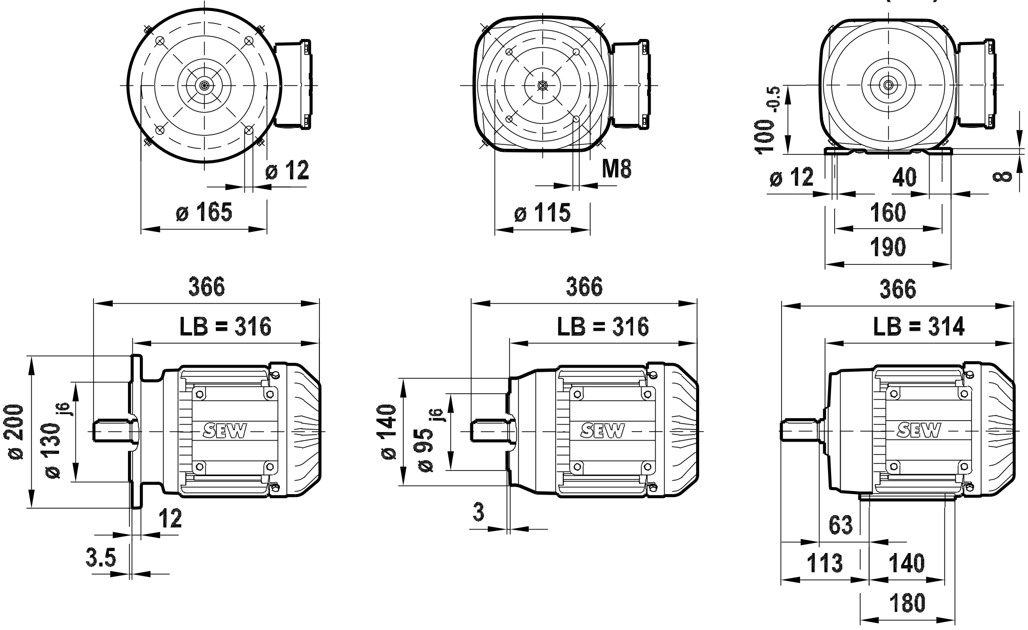




DRE100M 2; 6
DRP100M 2; 4

/FF (B5) FF165 — /FT (B14) FT115 — /FI.. (B3)





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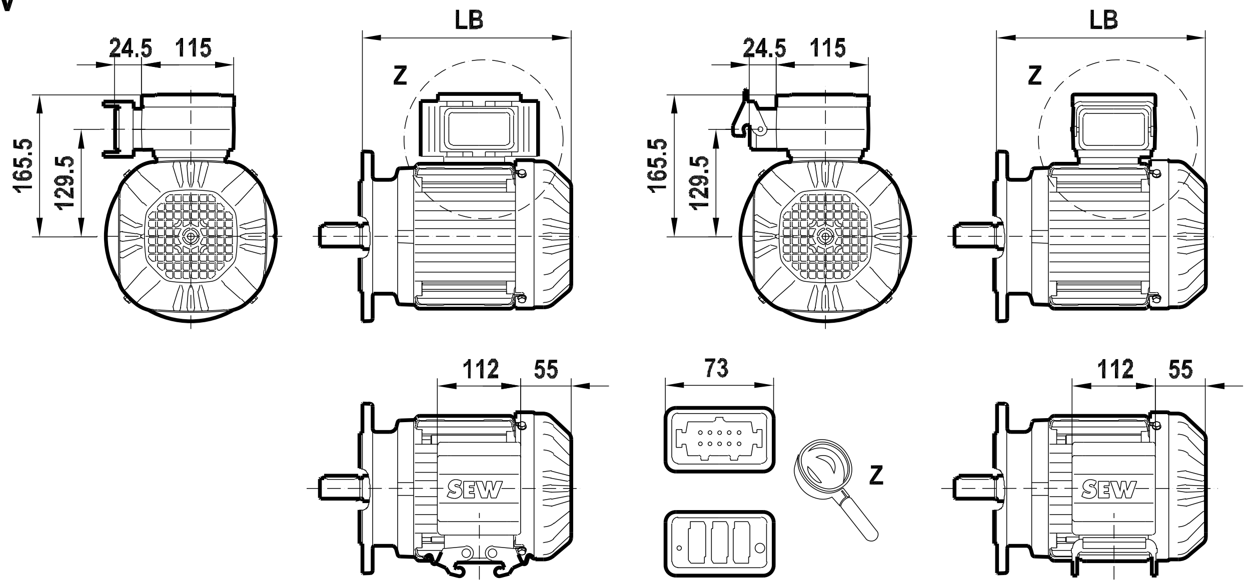
19290411/EN – 10/2014

DR.100M

08 197 03 06
2 (2)

/IV



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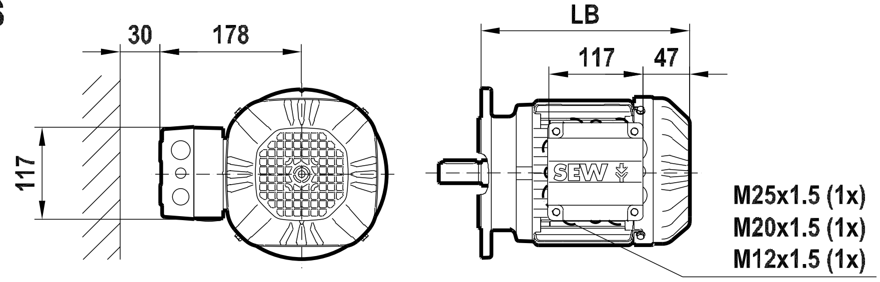

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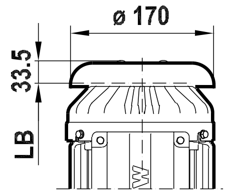

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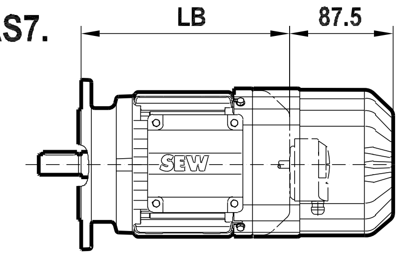

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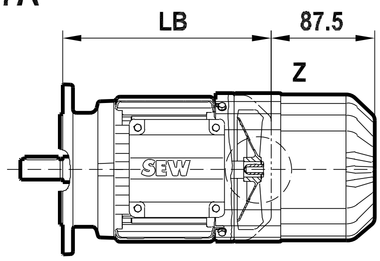

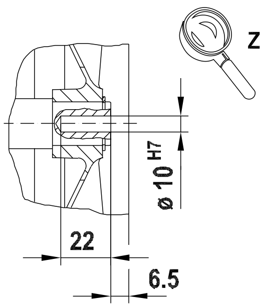

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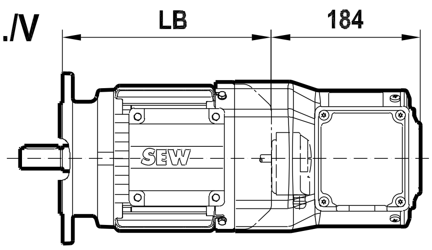

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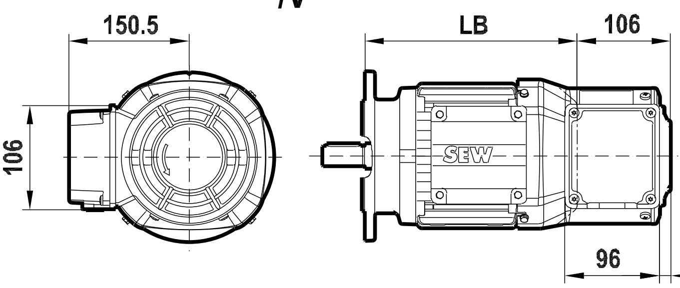

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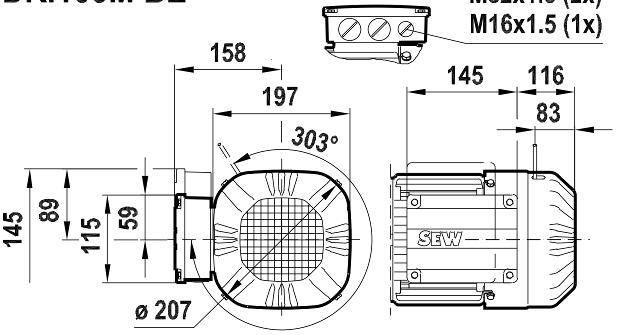
DR.100M BE



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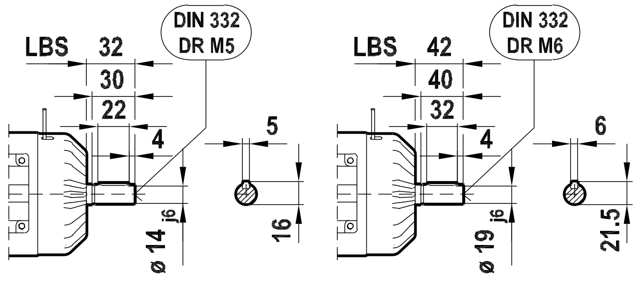
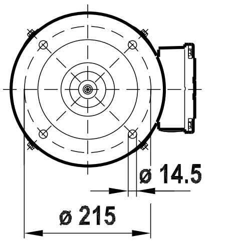
09 157 04 06
1 (2)



DRS100M 2; 4; 6; 4/2 8/2; 8/4
DRE100M 4
DRM100M 12

/FF (B5) FF215



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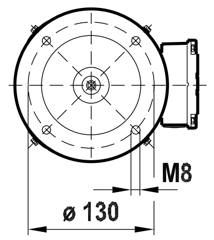

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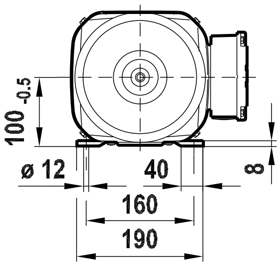

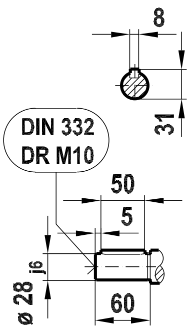

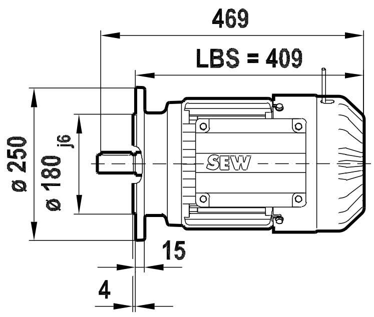

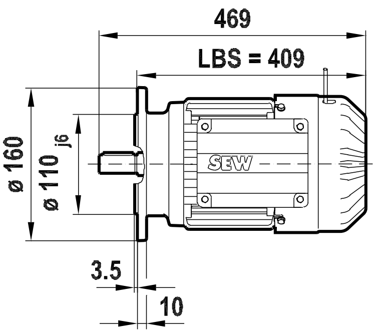

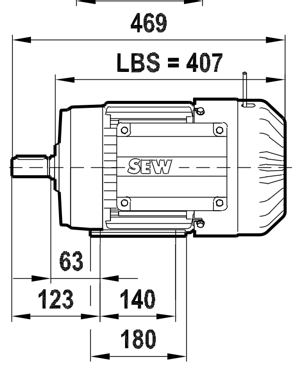

DRE100M 2; 6
DRP100M 2; 4

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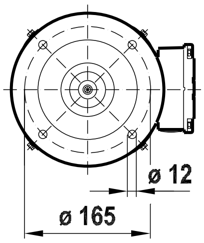

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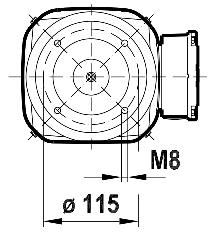

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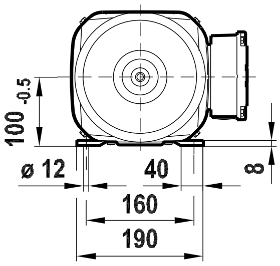

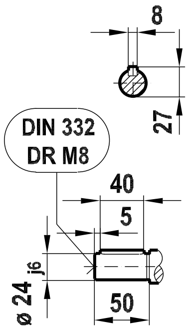

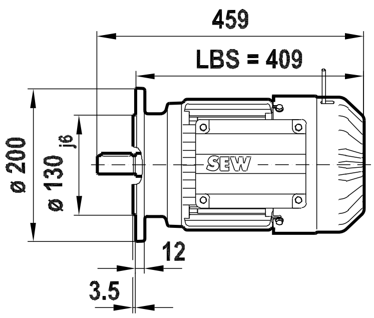

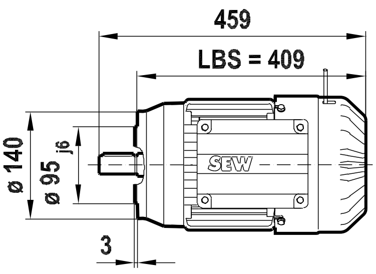

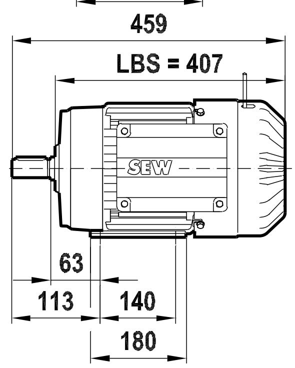

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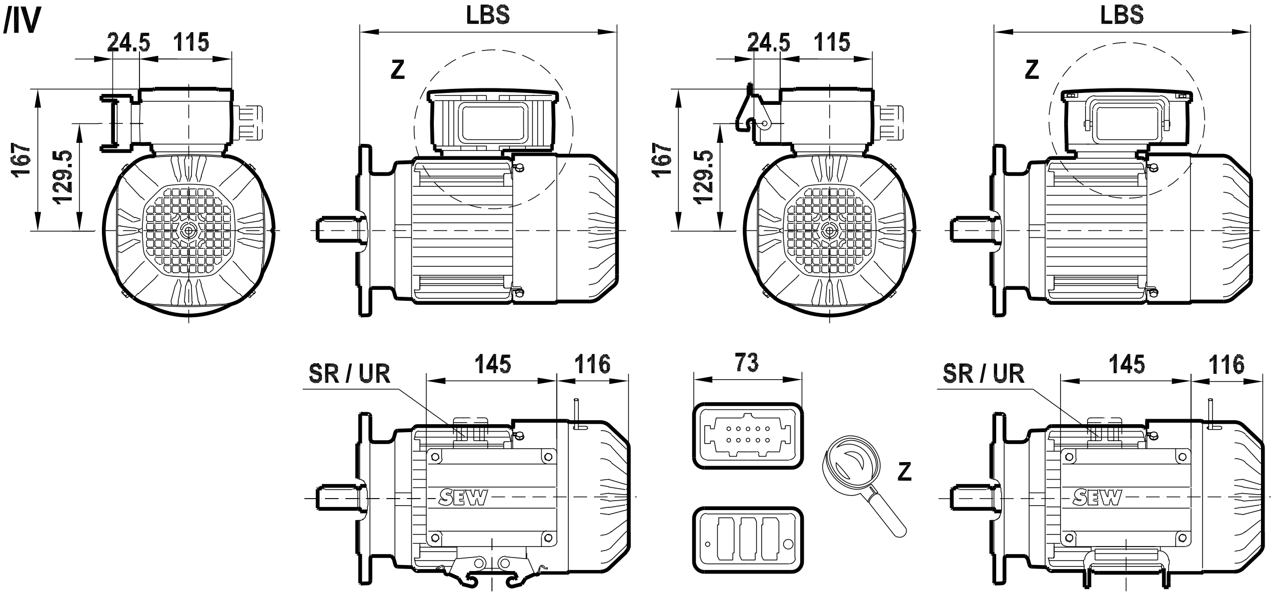
DR.100M BE

09 157 04 06
2 (2)

/IV



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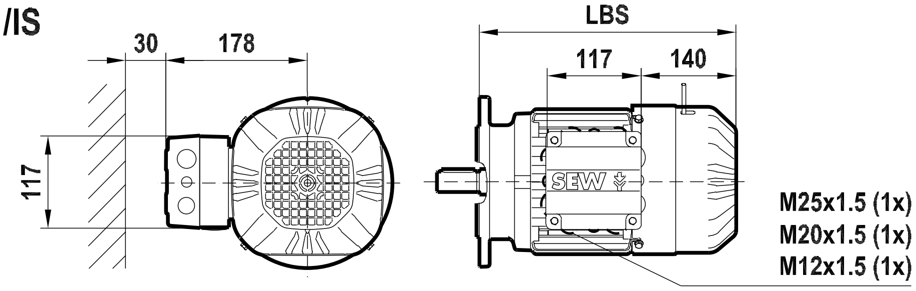

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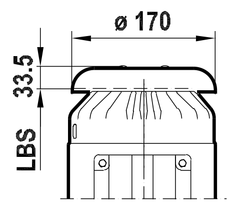

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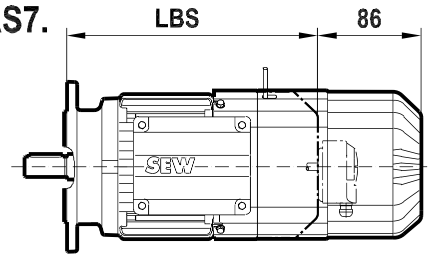

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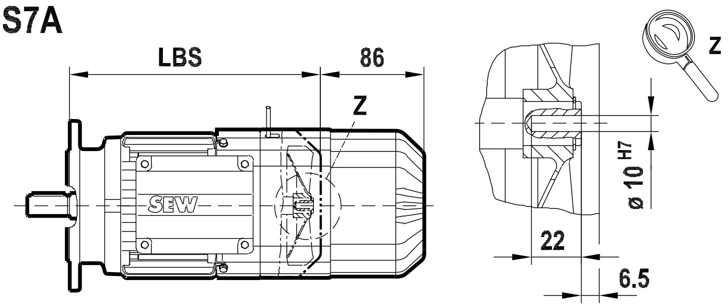

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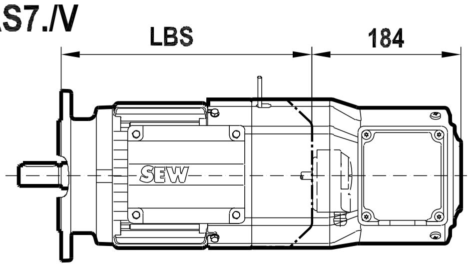

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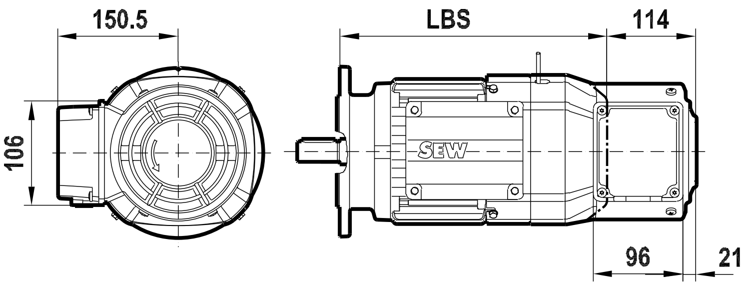

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DR.100L

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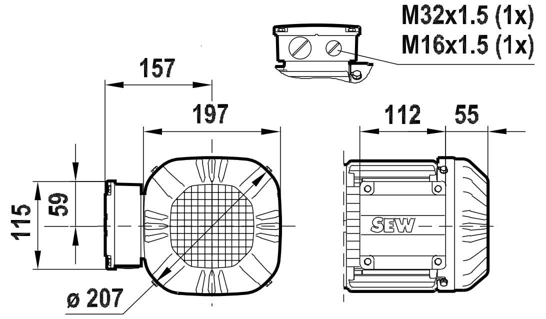
1 (2)



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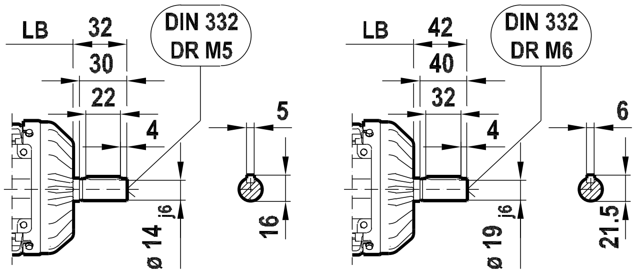
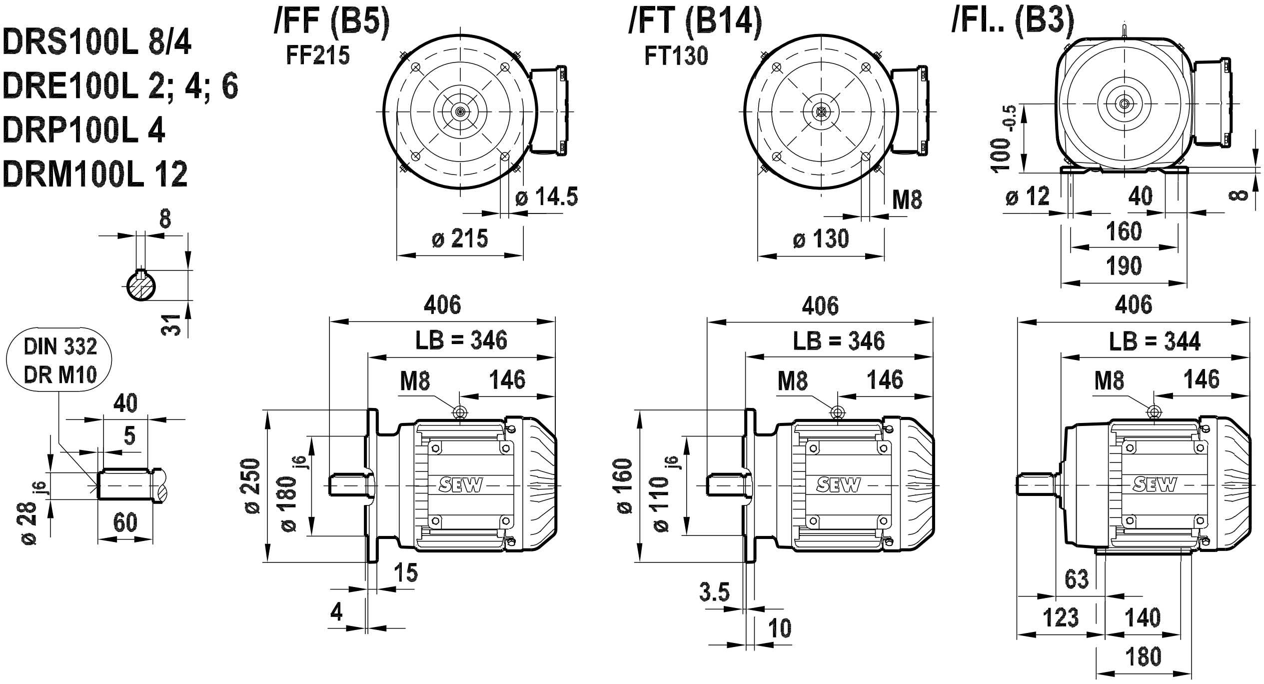


DRS100L 8/4
DRE100L 2; 4; 6
DRP100L 4
DRM100L 12

/FF (B5) FF215 — /FT (B14) FT130 — /FI.. (B3)



DRP100L 6
DRE100LC 6

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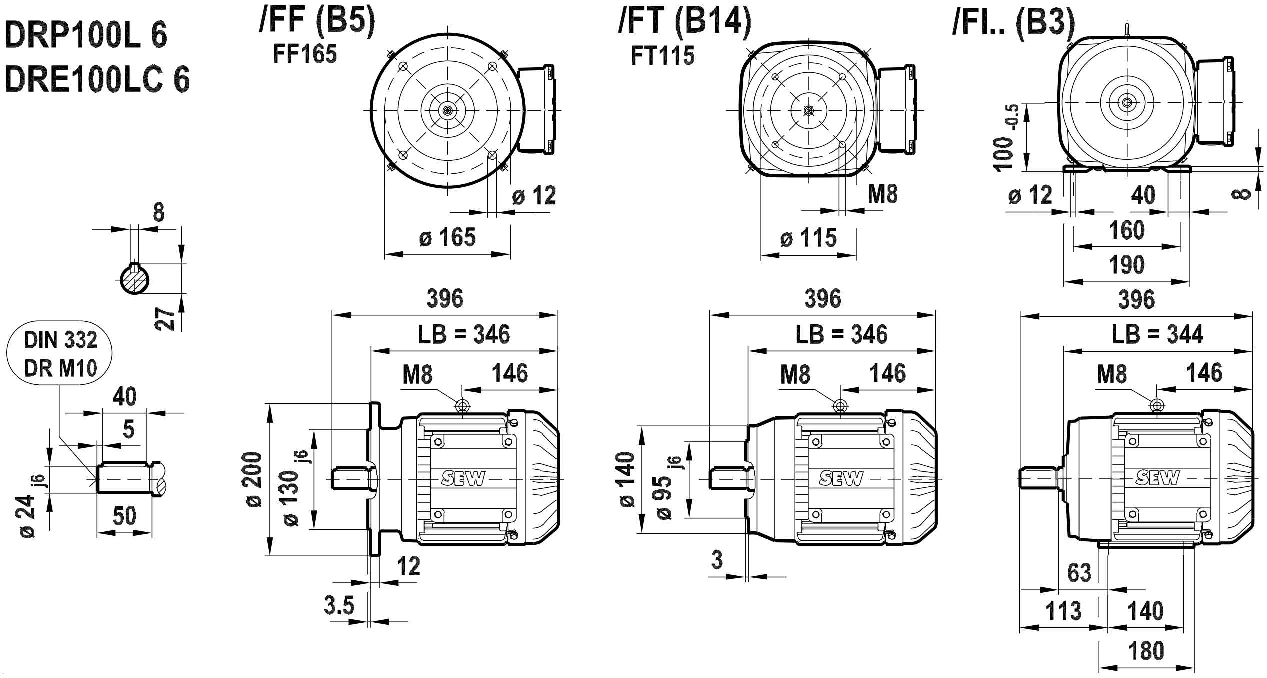

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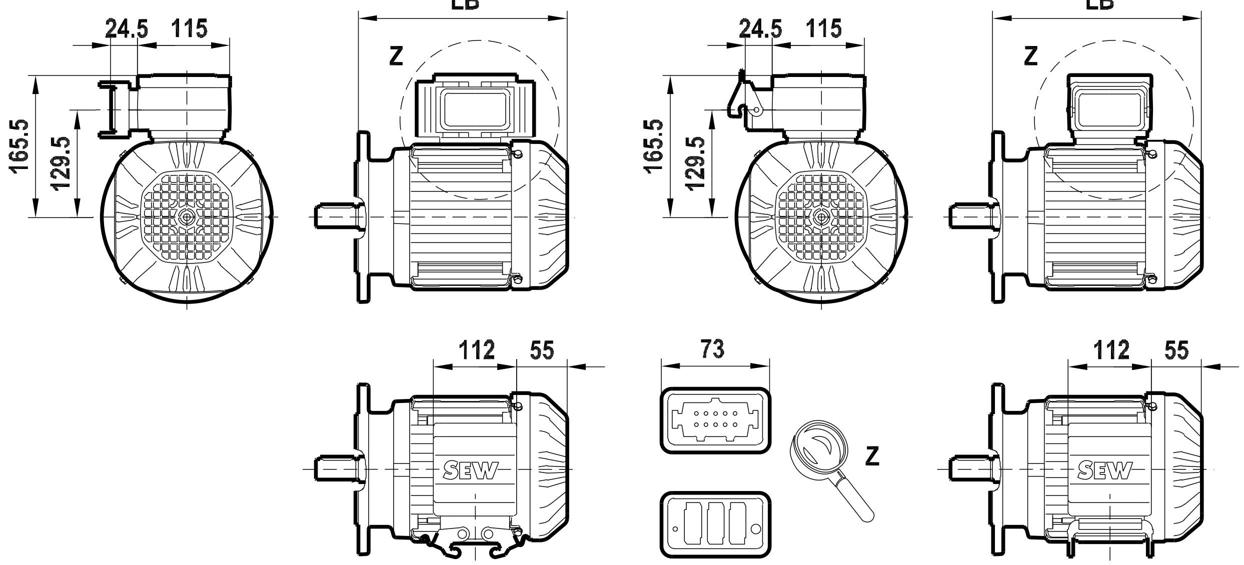
DR.100L

08 198 04 06
2 (2)

/IV



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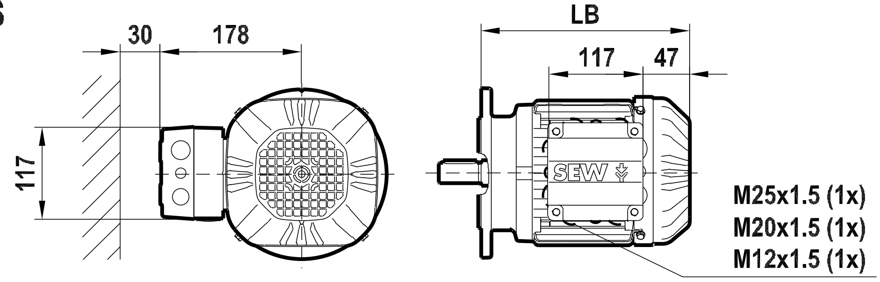

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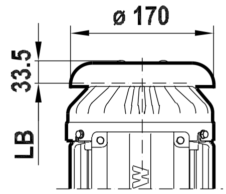

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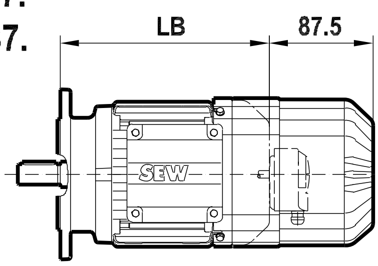

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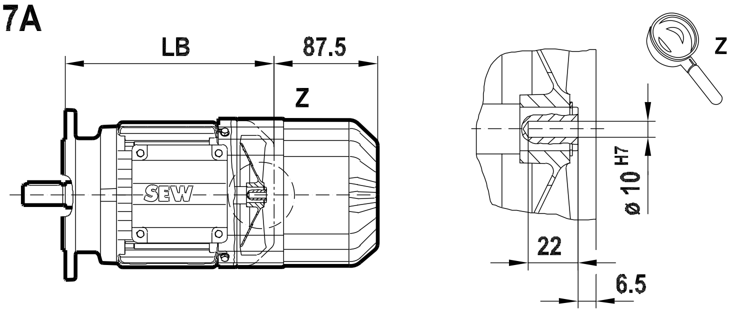

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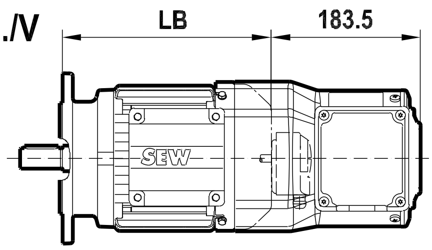

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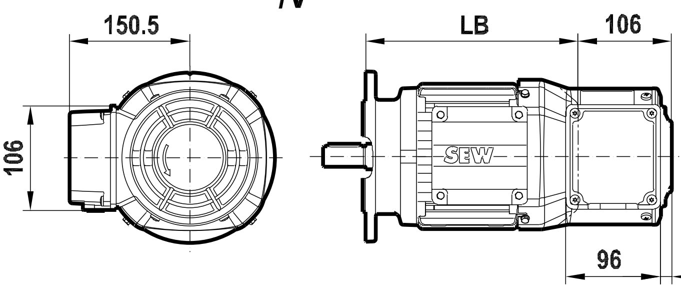

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DR.100L BE

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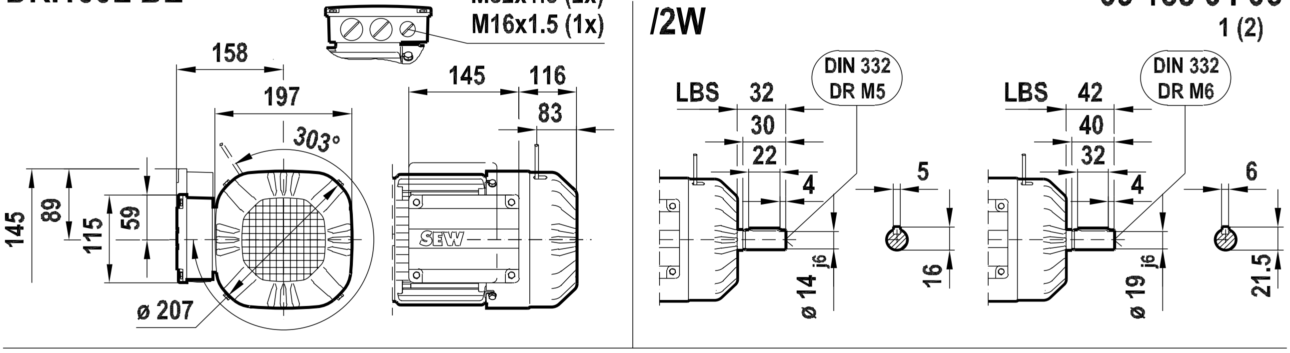
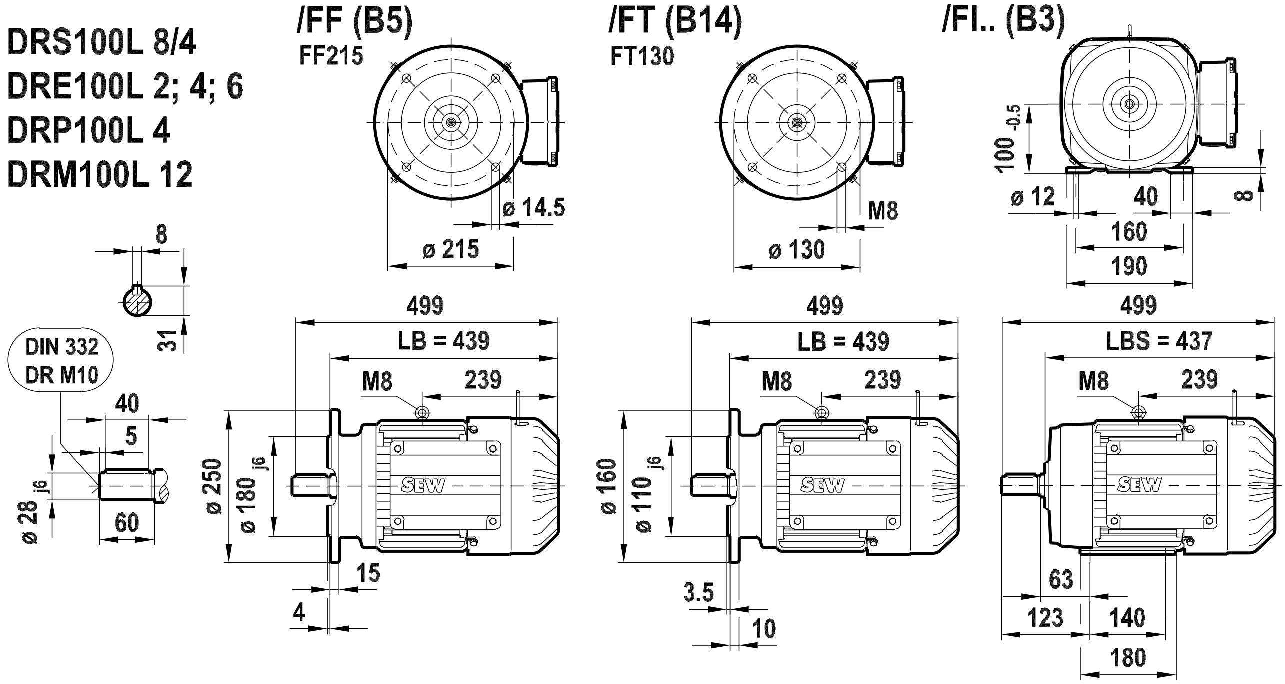
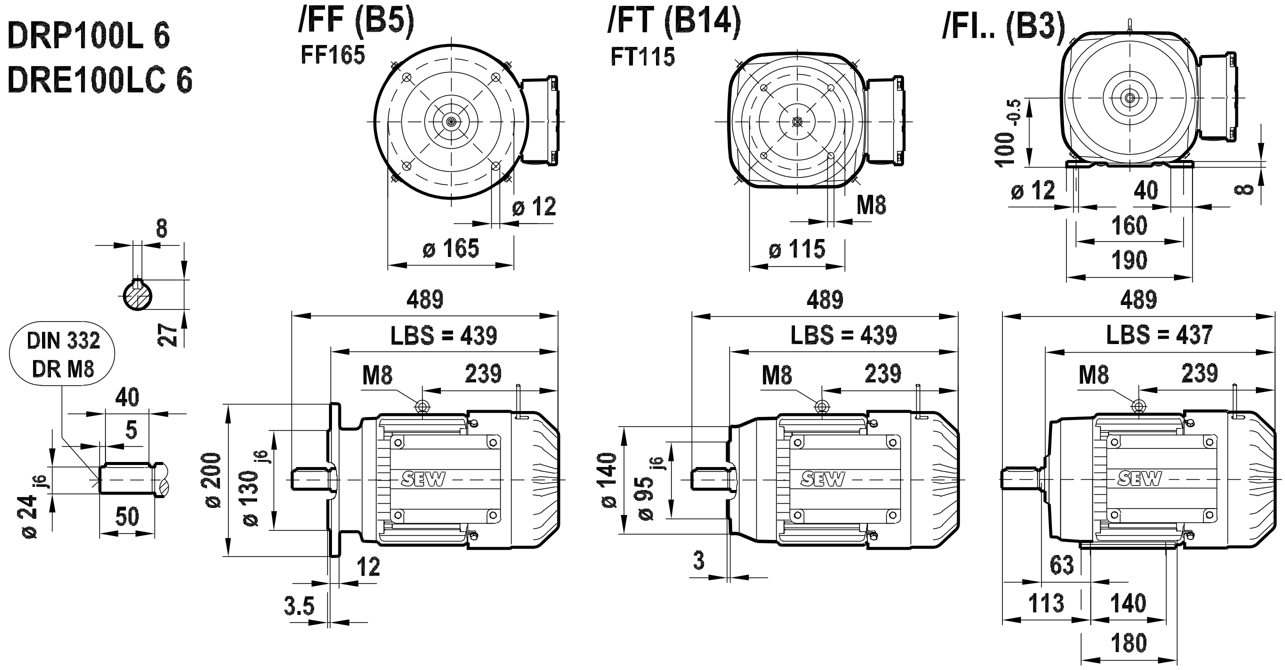


DRS100L 8/4
DRE100L 2; 4; 6
DRP100L 4
DRM100L 12



DRP100L 6
DRE100LC 6



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DR.100L BE

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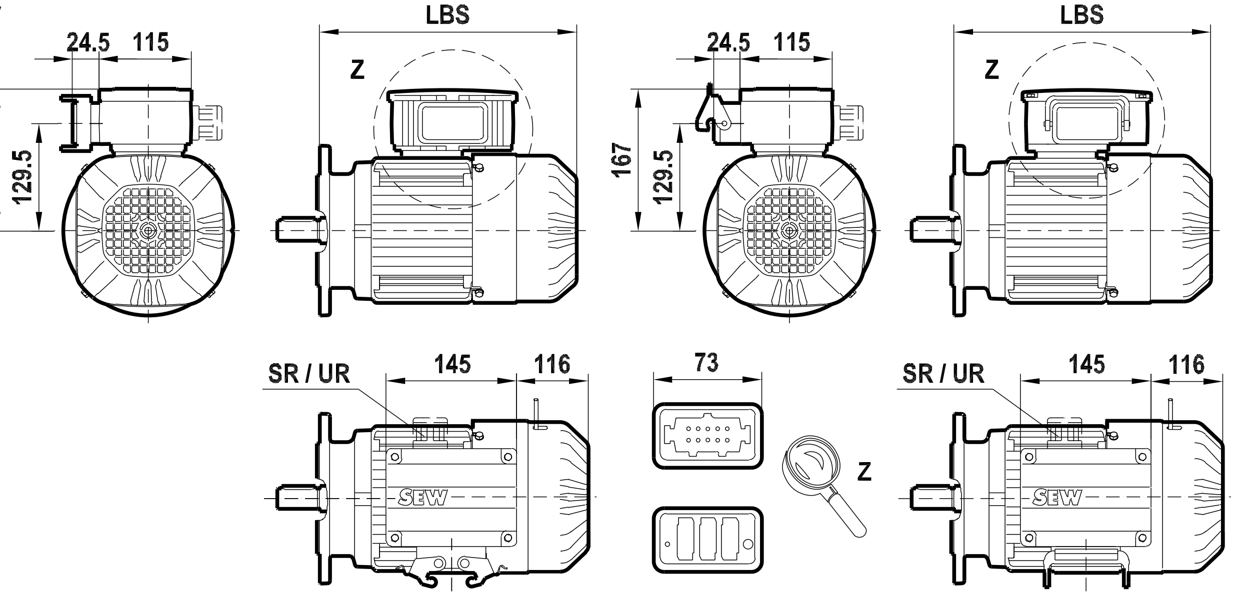
2 (2)

/IV



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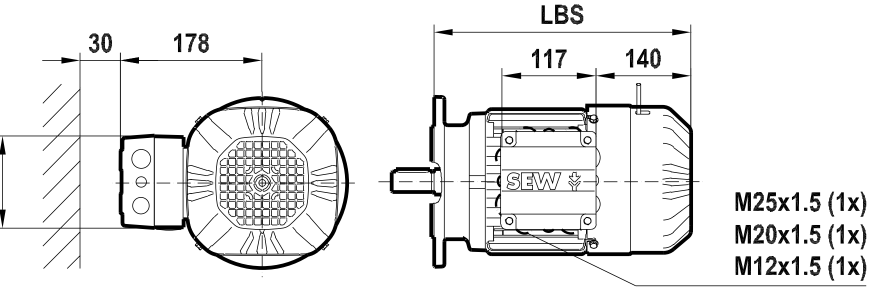

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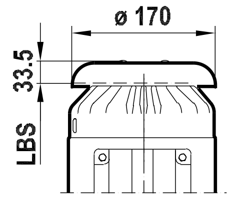

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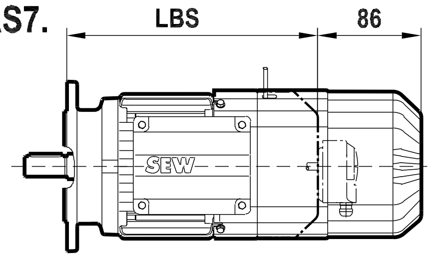

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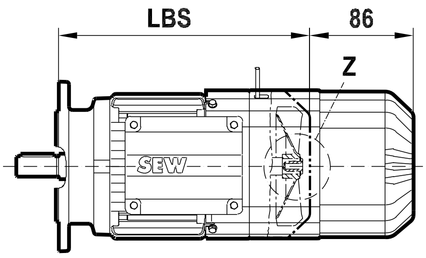

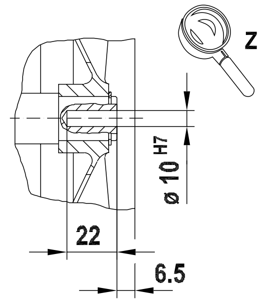

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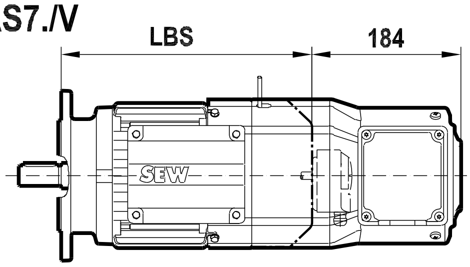

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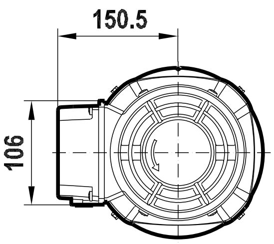

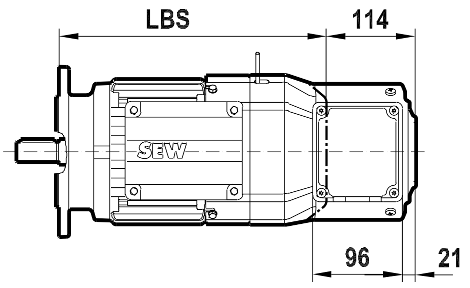

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DR.100LC

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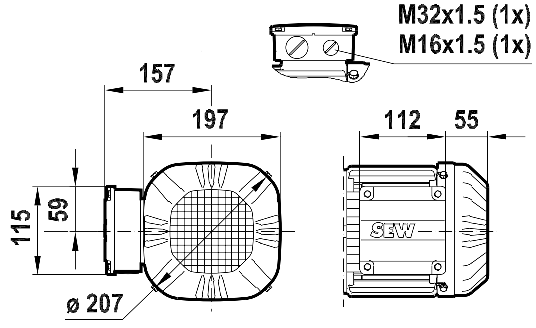
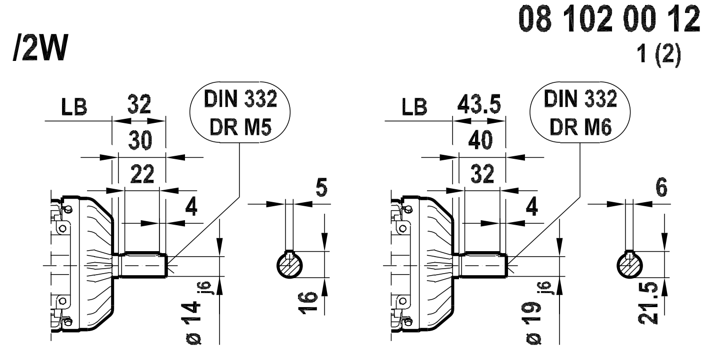
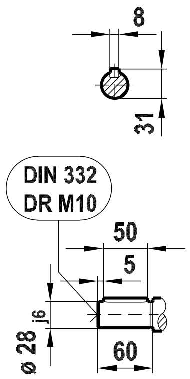
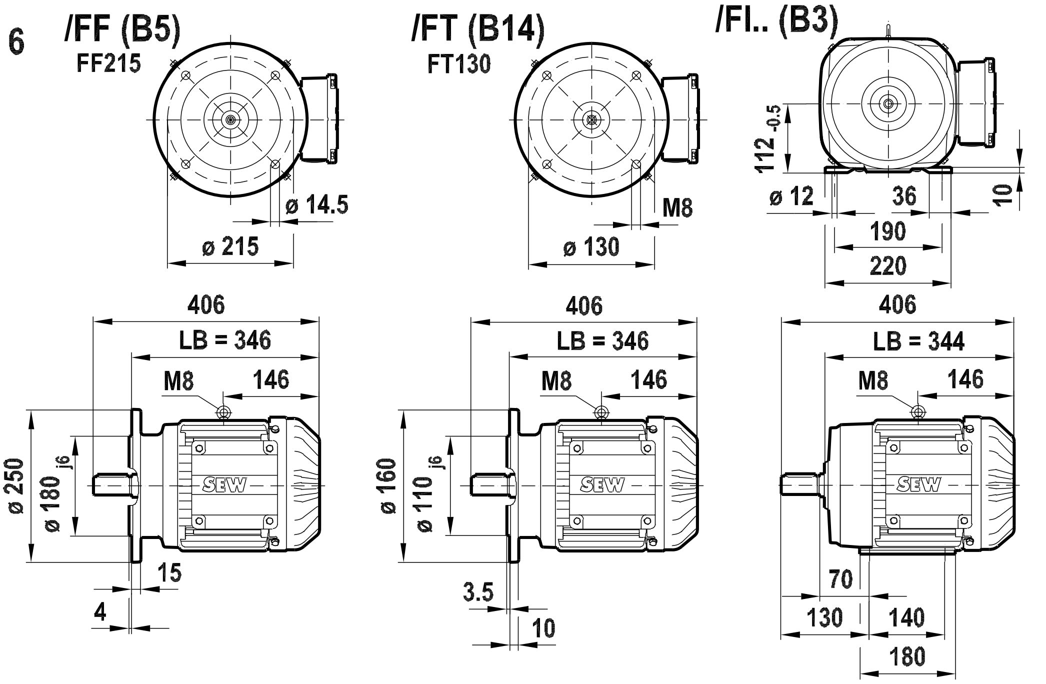
1 (2)



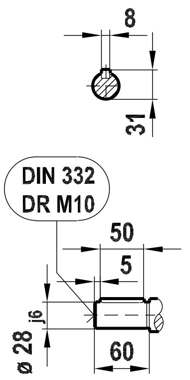


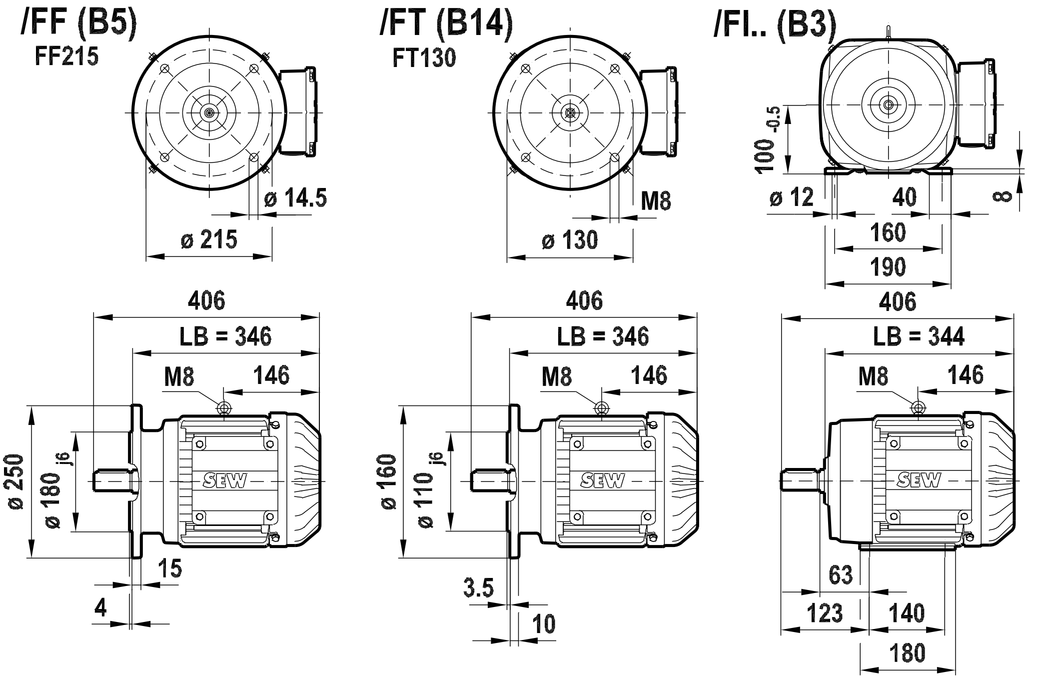
DRS100LC 2; 4; 6
DRS100L 4/2





DRE100LC 4
DRP100LC 2





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DR.100LC

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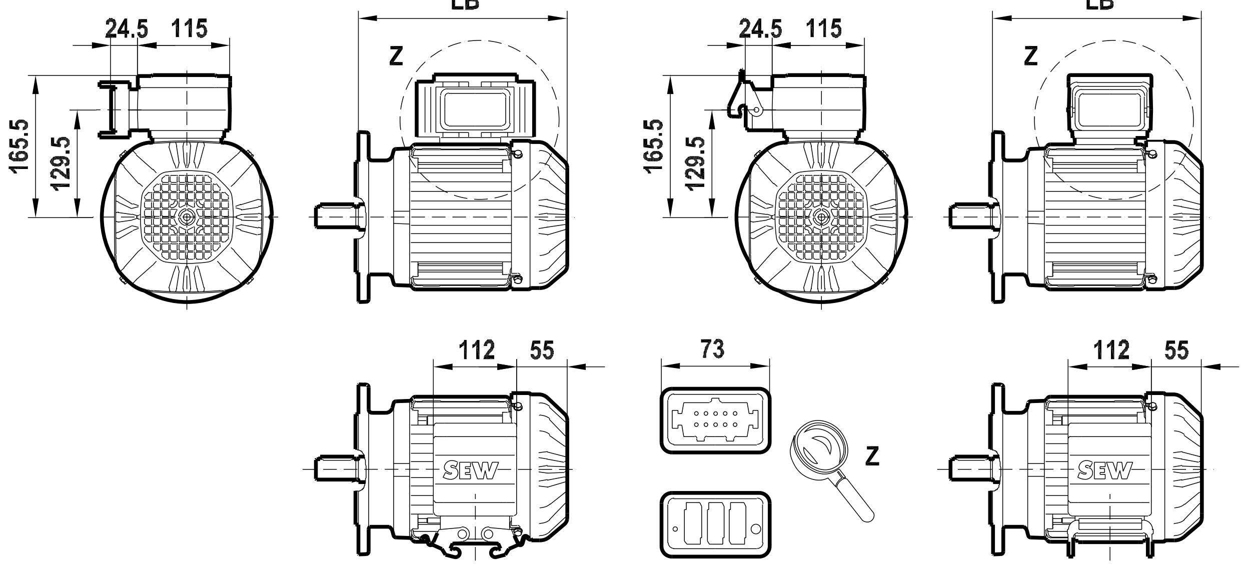
2 (2)

/IV



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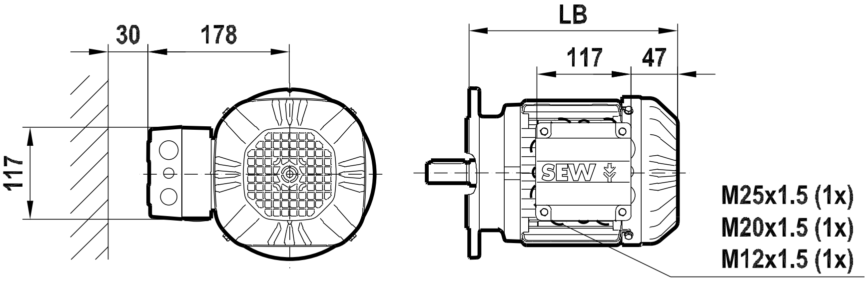

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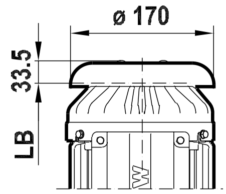

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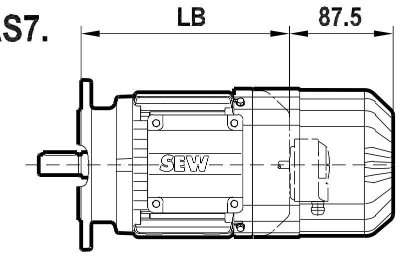

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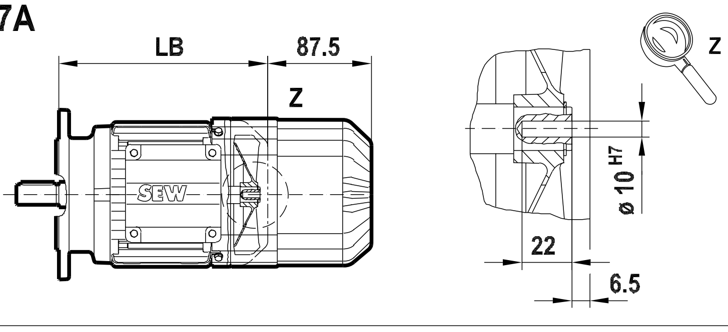

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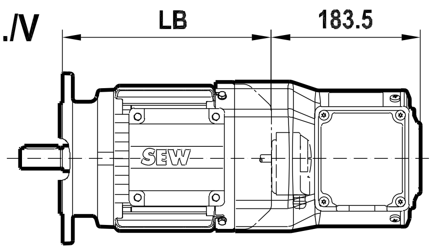

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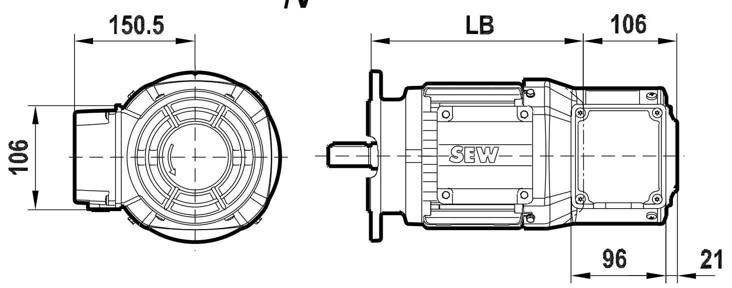

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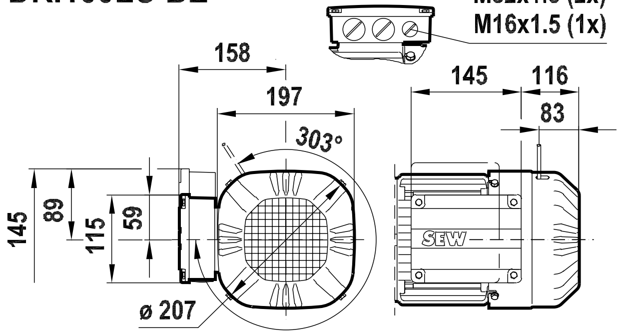
19290411/EN – 10/2014

DR.100LC BE

09 756 00 12
1 (2)



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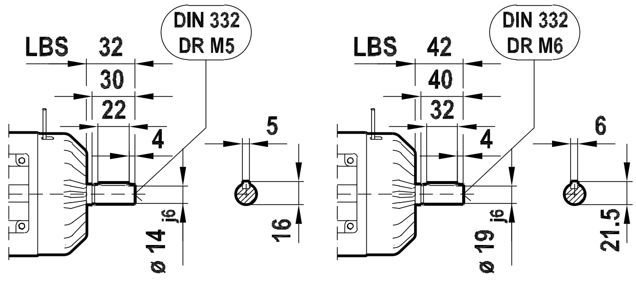
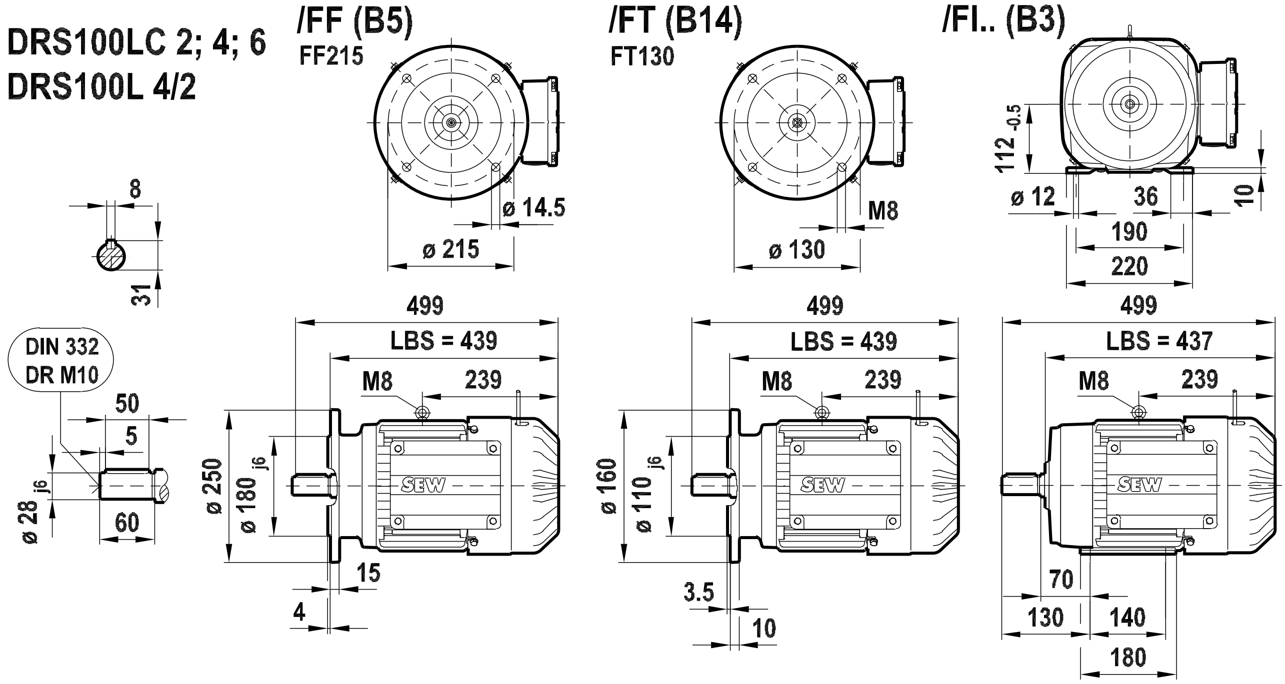
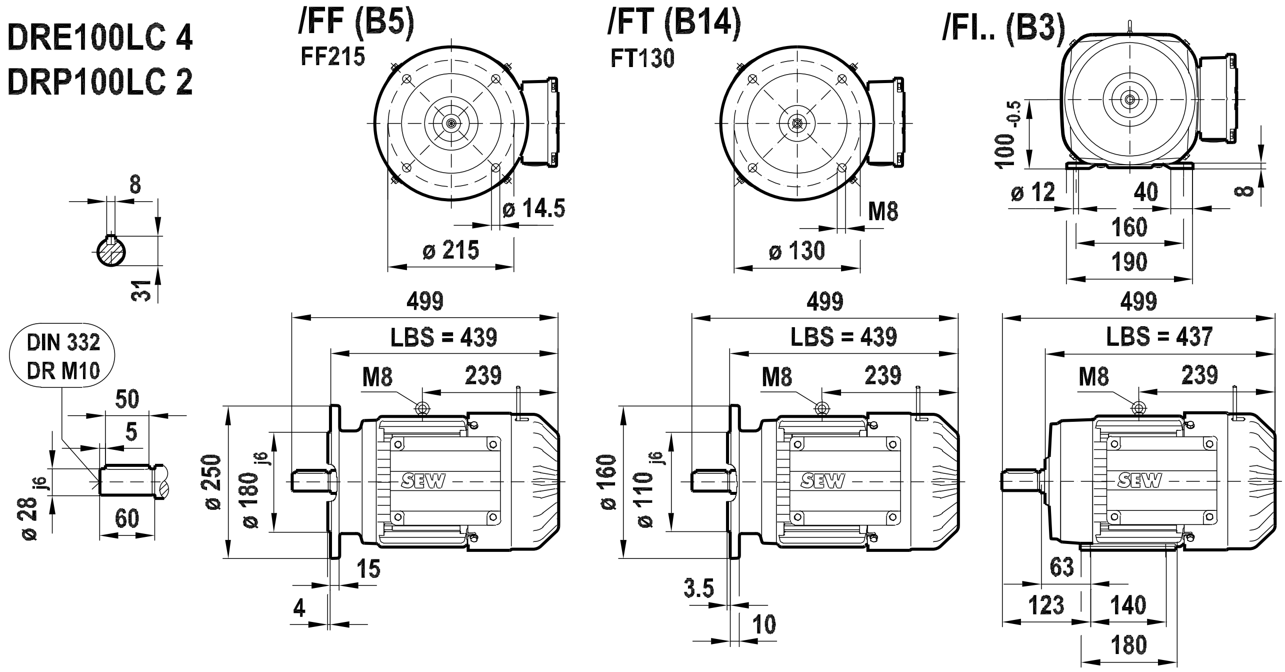


DRS100LC 2; 4; 6
DRS100L 4/2



DRE100LC 4
DRP100LC 2



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DR.100LC BE

09 756 00 12
2 (2)

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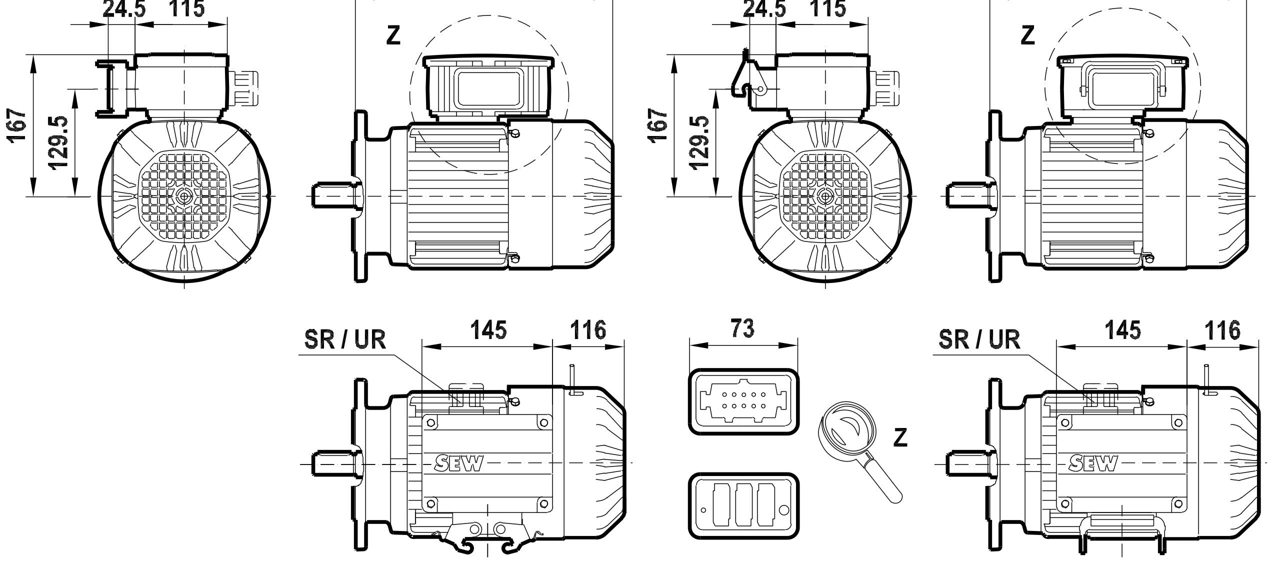

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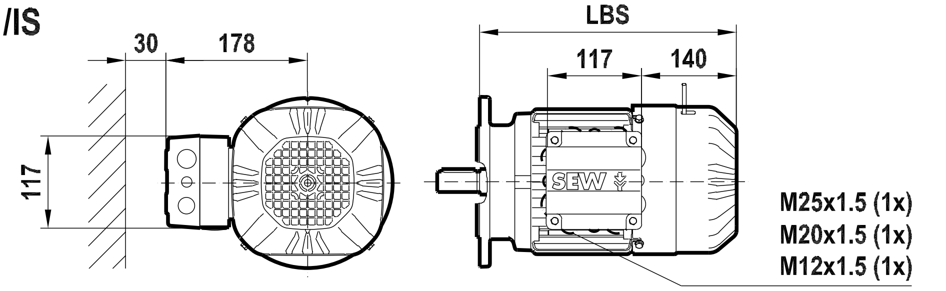

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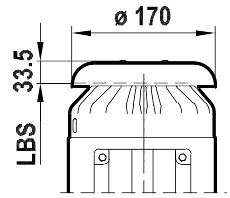

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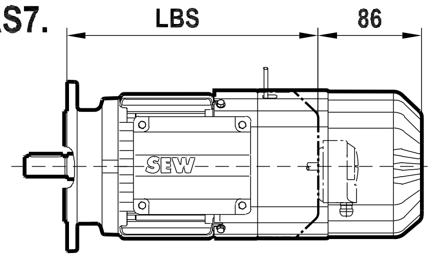

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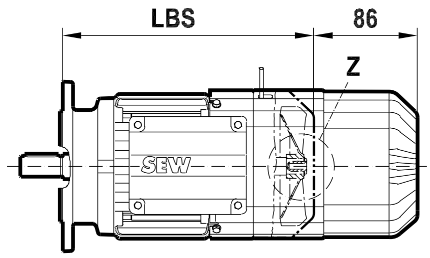

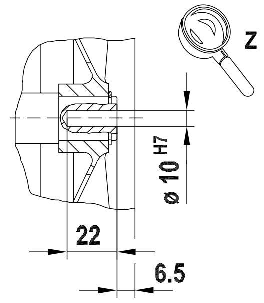

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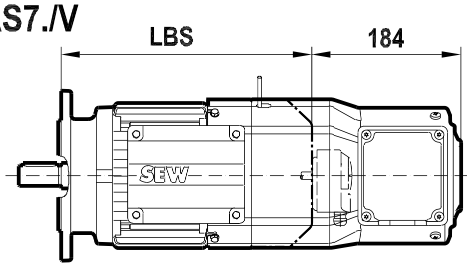

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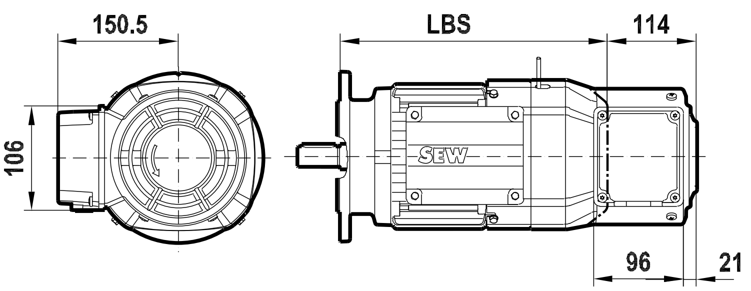

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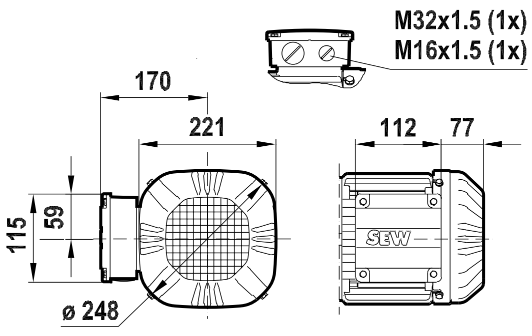
19290411/EN – 10/2014

DR.112M

08 276 04 07
1 (2)



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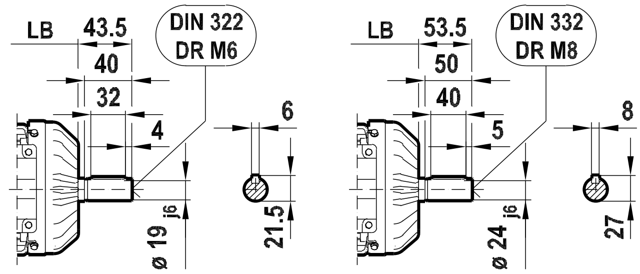
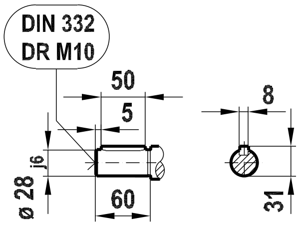


DRS112M 2; 4; 6; 8/2; 8/4
DRE112M 2; 4; 6
DRP112M 2; 4; 6



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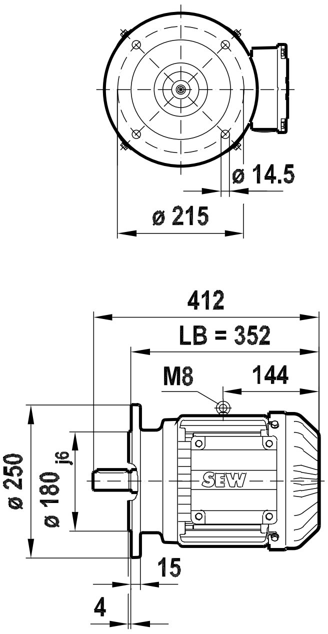

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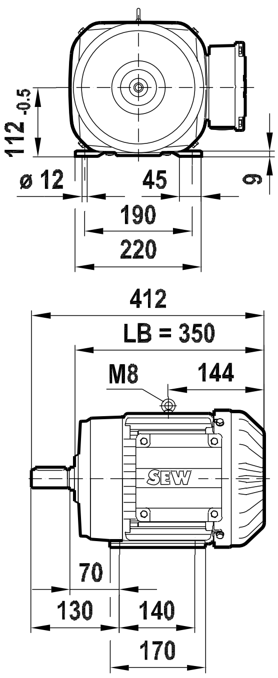

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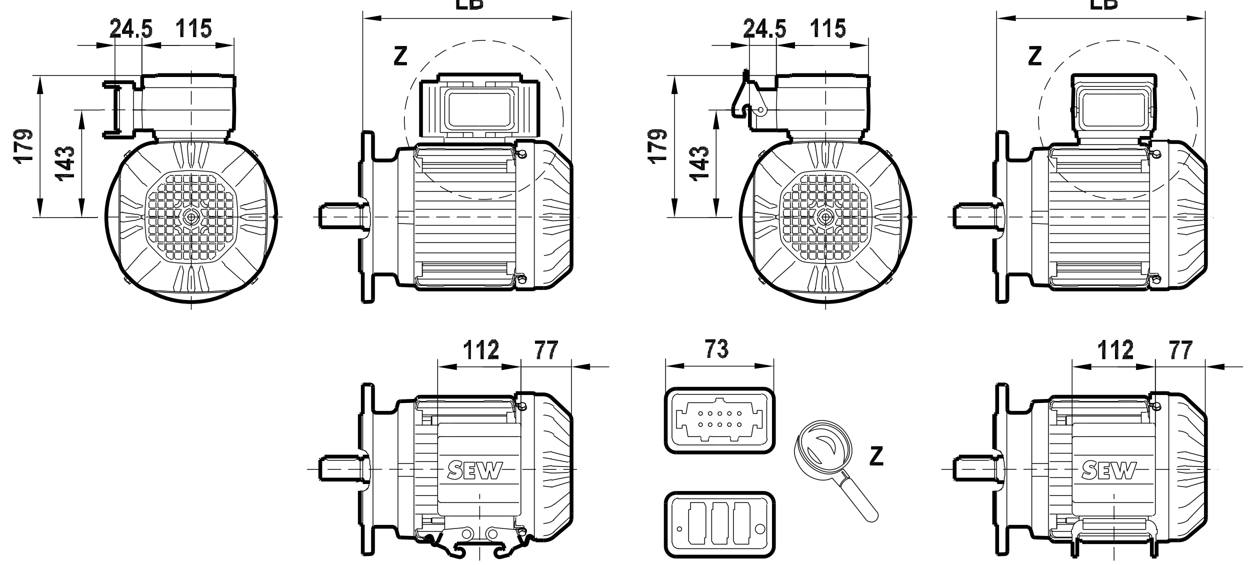
DR.112M

08 276 04 07
2 (2)

/IV



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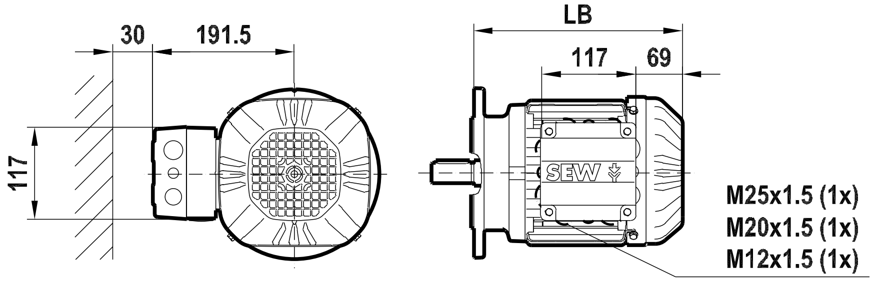

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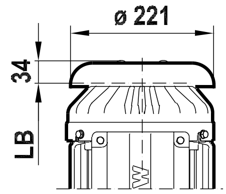

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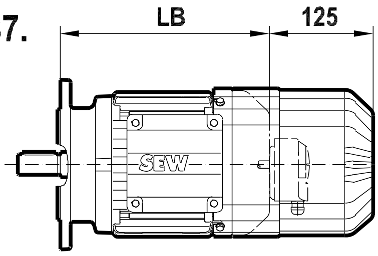

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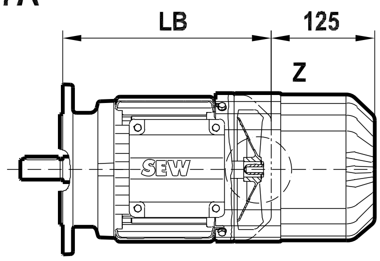

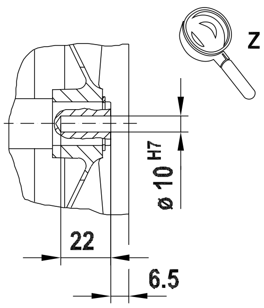

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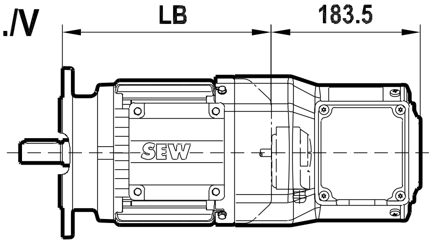

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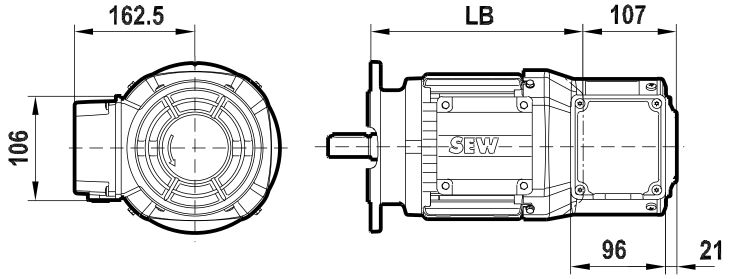

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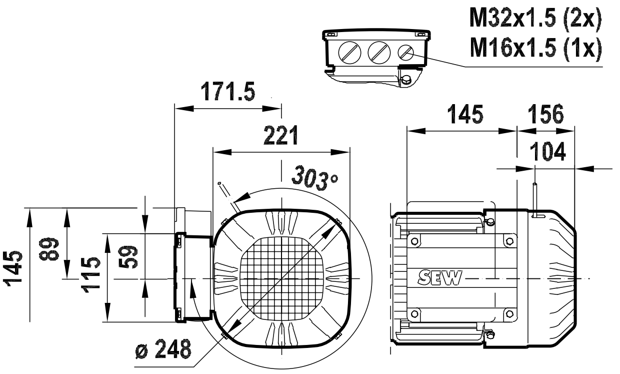
DR.112M BE

09 197 04 07
1 (2)



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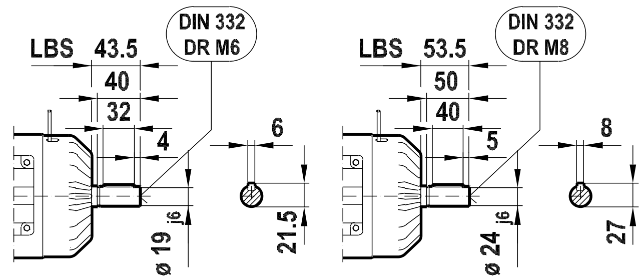
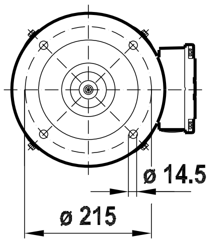


DRS112M BE 2; 4; 6; 8/2; 8/4
DRE112M BE 2; 4; 6
DRP112M BE 2; 4; 6

/FF (B5) FF215



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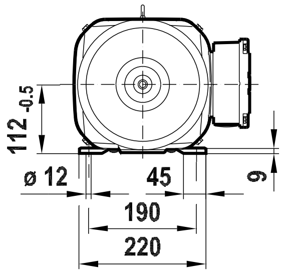

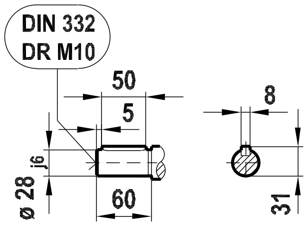

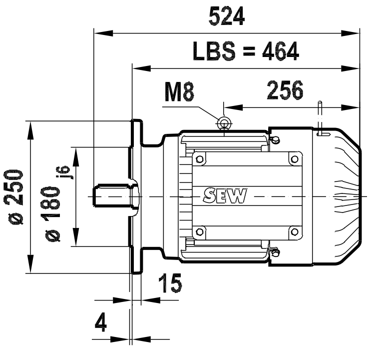

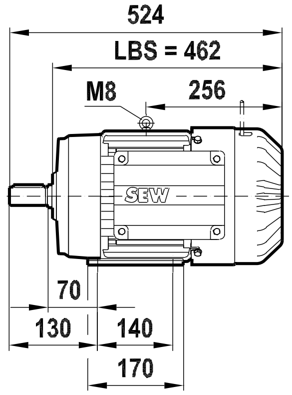

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19290411/EN – 10/2014

DR.112M BE

09 197 04 07
2 (2)

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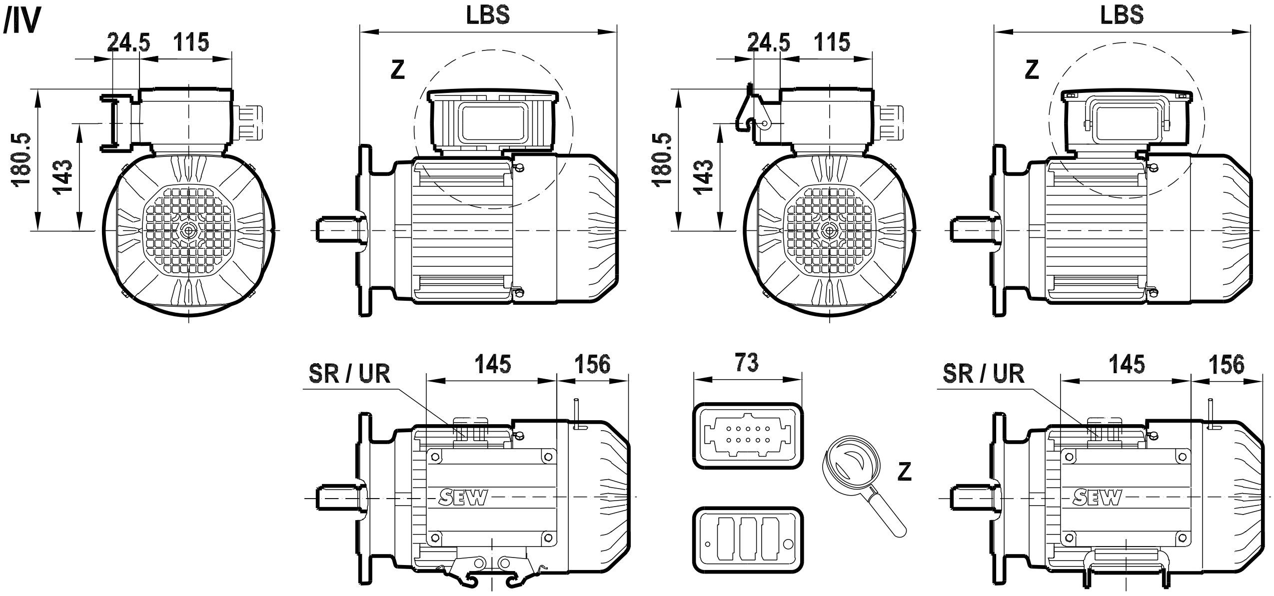

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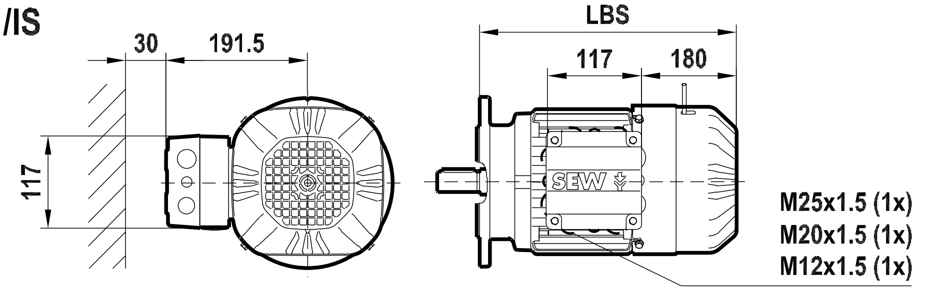

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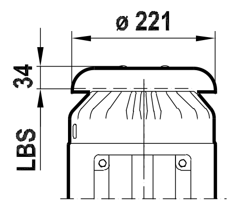

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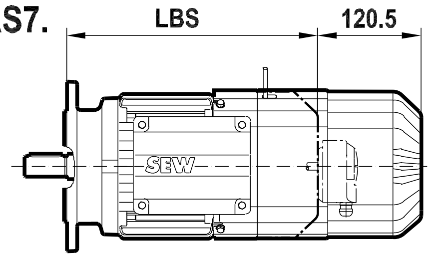

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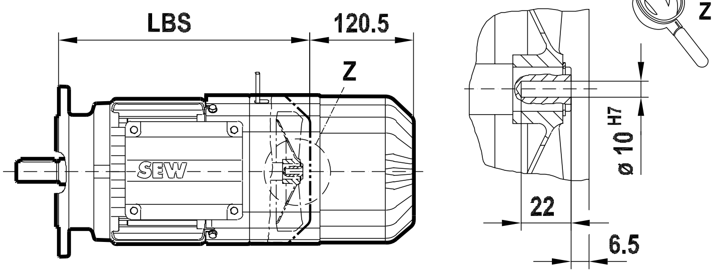

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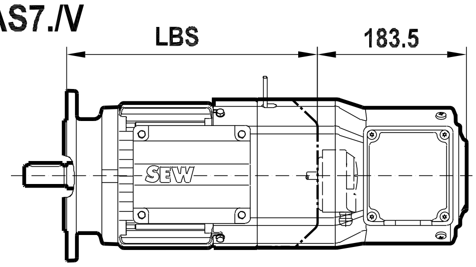

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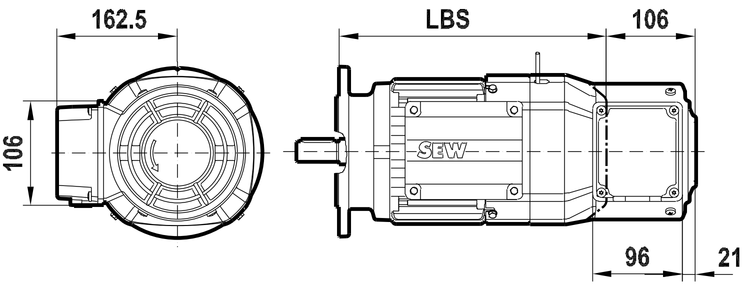

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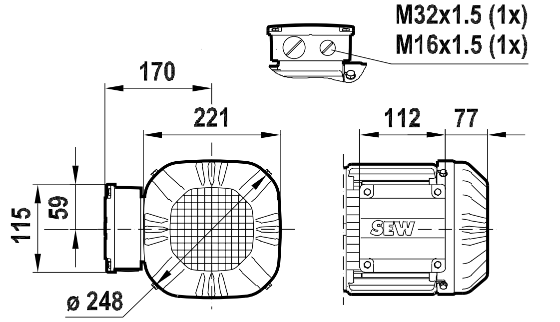
DR.132S



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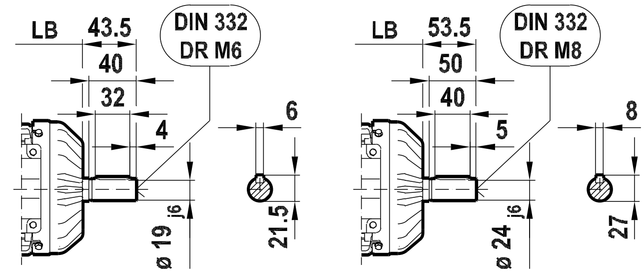
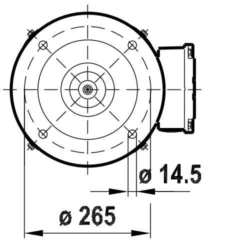
08 277 04 07
1 (2)



DRS132S 2; 4; 6; 4/2; 8/4
DRE132S 2; 6
DRM132S 12

/FF (B5)
FF265



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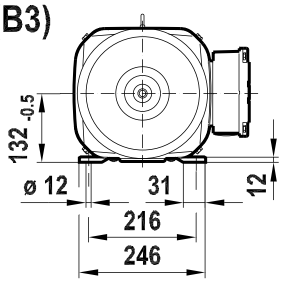

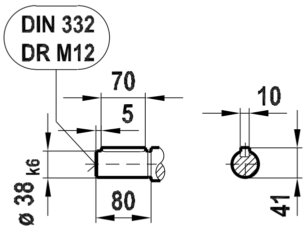

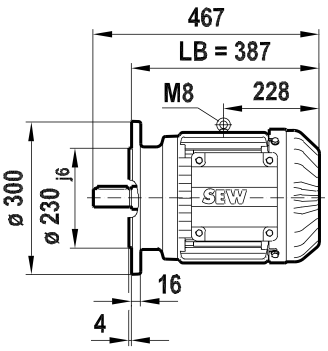

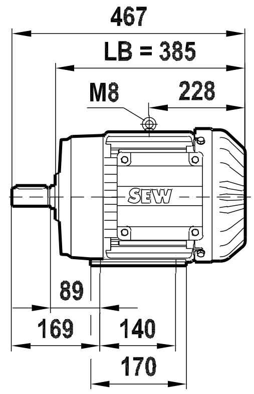

DRE132S 4
DRP132S 2; 6

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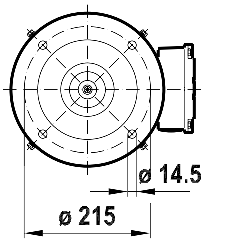
FF215



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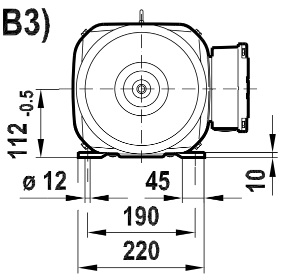

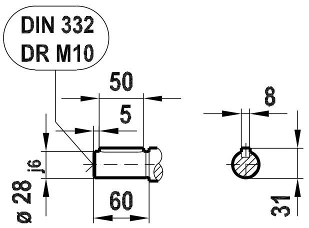

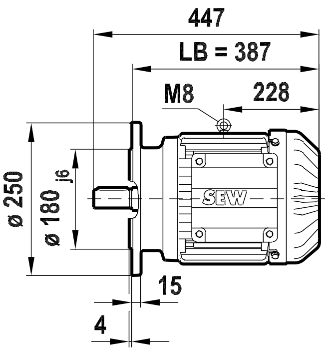

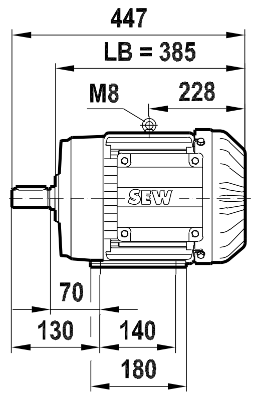

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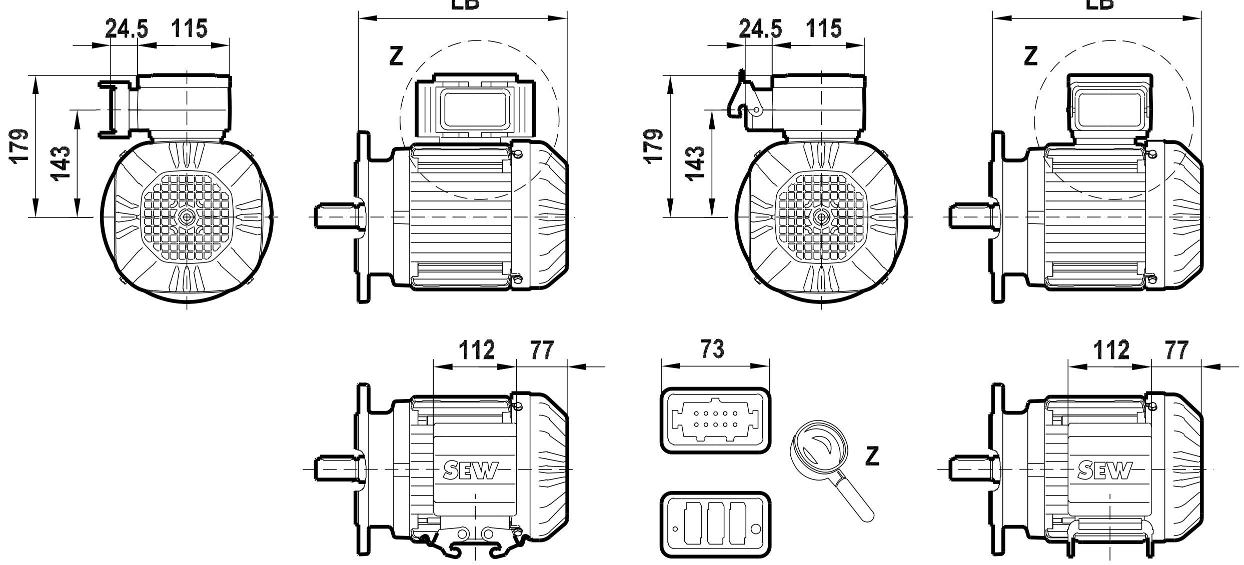
19290411/EN – 10/2014

DR.132S

08 277 04 07
2 (2)

/IV



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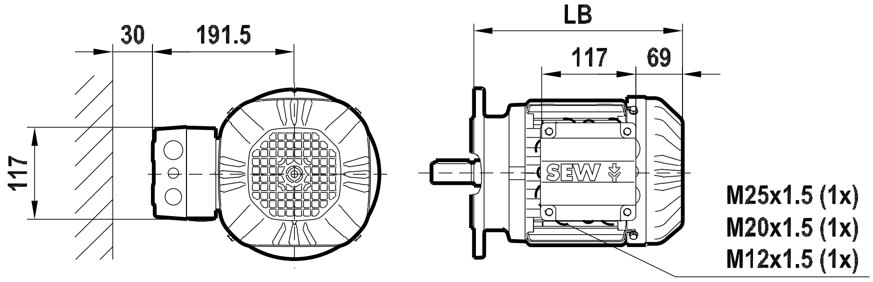

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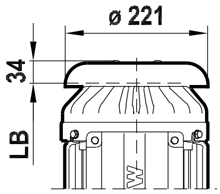

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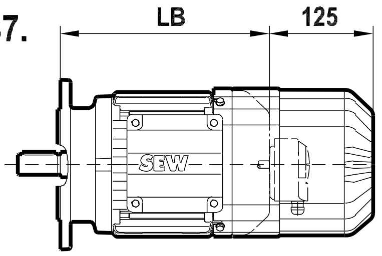

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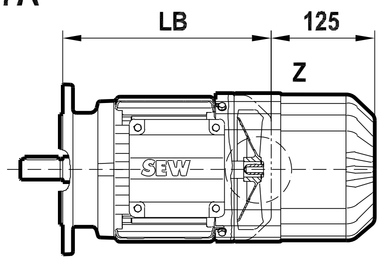

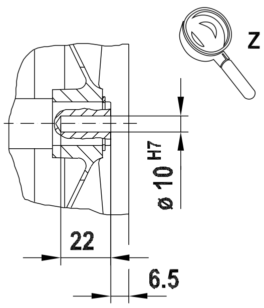

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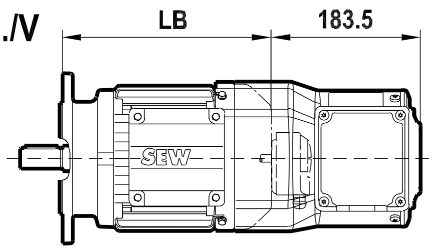

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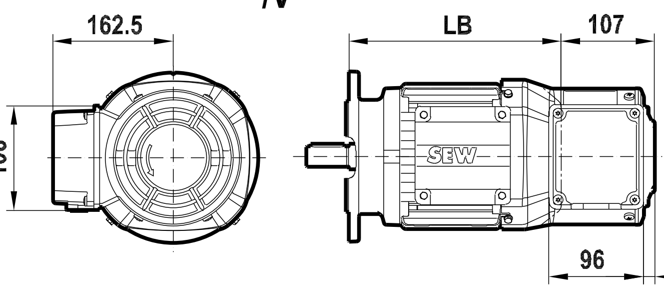

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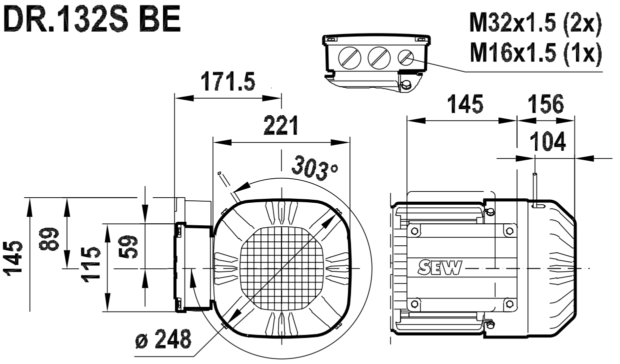
19290411/EN – 10/2014

DR.132S BE

09 198 04 07
1 (2)



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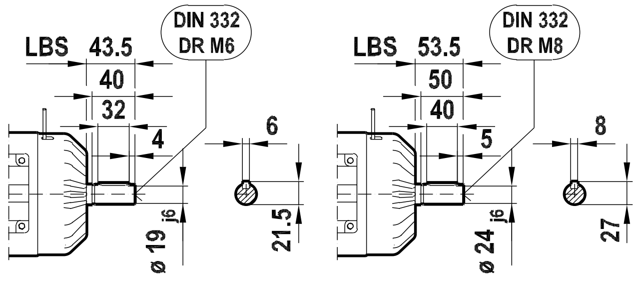

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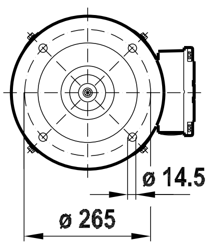
DRS132S 2; 4; 6; 4/2; 8/4
DRE132S 2; 6
DRM132S 12

/FF (B5)
FF265



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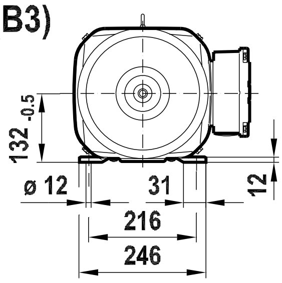
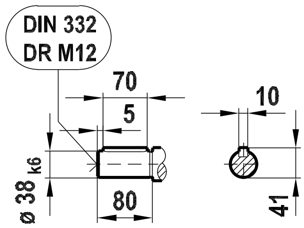
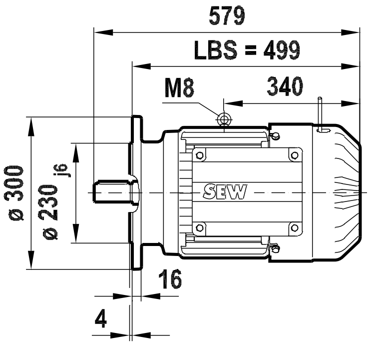
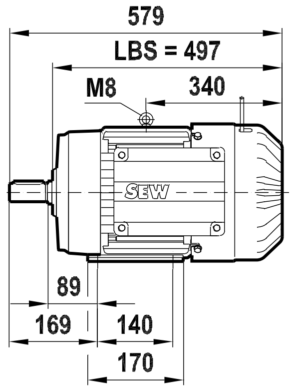


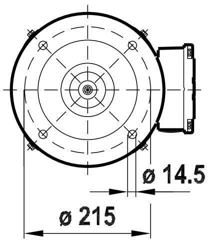






DRE132S 4
DRP132S 2; 6

/FF (B5)
FF215



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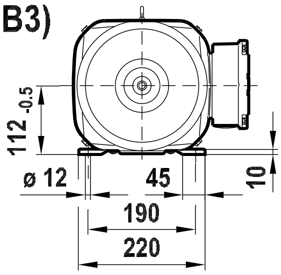

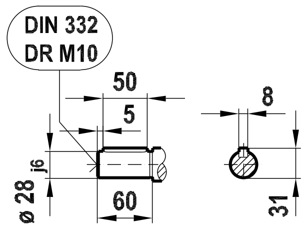

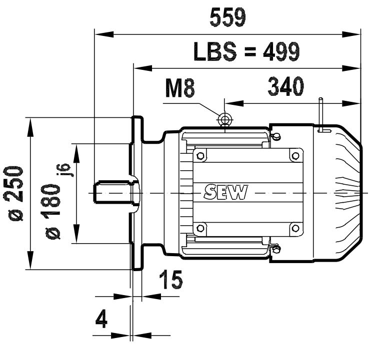

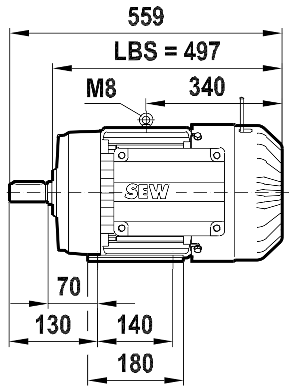

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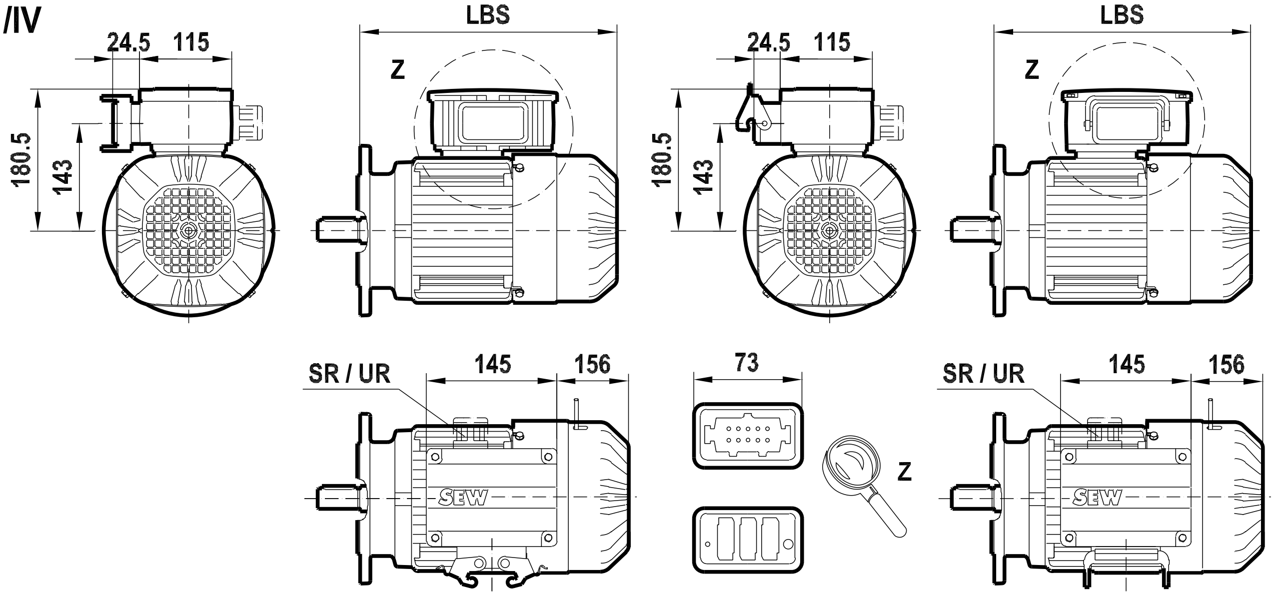
DR.132S BE

09 198 04 07
2 (2)

/IV



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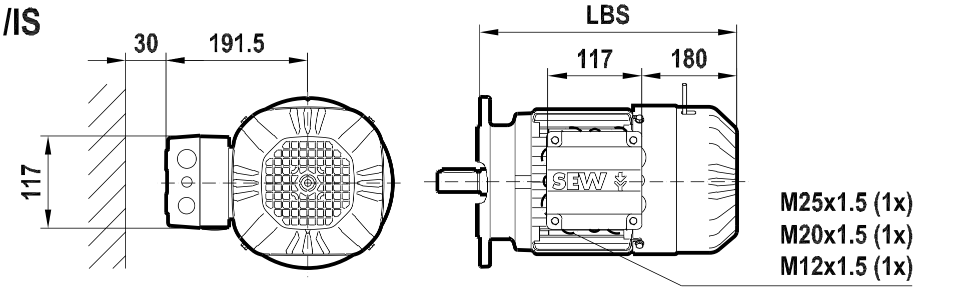

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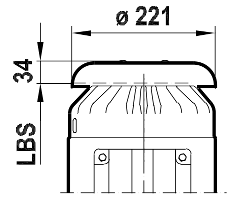

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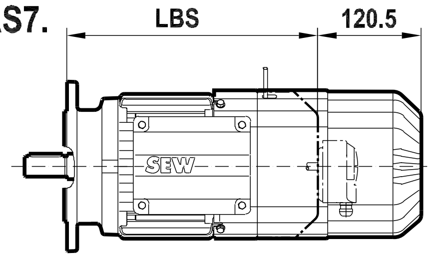

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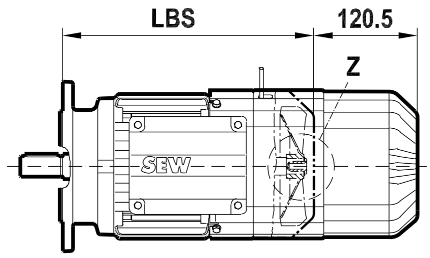

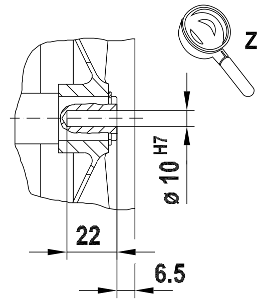

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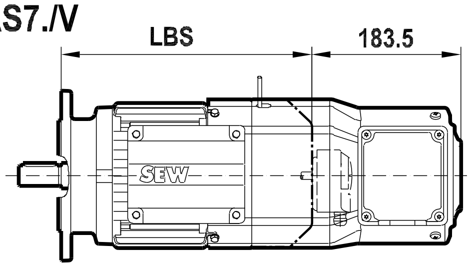

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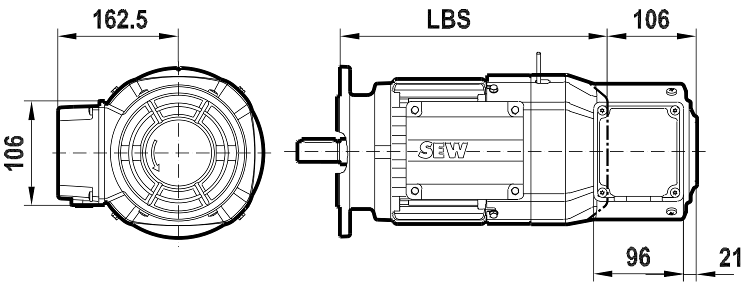

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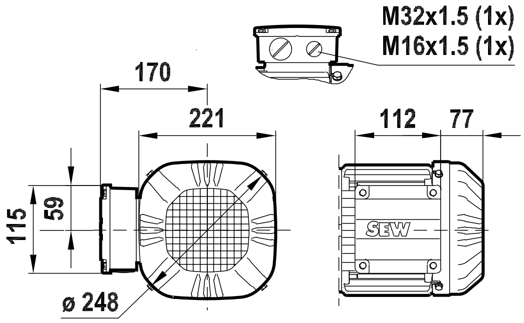
DR.132M

08 278 04 07
1 (2)



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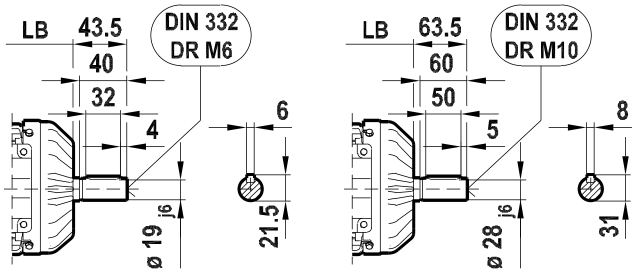

DRS132M 2; 4; 4/2; 8/2; 8/4
DRE132M 2; 4; 6
DRP132M 2; 6
DRM132M 12

/FF (B5)
FF265

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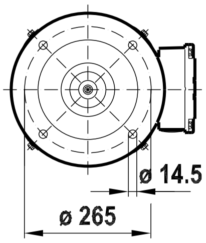

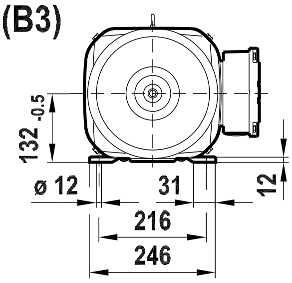

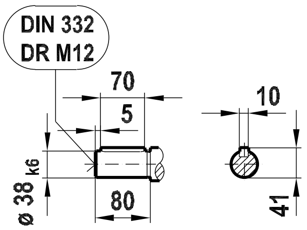

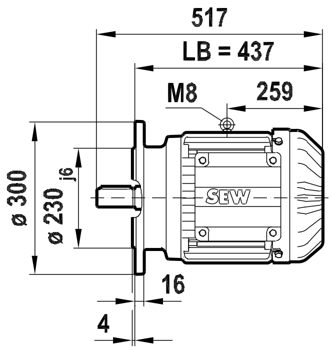

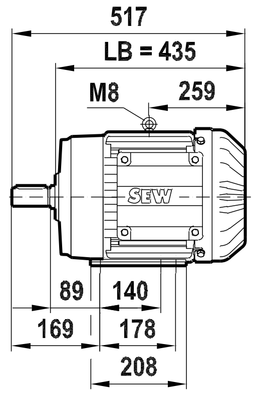

DRP132M 4
DRE132M 6

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FF215

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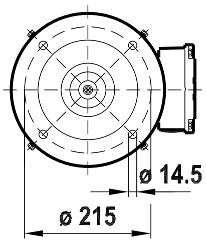

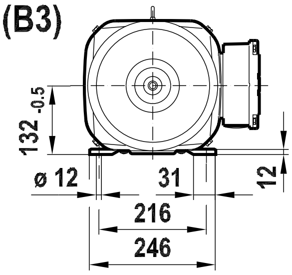

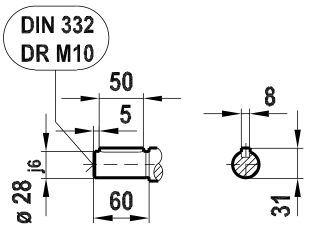

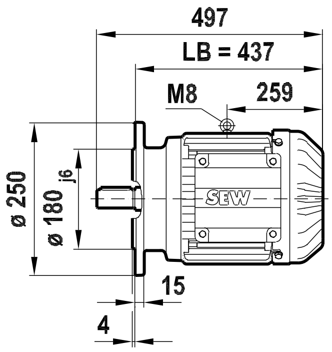

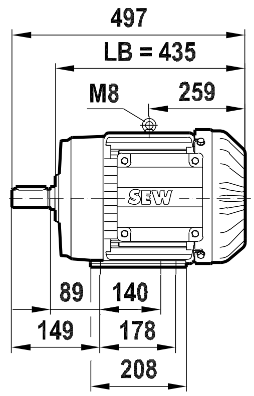

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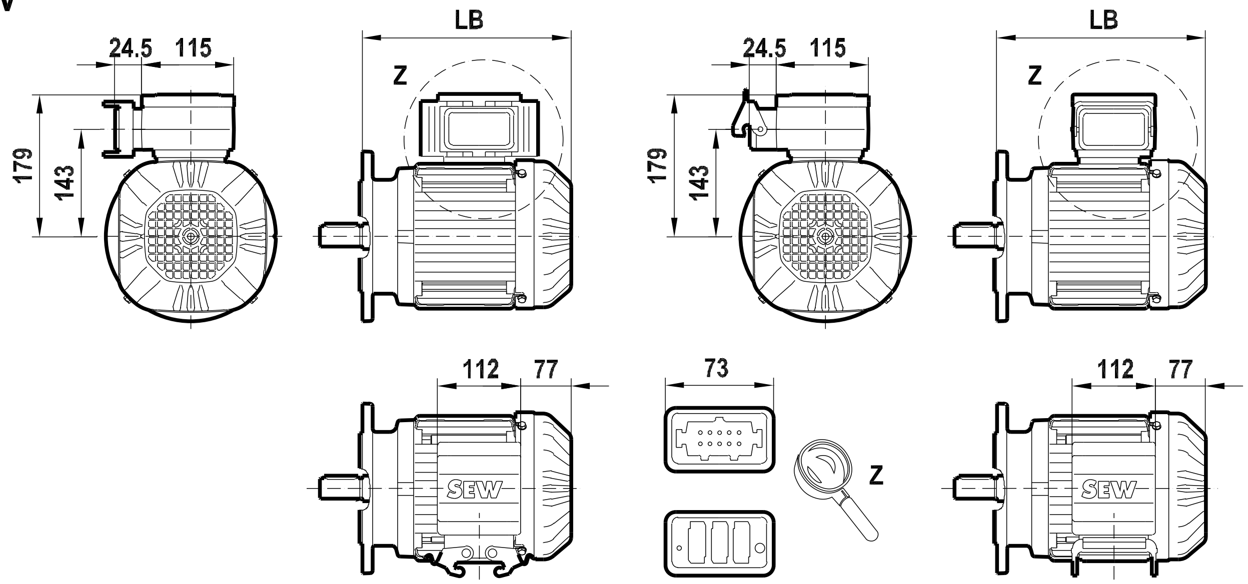
19290411/EN – 10/2014

DR.132M

08 278 04 07
2 (2)

/IV



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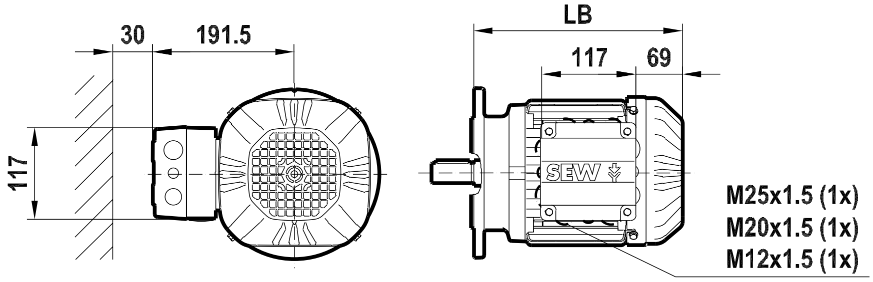

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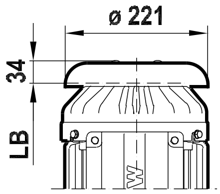

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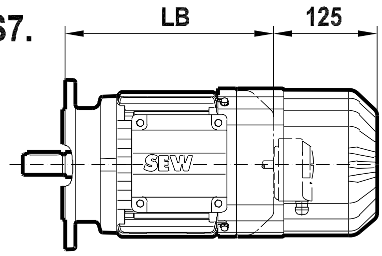

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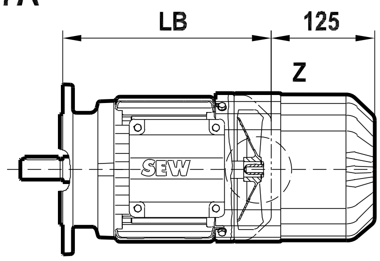

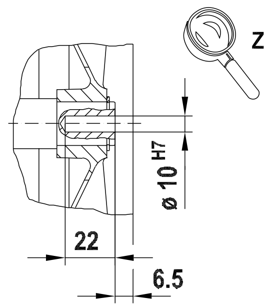

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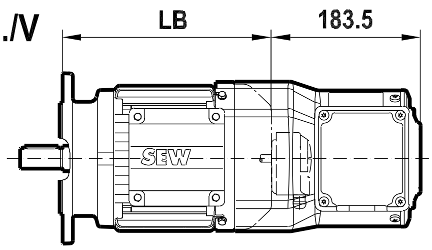

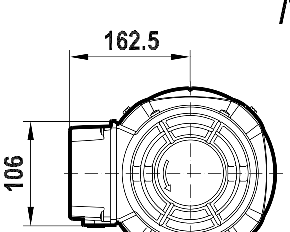

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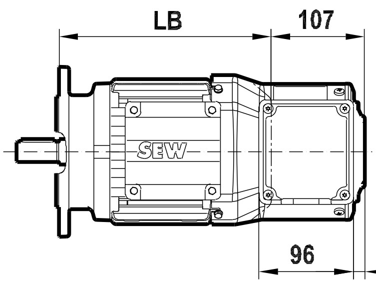

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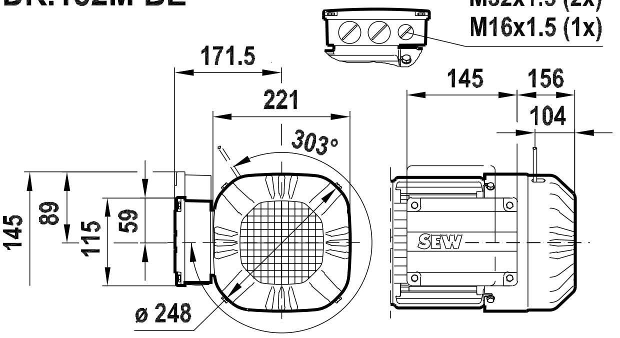
DR.132M BE

09 199 04 07
1 (2)



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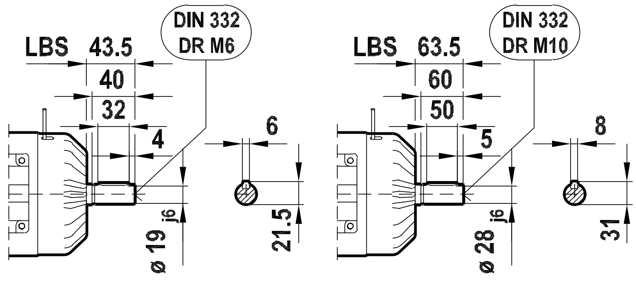
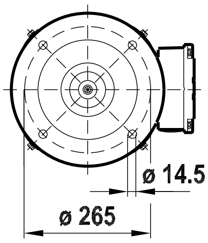


DRS132M 2; 4; 4/2; 8/2; 8/4
DRE132M 2; 4; 6
DRP132M 2; 6
DRM132M 12

/FF (B5)
FF265



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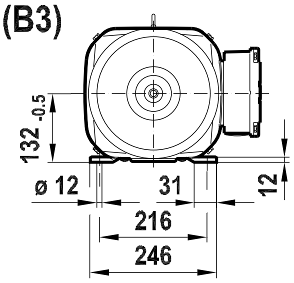
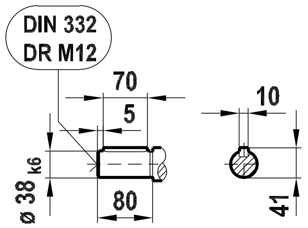
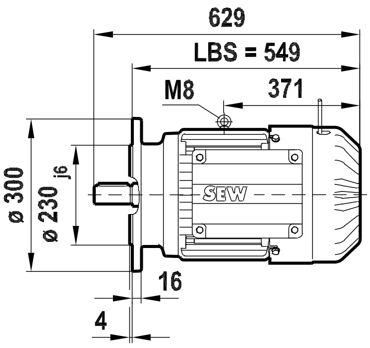
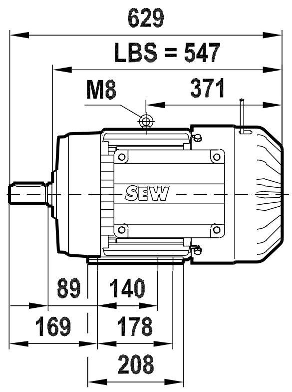


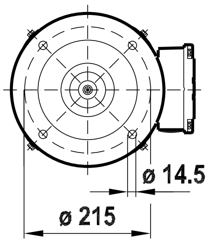






DRP132M 4
DRE132M 6

/FF (B5)
FF215



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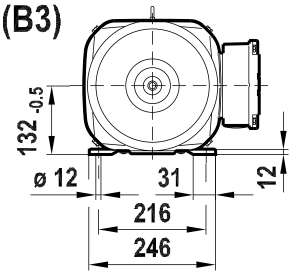

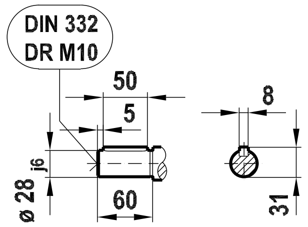

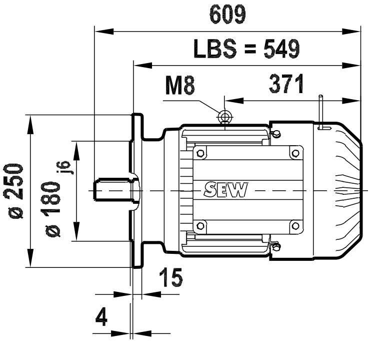

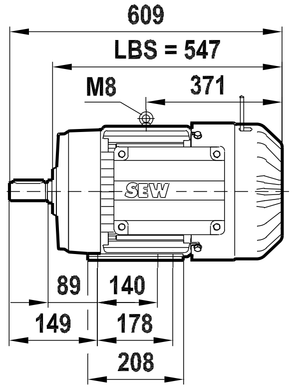

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DR.132M BE

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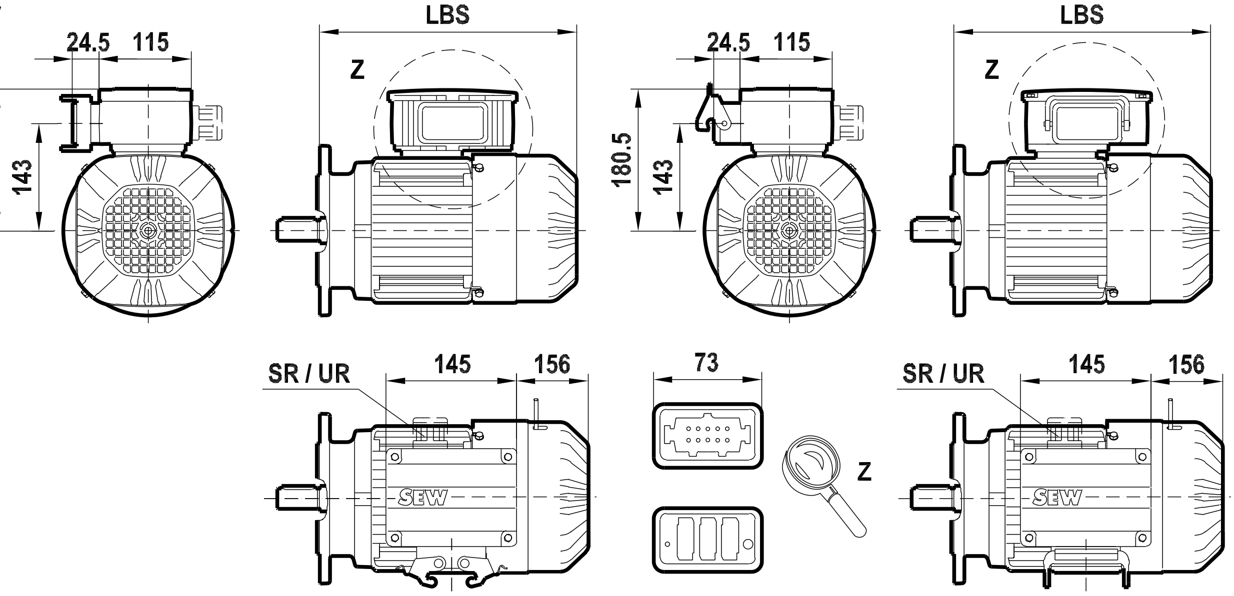
2 (2)

/IV



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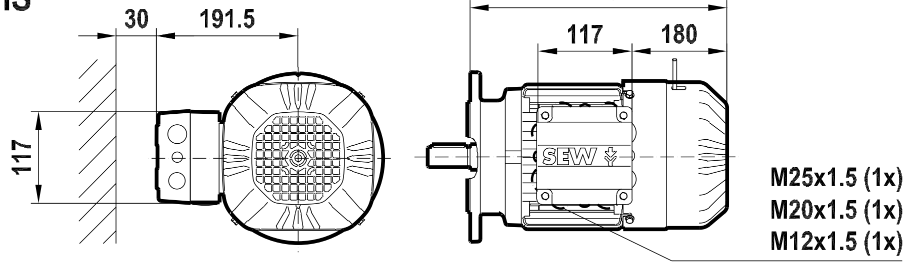

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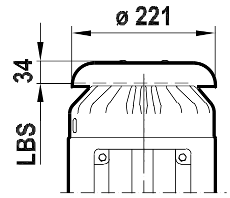

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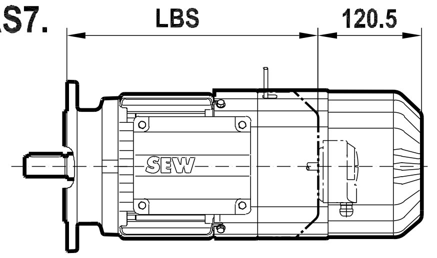

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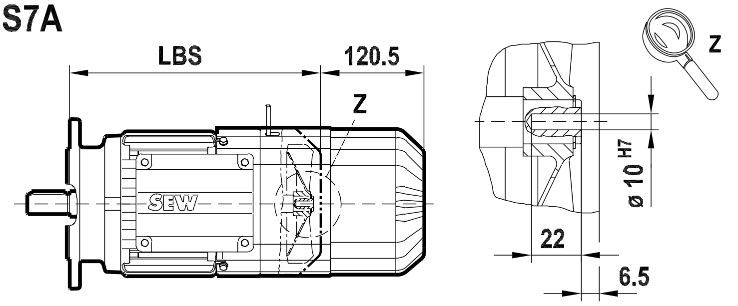

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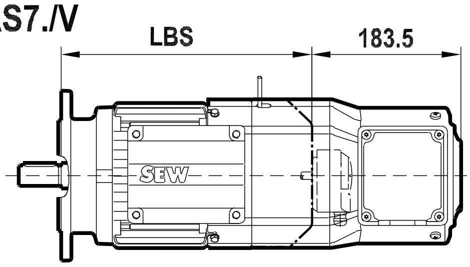

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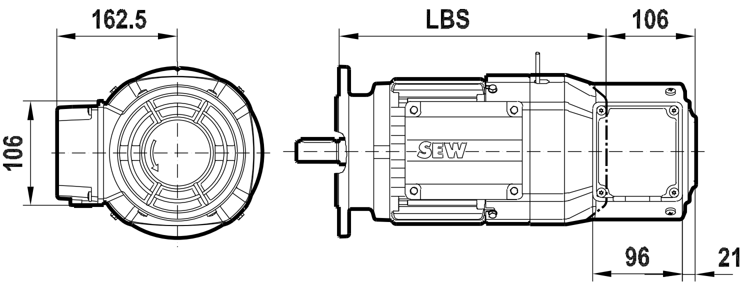

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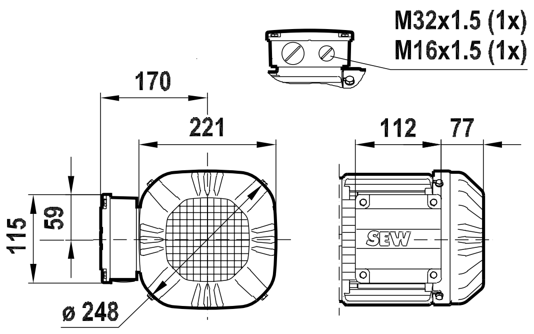
DR.132MC

08 113 00 12
1 (2)



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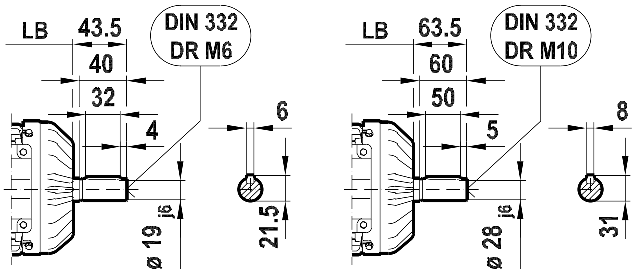
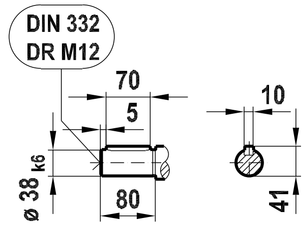
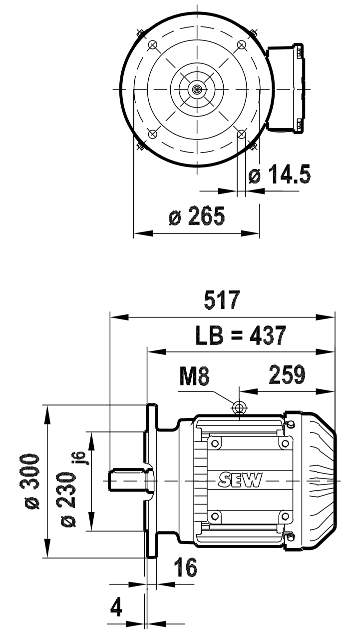


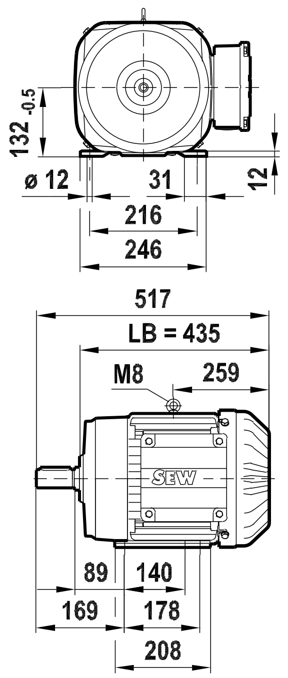
DRS132MC 4; 6
DRE132MC 2; 4; 6
DRP132MC 4; 6

/FF (B5) FF265

/FI.. (B3)







19290411/EN – 10/2014

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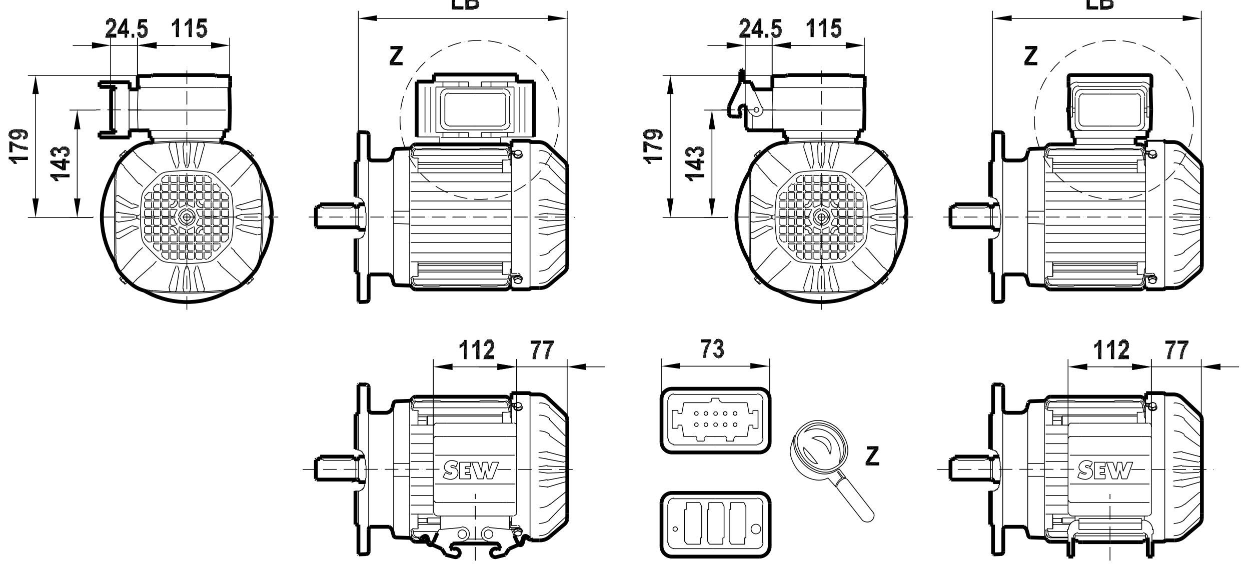
DR.132MC

08 113 00 12
2 (2)

/IV



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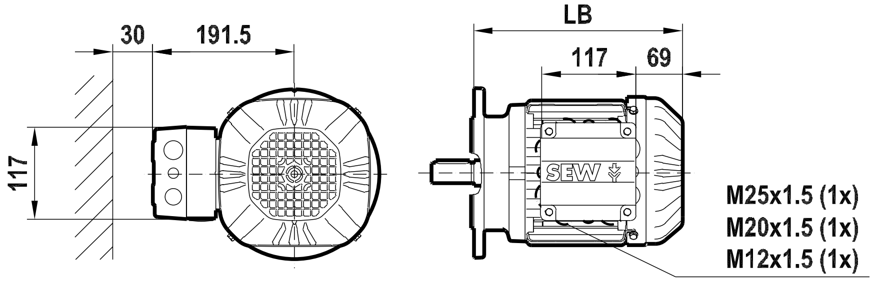

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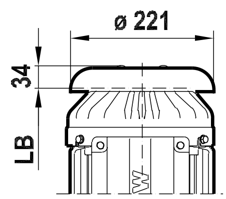

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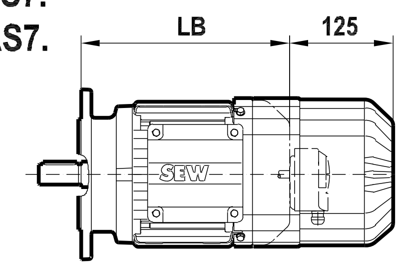

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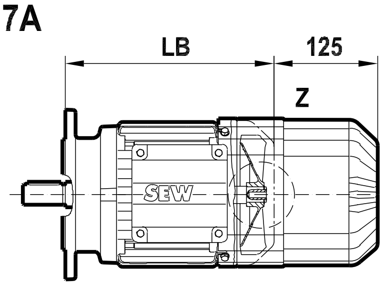

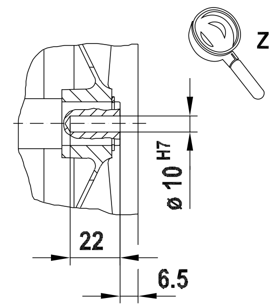

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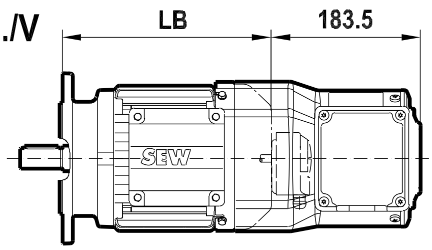
/AS7./V



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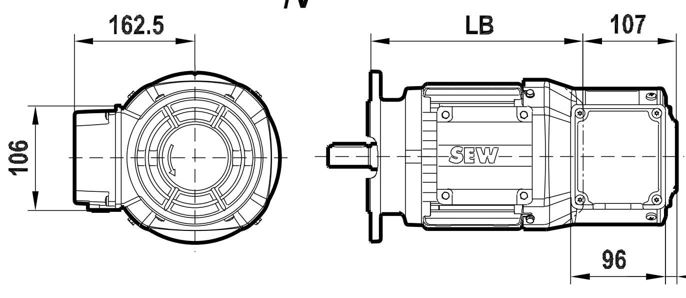

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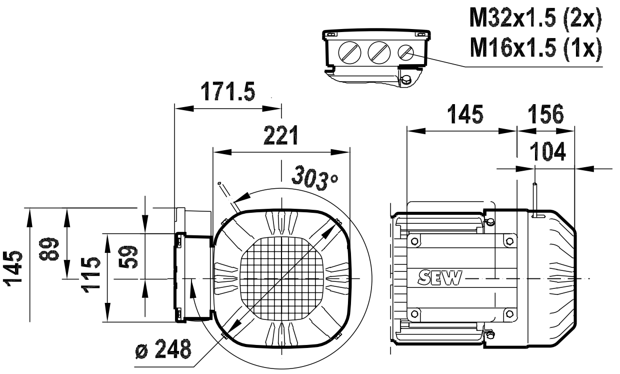
19290411/EN – 10/2014

DR.132MC BE

09 759 00 12
1 (2)



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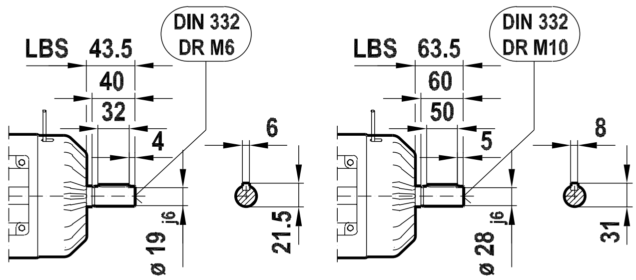
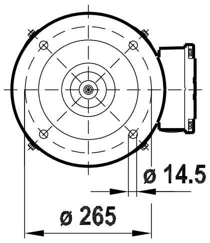


DRS132MC 4; 6
DRE132MC 2; 4; 6
DRP132MC 4; 6

/FF (B5) FF265



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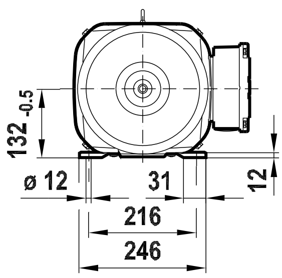

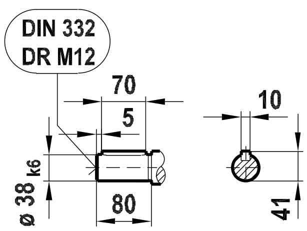

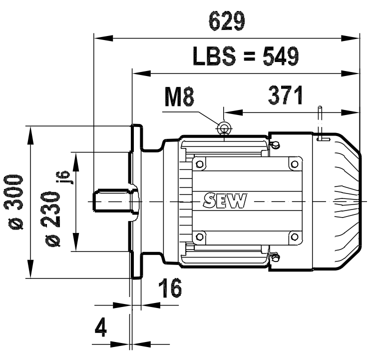

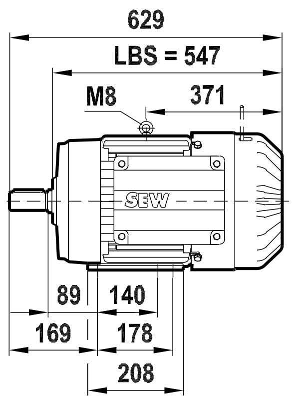

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19290411/EN – 10/2014

DR.132MC BE

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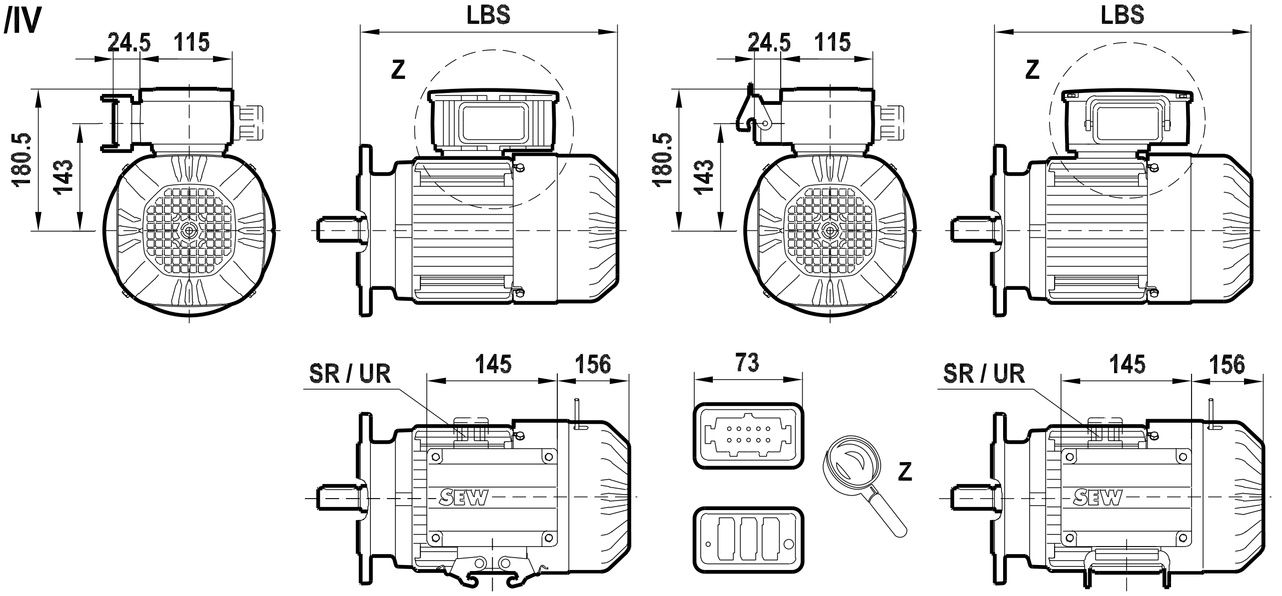
2 (2)

/IV



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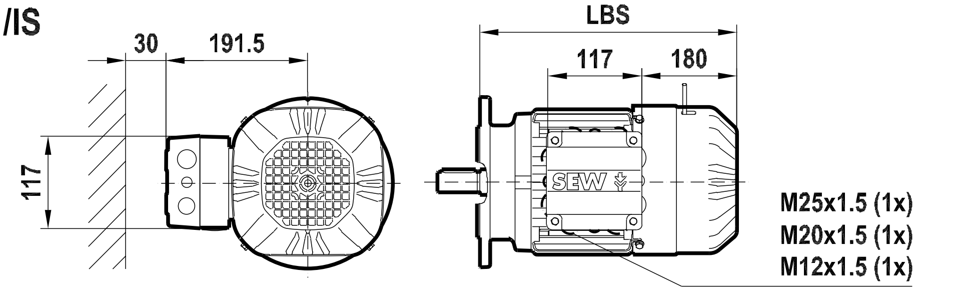

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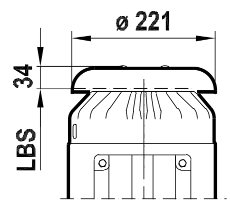

/ES7.
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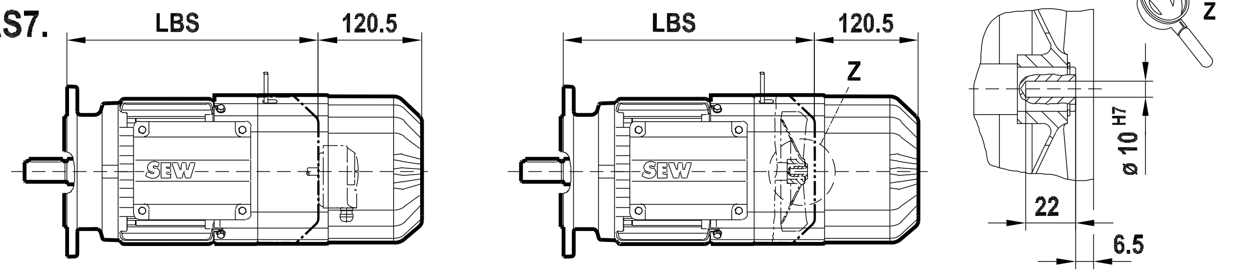

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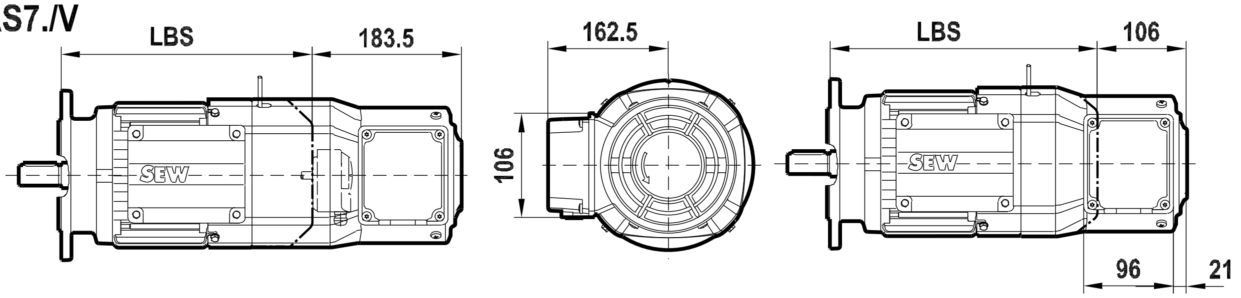

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DR.160S

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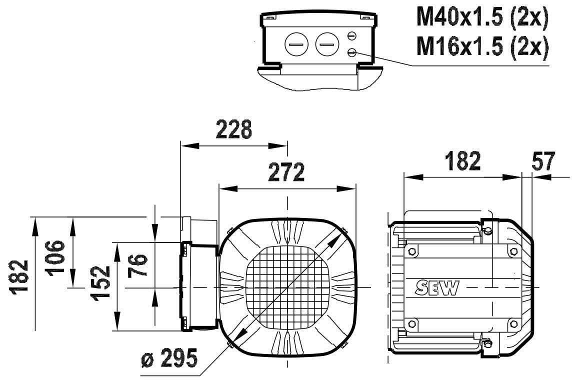

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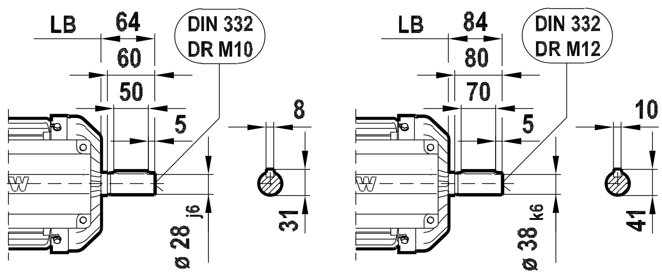

DRS160S 4; 6; 4/2; 8/4
DRE160S 4
DRP160S 4

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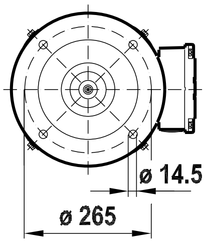
FF265



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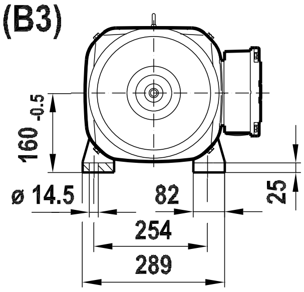

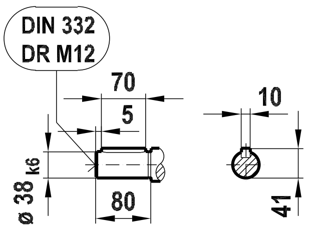

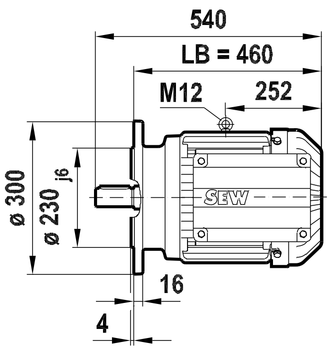

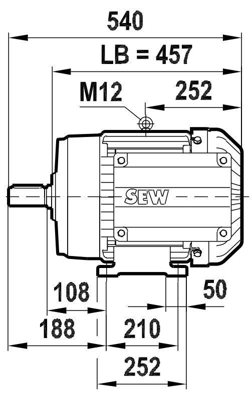

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DR.160S

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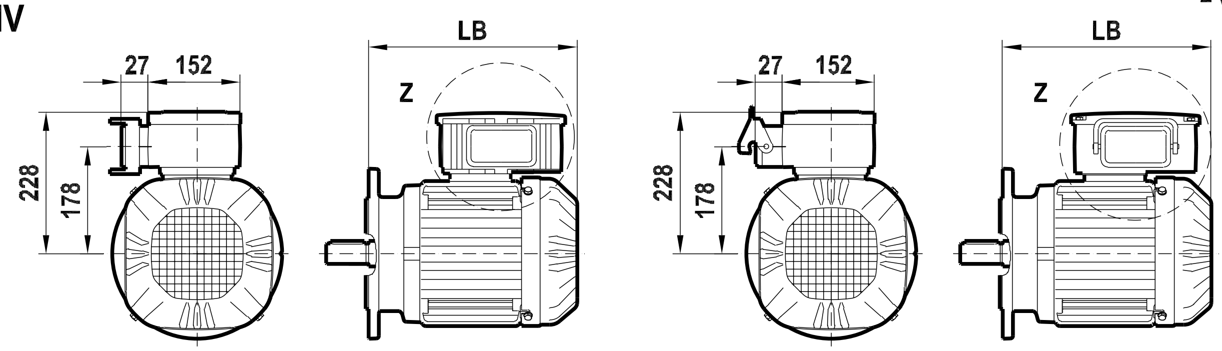

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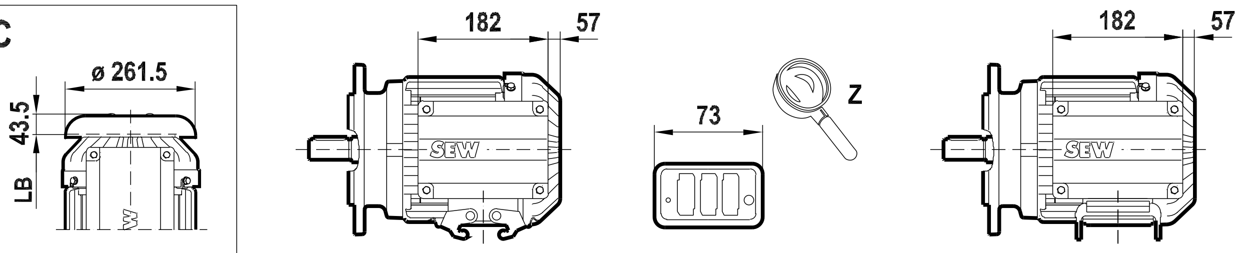

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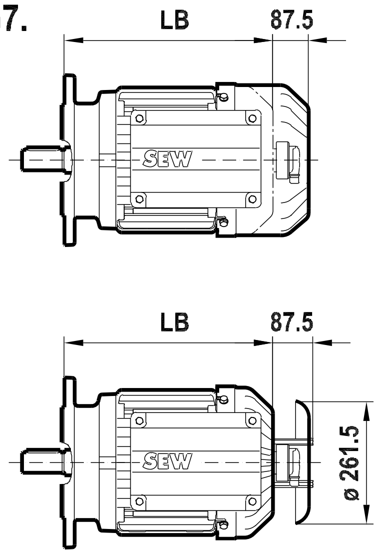

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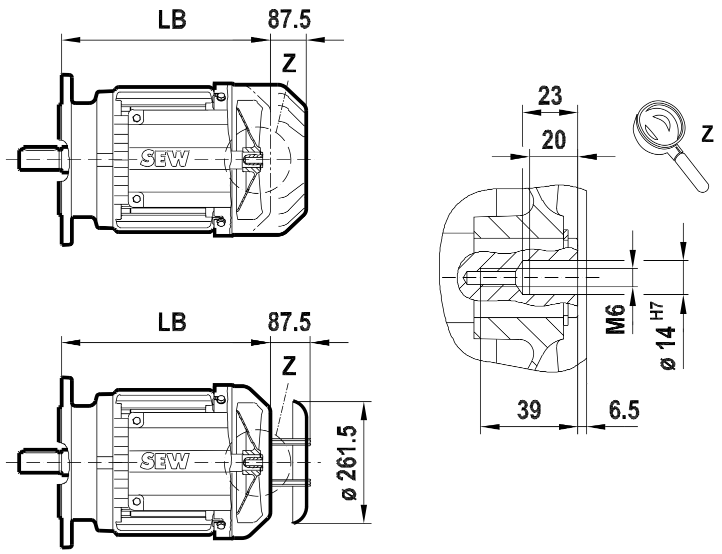

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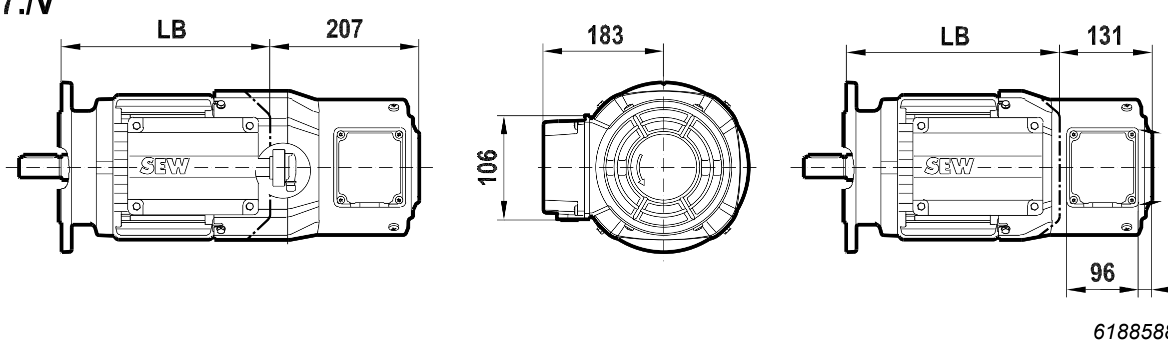

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DR.160S BE

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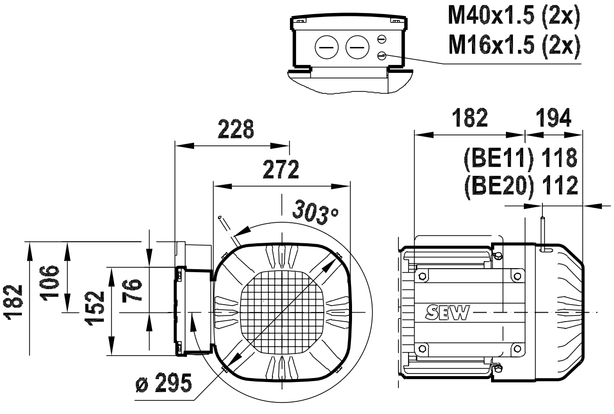

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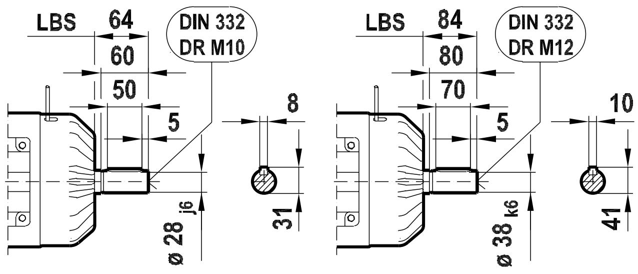
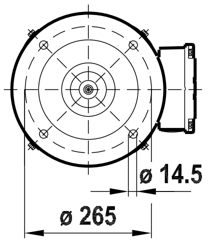


DRS160S 4; 6; 4/2; 8/4
DRE160S 4
DRP160S 4

/FF (B5)
FF265



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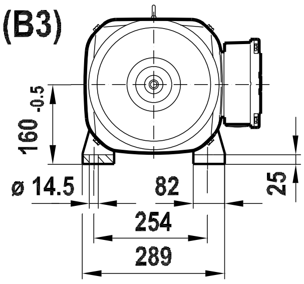

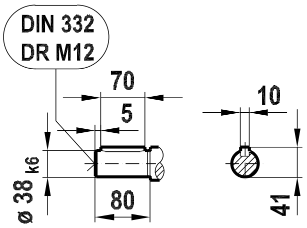

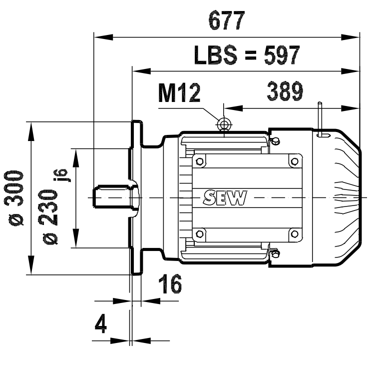

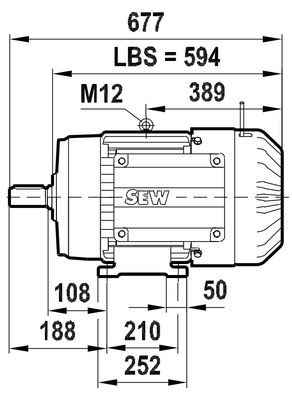

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DR.160S BE

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2 (2)

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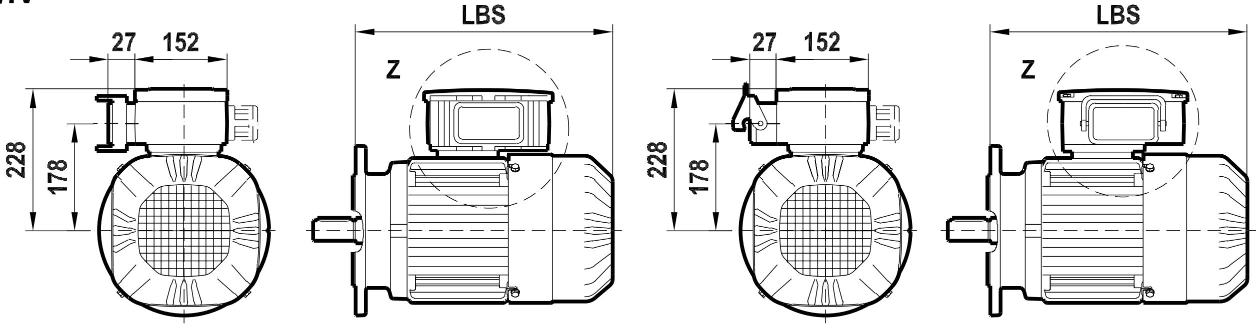

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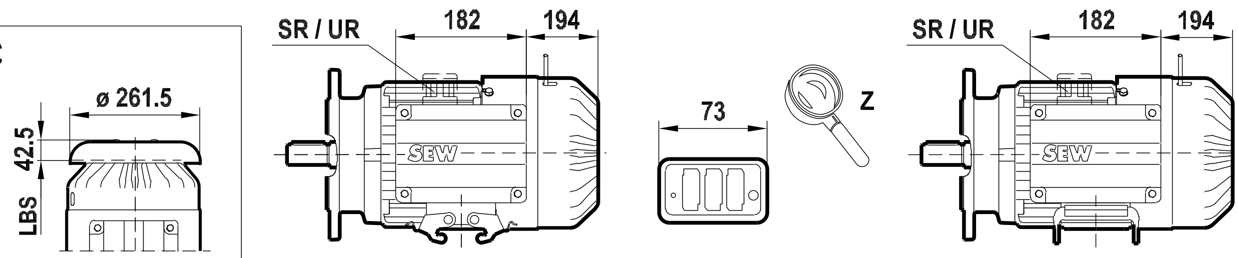

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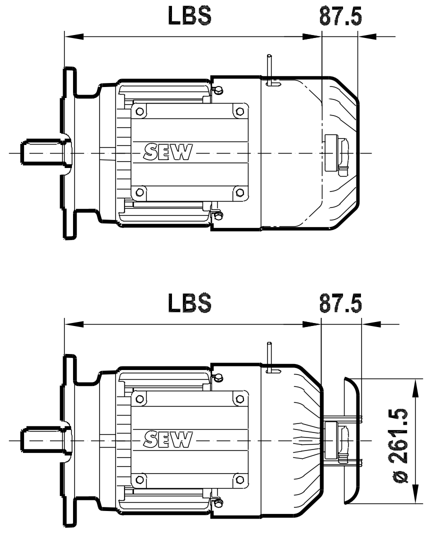

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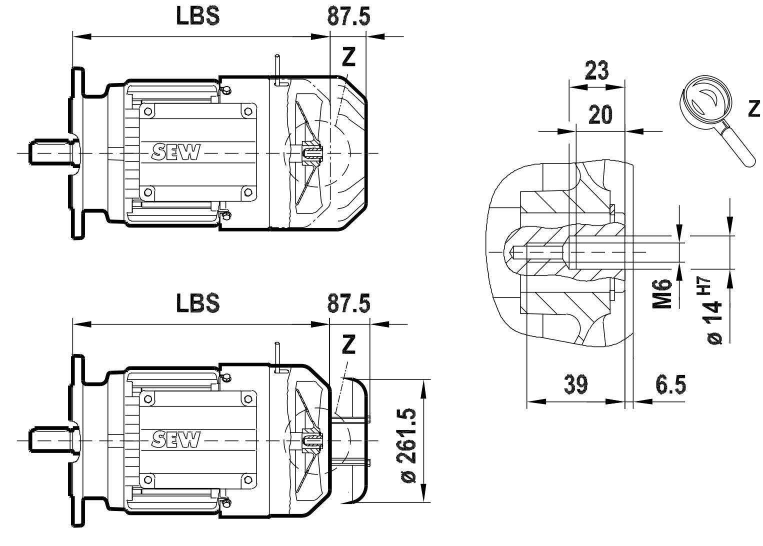

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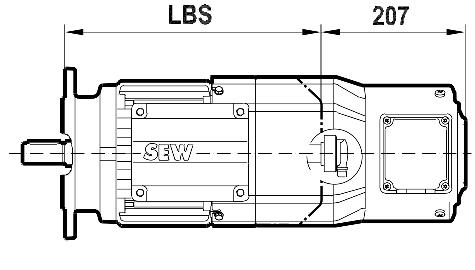

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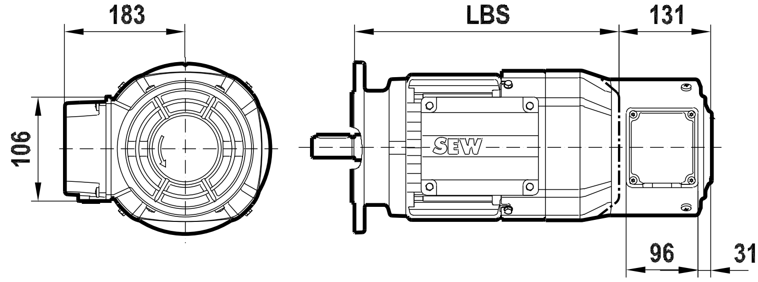

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DR.160M,MC

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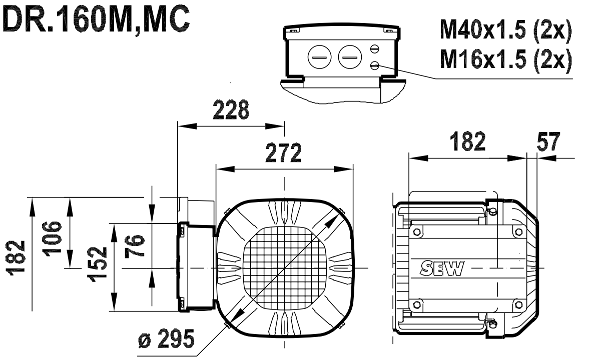
1 (2)



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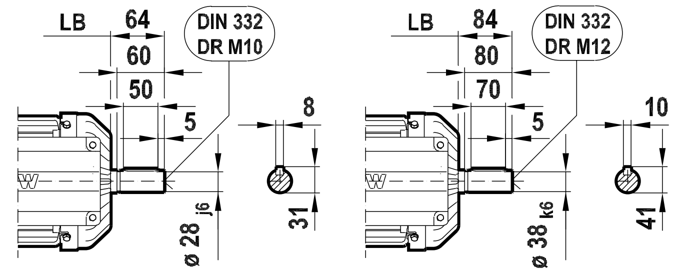
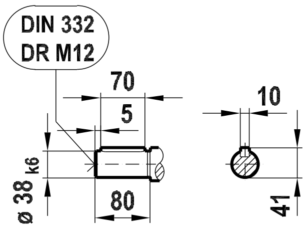


DRE160M 4; 6
DRP160M 4; 6
DRP160MC 4



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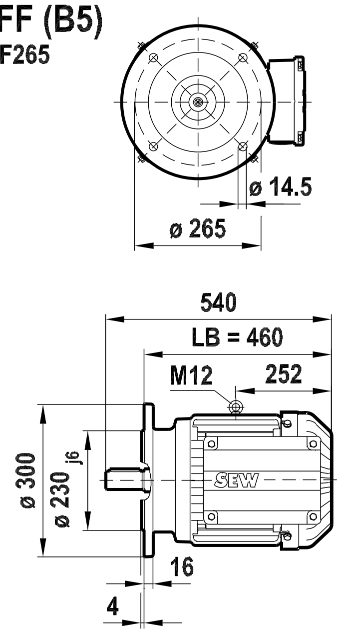

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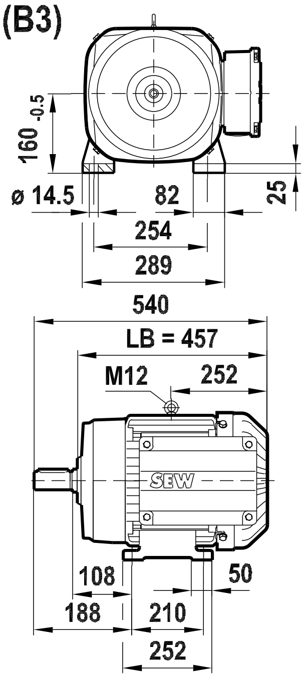
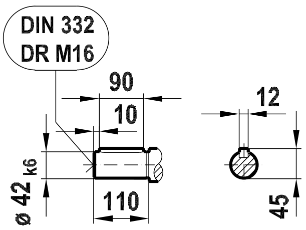


DRS160M 4; 6; 4/2; 8/4
DRS160MC 4
DRE160MC 4



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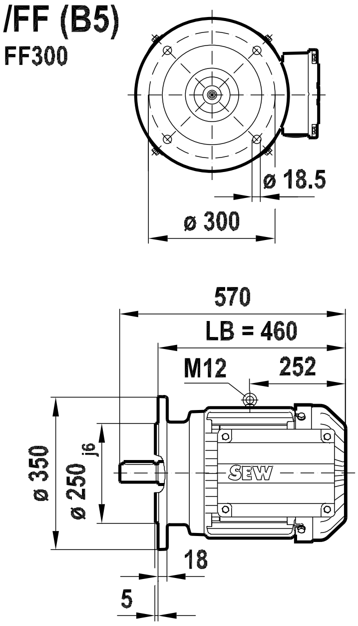

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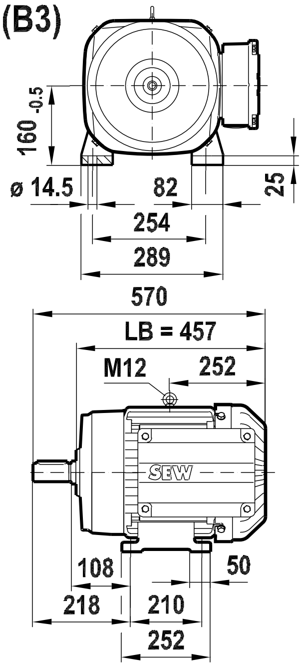

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DR.160M,MC

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2 (2)

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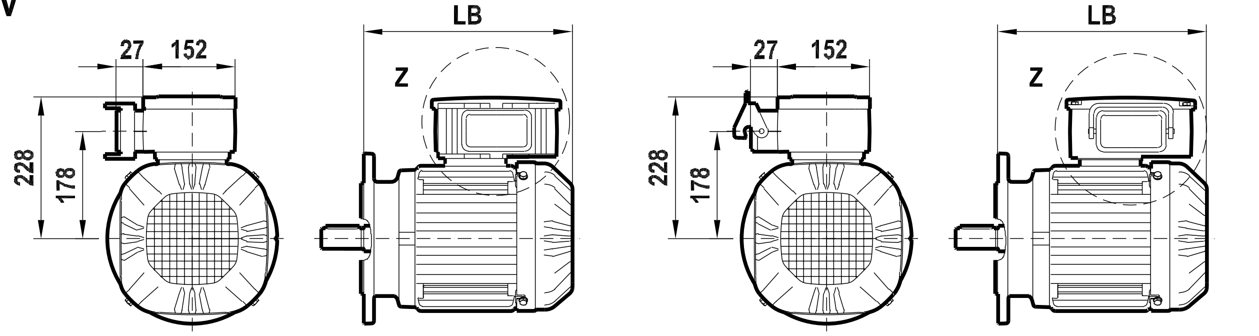

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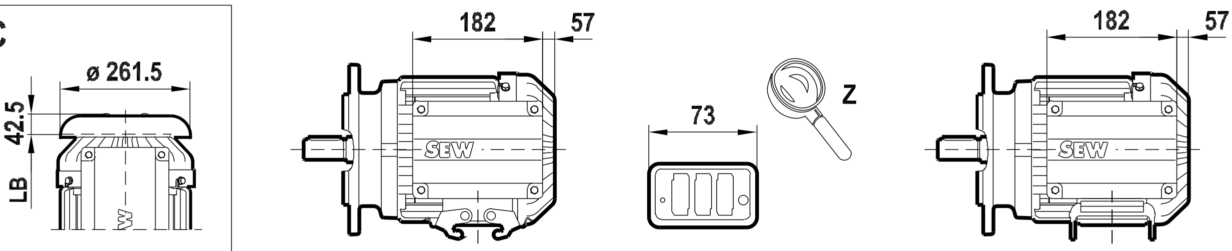

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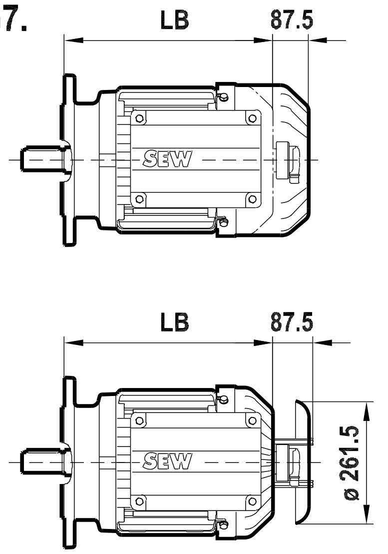

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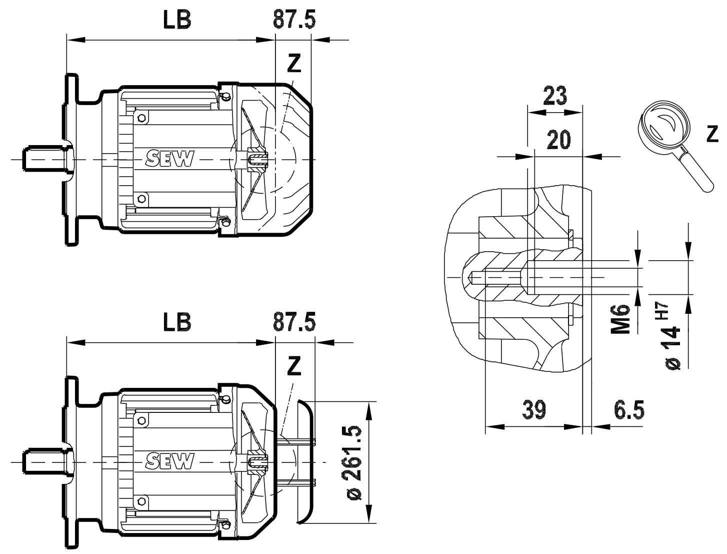

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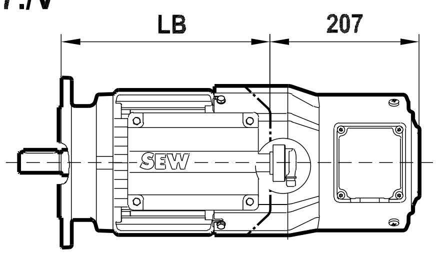

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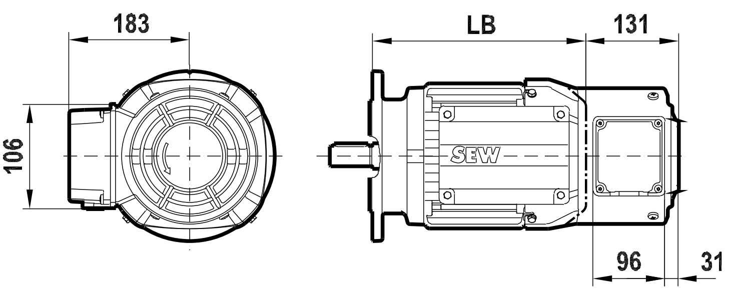

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DR.160M,MC BE

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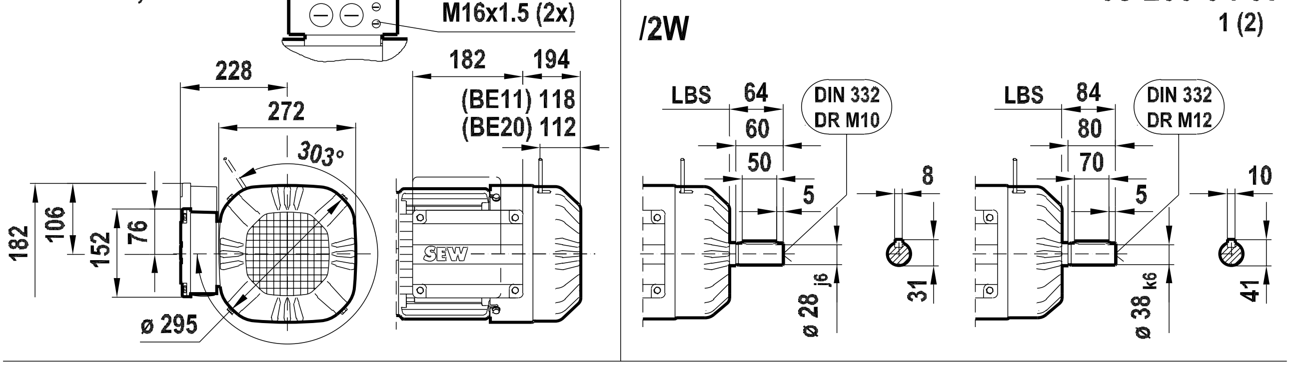
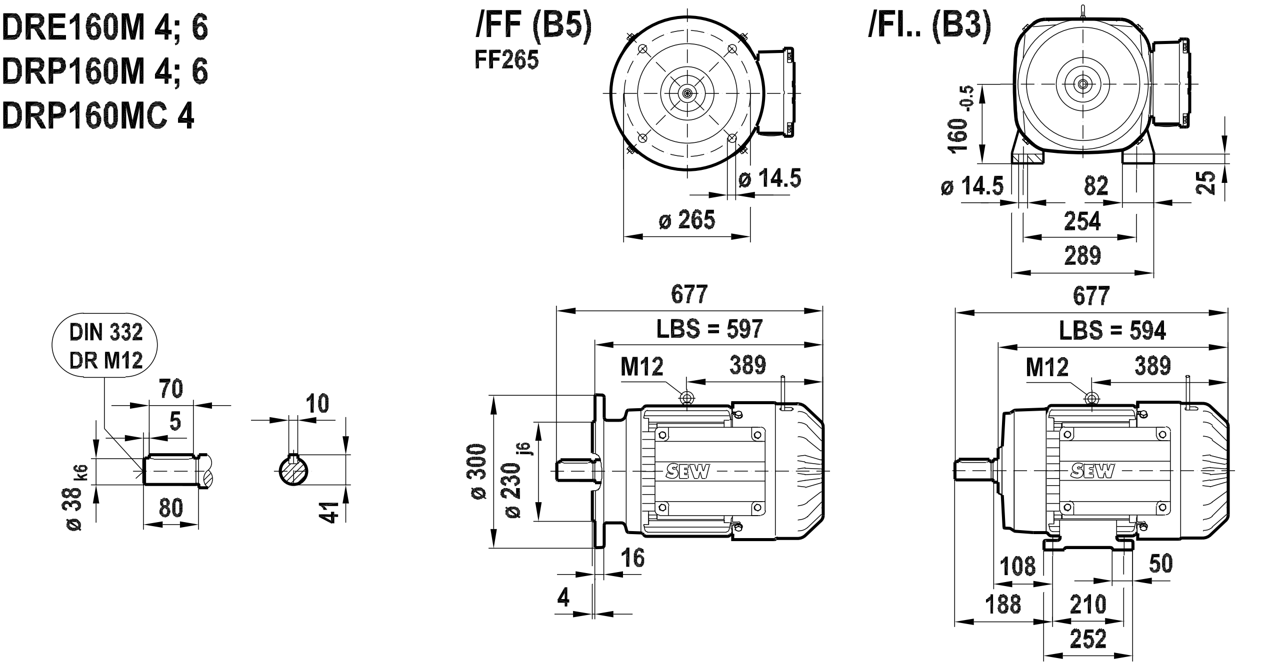


DRE160M 4; 6
DRP160M 4; 6
DRP160MC 4



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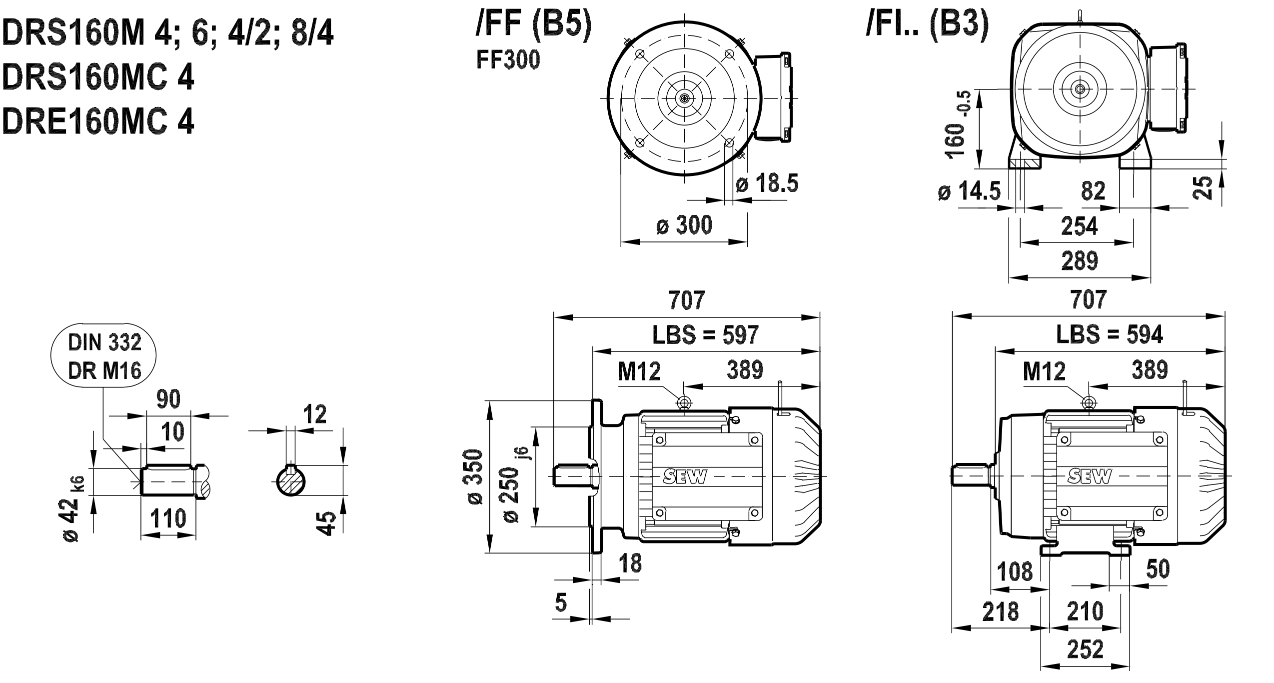
DRS160MC 4
DRE160MC 4



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DR.160M,MC BE

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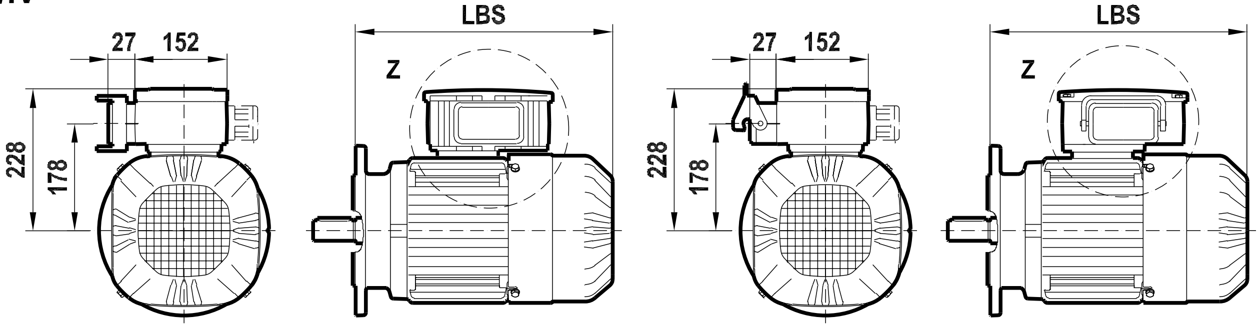

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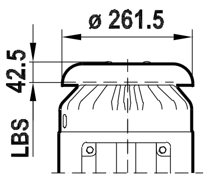

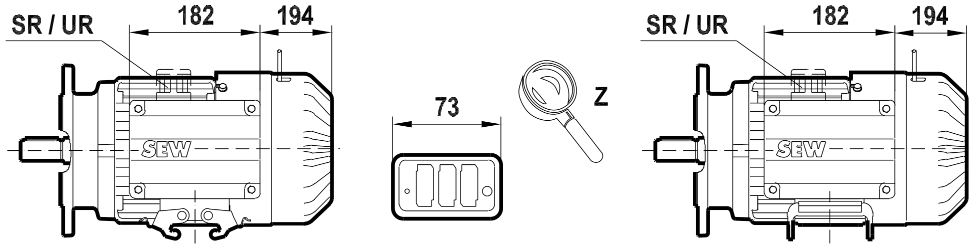

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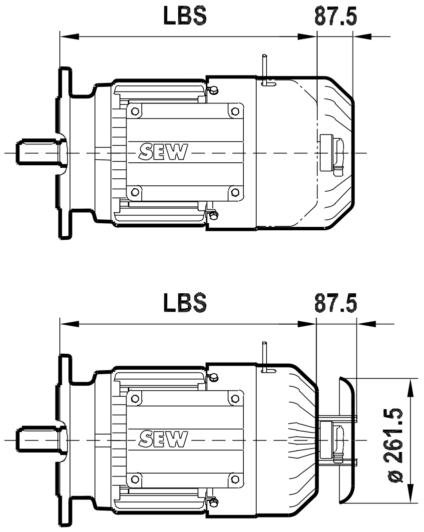

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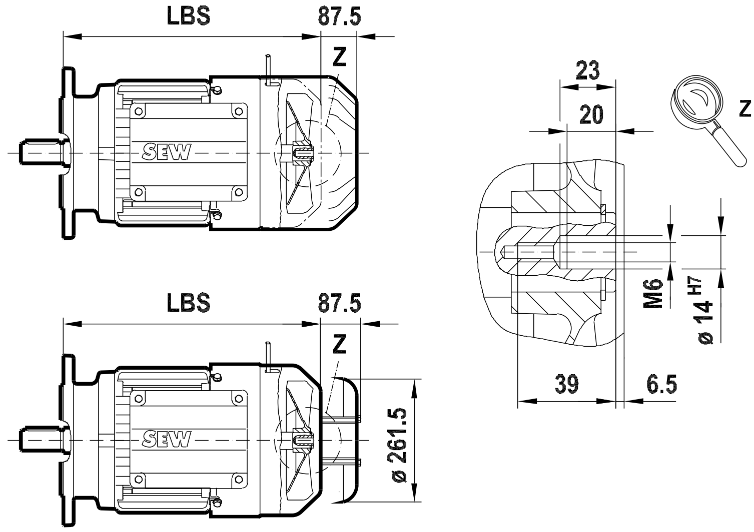

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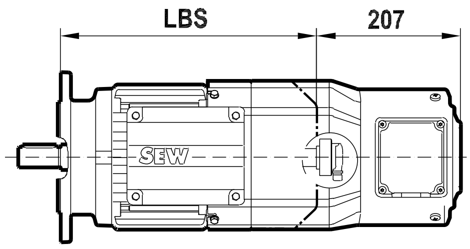

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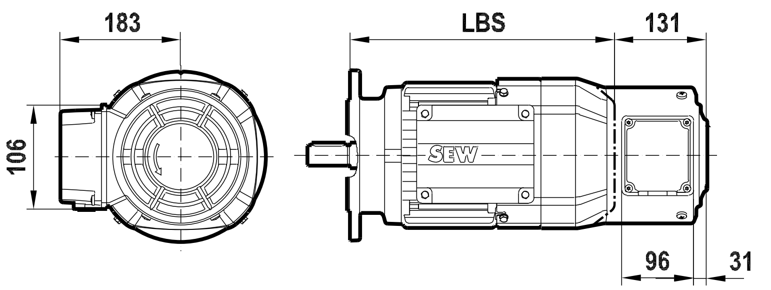

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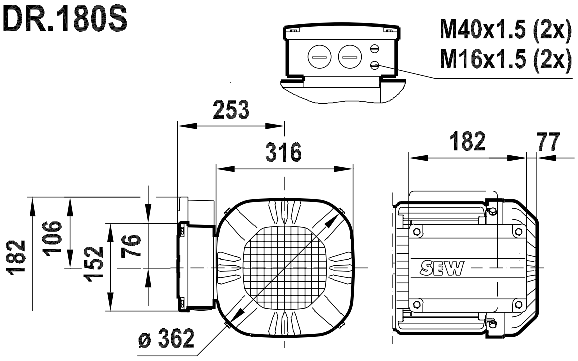
DR.180S



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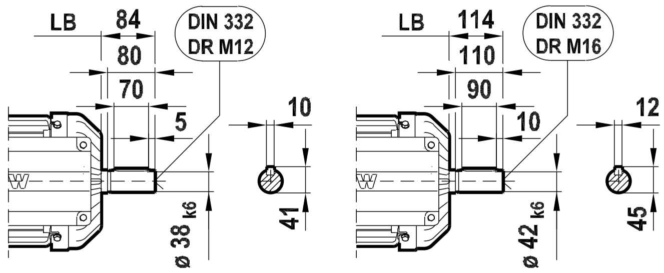
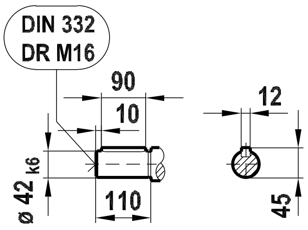
1 (2)



DRS180S 4; 8/4
DRE180S 4



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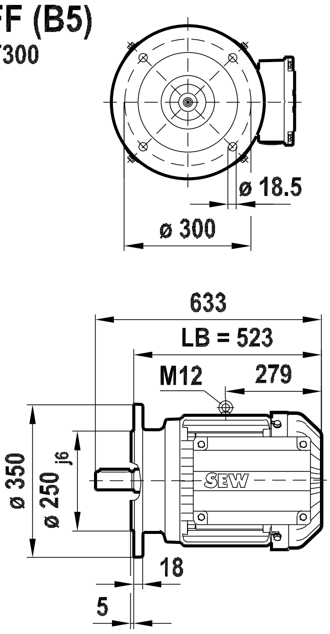

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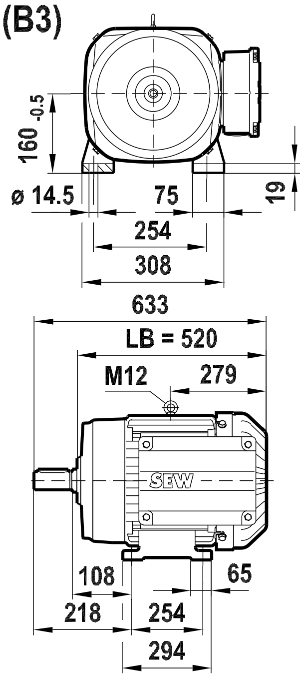

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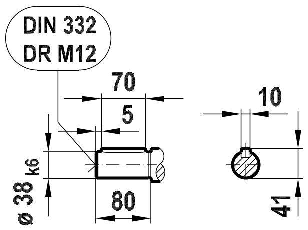

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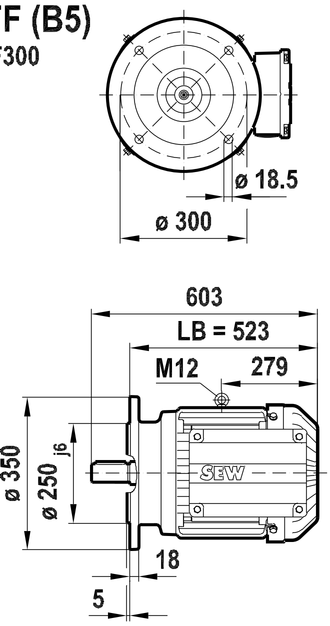

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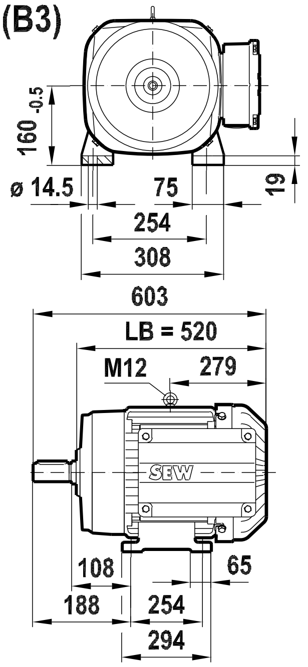

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19290411/EN – 10/2014

DR.180S

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2 (2)

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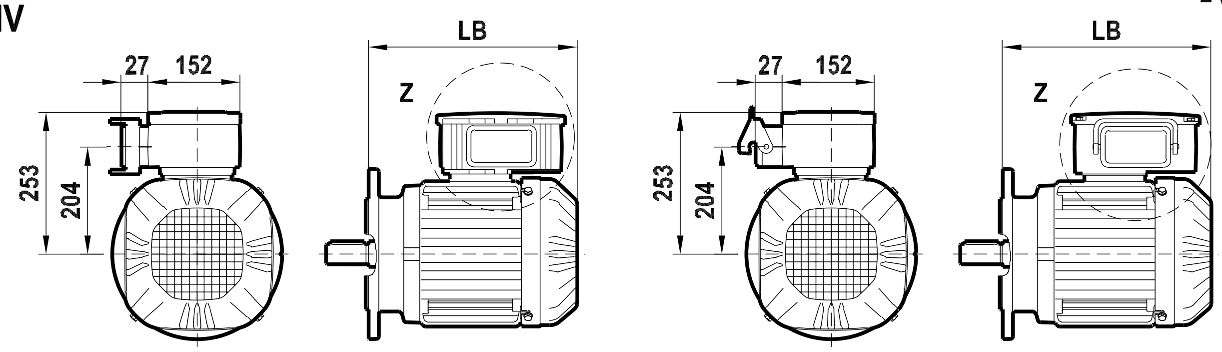

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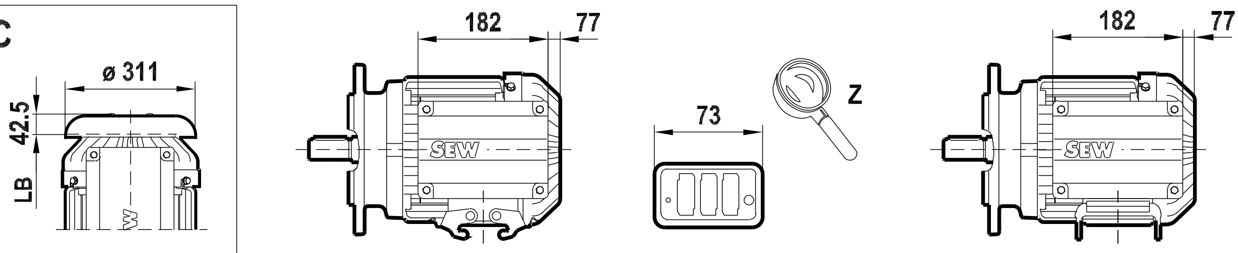

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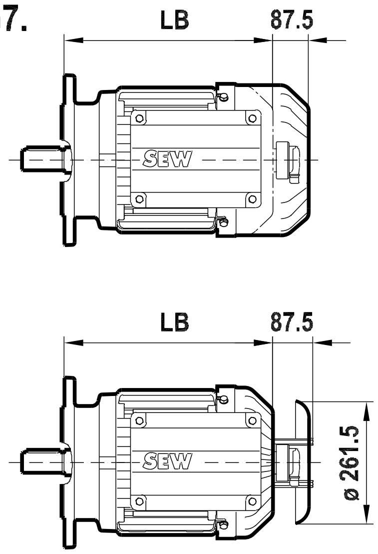

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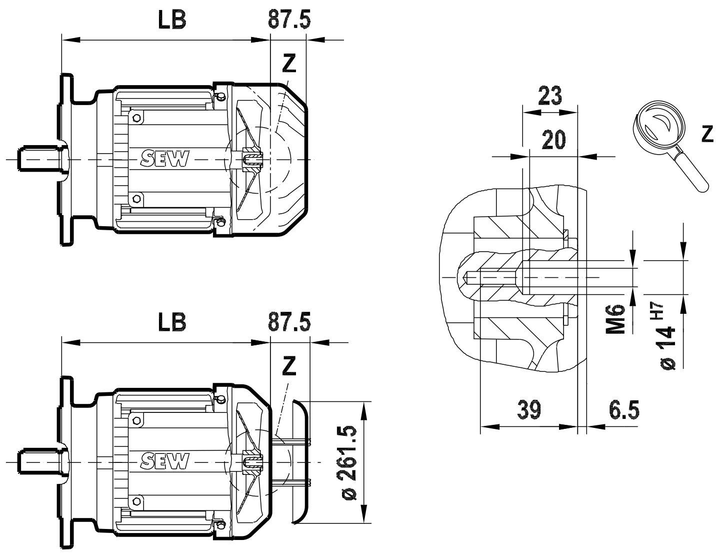

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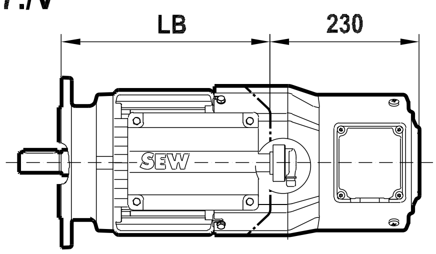

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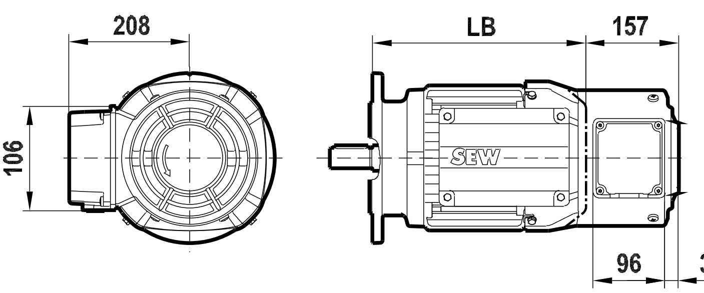

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19290411/EN – 10/2014

DR.180S BE

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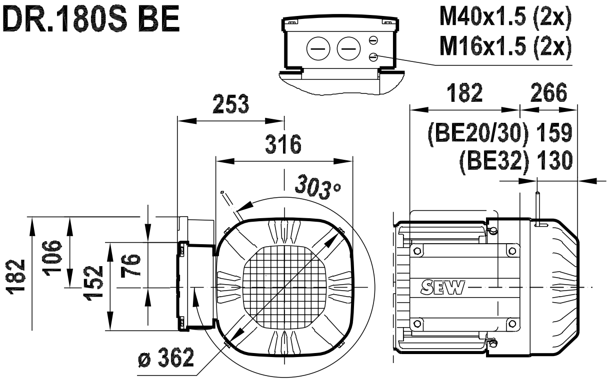
1 (2)



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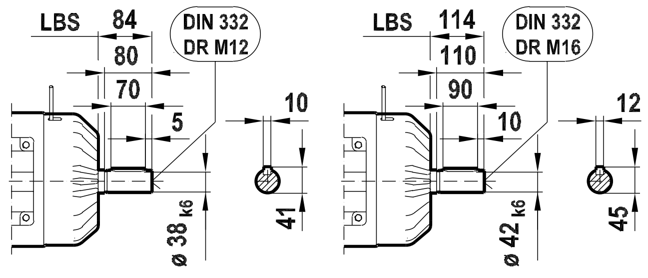
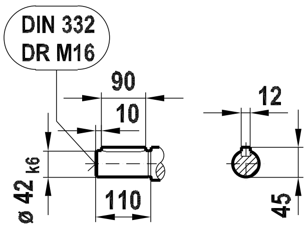


DRS180S 4; 8/4
DRE180S 4



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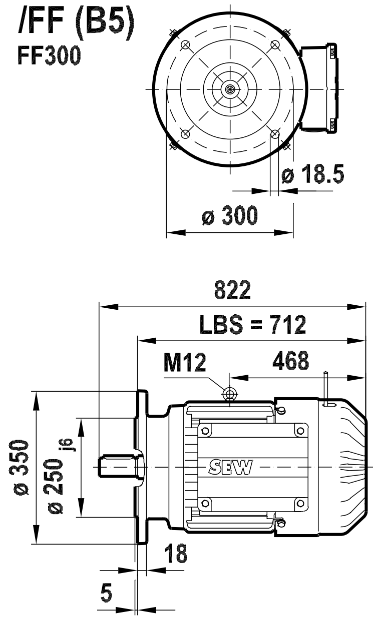

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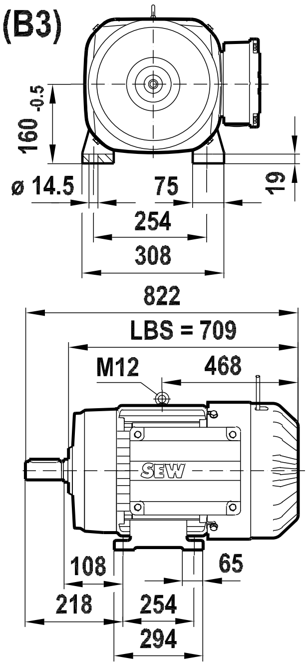
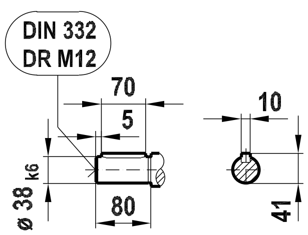


DRP180S 4



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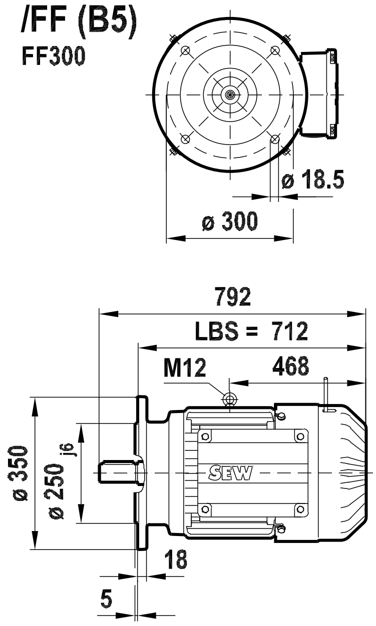

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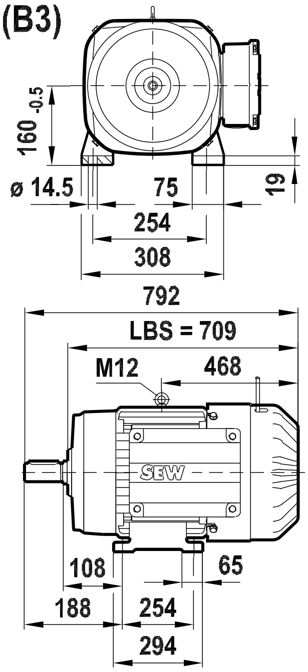

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DR.180S BE

09 201 04 07
2 (2)

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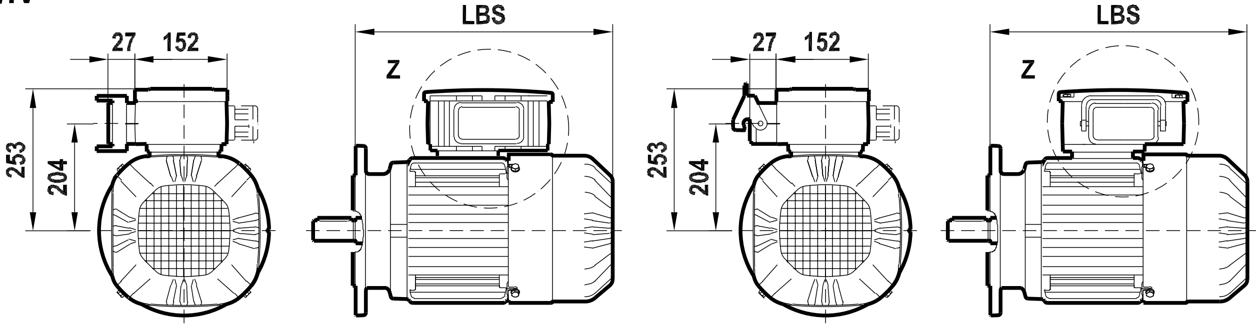

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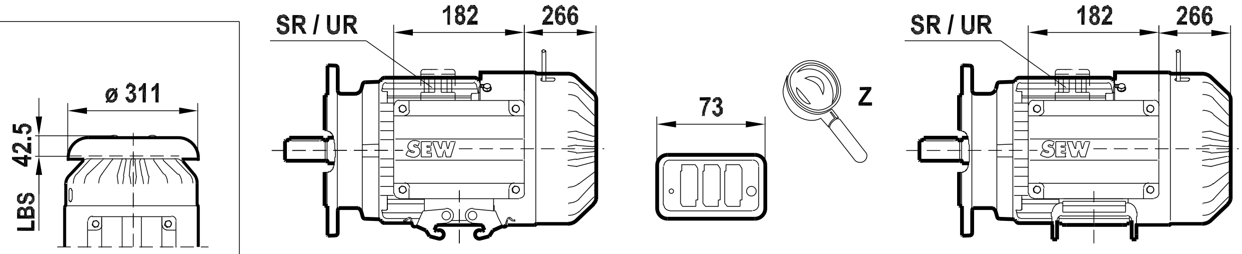

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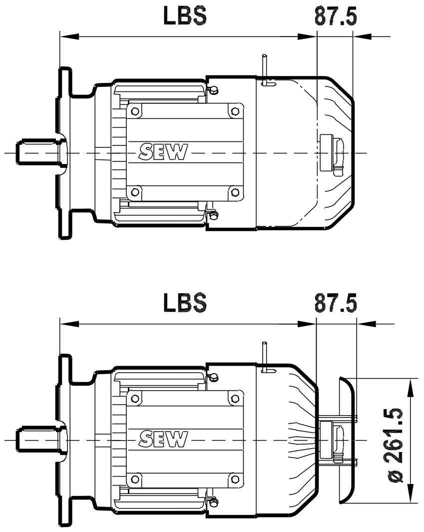

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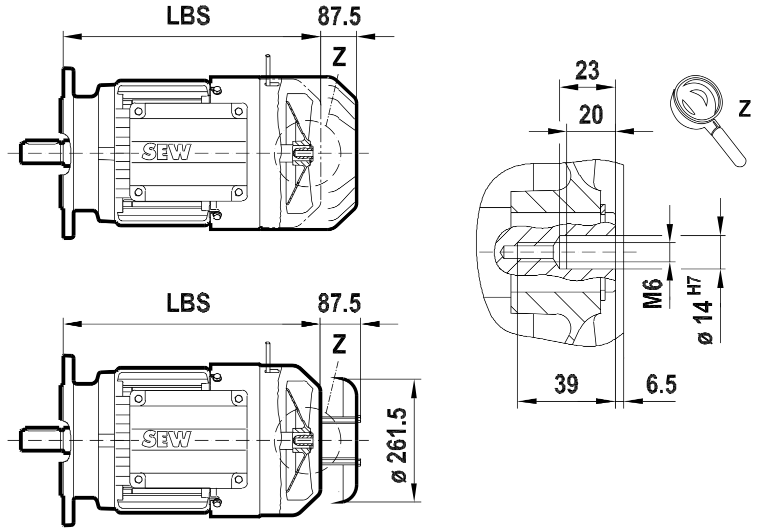

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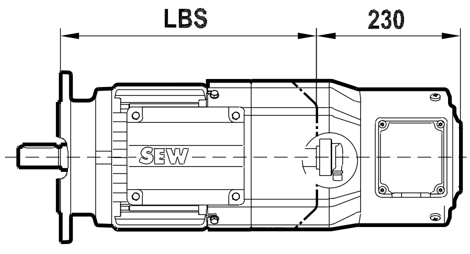

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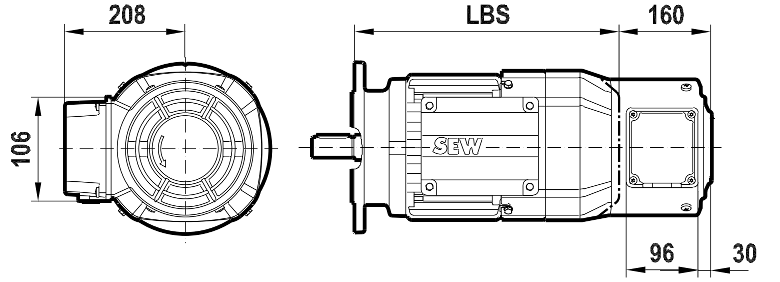

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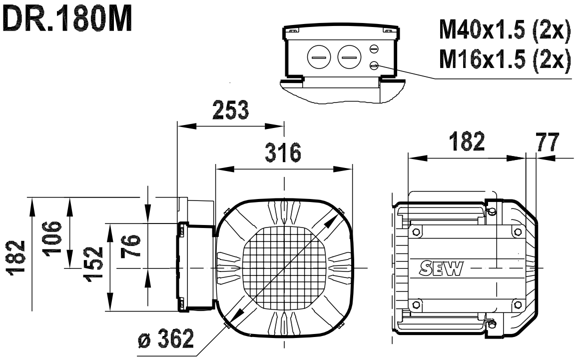
DR.180M



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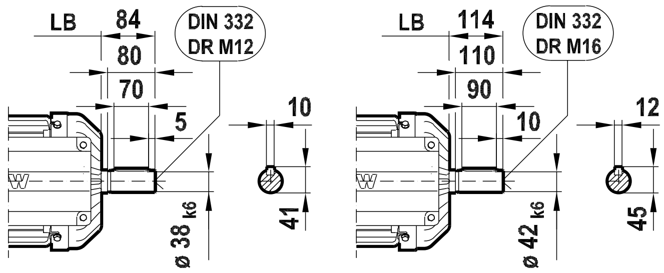
1 (2)



DRS180M 4

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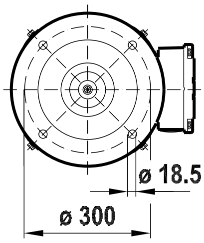

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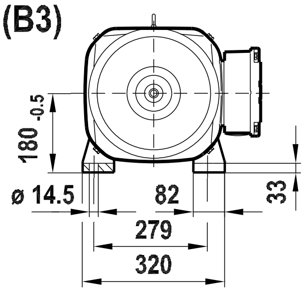

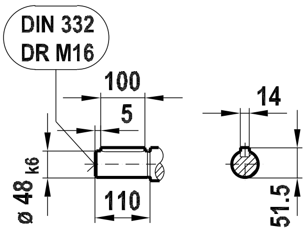

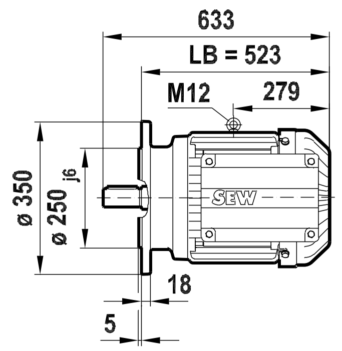

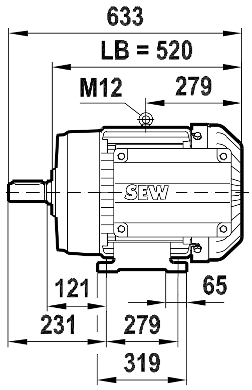

DRE180M 4
DRP180M 4

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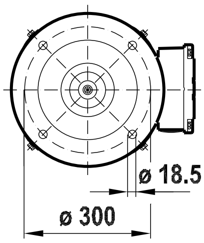

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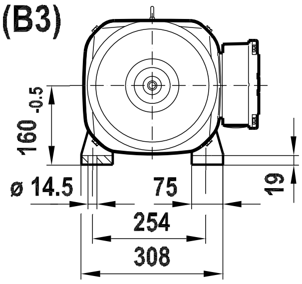

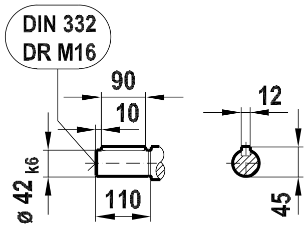

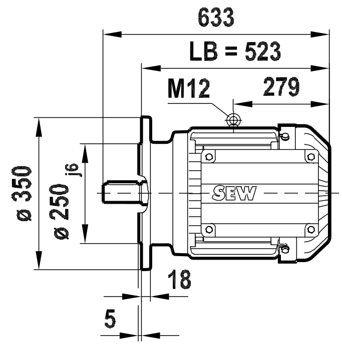

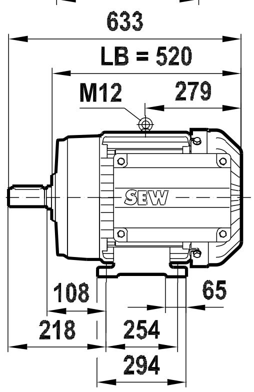

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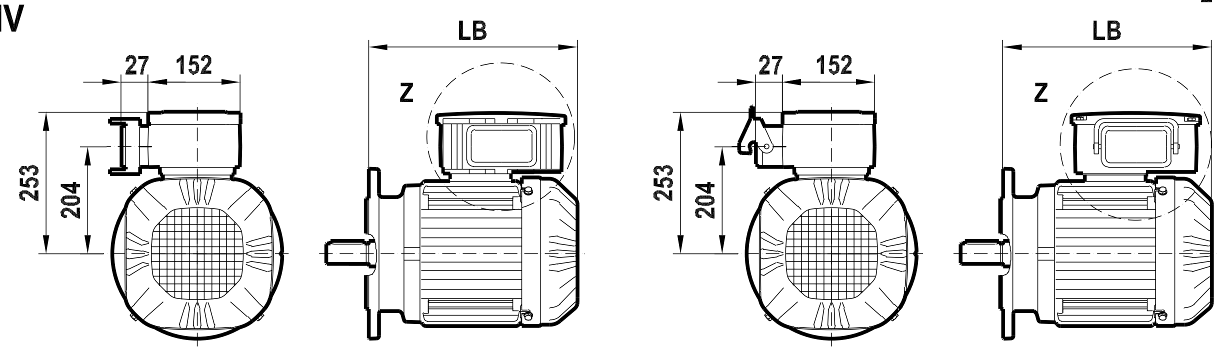
DR.180M

08 305 03 07
2 (2)

/IV



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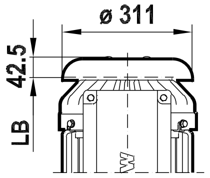

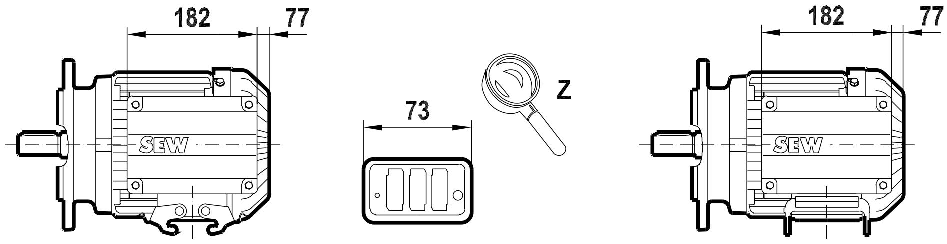

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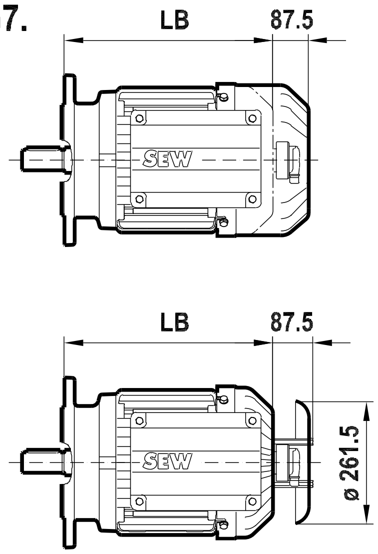

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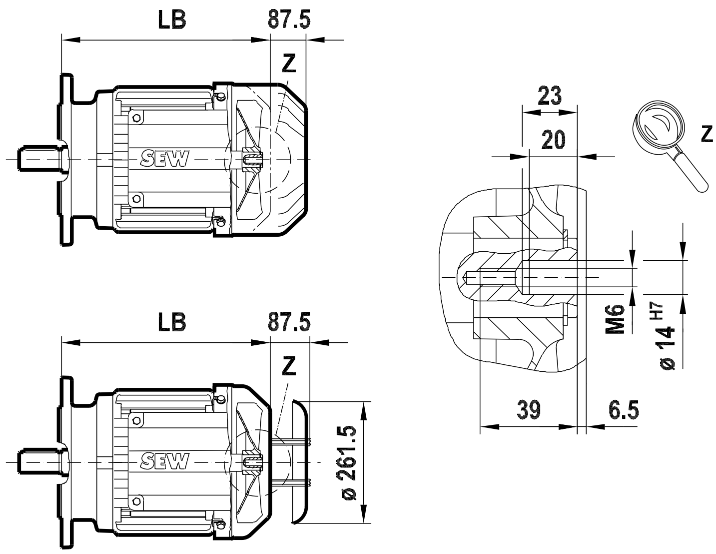

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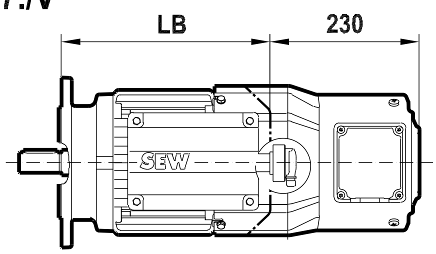

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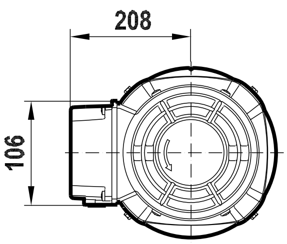

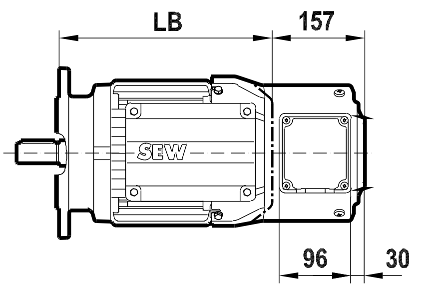

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DR.180M BE

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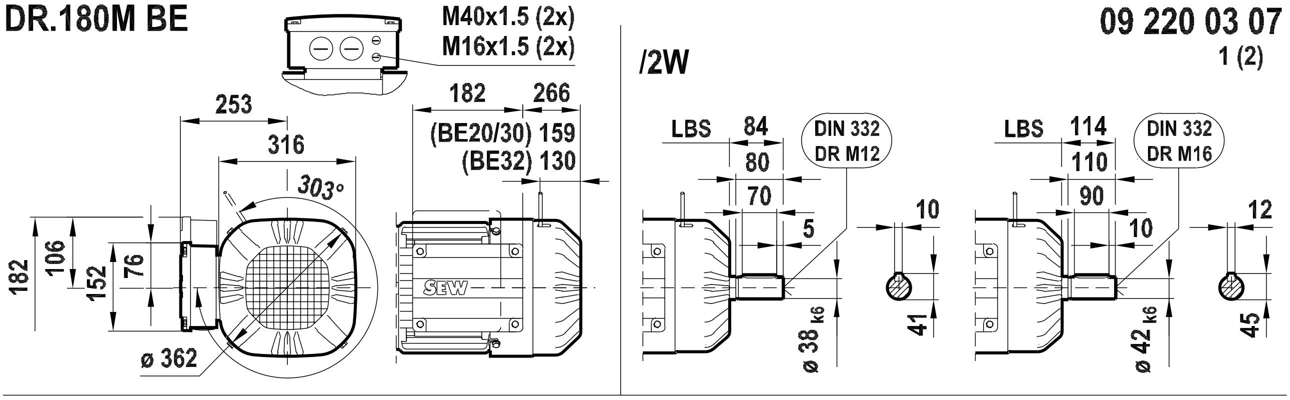
1 (2)



DRS180M 4

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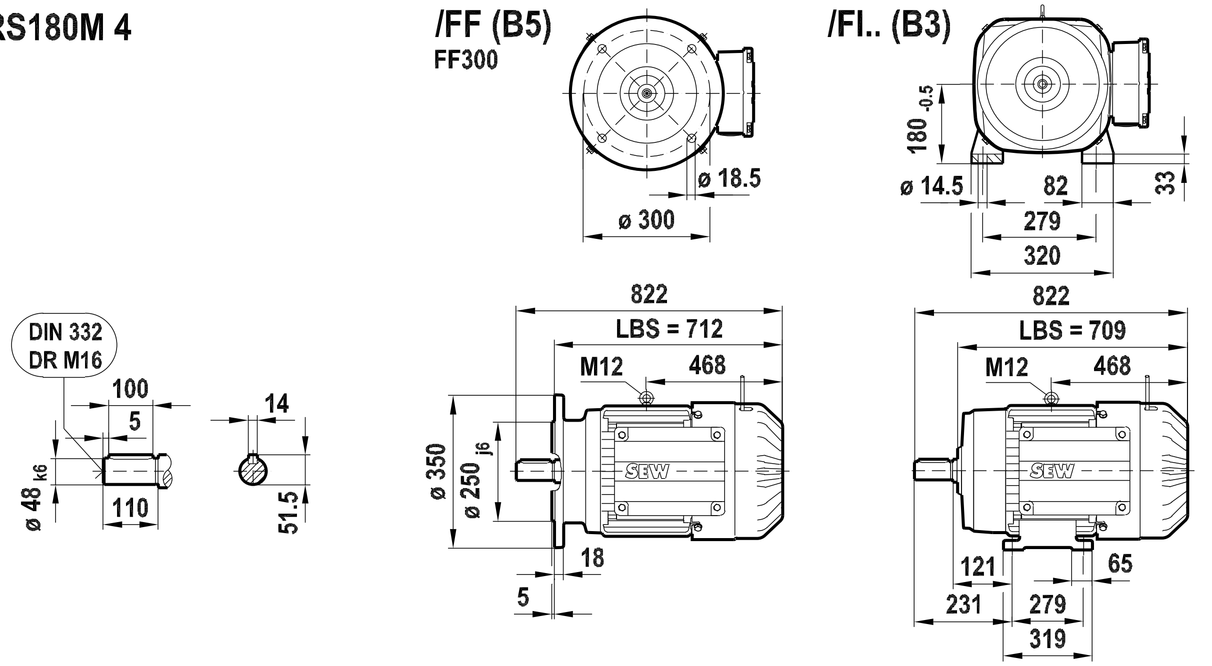

DRE180M 4
DRP180M 4

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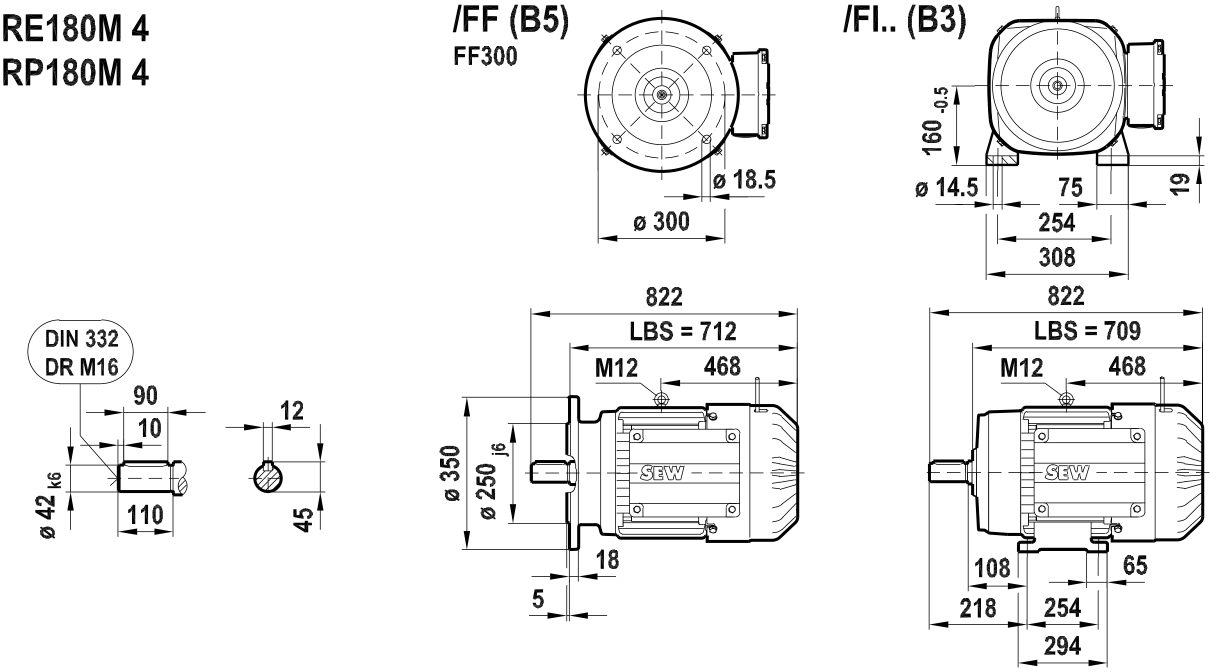

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7

DR.180M BE

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2 (2)

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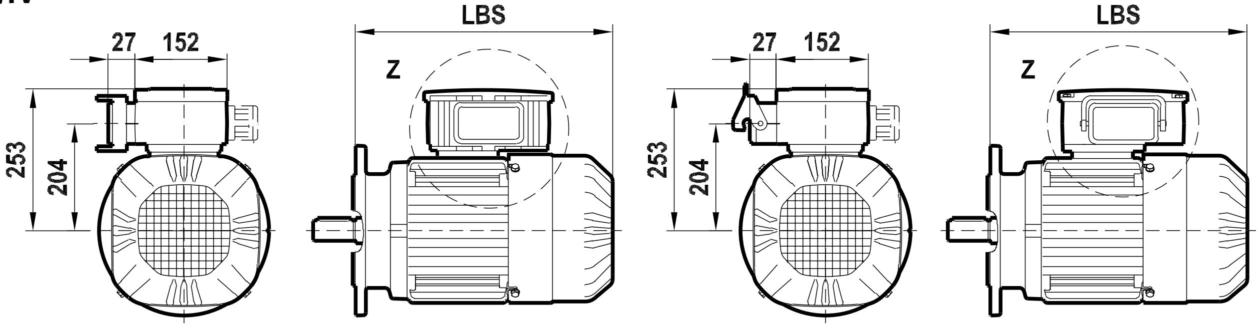

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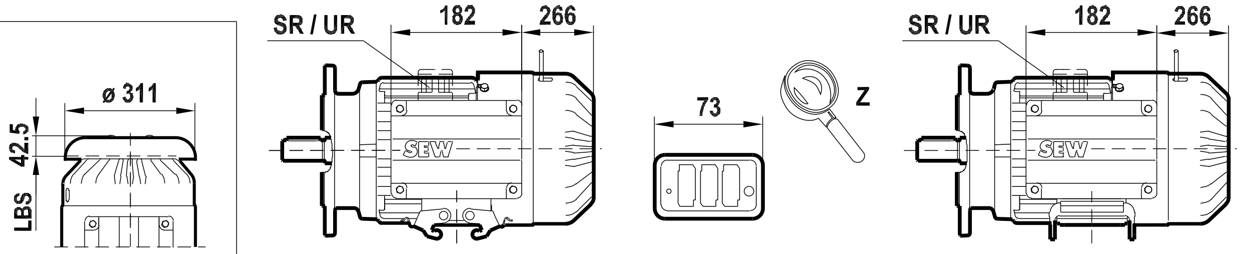

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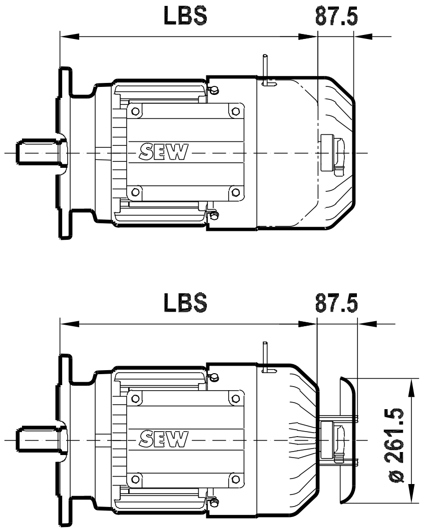

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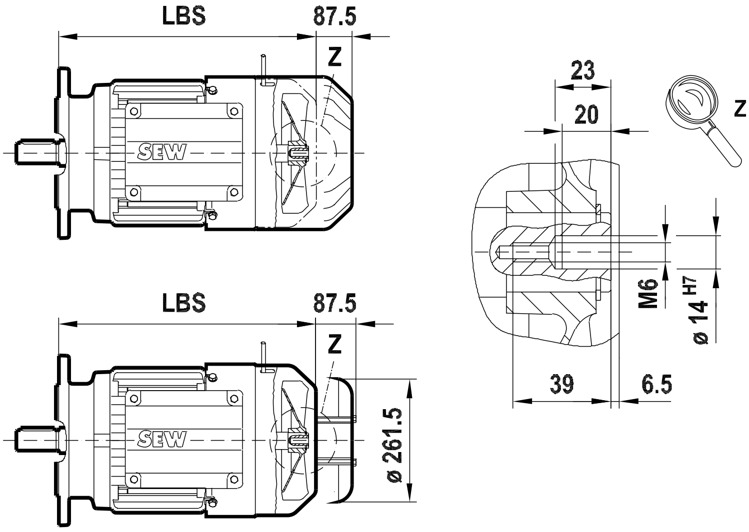

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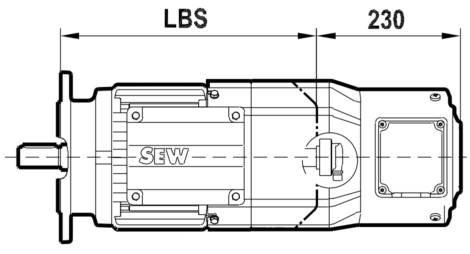

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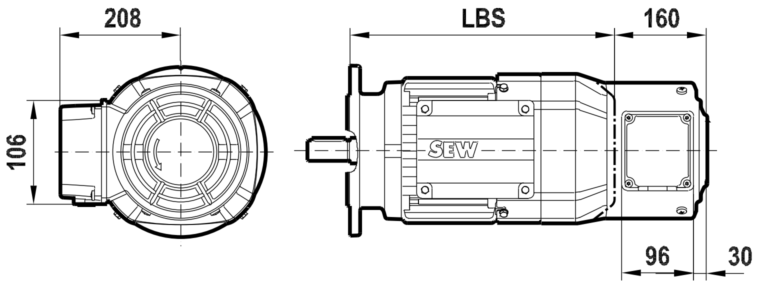

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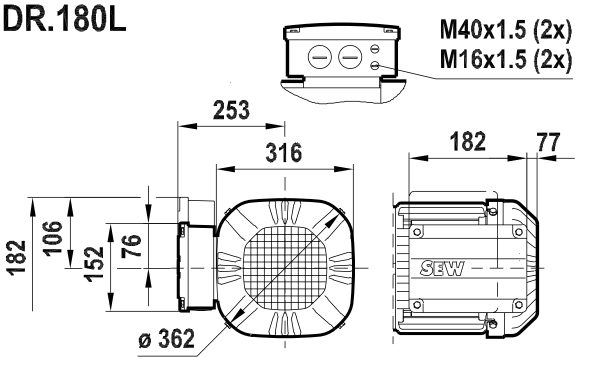
DR.180L



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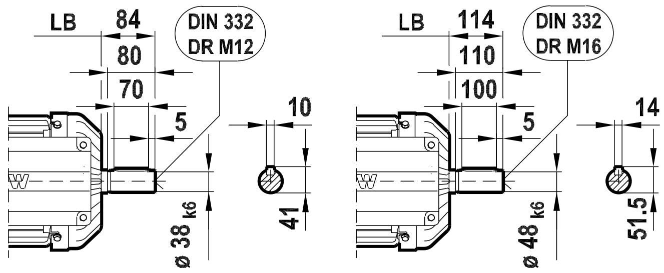
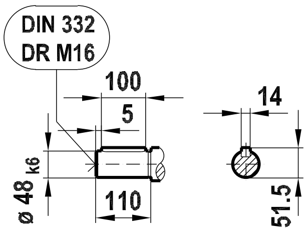
08 306 03 07
1 (2)



DRS180L 4; 4/2; 8/4
DRE180L 4



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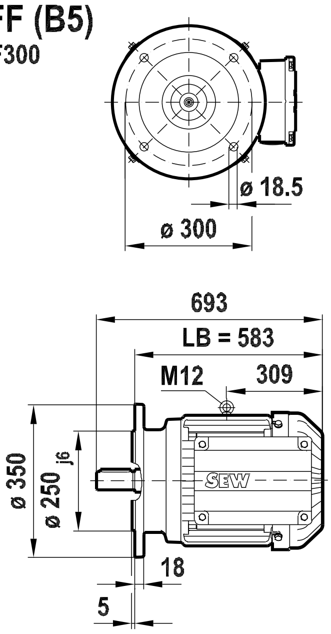

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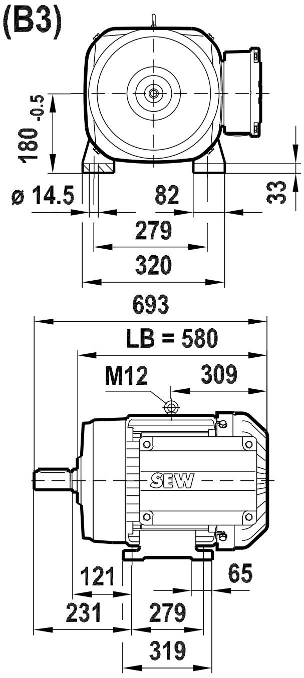
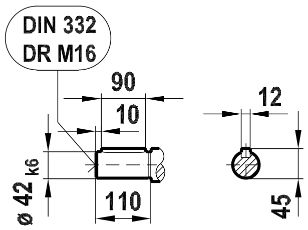


DRP180L 4



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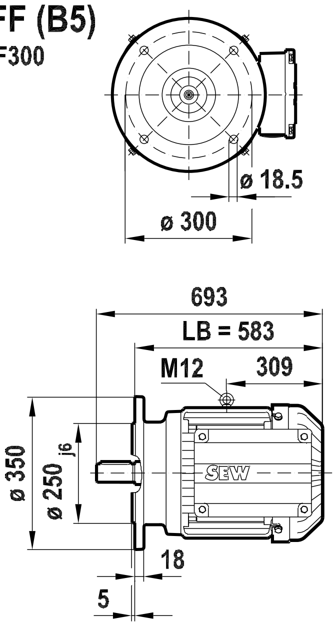

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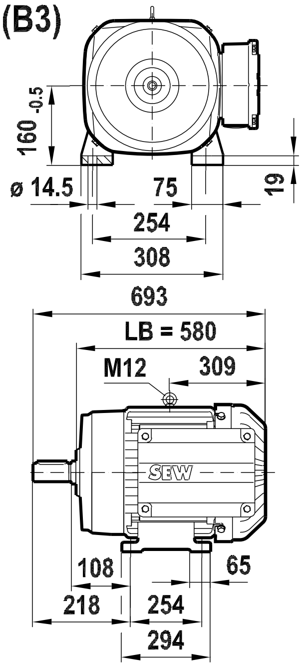

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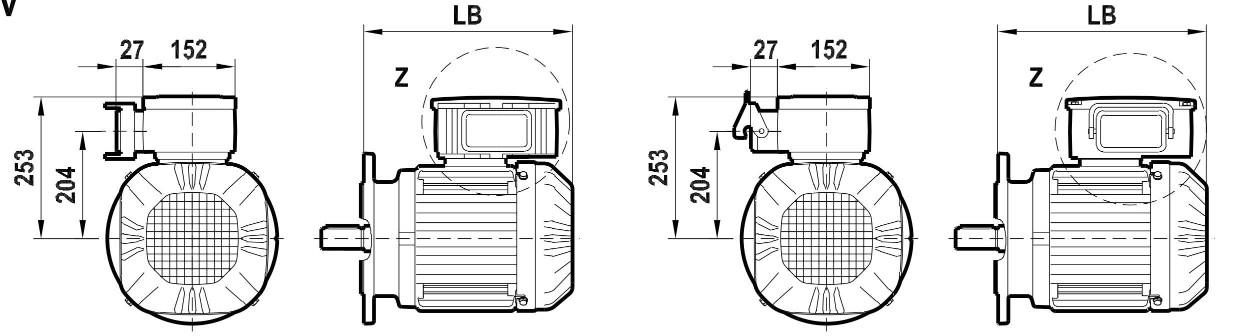
DR.180L

08 306 03 07
2 (2)

/IV



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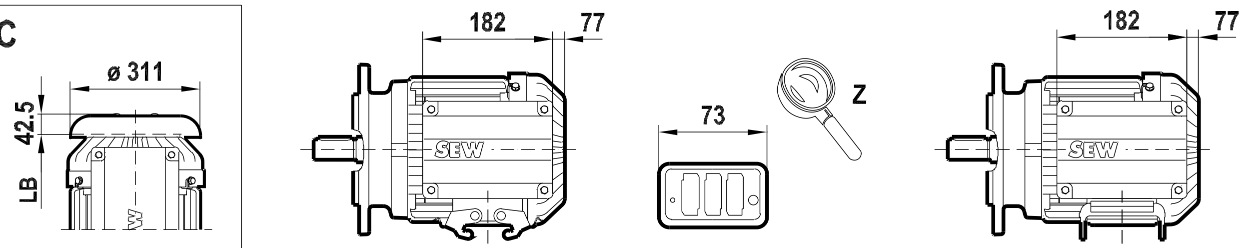

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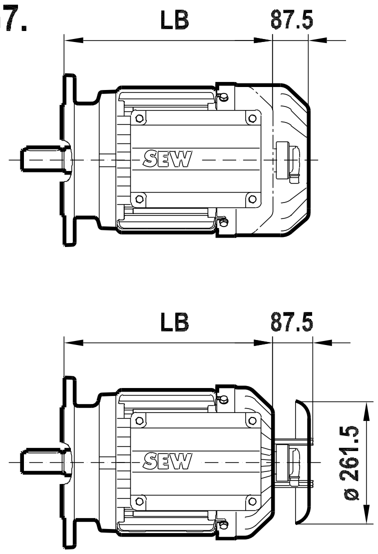

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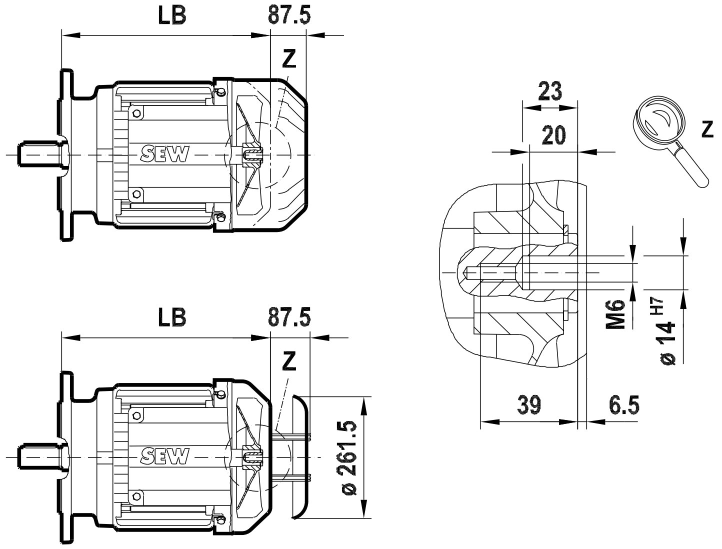

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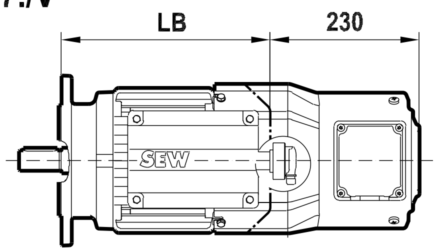

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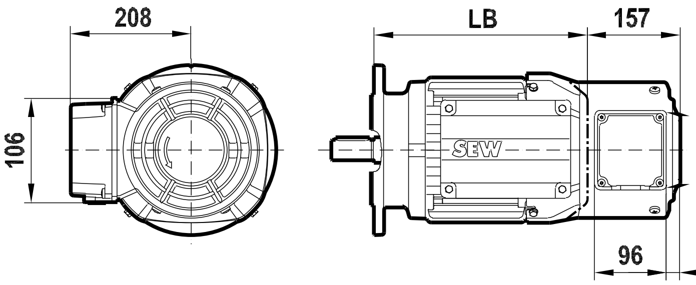

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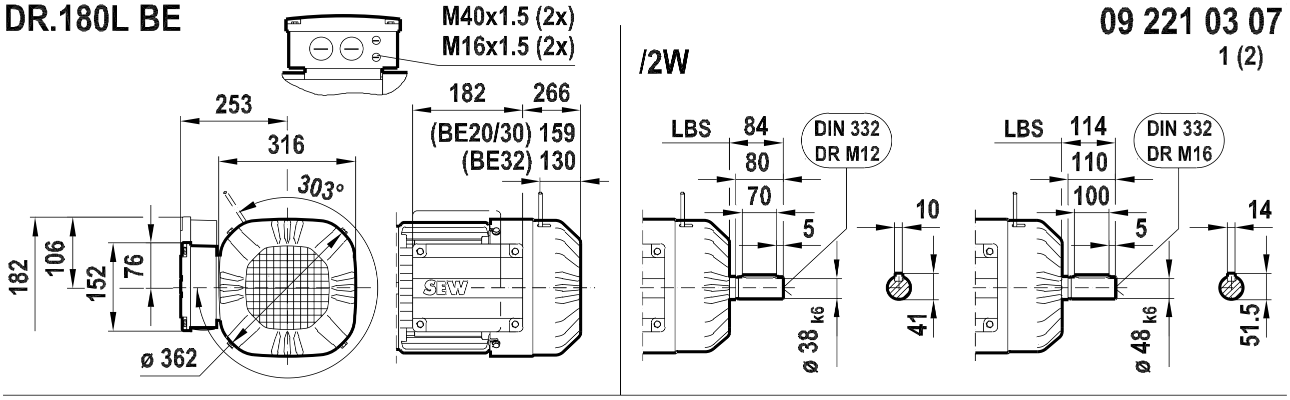
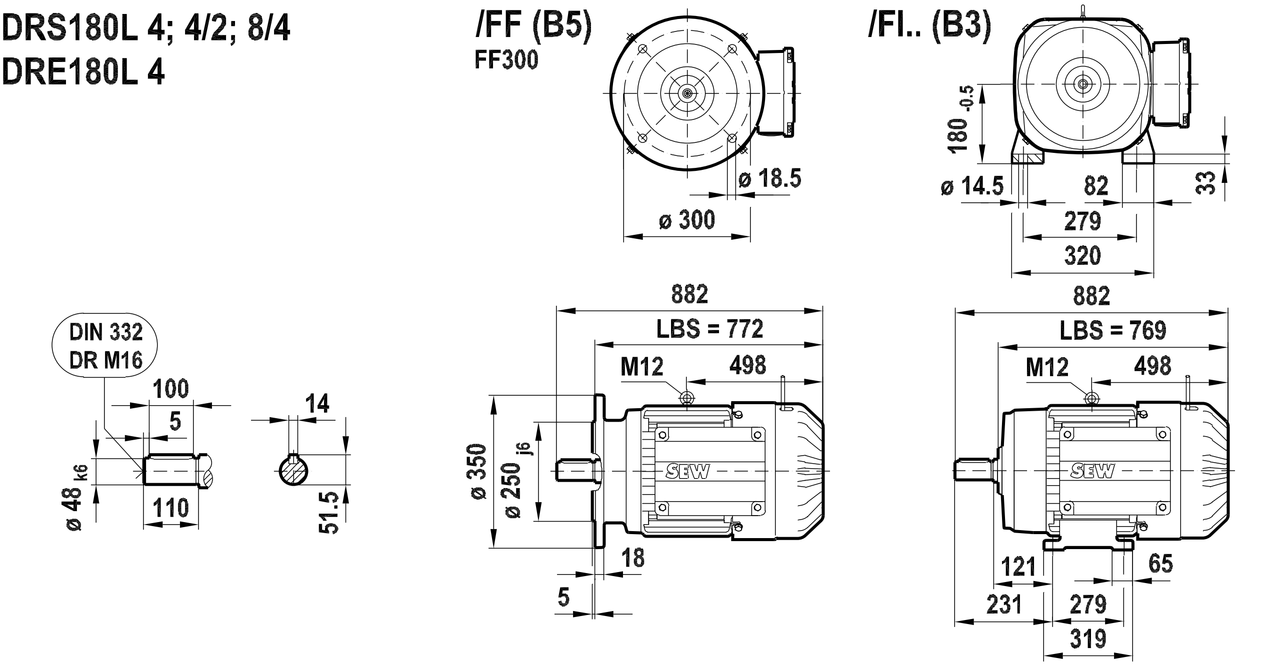
DR.180L BE

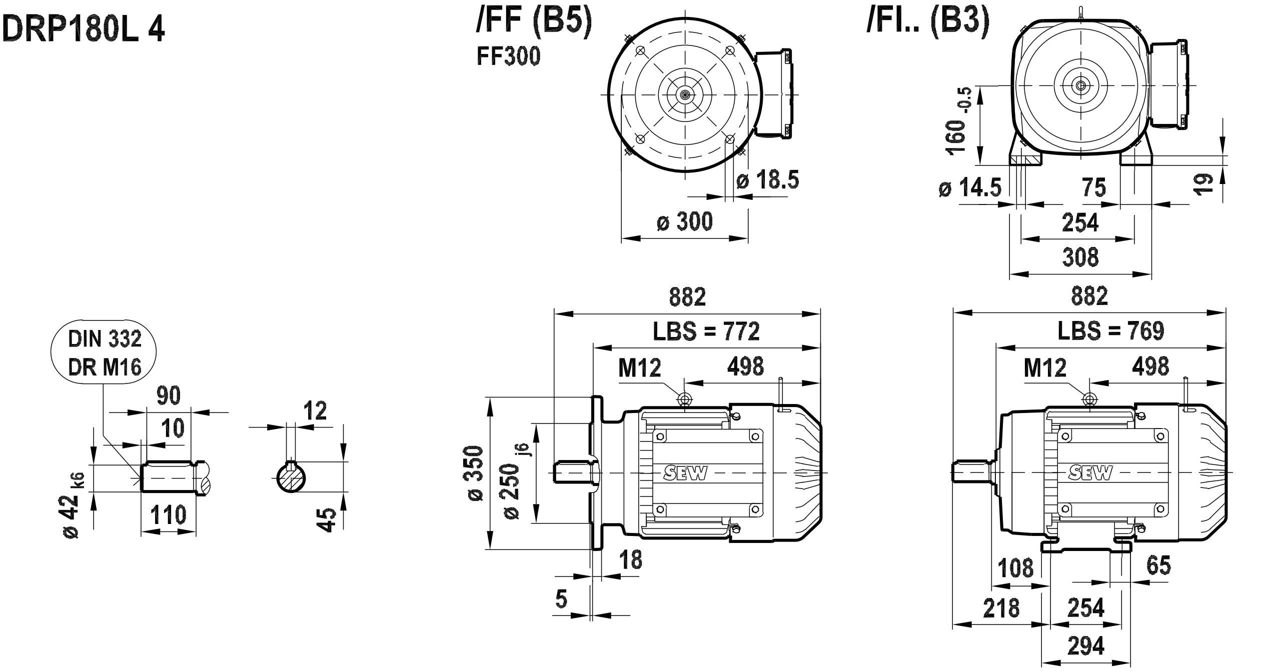
09 221 03 07
1 (2)



DRS180L 4; 4/2; 8/4
DRE180L 4



DRP180L 4



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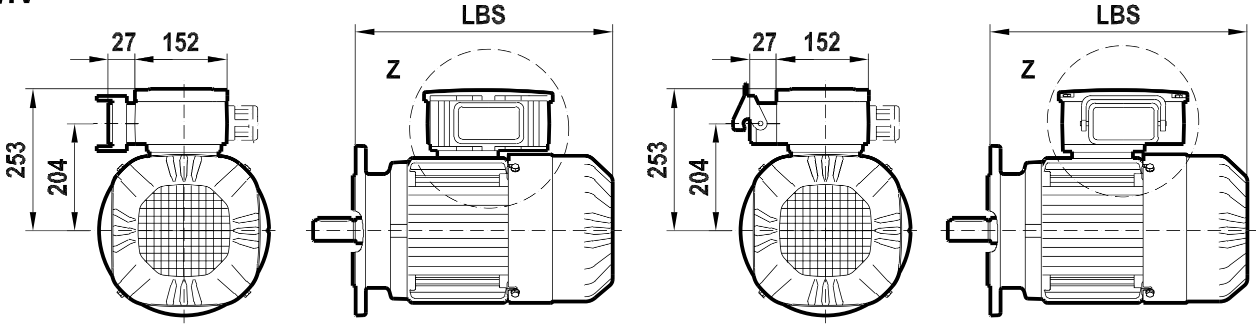
19290411/EN – 10/2014

DR.180L BE

09 221 03 07
2 (2)

/IV



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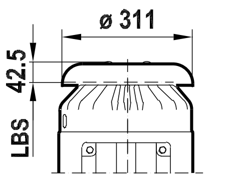

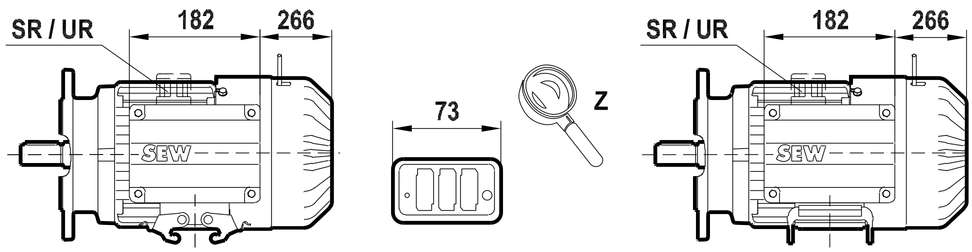

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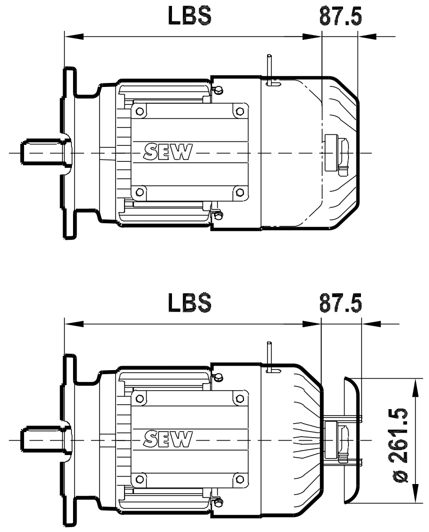

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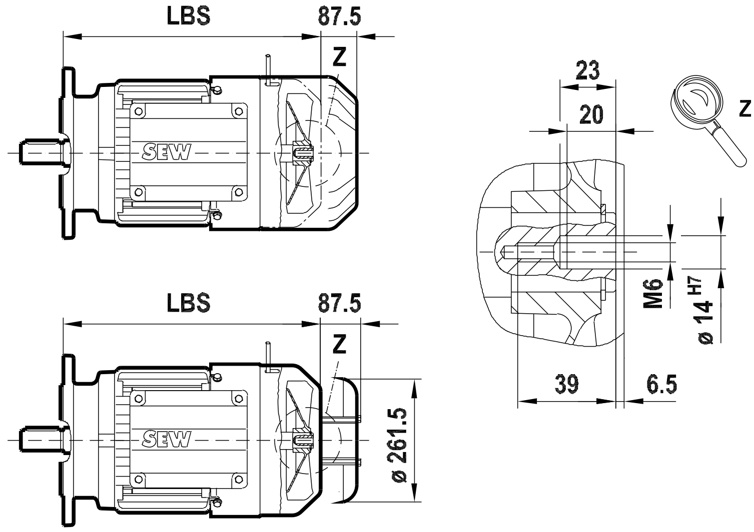

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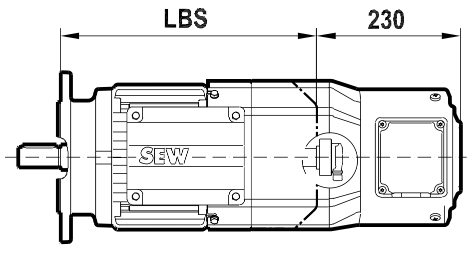

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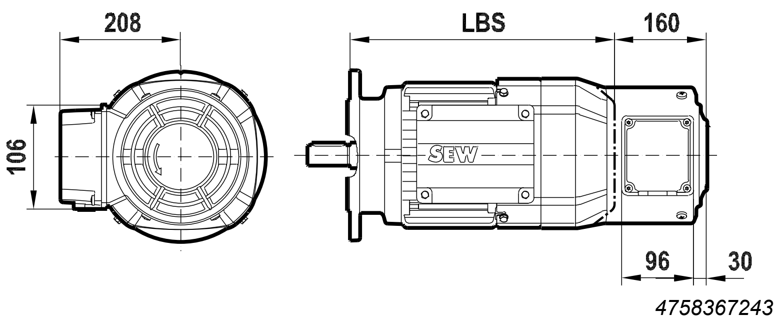

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DR.180LC

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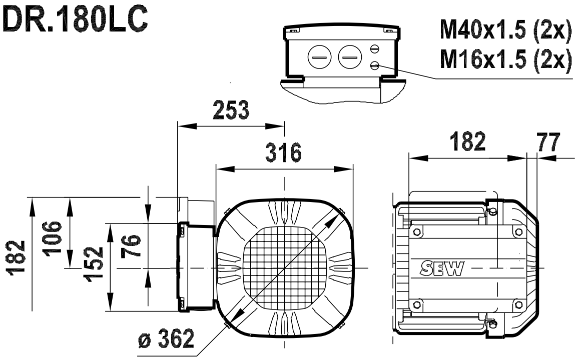
1 (2)



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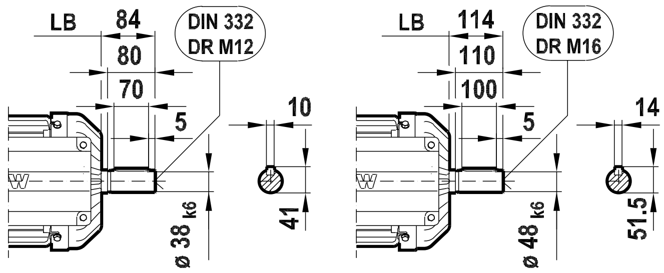

DRS180LC 4

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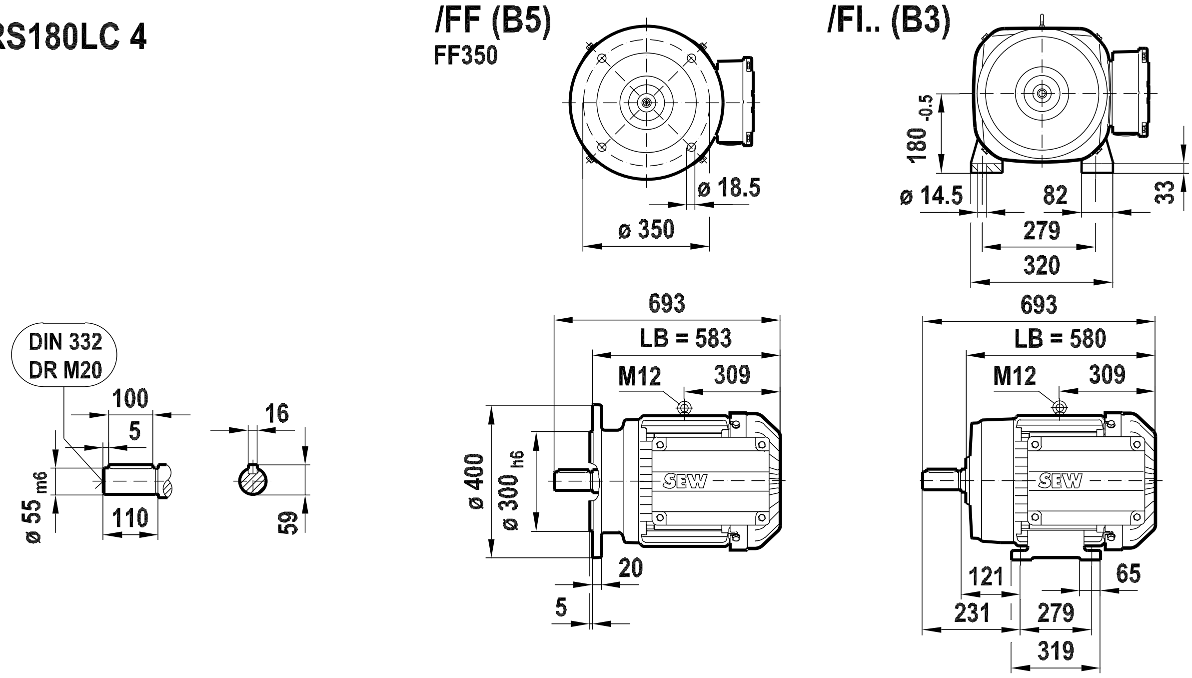

DRE180LC 4
DRP180LC 4

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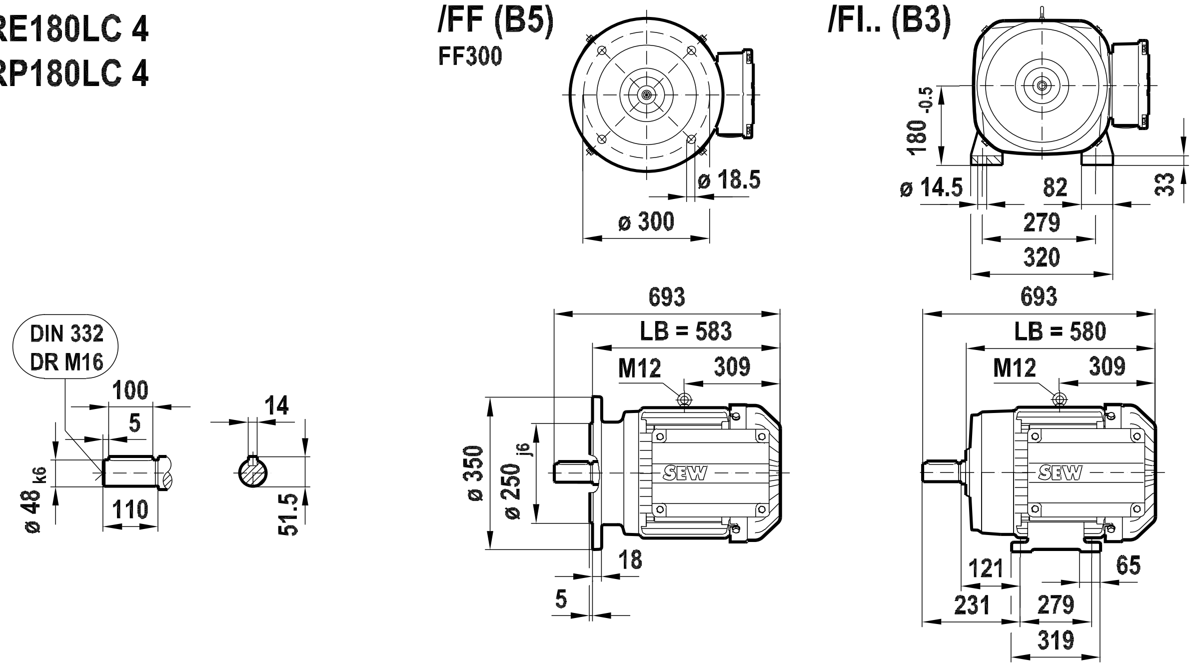

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19290411/EN – 10/2014

DR.180LC

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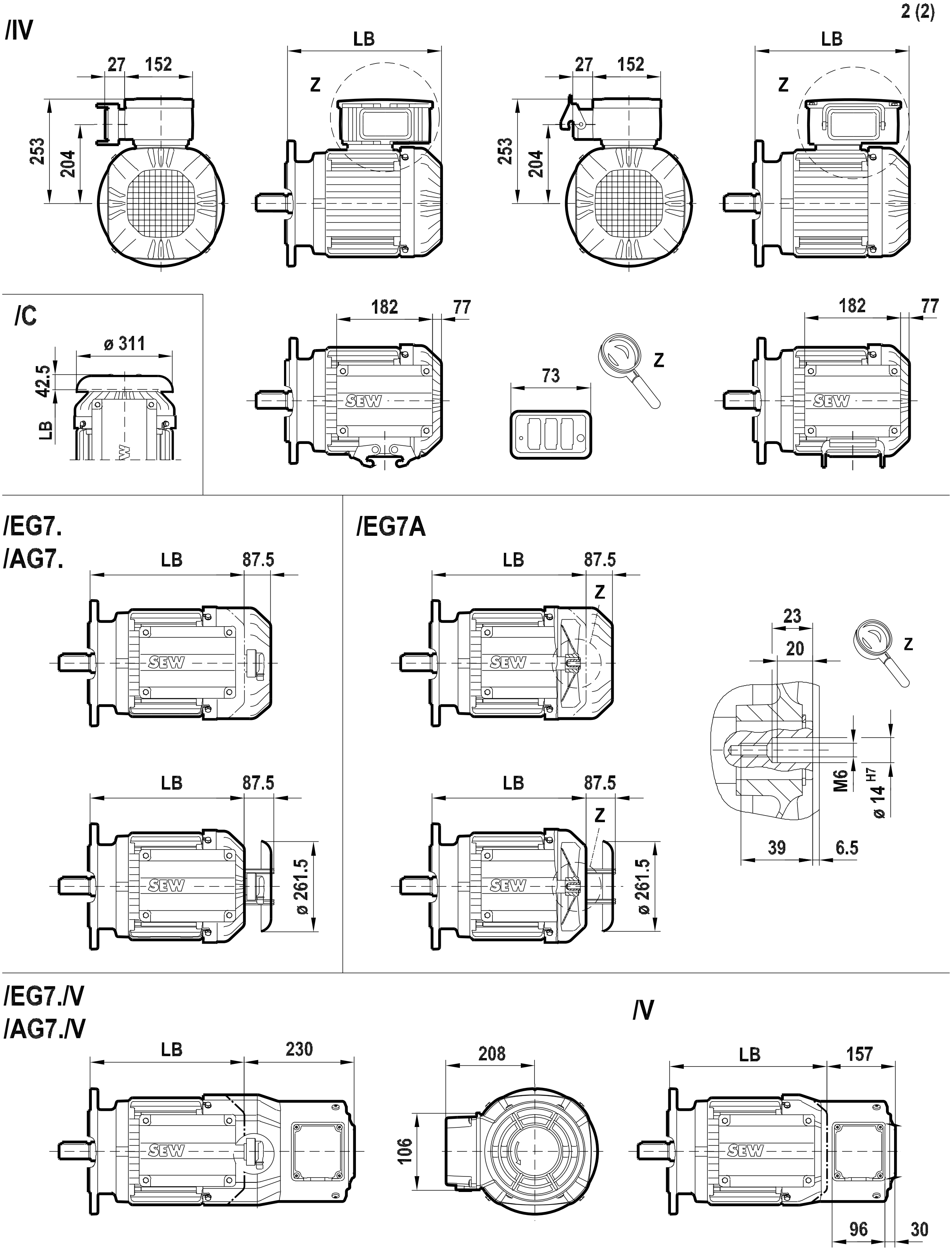
2 (2)



4757907723

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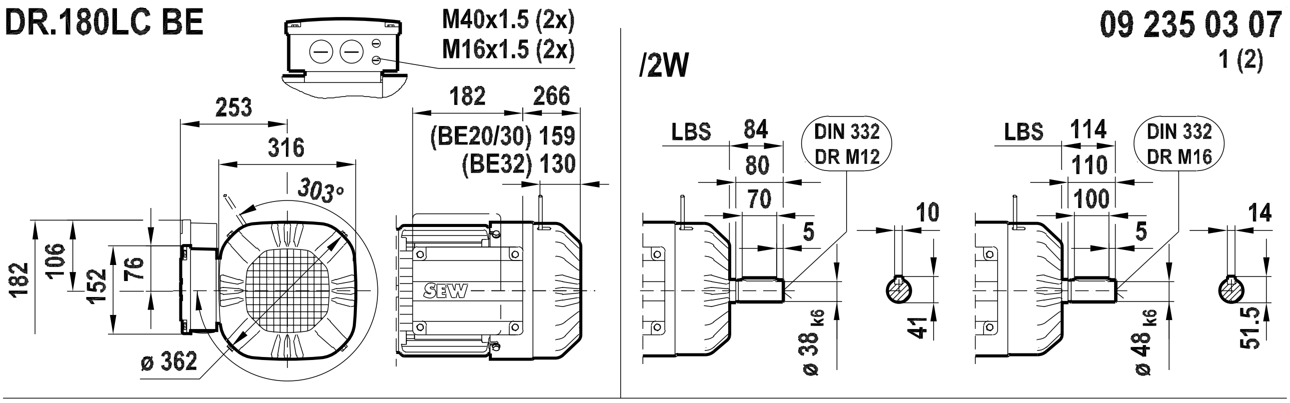

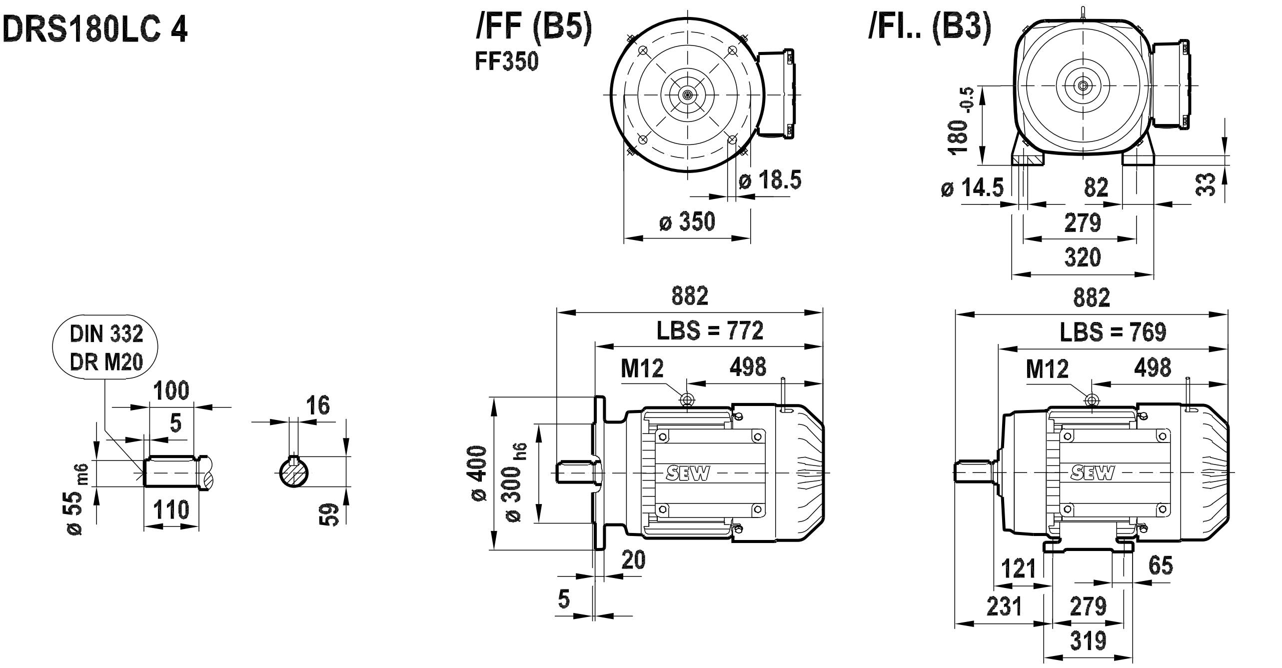

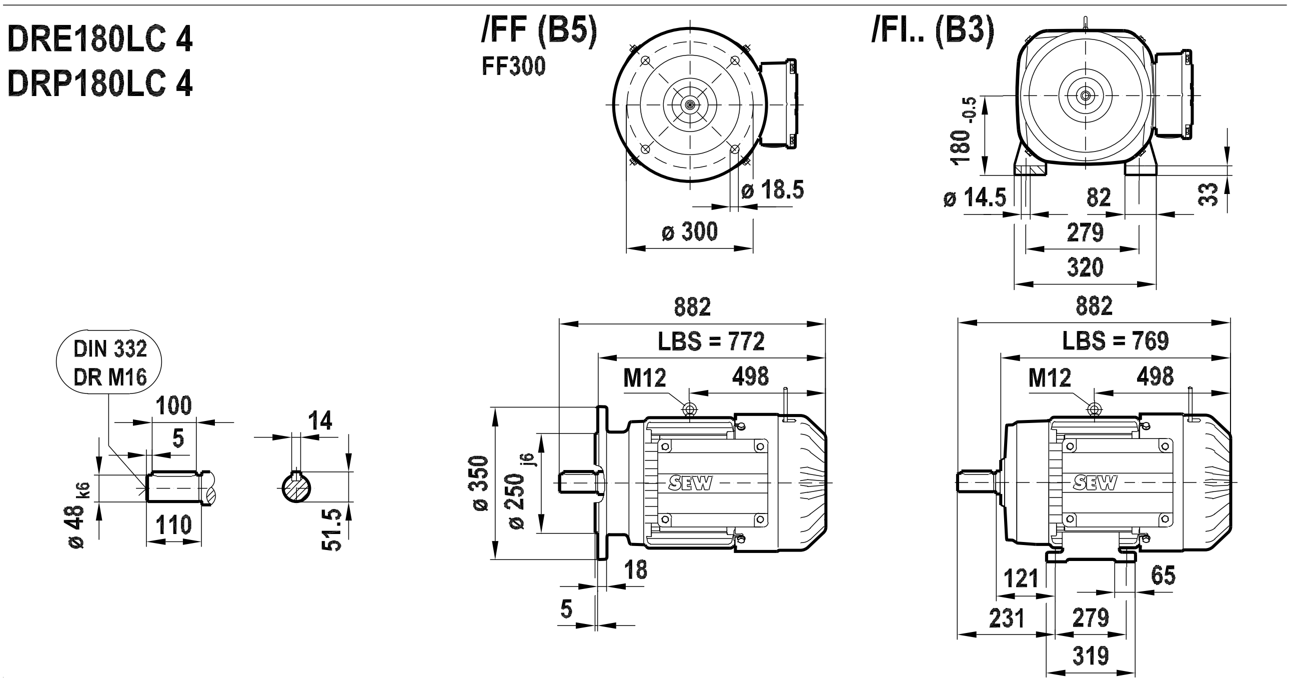

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19290411/EN – 10/2014

DR.180LC BE

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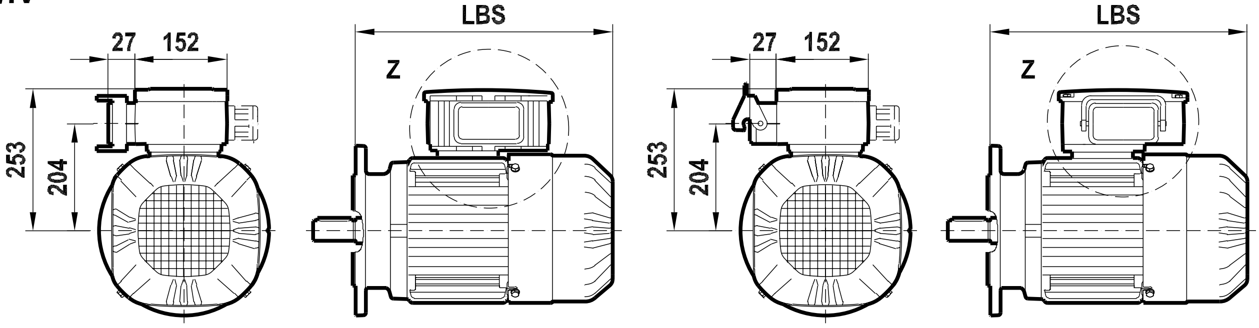

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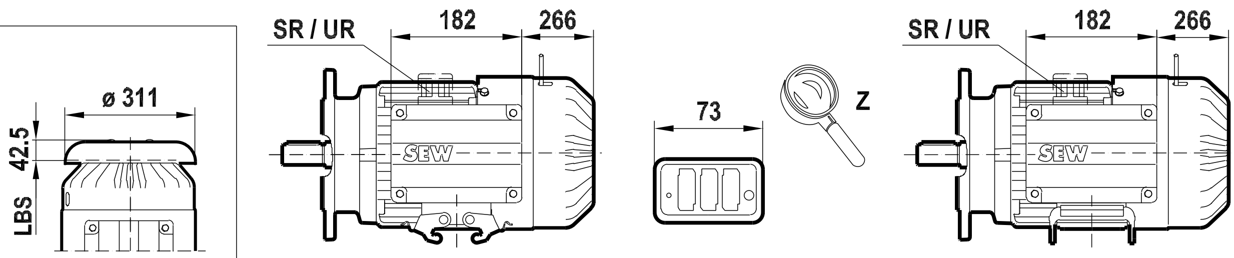

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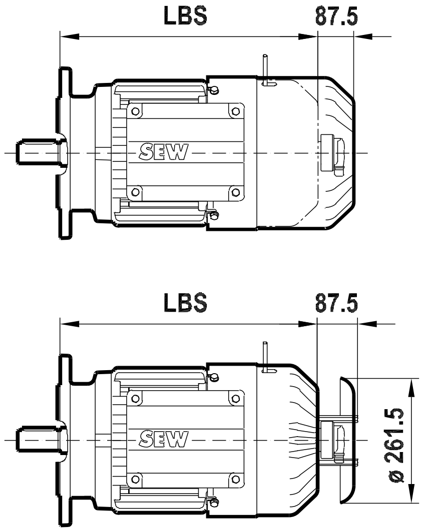

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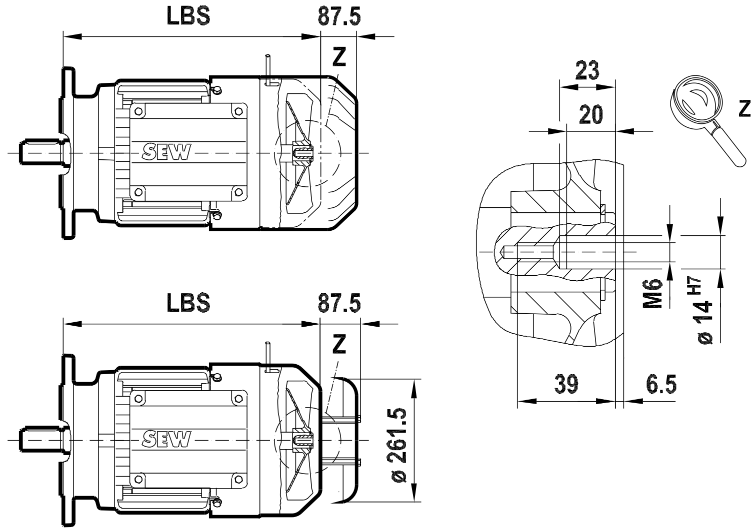

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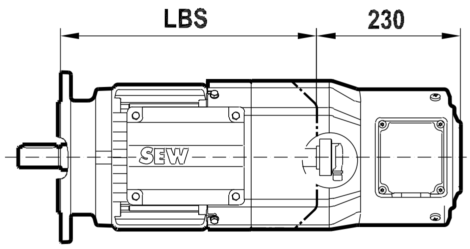

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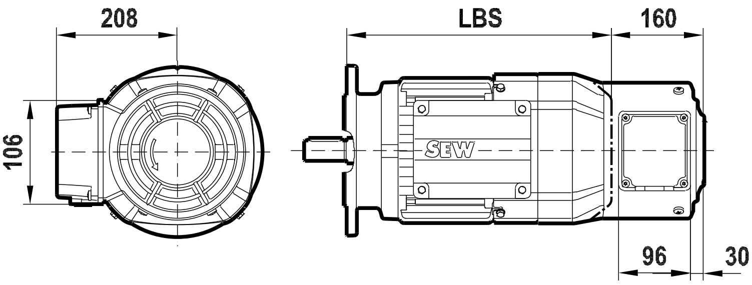

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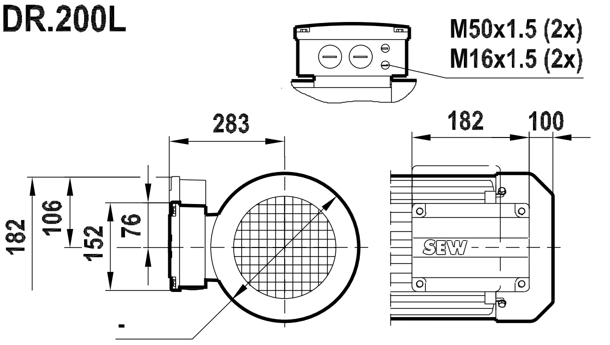
19290411/EN – 10/2014

DR.200L



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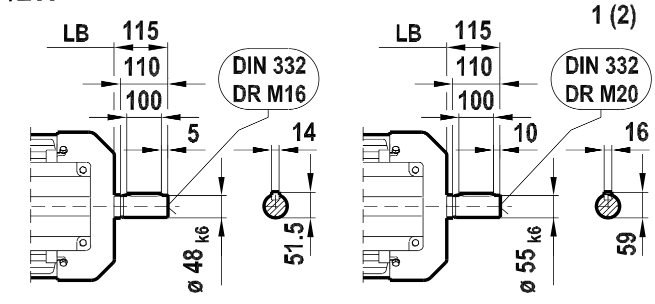
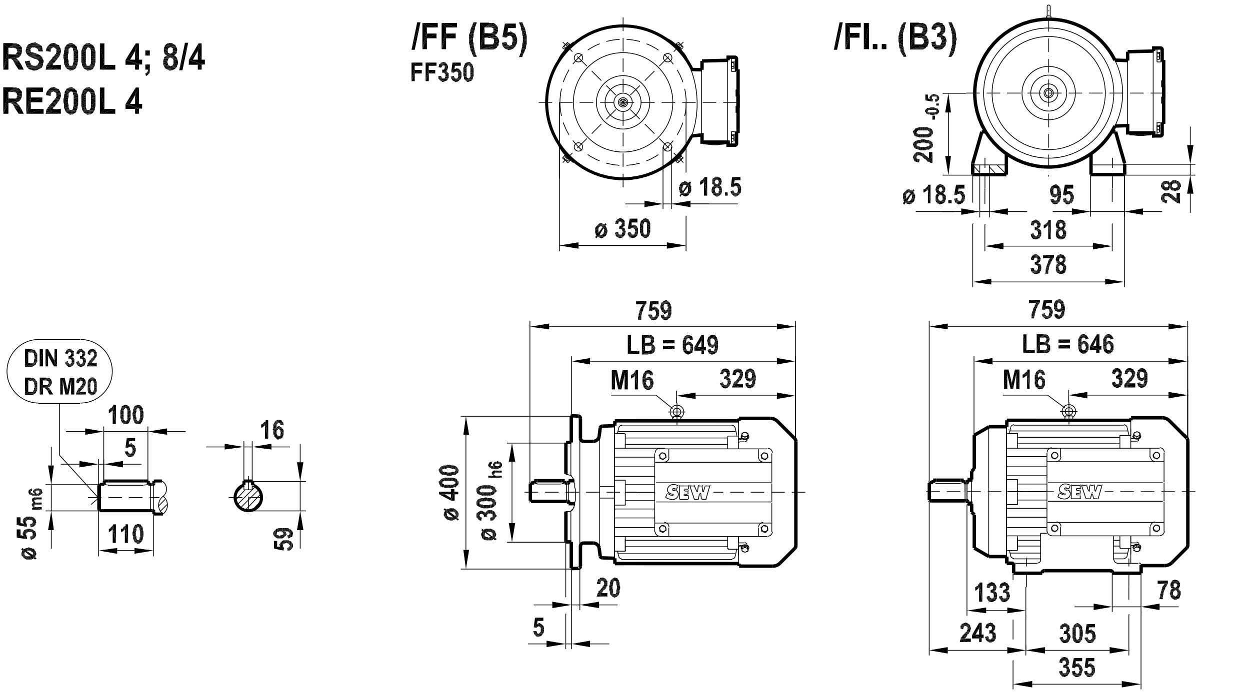


DRS200L 4; 8/4
DRE200L 4



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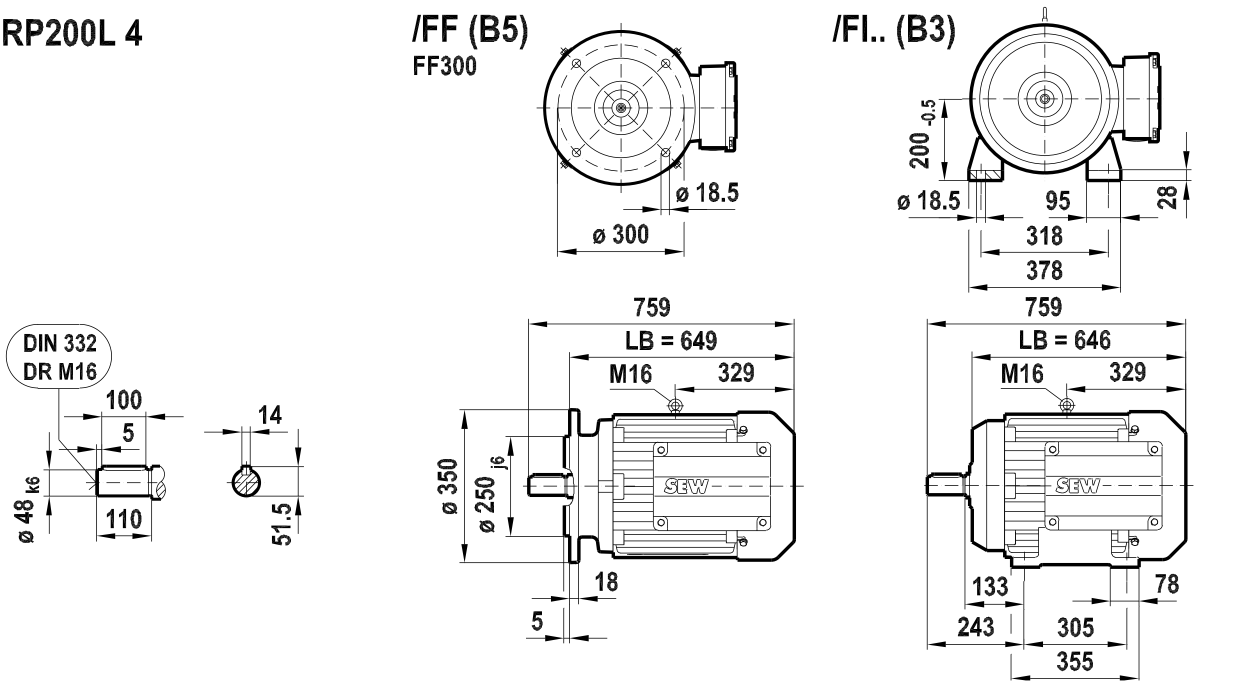

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19290411/EN – 10/2014

DR.200L

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2 (2)

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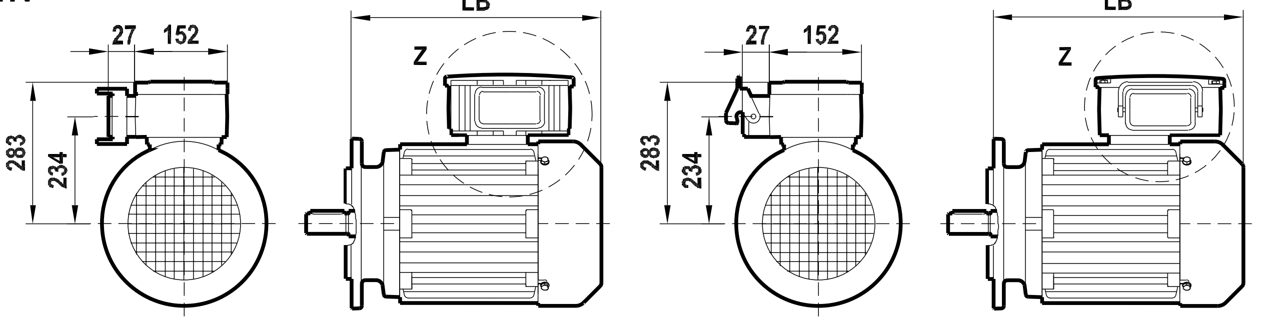

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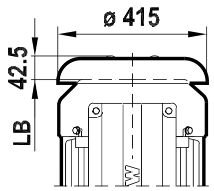

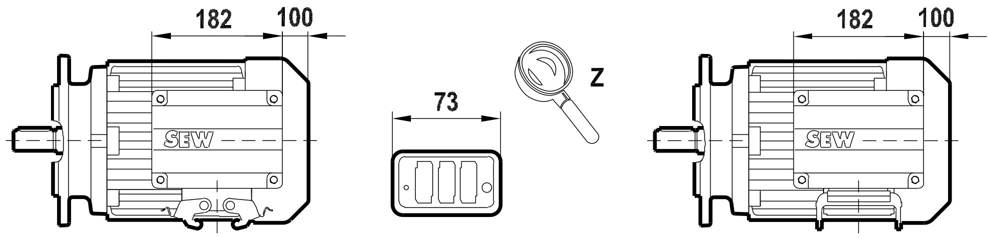

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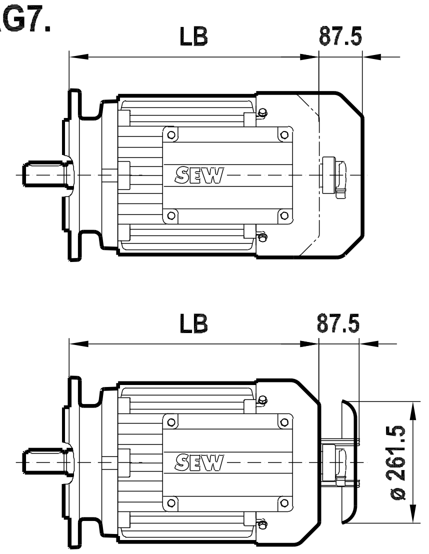

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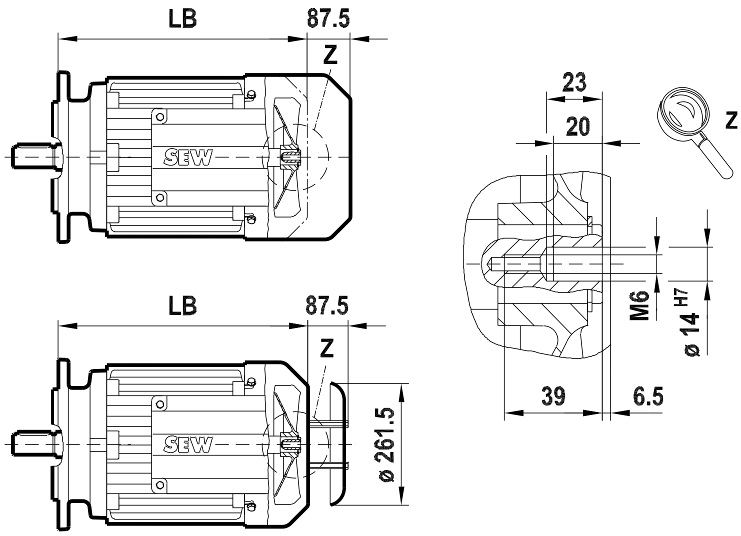

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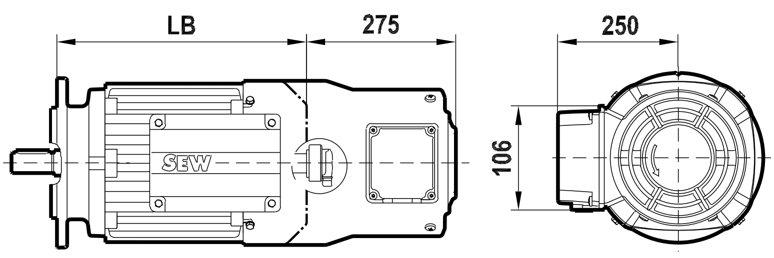

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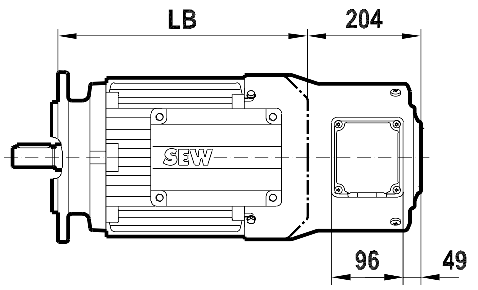

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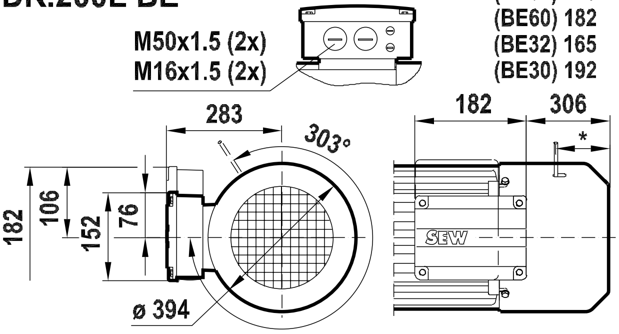
19290411/EN – 10/2014

DR.200L BE



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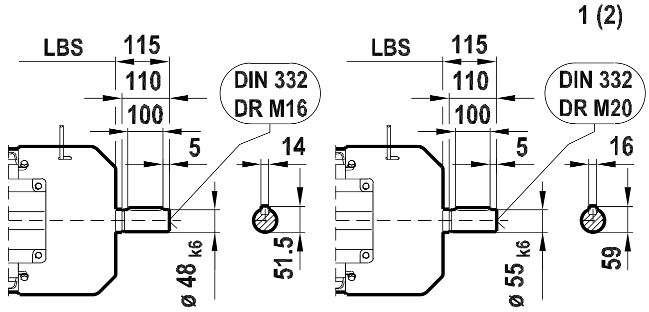

DRS200L 4; 8/4
DRE200L 4

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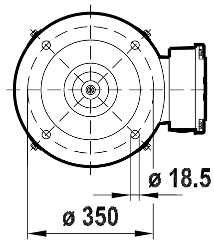

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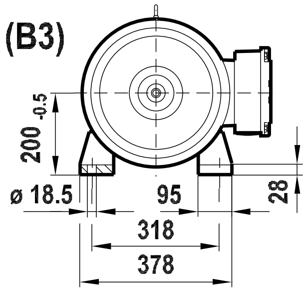

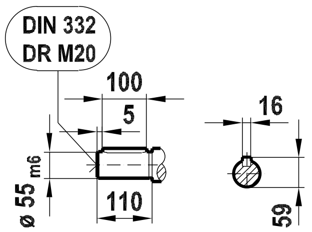

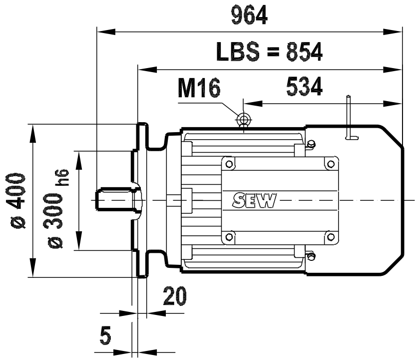

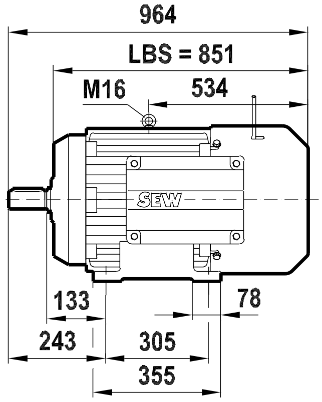

DRP200L 4

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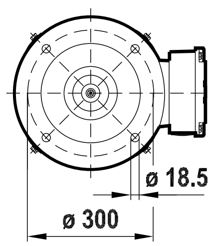

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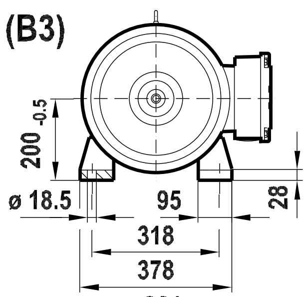

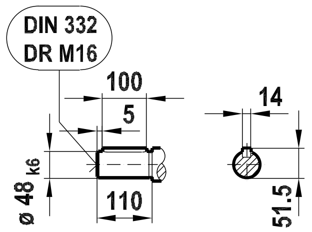

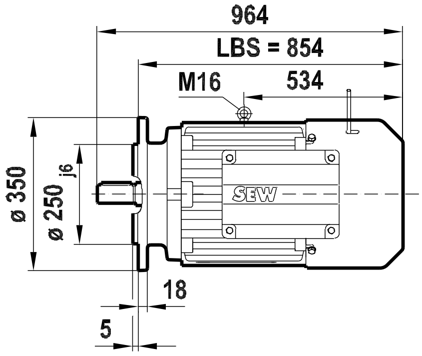

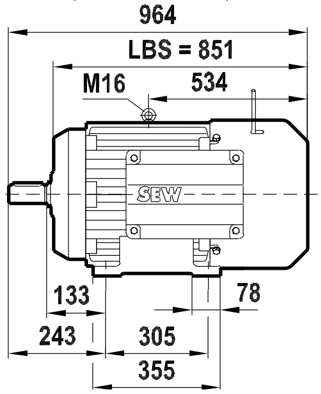

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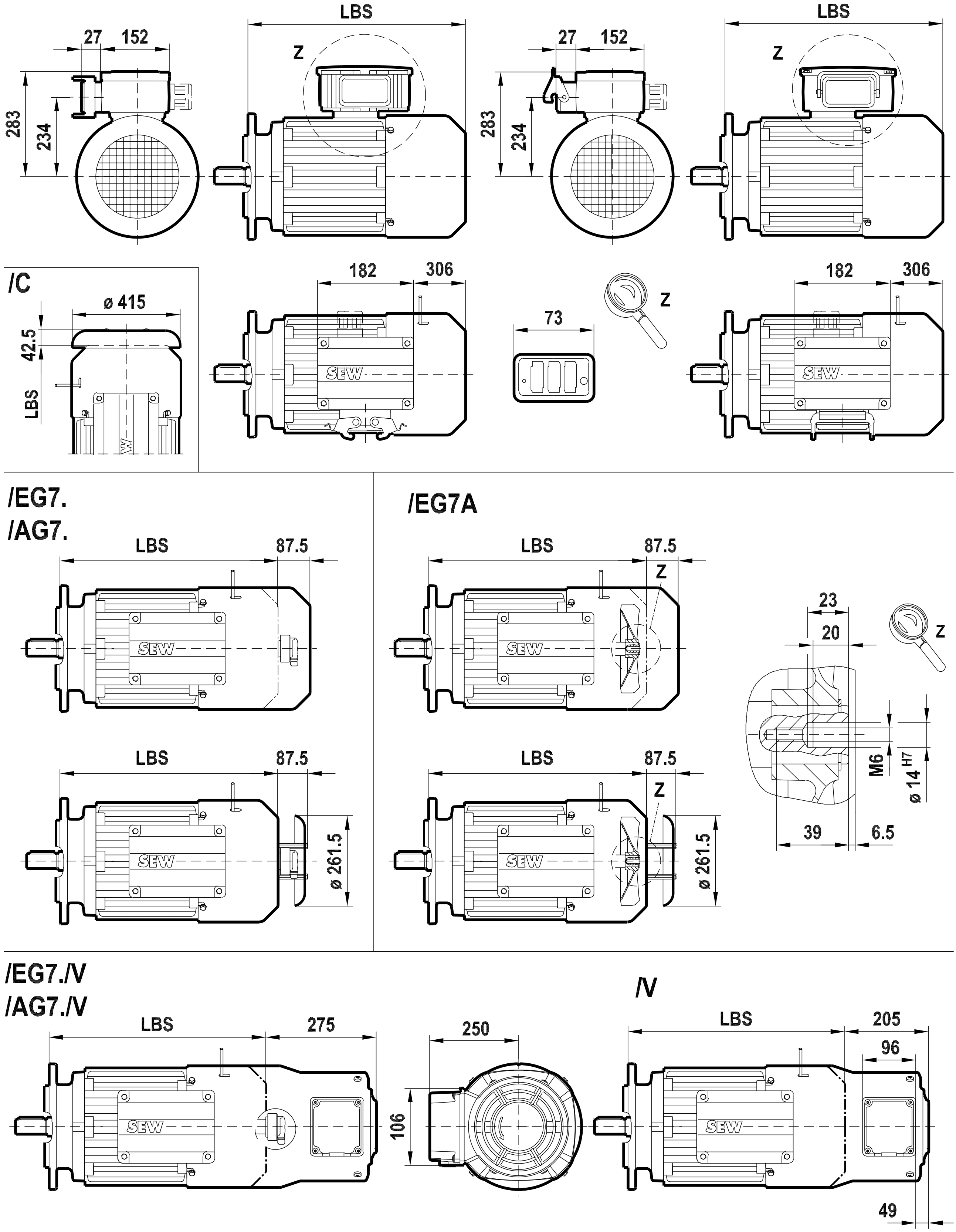

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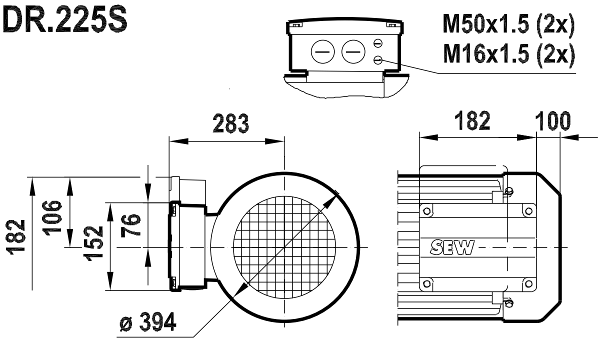
19290411/EN – 10/2014

DR.225S



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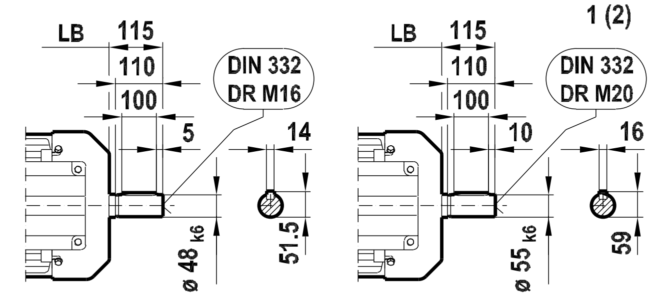

DRS225S 4; 8/4
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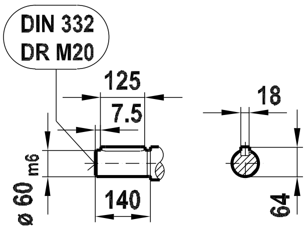

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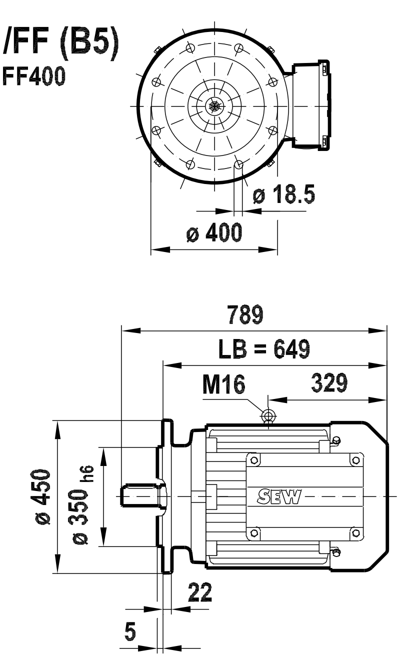

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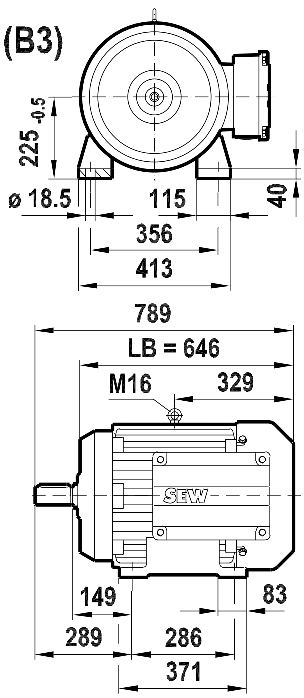
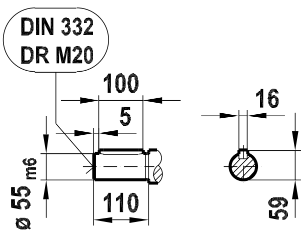


DRP225S 4



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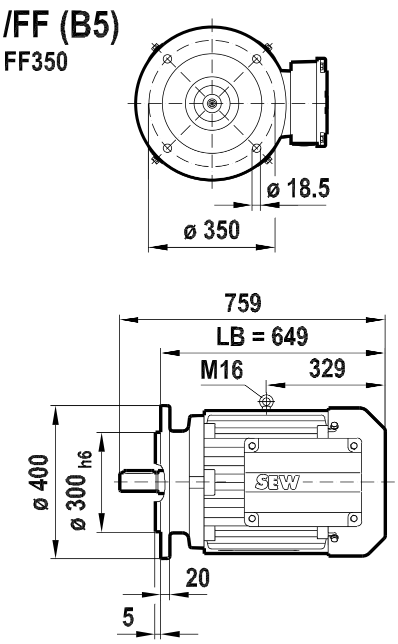

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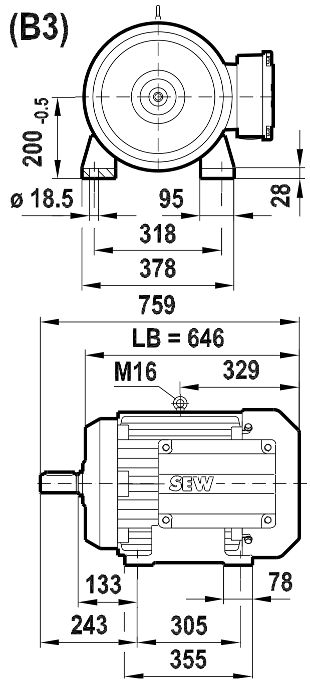

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DR.225S

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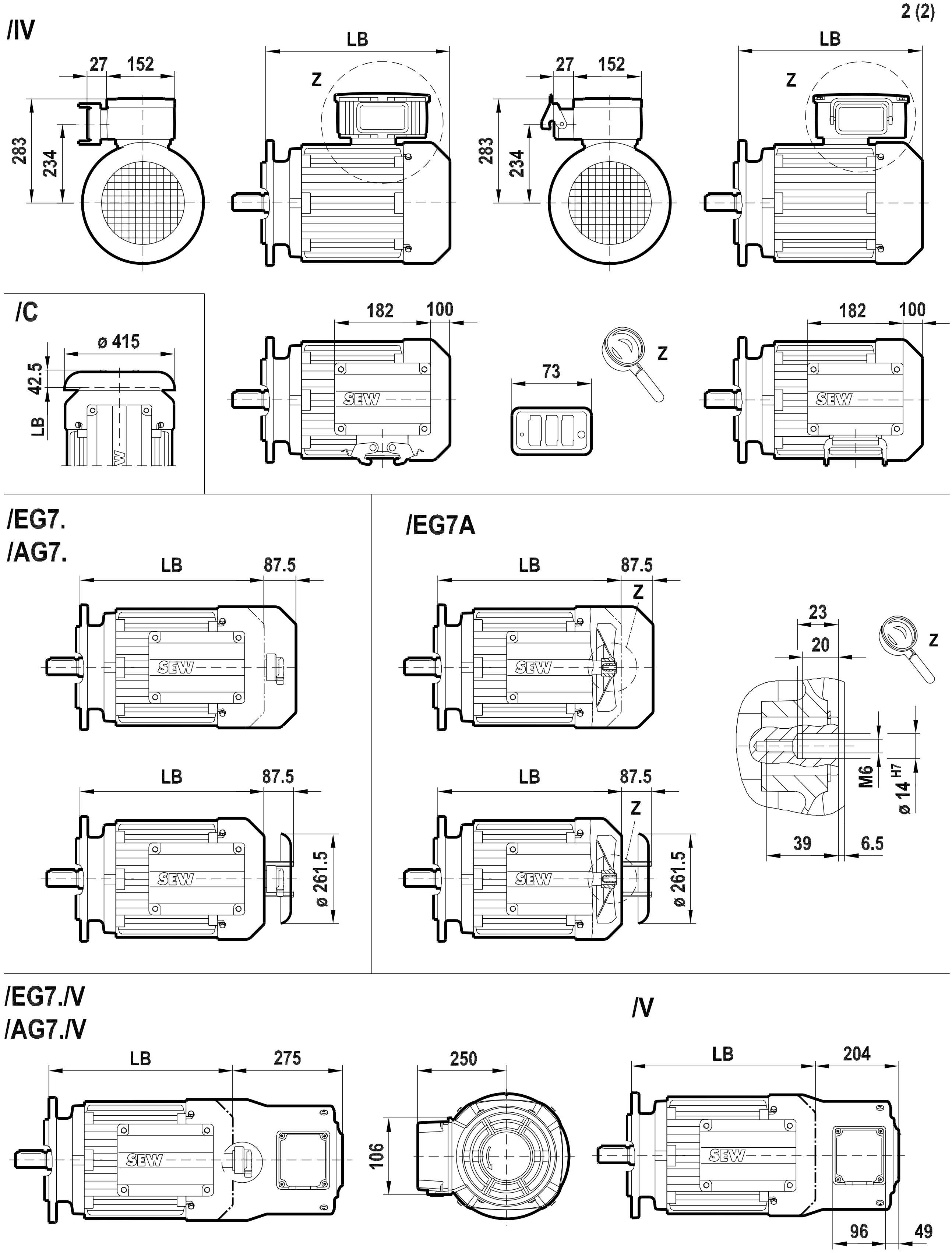

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19290411/EN – 10/2014

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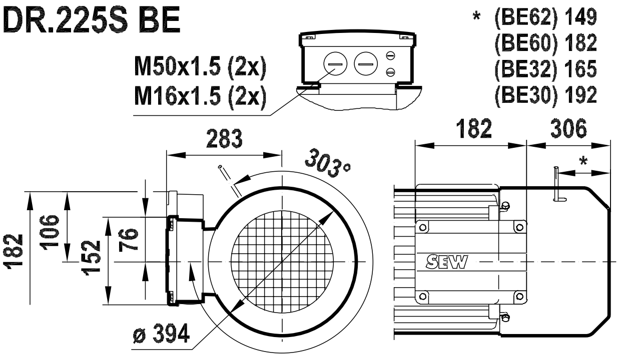

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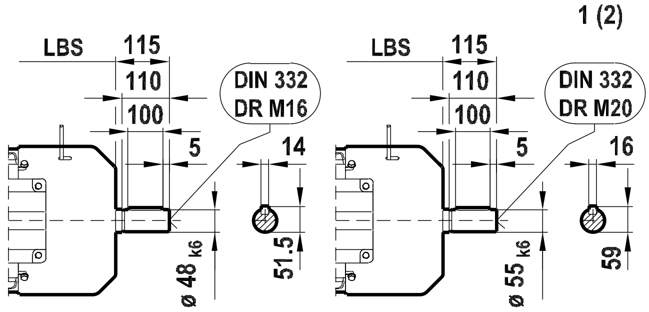
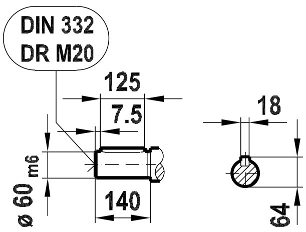


DRS225S 4; 8/4
DRE225S 4



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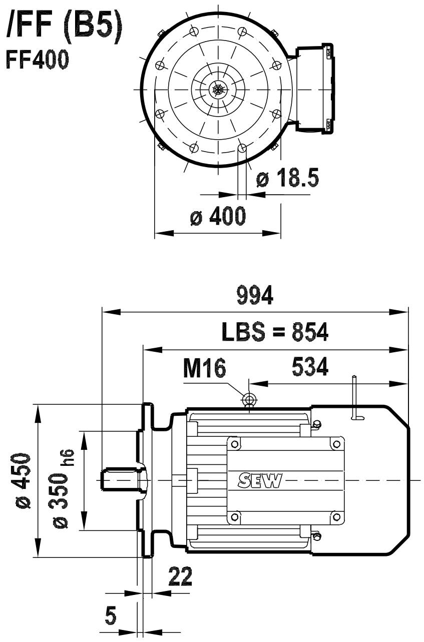

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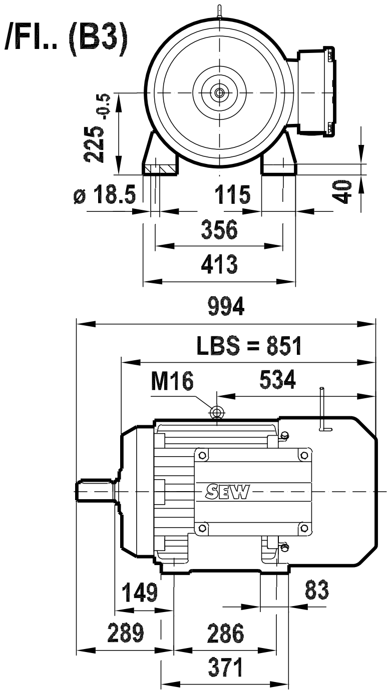

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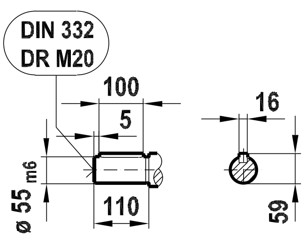

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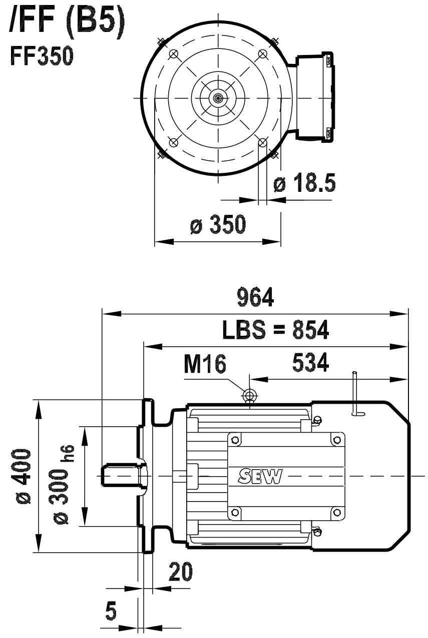

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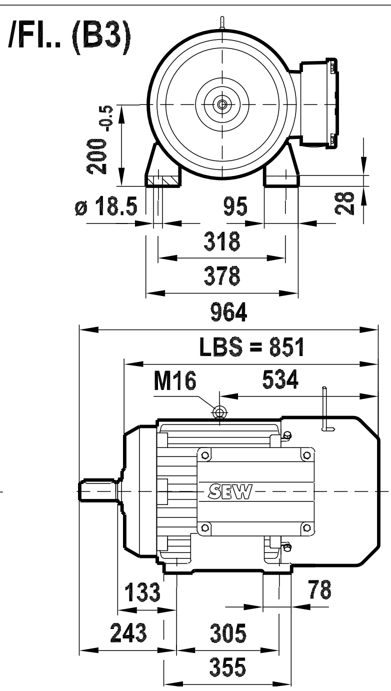

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DR.225S BE /IV

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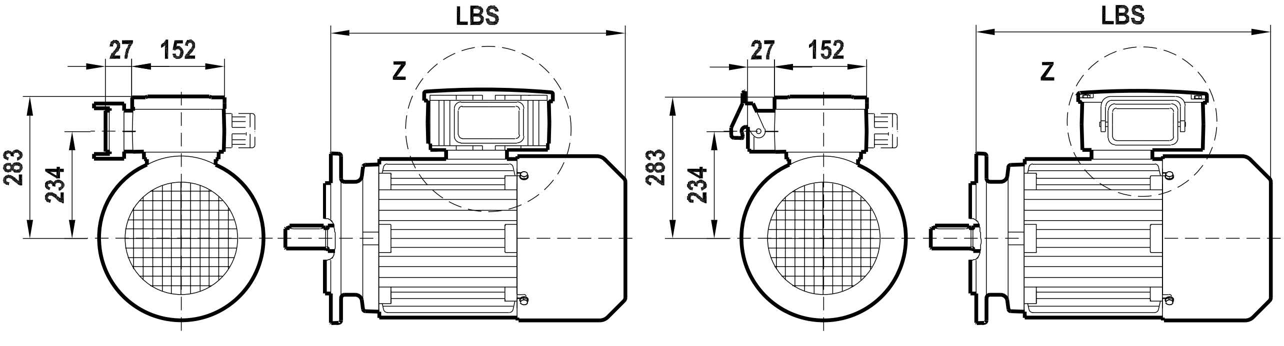

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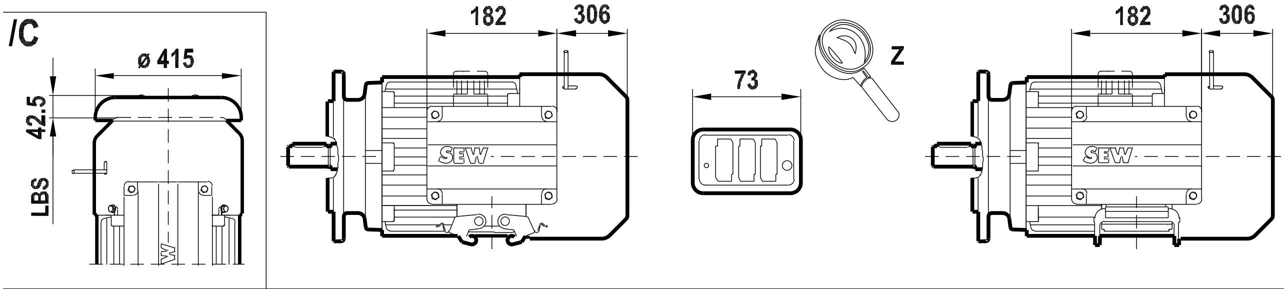

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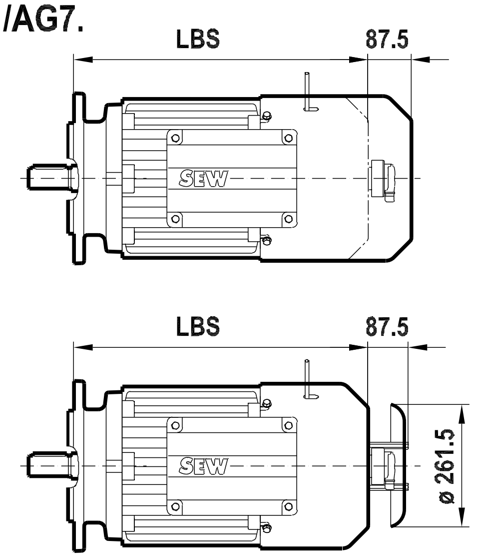

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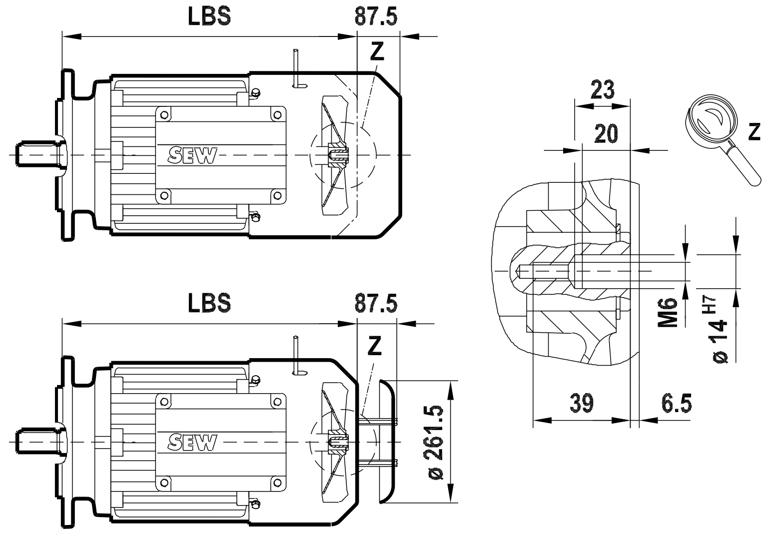

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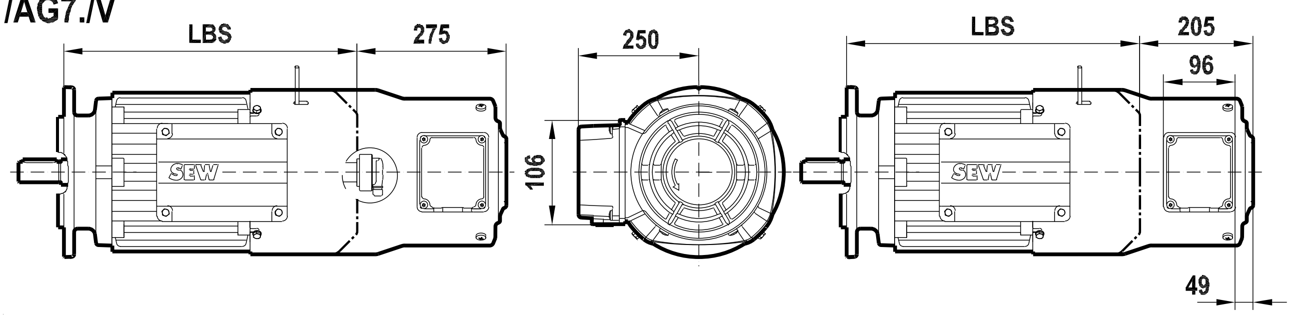

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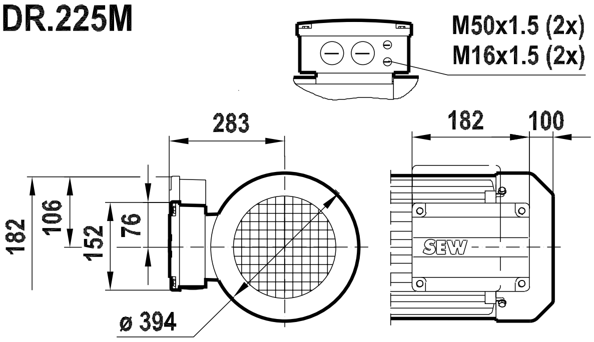
19290411/EN – 10/2014

DR.225M



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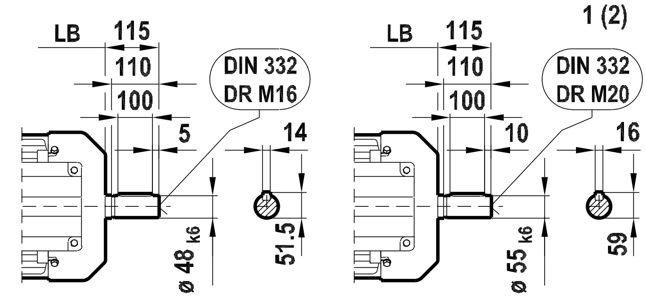

DRS225M 4; 8/4
DRE225M 4

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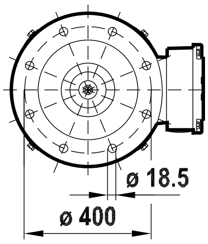

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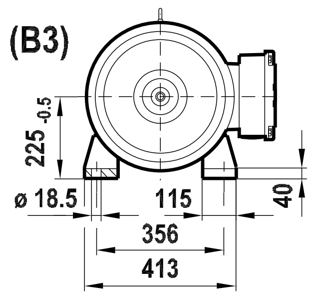

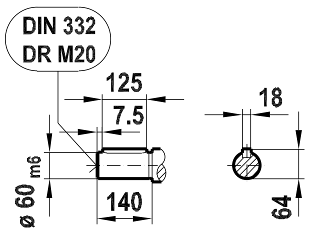

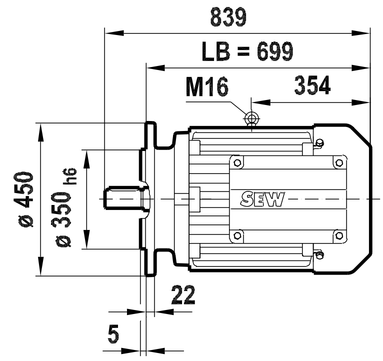

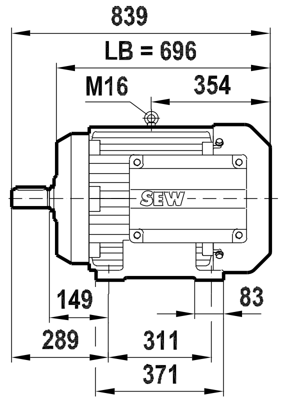

DRP225M 4

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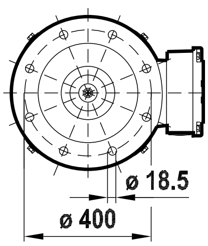

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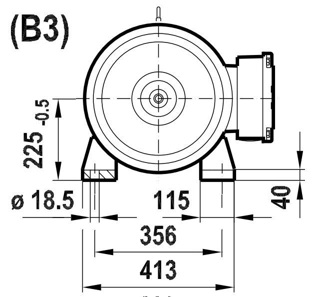

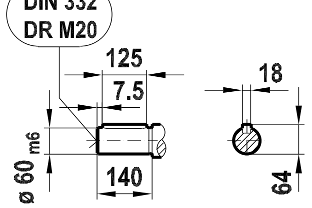

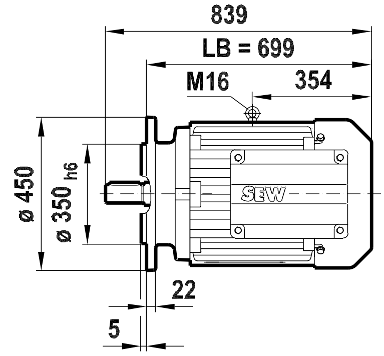

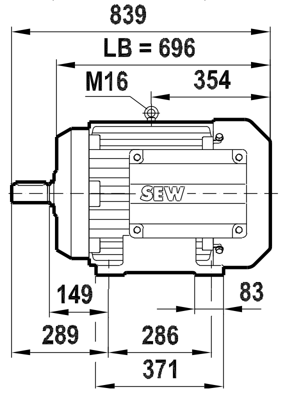

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19290411/EN – 10/2014

DR.225M

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2 (2)

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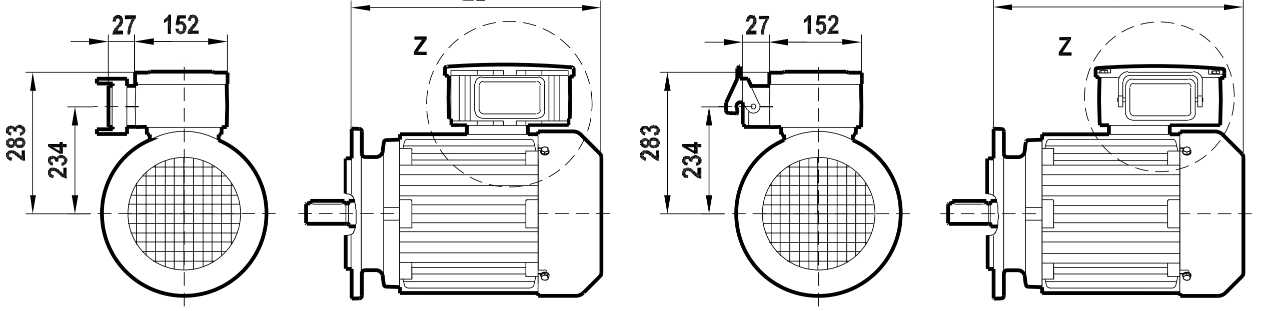

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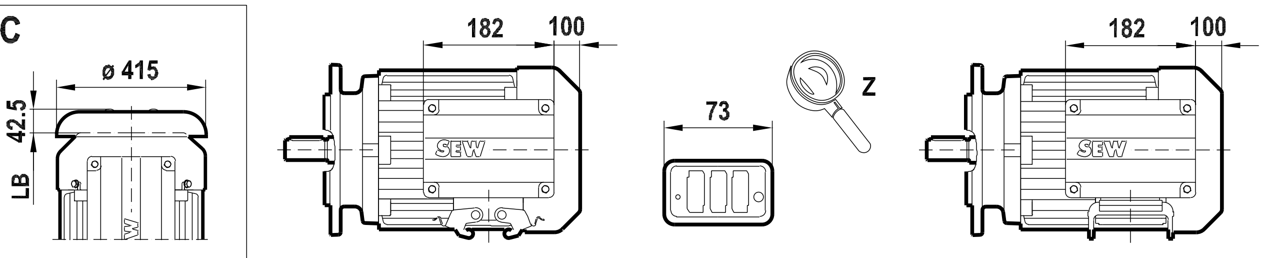

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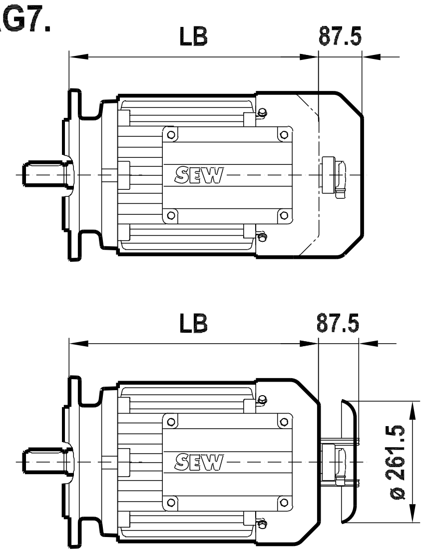

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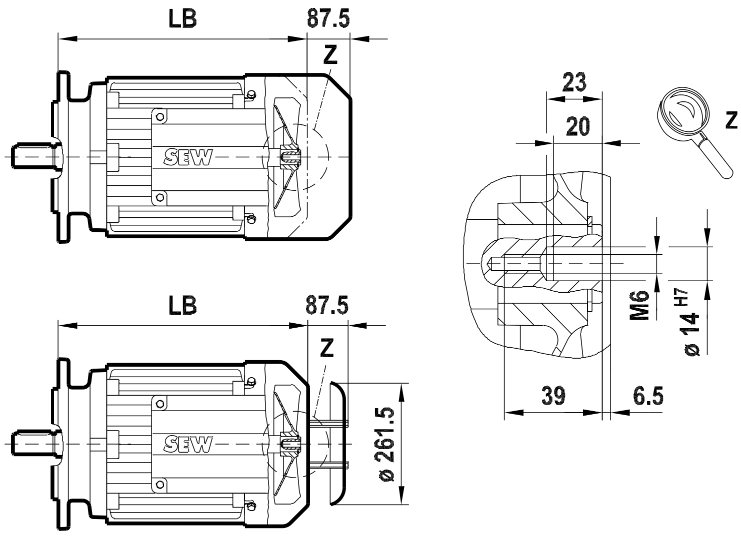

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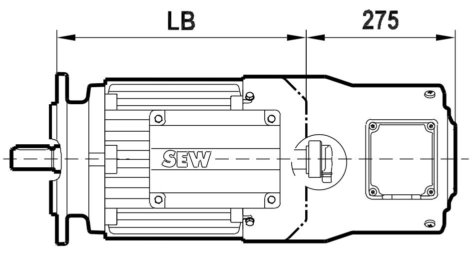

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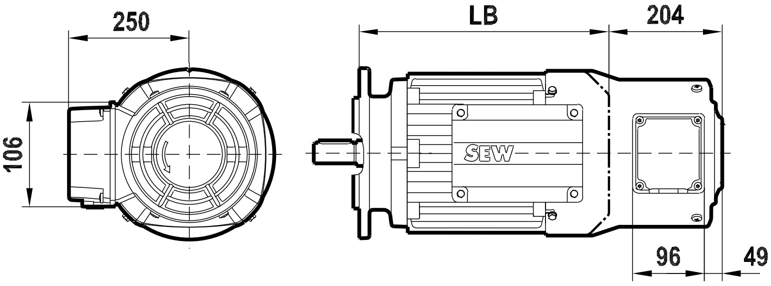

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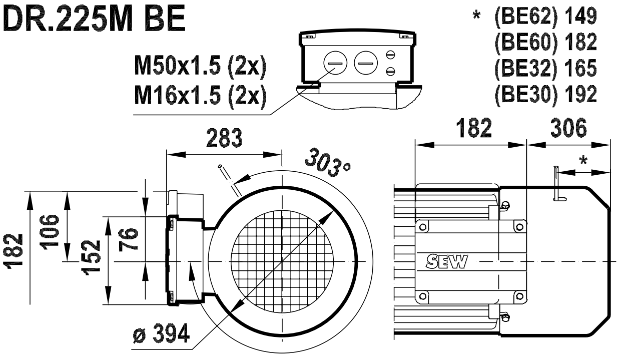
DR.225M BE



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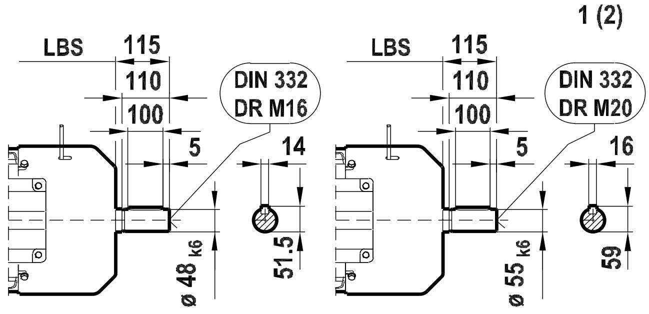
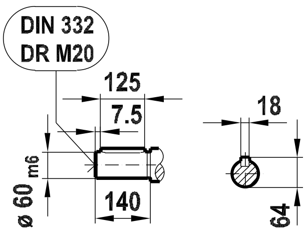
1 (2)



DRS225M 4; 8/4
DRE225M 4



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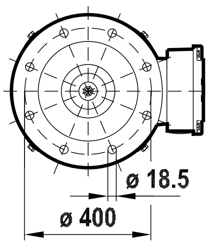

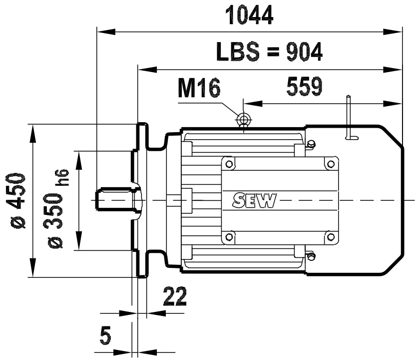

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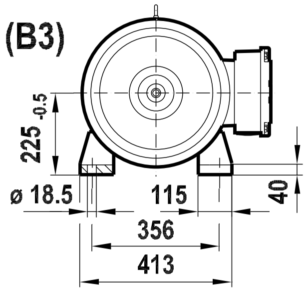
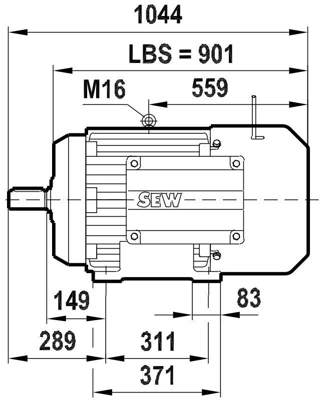
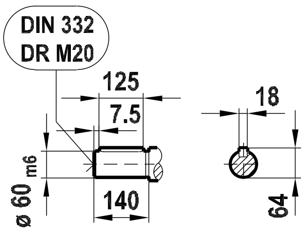




DRP225M 4



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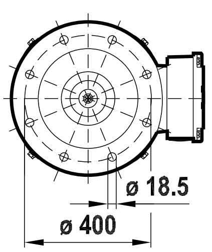

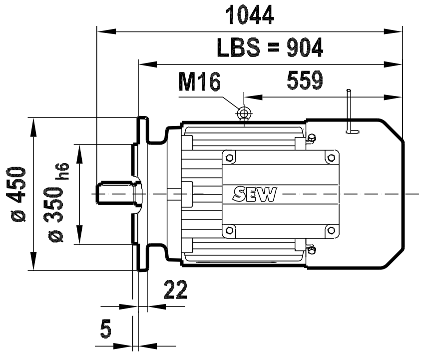

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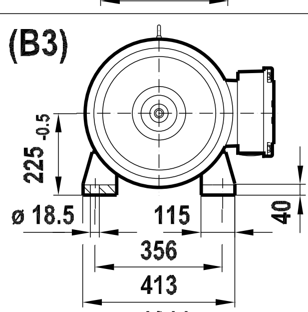

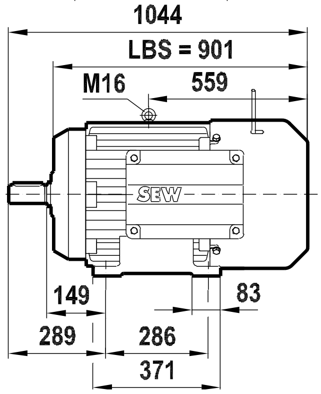

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DR.225M BE /IV

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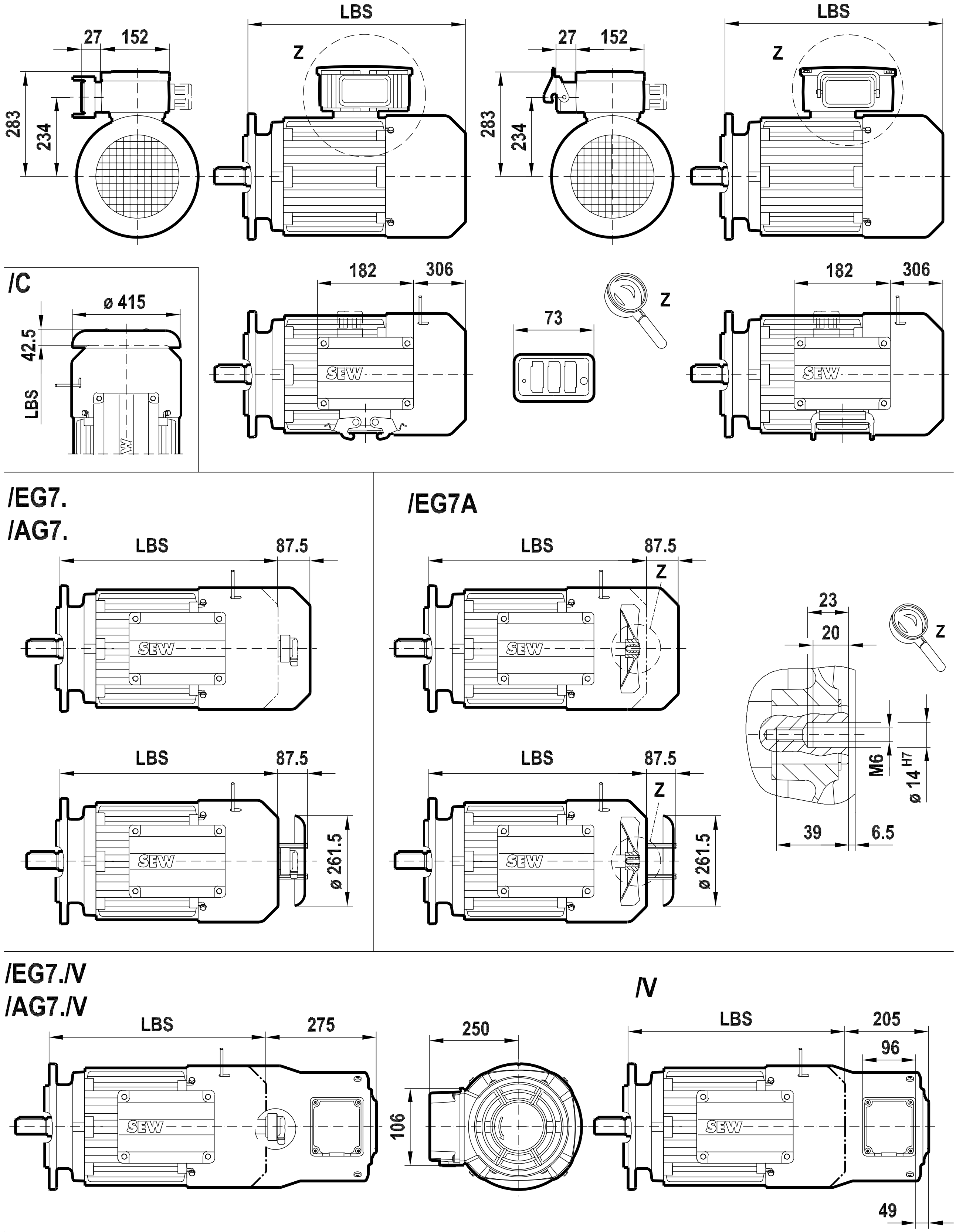

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19290411/EN – 10/2014

DR.225MC

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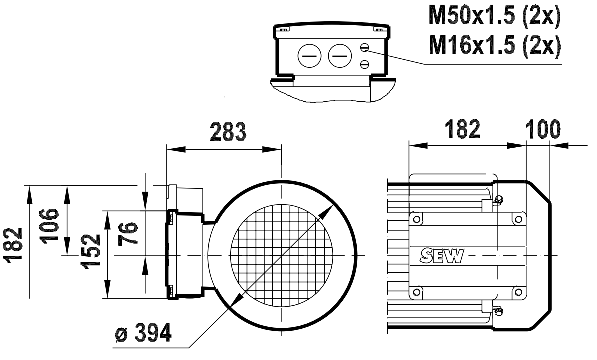

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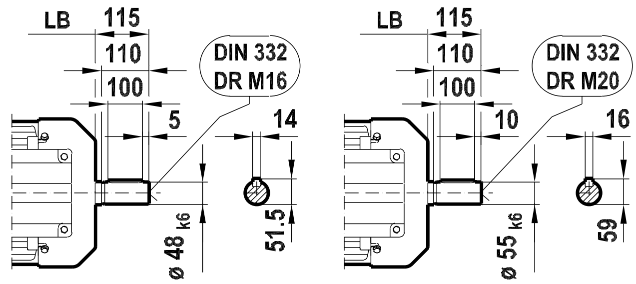

DRS225MC 4

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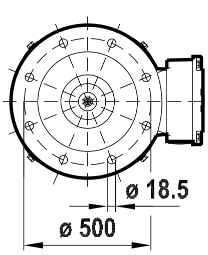

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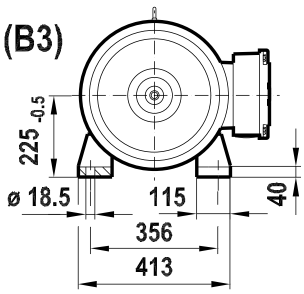

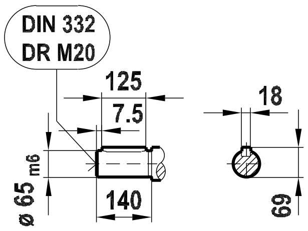

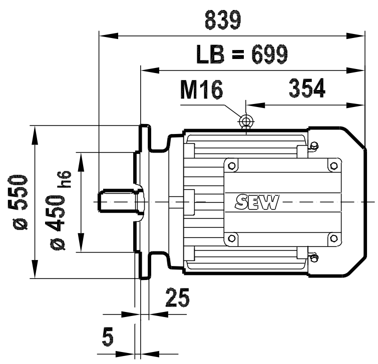

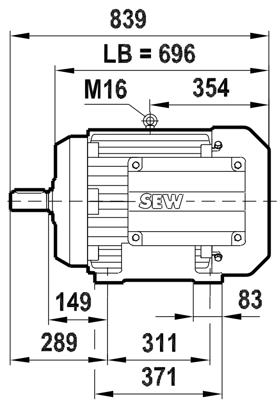

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DR.225MC

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2 (2)

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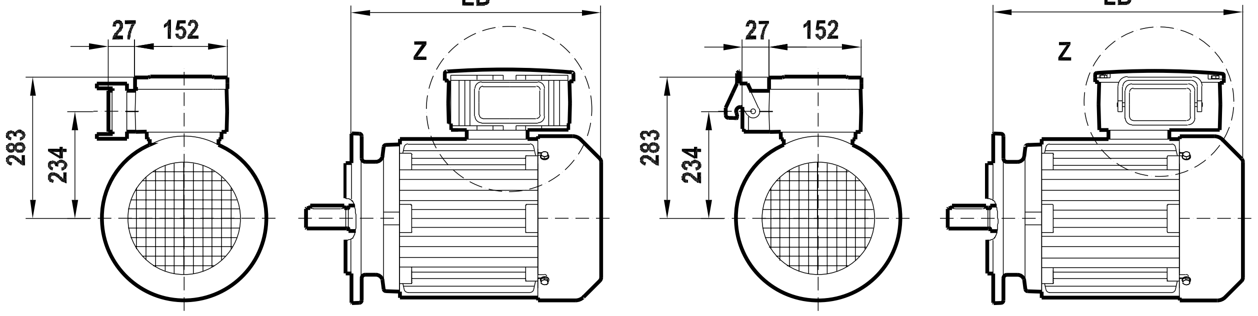

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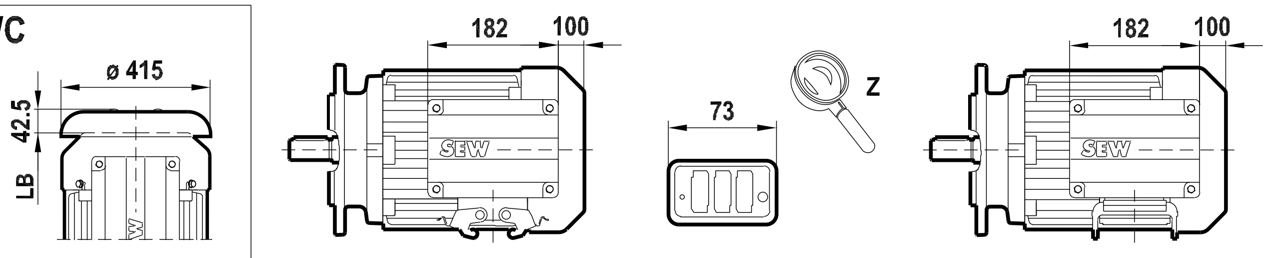

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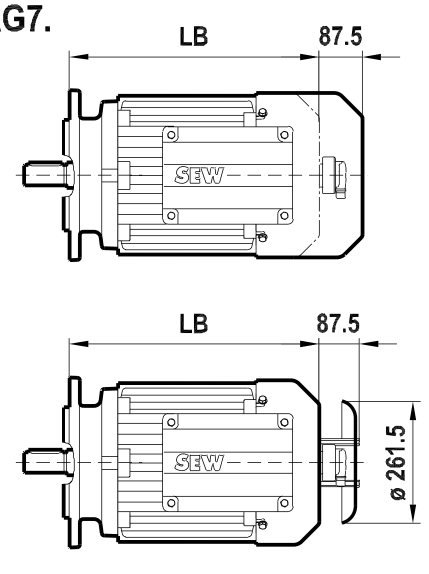

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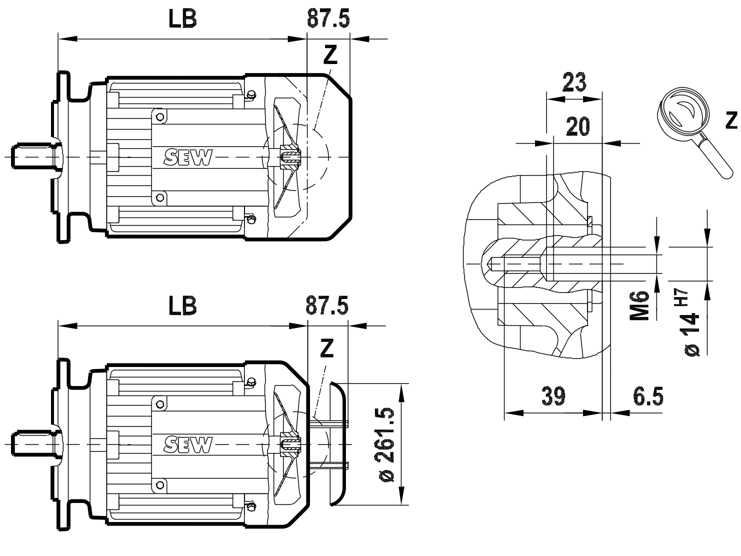

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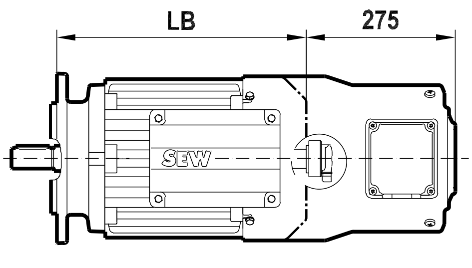

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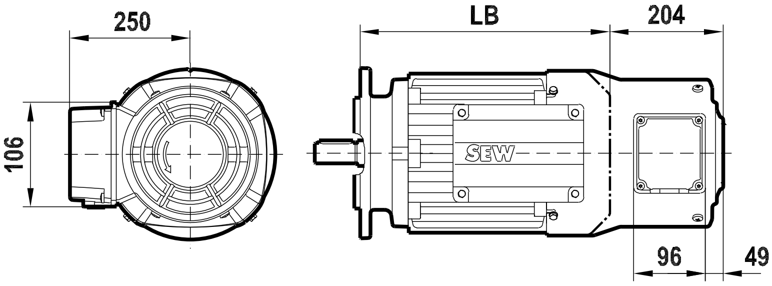

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DR.225MC BE

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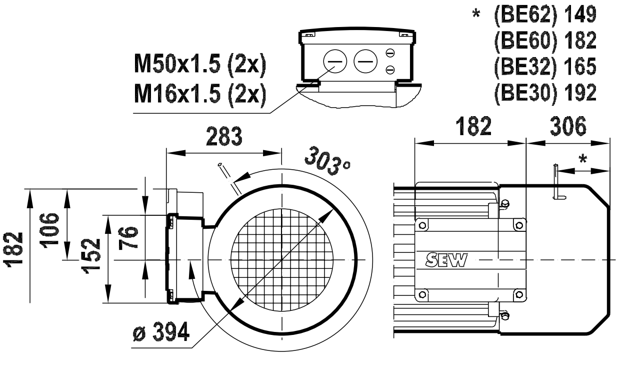

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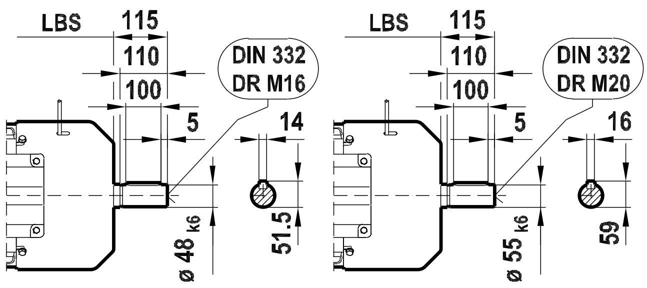

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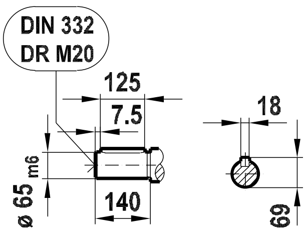
DRS225MC 4



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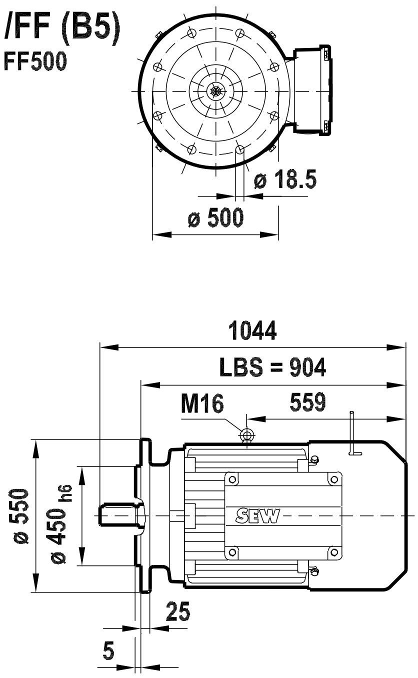

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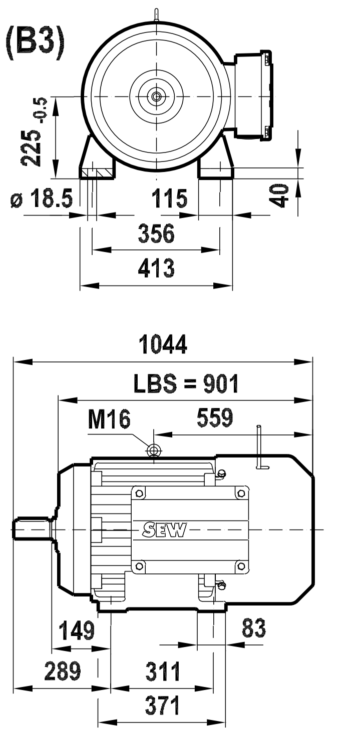

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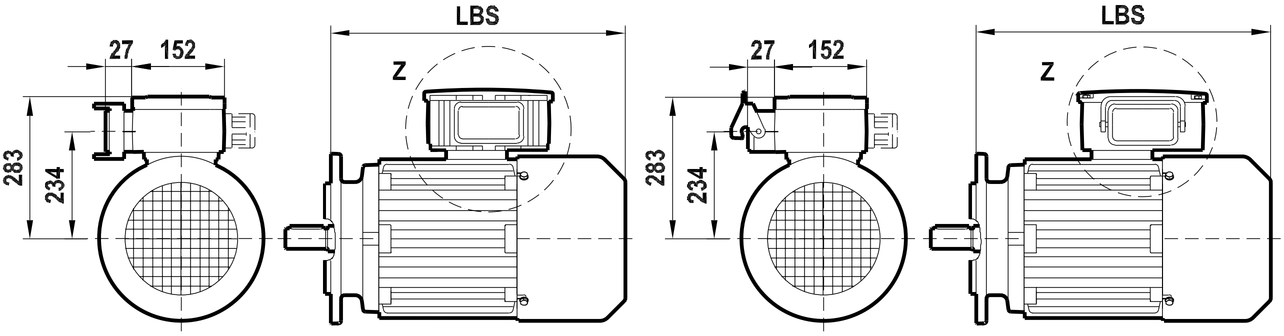
DR.225MC BE /IV

09 239 03 07
2 (2)



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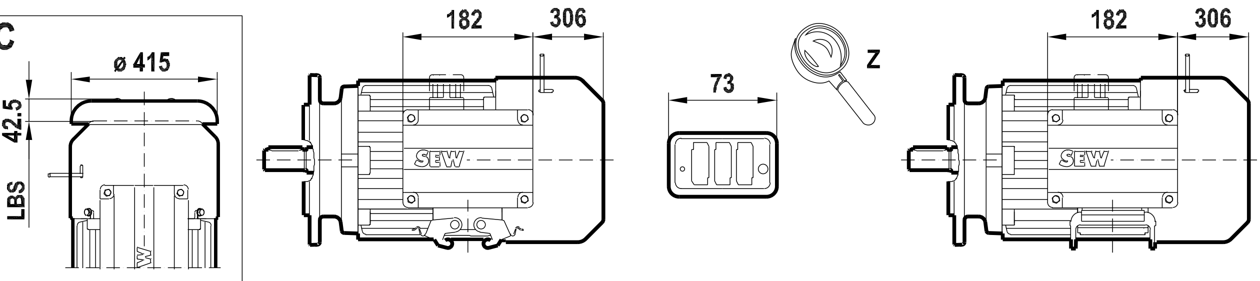

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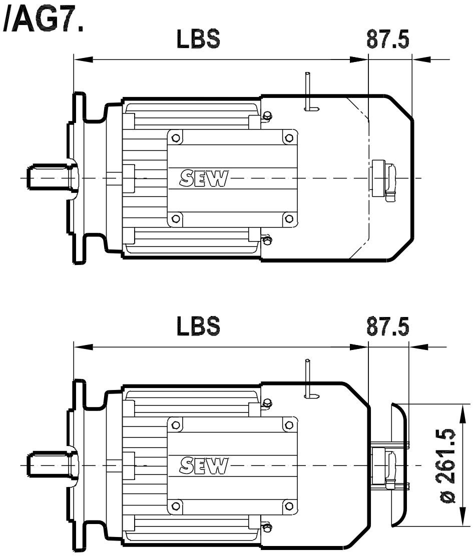

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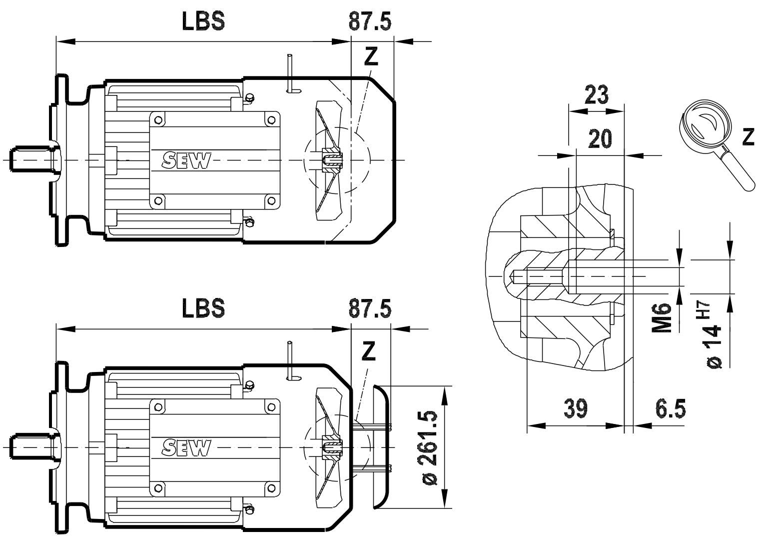

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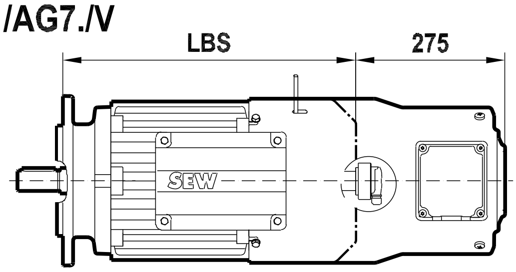

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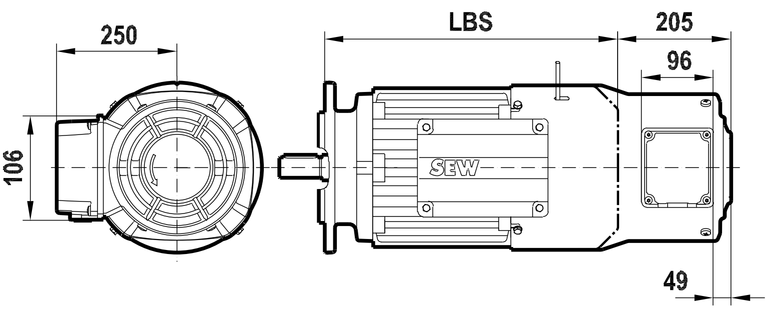

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DR.250/280

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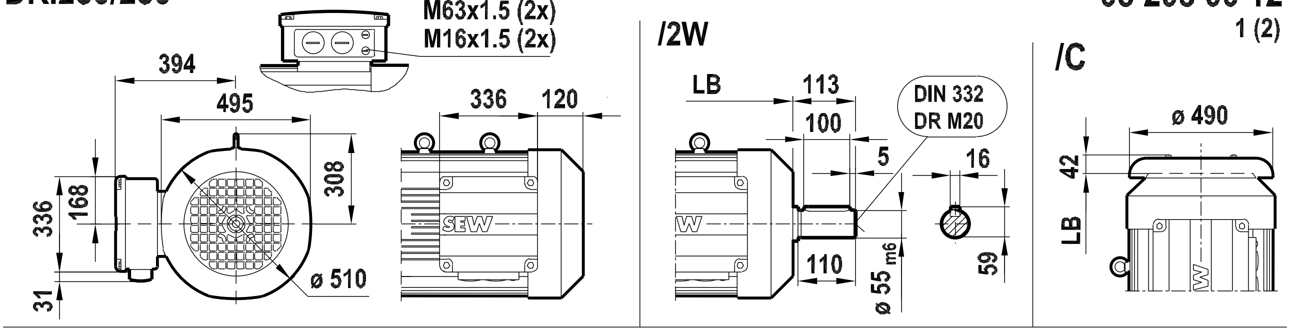
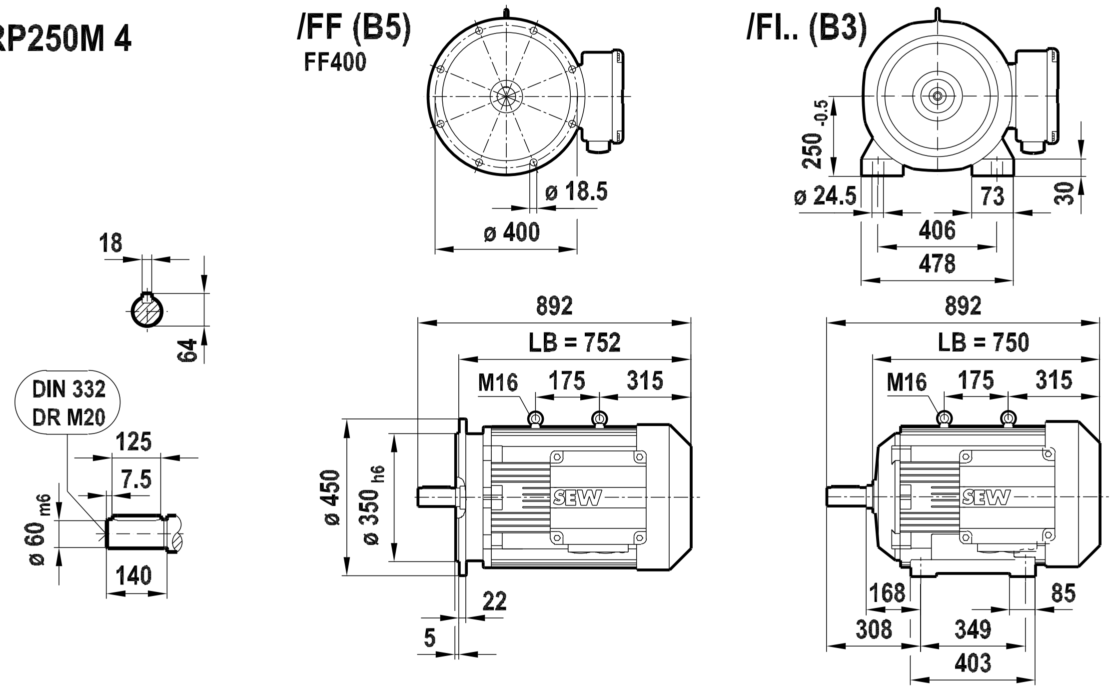
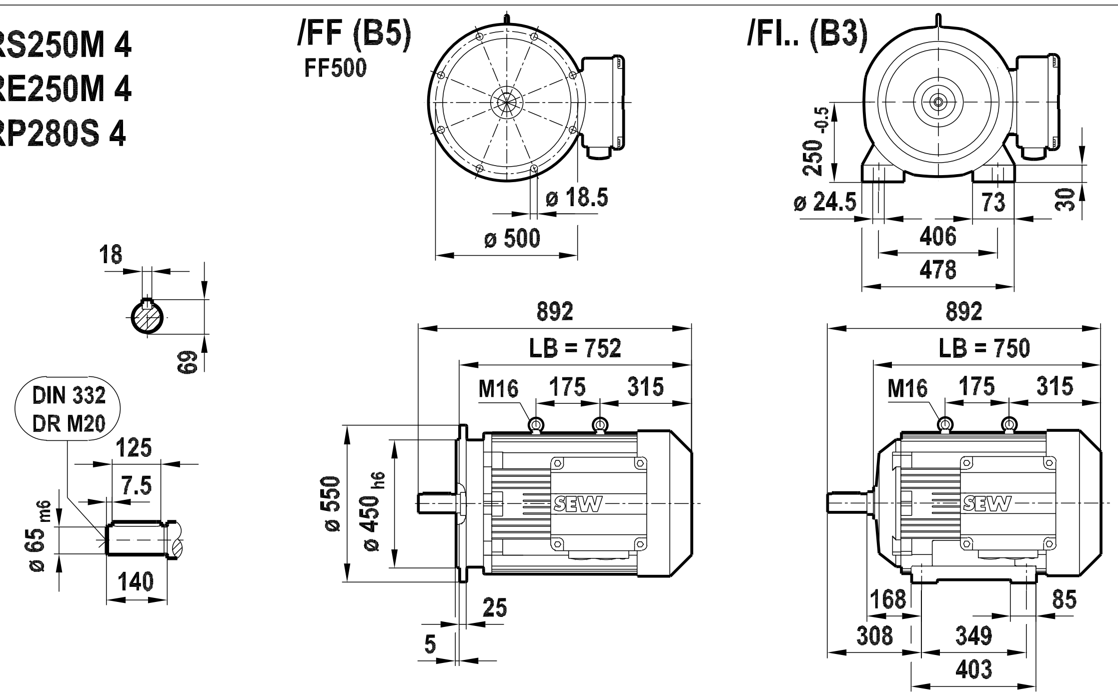
1 (2)



DRP250M 4



DRS250M 4
DRE250M 4
DRP280S 4

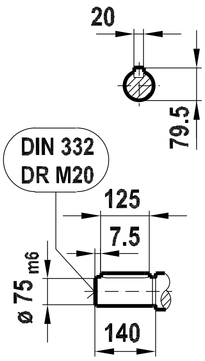


6852409867

DR.250/280

08 208 00 12
2 (2)

DRS280S 4
DRE280S 4
DRS280M 4
DRE280M 4
DRP280M 4



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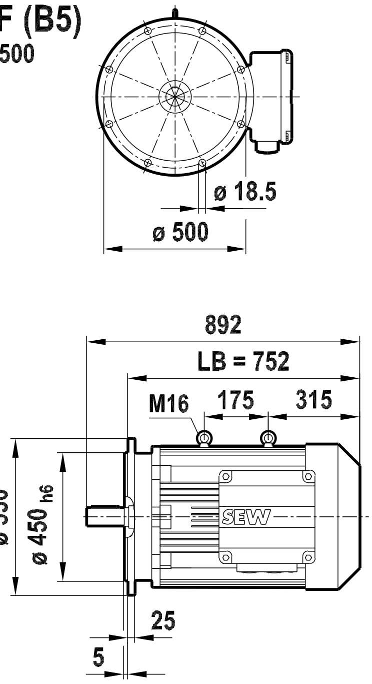

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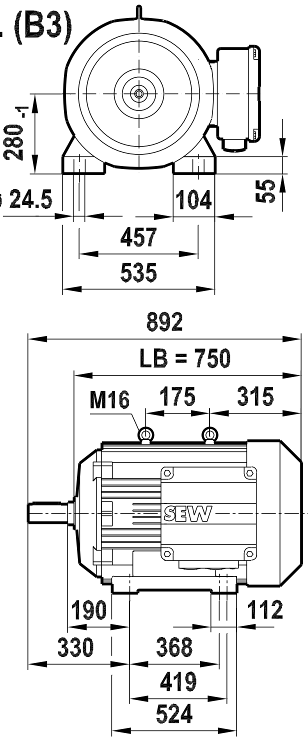

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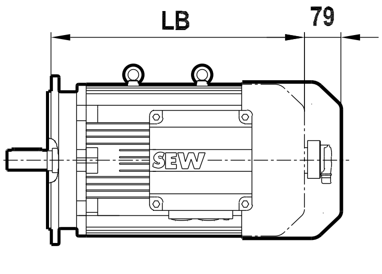

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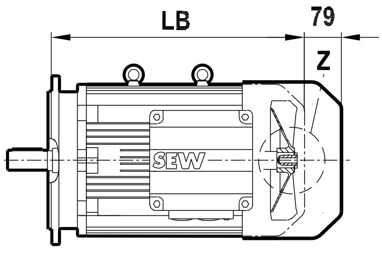

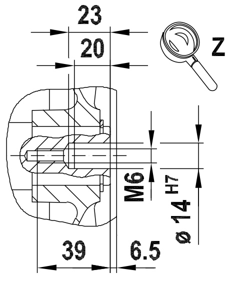

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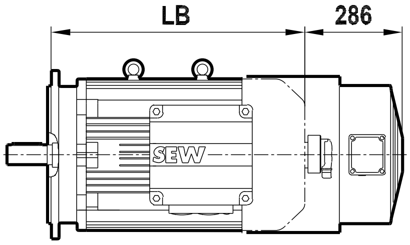

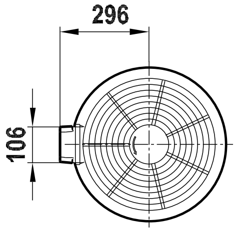

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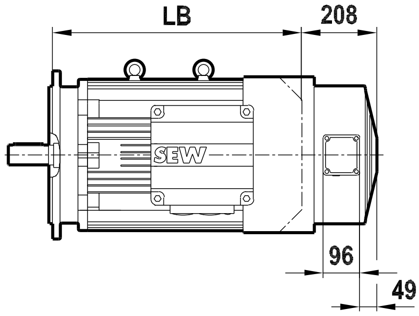

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DR.250/280 BE

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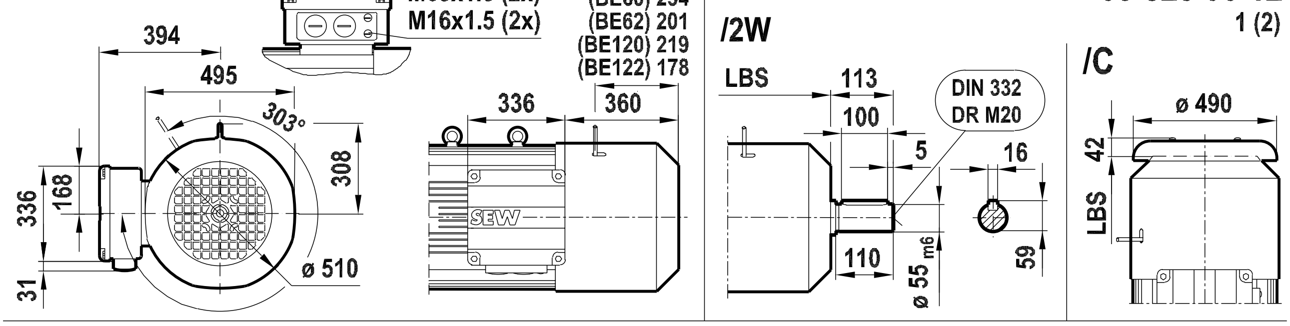
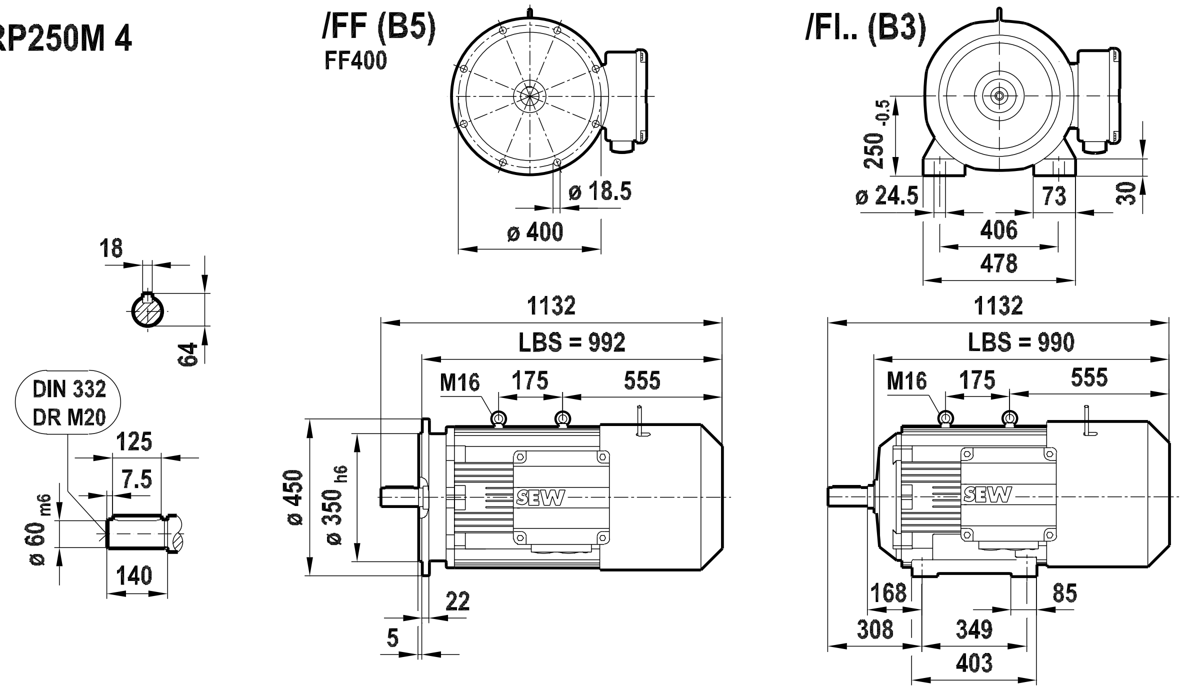
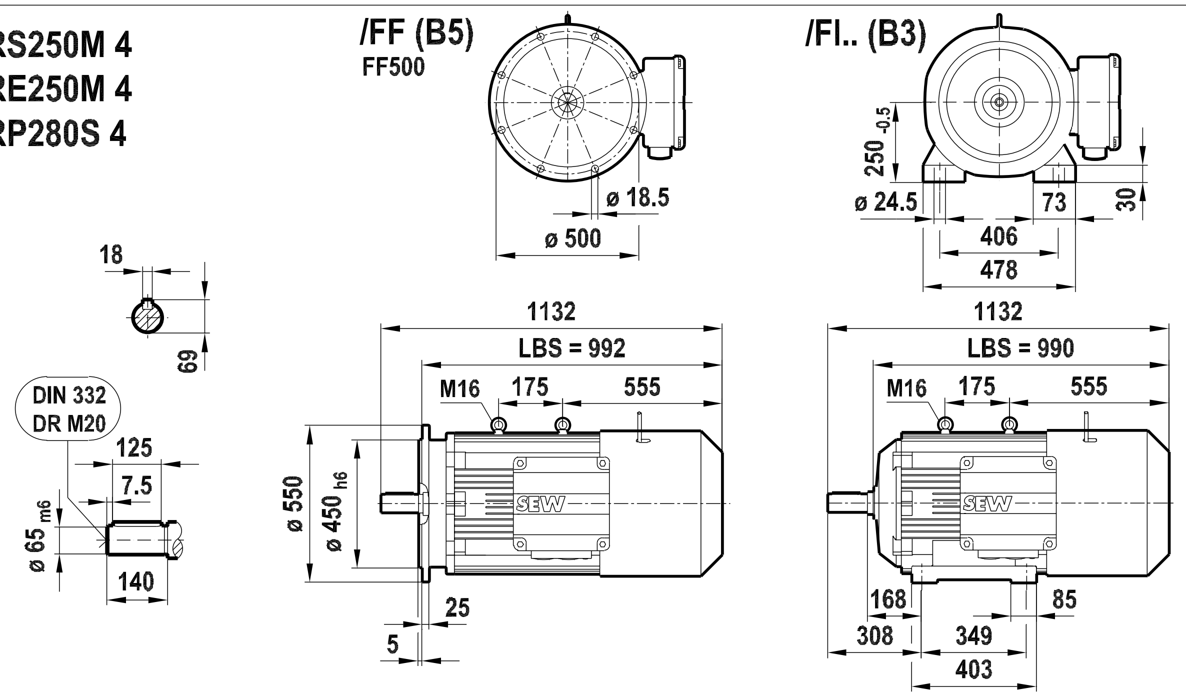
1 (2)



DRP250M 4



DRS250M 4
DRE250M 4
DRP280S 4



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DR.250/280 BE

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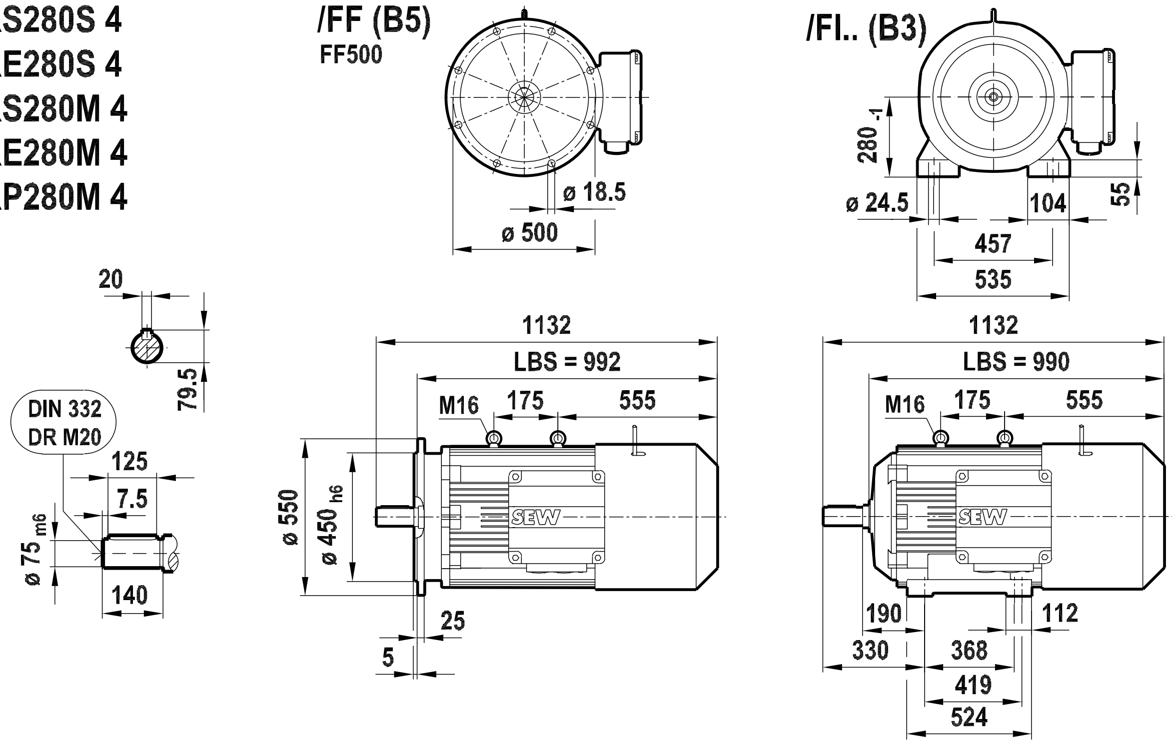
2 (2)

DRS280S 4
DRE280S 4
DRS280M 4
DRE280M 4
DRP280M 4



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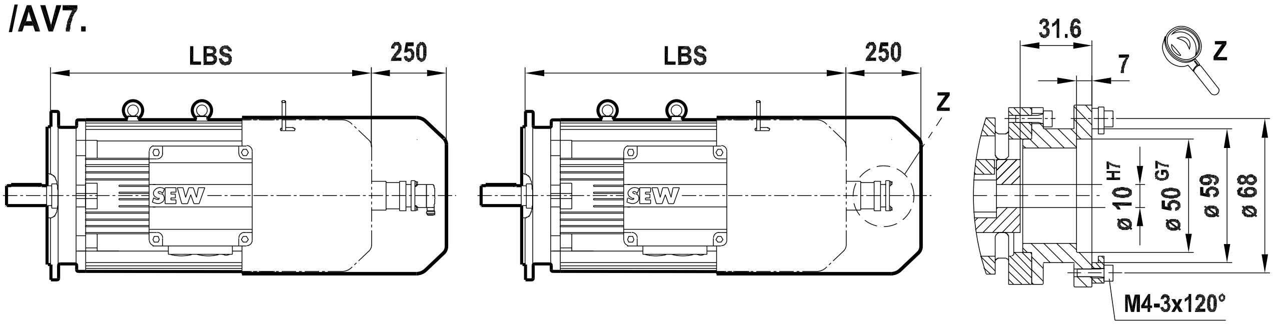

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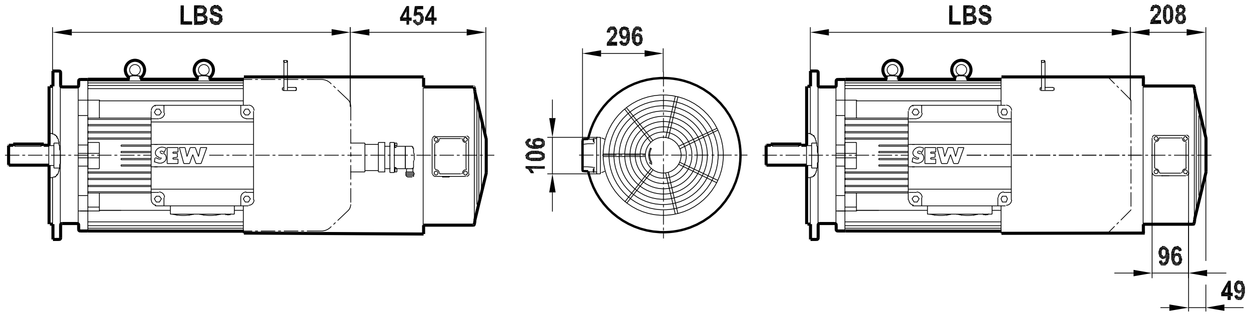

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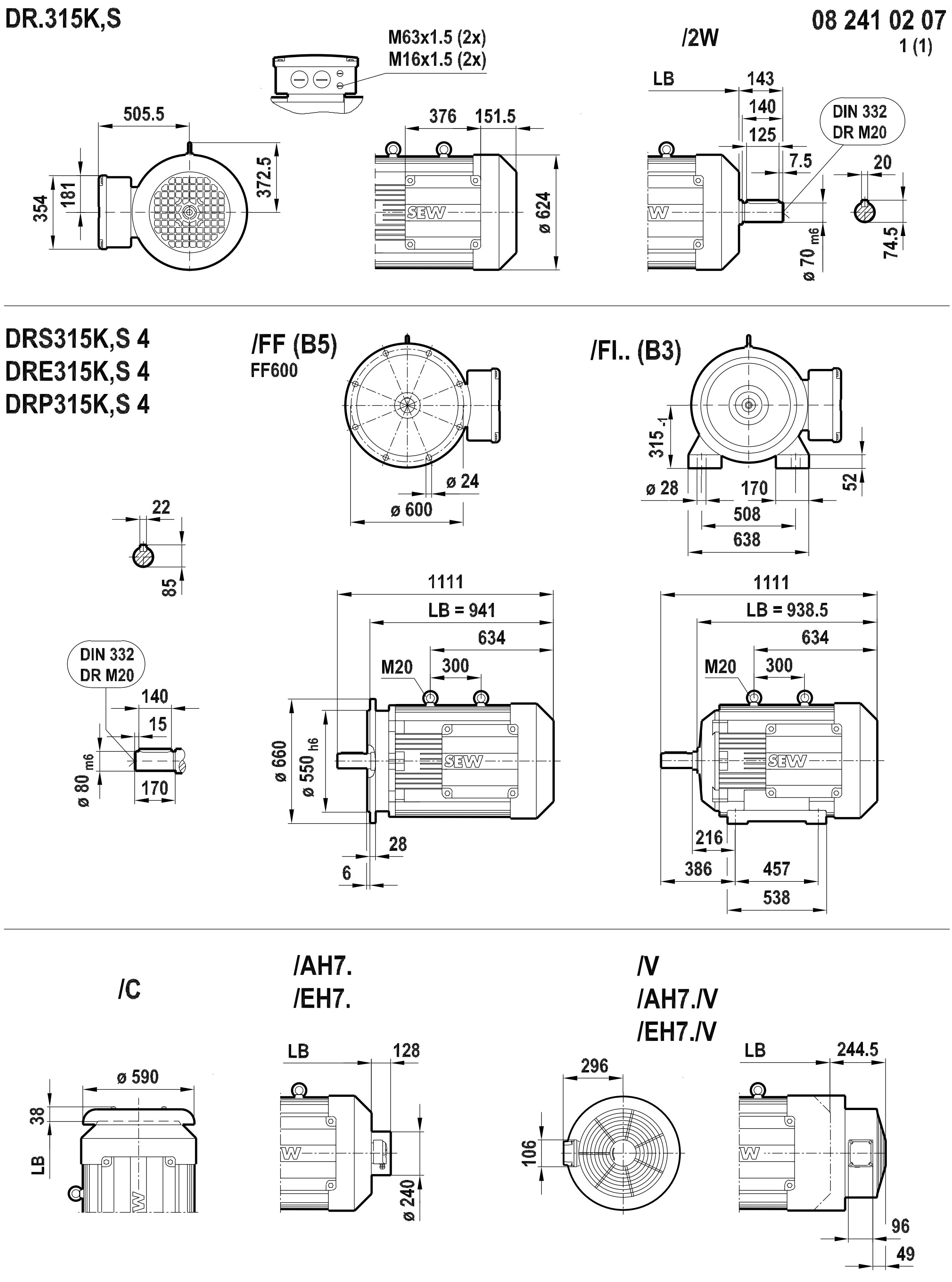
19290411/EN – 10/2014



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DR.315K,S BE

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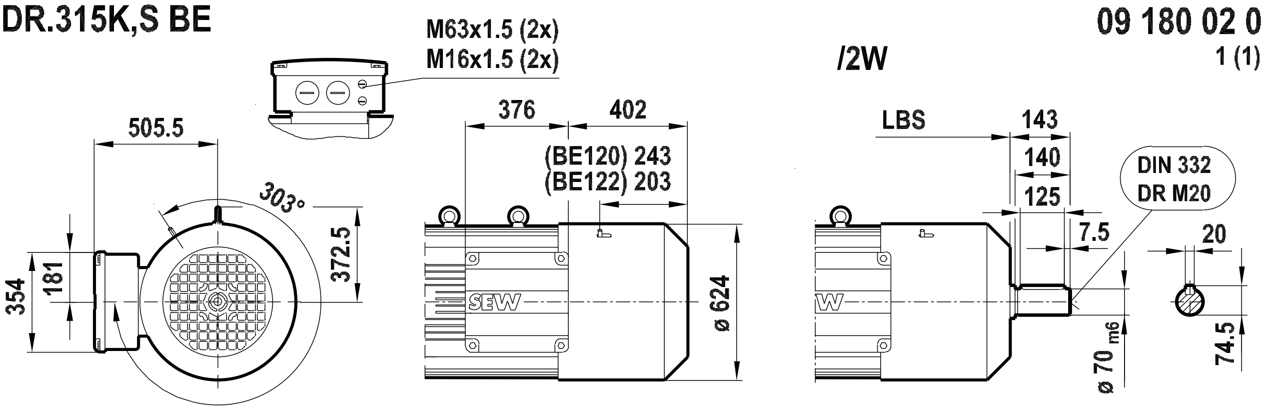
1 (1)



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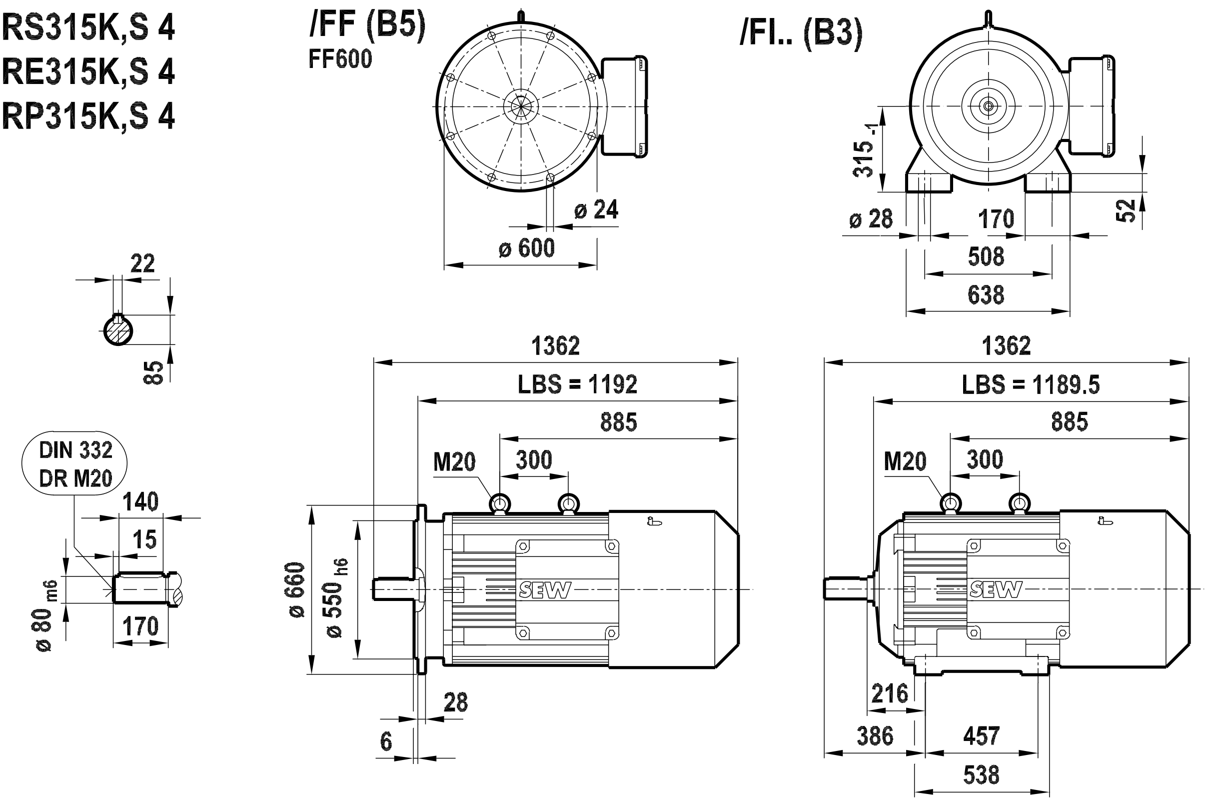
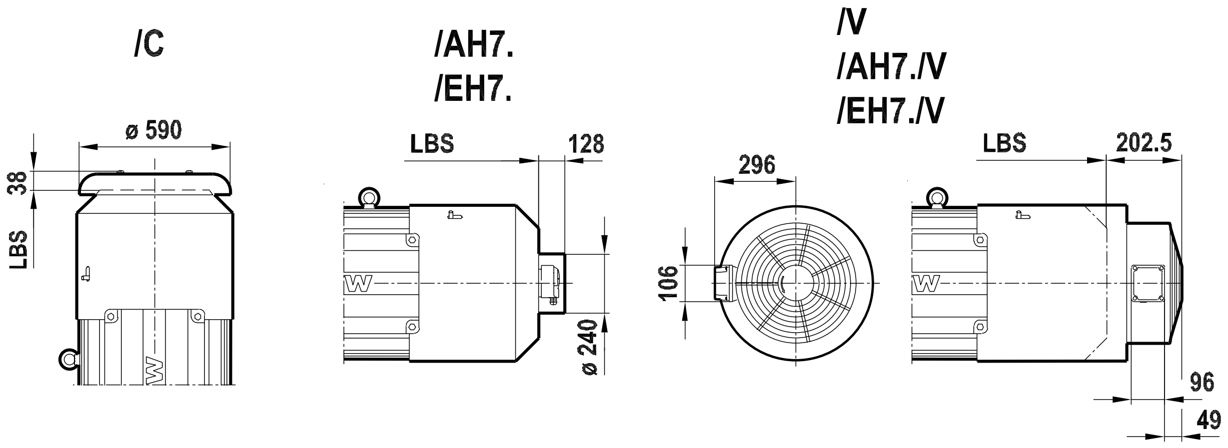
DRE315K,S 4
DRP315K,S 4





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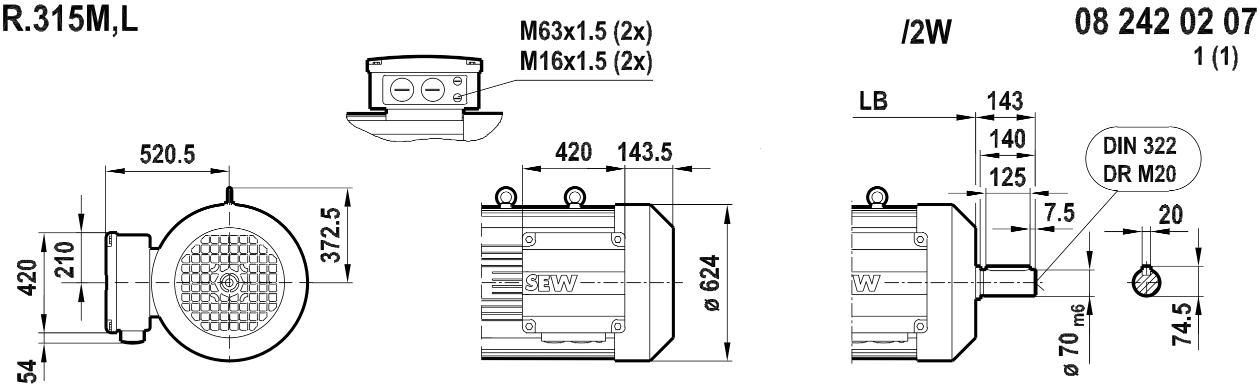
DR.315M,L



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DRE315M,L 4
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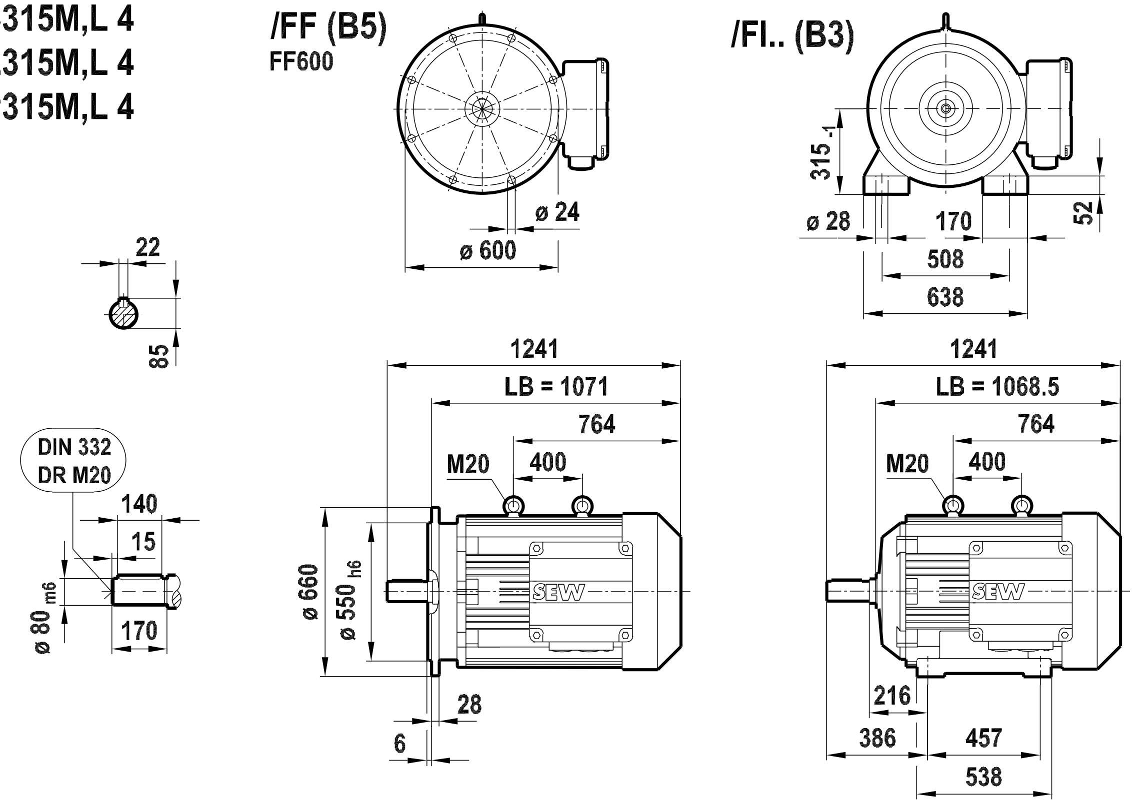

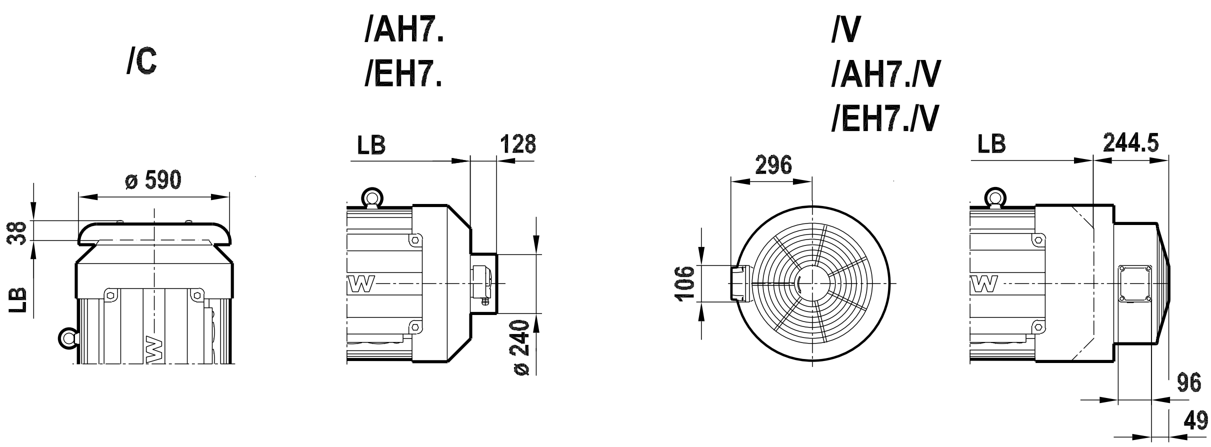

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19290411/EN – 10/2014

DR.315M,L BE

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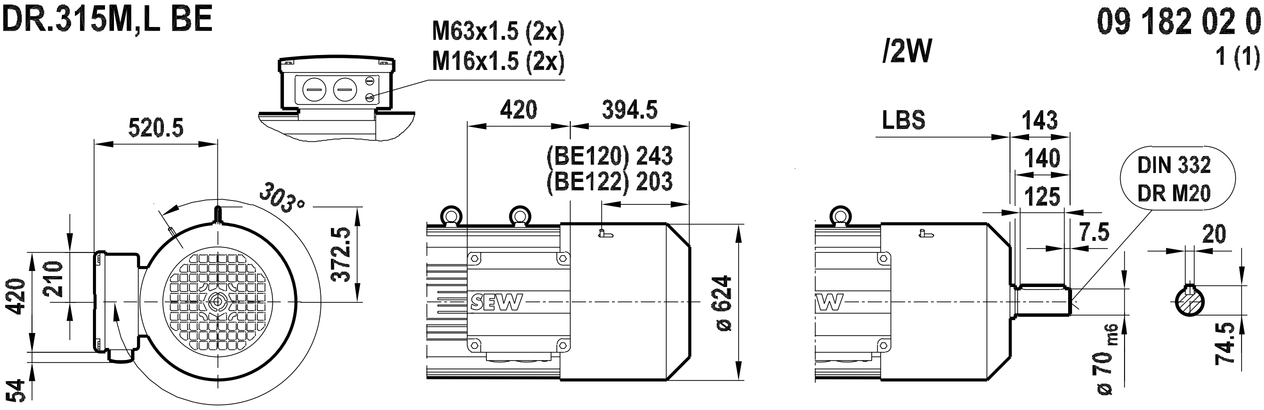
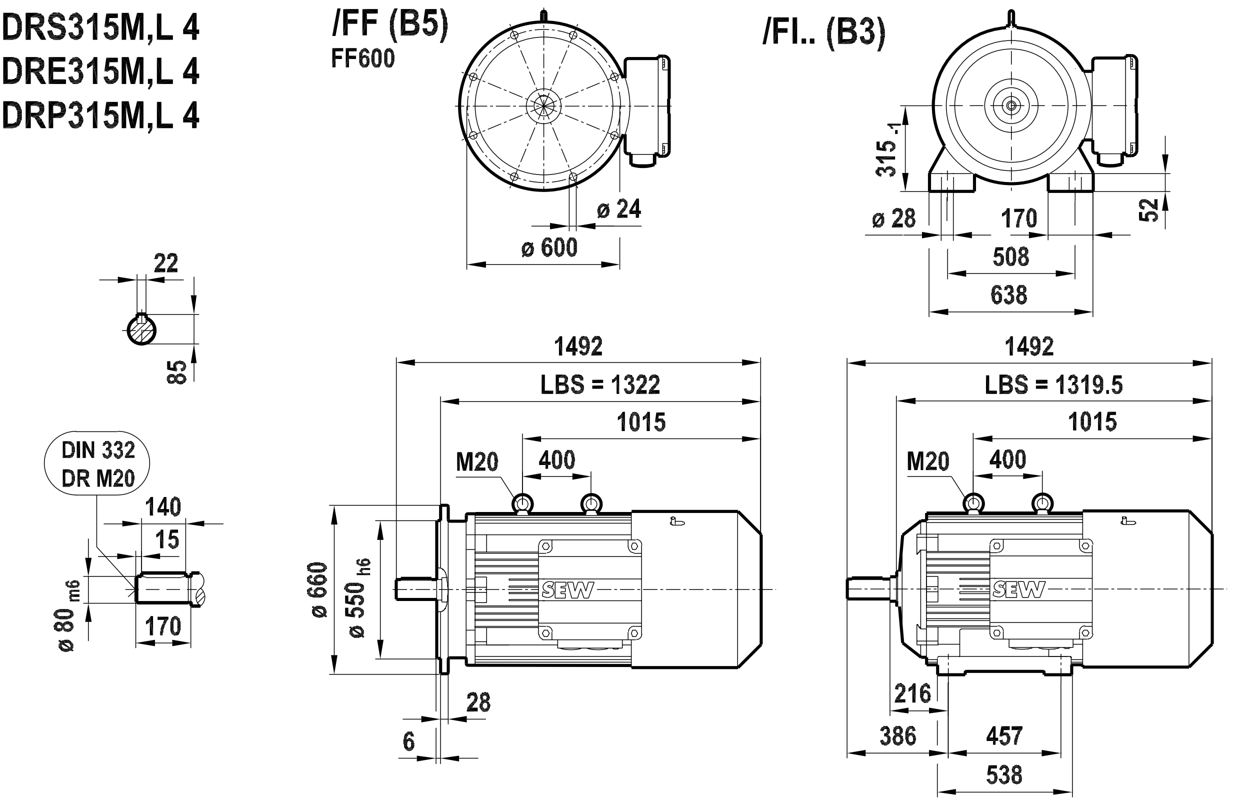
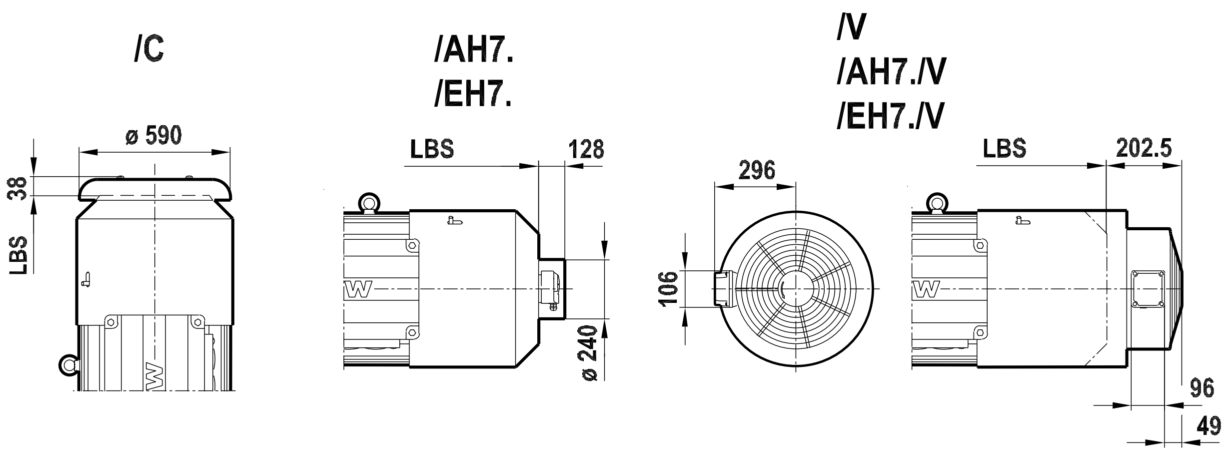


DRS315M,L 4
DRE315M,L 4
DRP315M,L 4





4758007563

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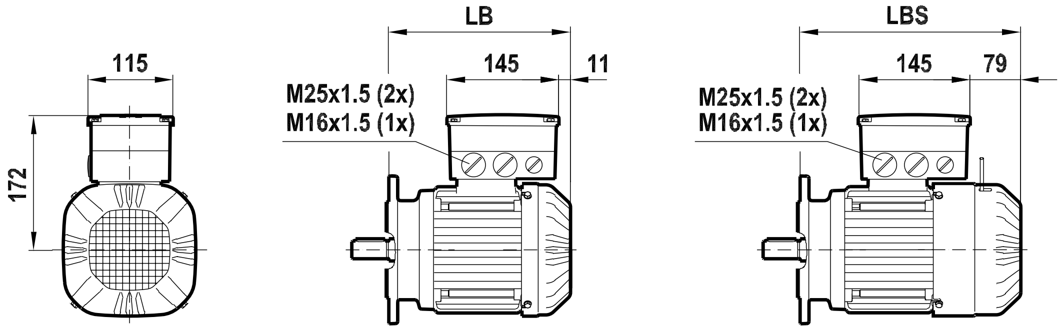
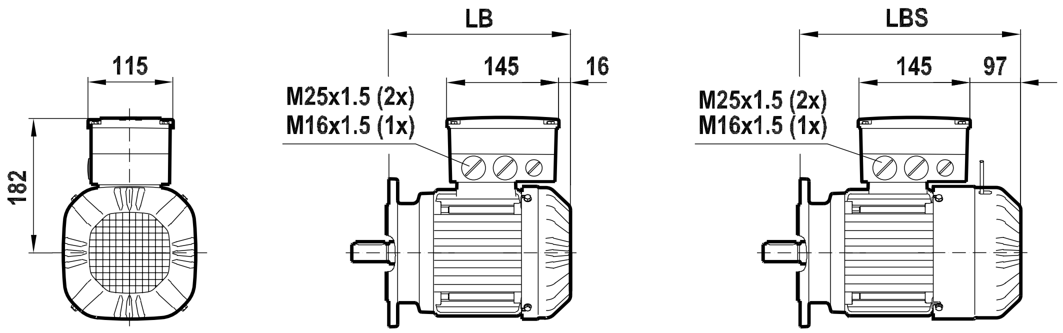
7.3 Dimension sheet for DRK.. motors/brakemotors

08 424 00 13
1 (1)

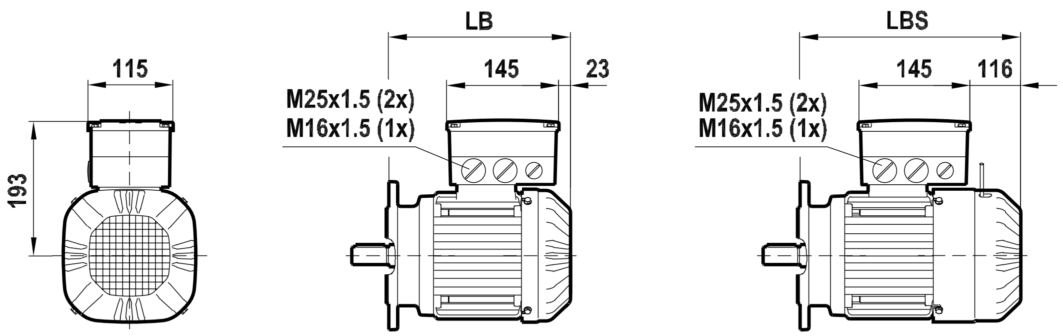
DRK71.. DRK71..BE



DRK80.. DRK80..BE



DRK90.. DRK90..BE

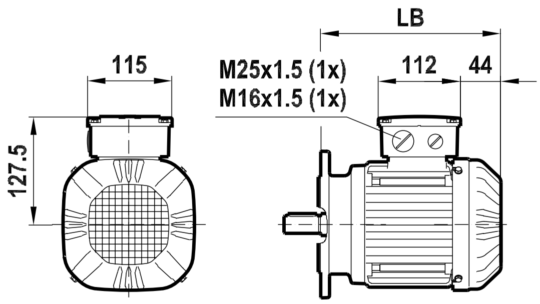


9686868235

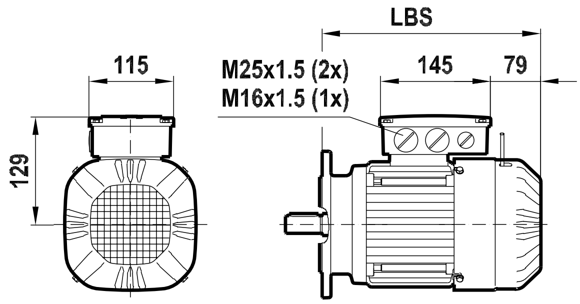
7.4 Dimension sheets for motors/brakemotors with KCC and KC1

08 415 01 08
1 (2)

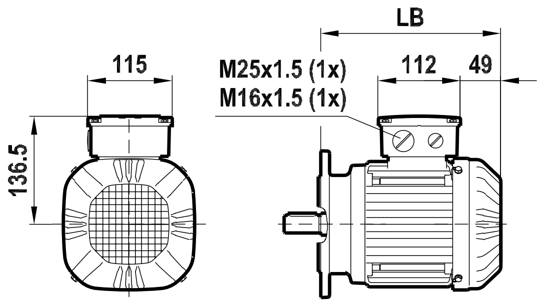
DR.71.. KCC



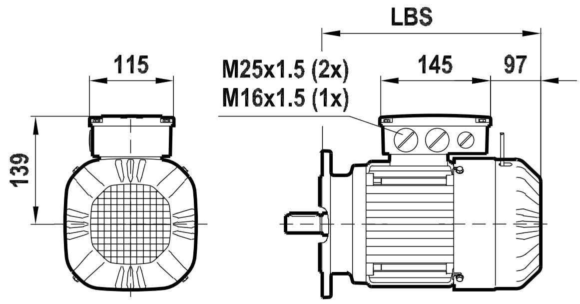
DR.71..BE KCC



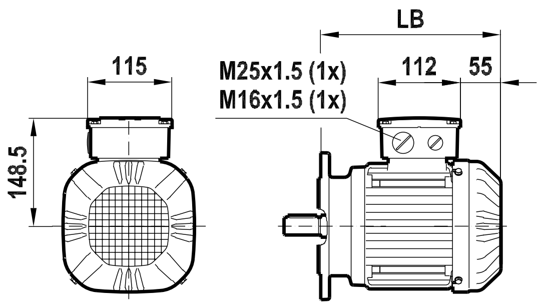
DR.80.. KCC



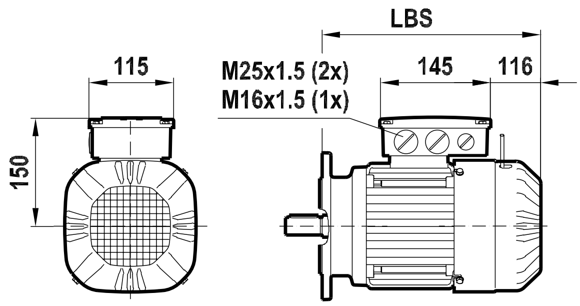
DR.80..BE KCC



DR.90.. KCC



DR.90..BE KCC



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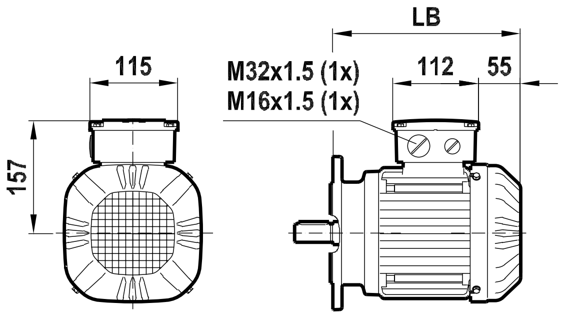
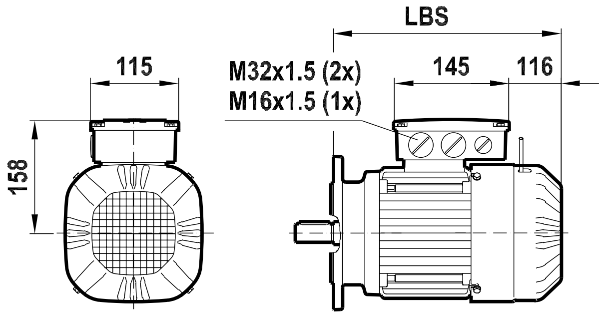
08 415 01 08
1 (2)

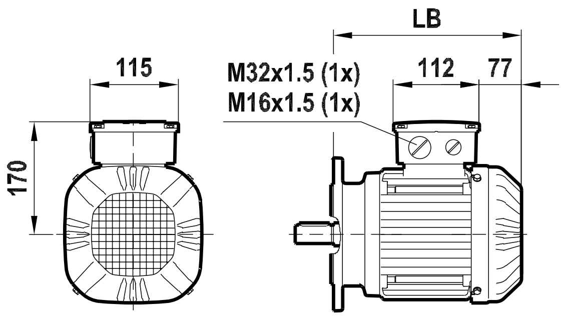
DR.100.. KCC



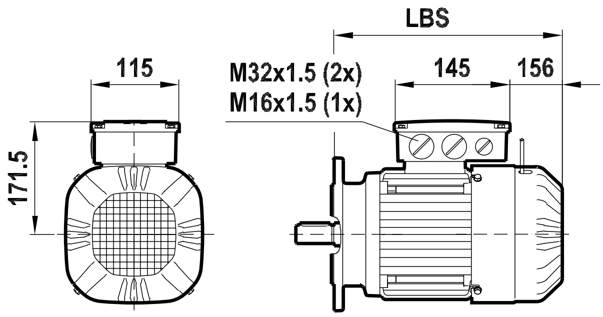
DR.100..BE KCC



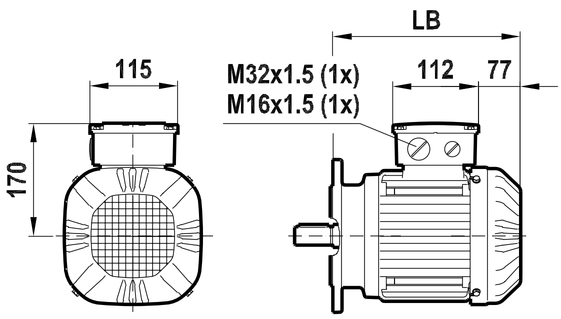
DR.112.. KCC



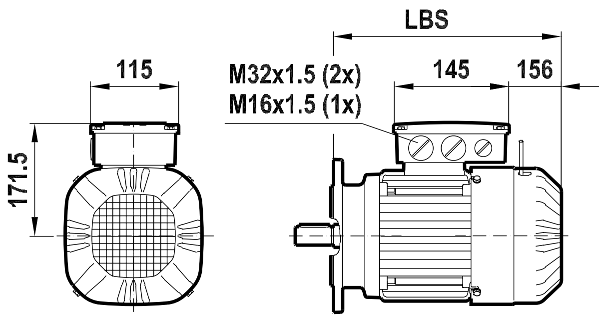
DR.112..BE KCC



DR.132.. KCC



DR.132..BE KCC



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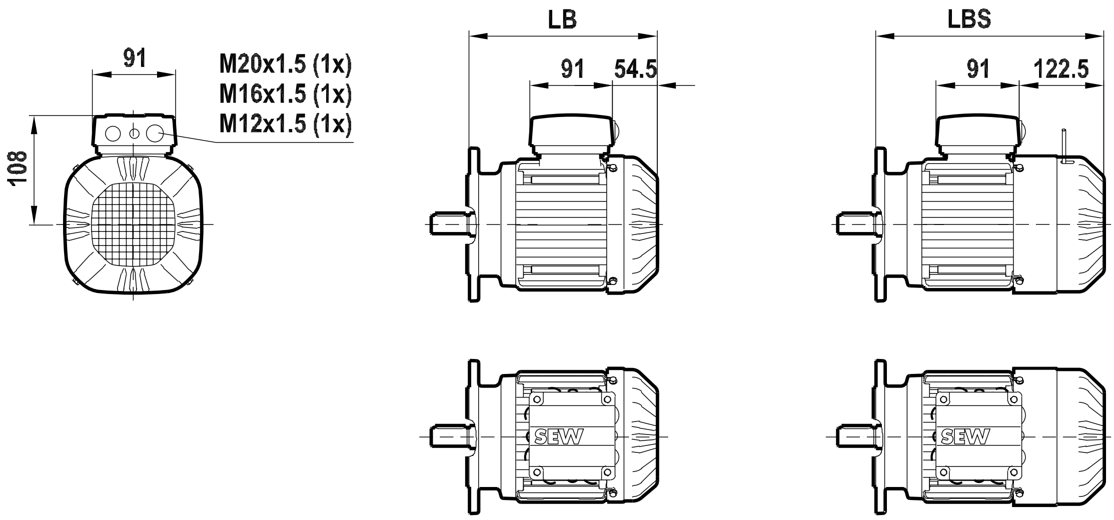
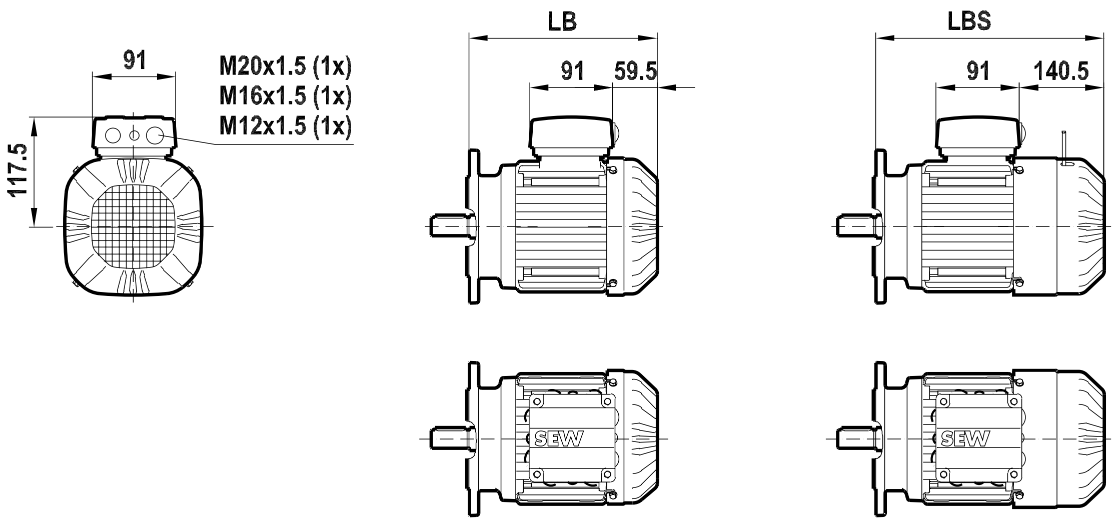
08 463 01 08
1 (2)

DR.71.. KC1 **DR.71..BE KC1**



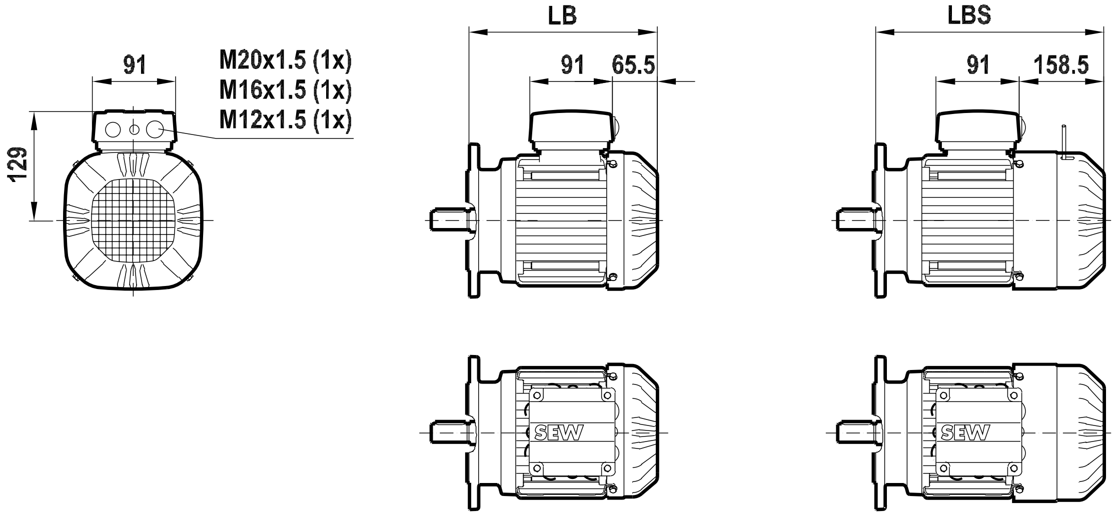
DR.80.. KC1 **DR.80..BE KC1**



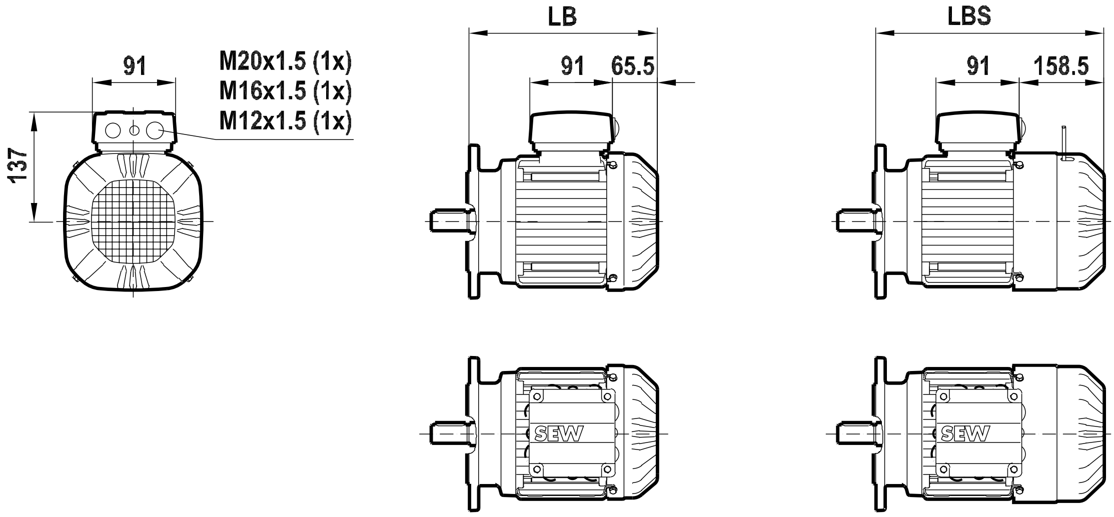
4762530315

08 463 00 08
2 (2)

DR.90.. KC1 **DR.90..BE KC1**

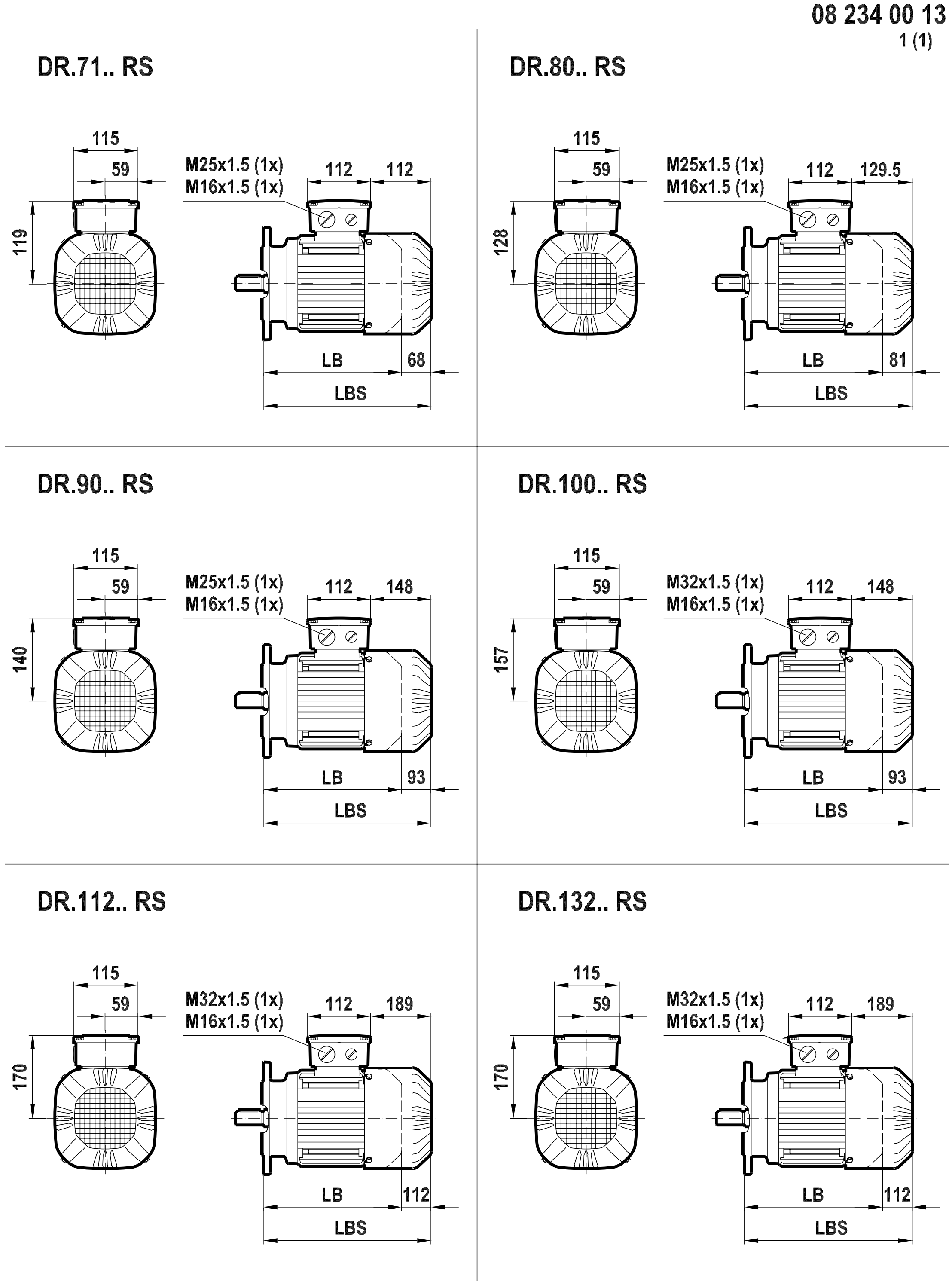


DR.100.. KC1 **DR.100..BE KC1**



6188256779

7.5 Dimension sheet for motors with backstop RS



9007206661364235

The dimensions of the motors DR.160 – DR.315 with backstop are the same as for the brakemotors DR.160 – DR.315.

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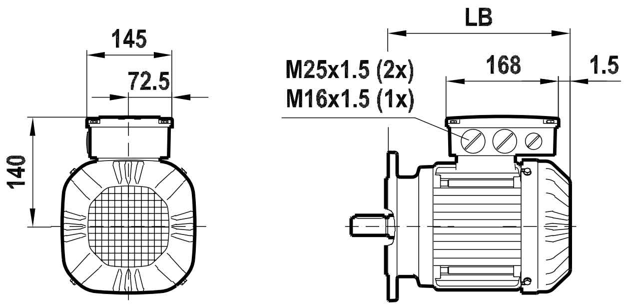
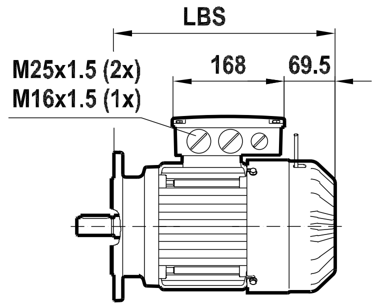
7.6 Dimension sheets for motors/brakemotors with gray cast iron terminal box

08 480 02 08
1 (4)

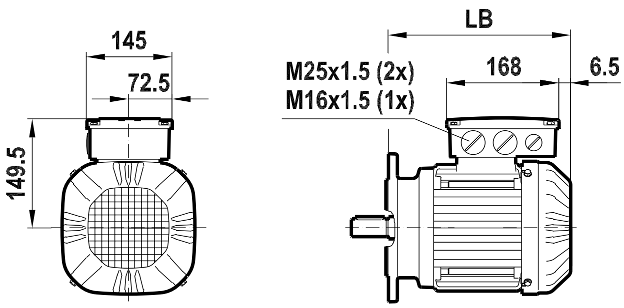
DR.71..



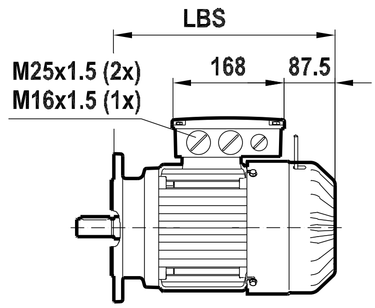
DR.71..BE



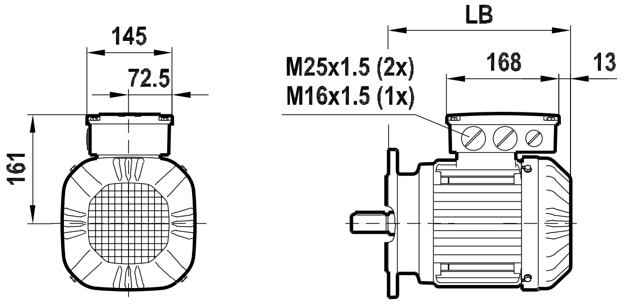
DR.80..



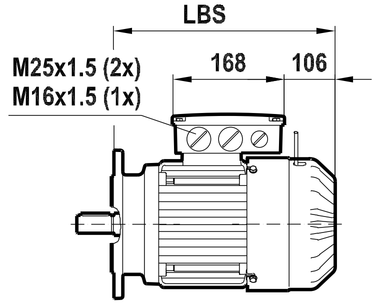
DR.80..BE



DR.90..



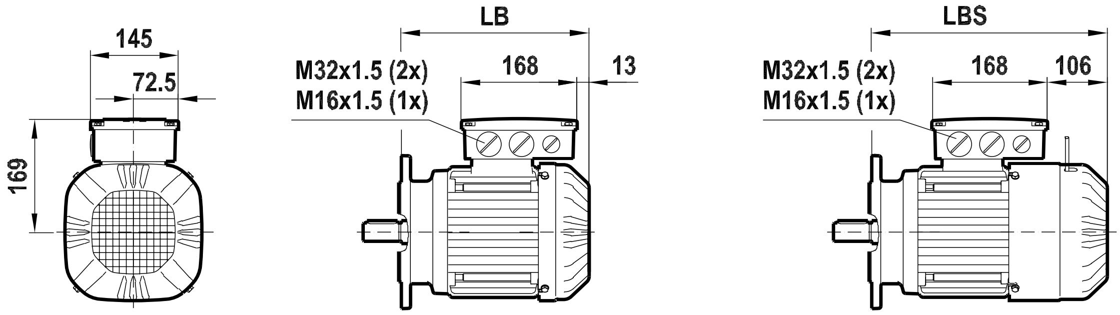
DR.90..BE



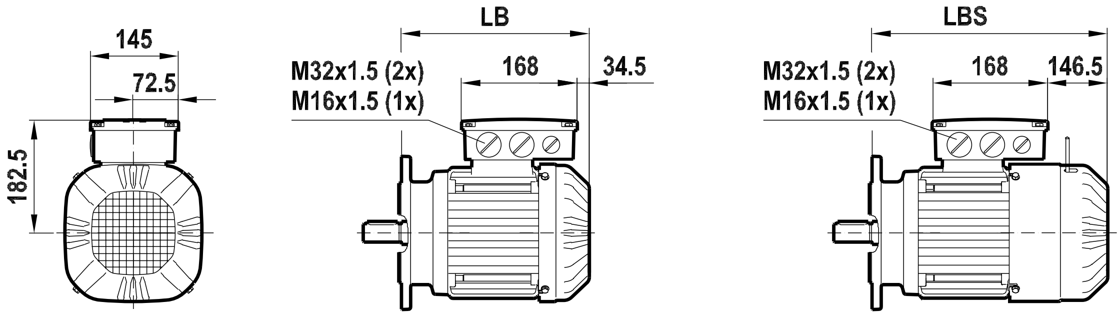
7406615563

08 480 02 08
2 (4)

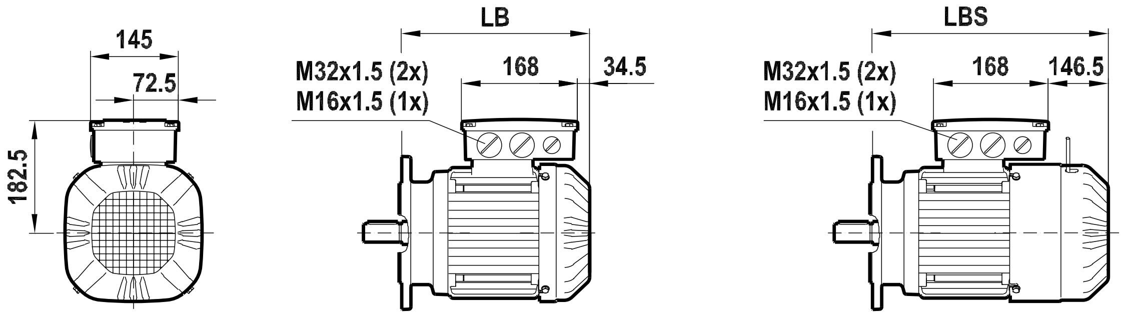
DR.100.. **DR.100..BE**



DR.112.. **DR.112..BE**



DR.132.. **DR.132..BE**



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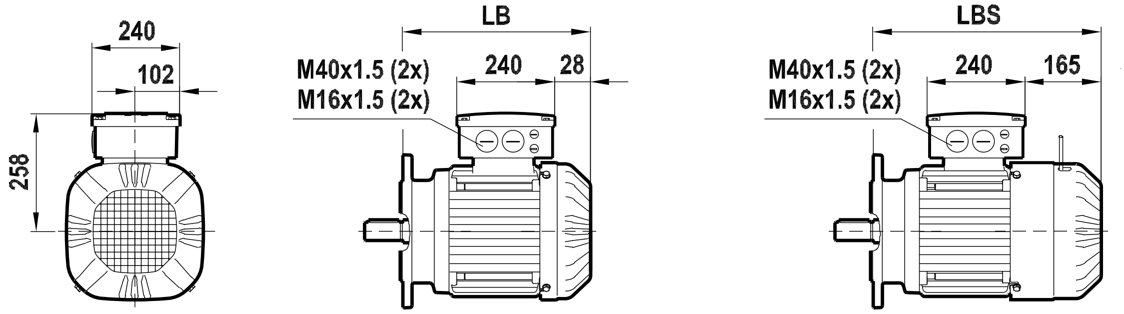
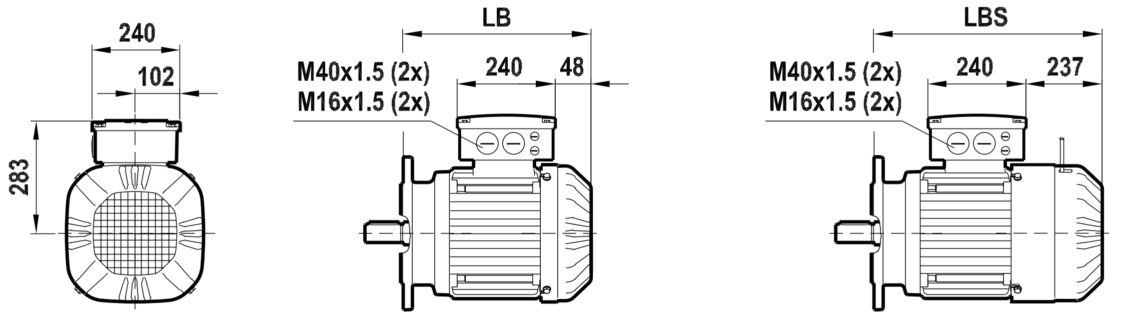
08 480 02 08
3 (4)

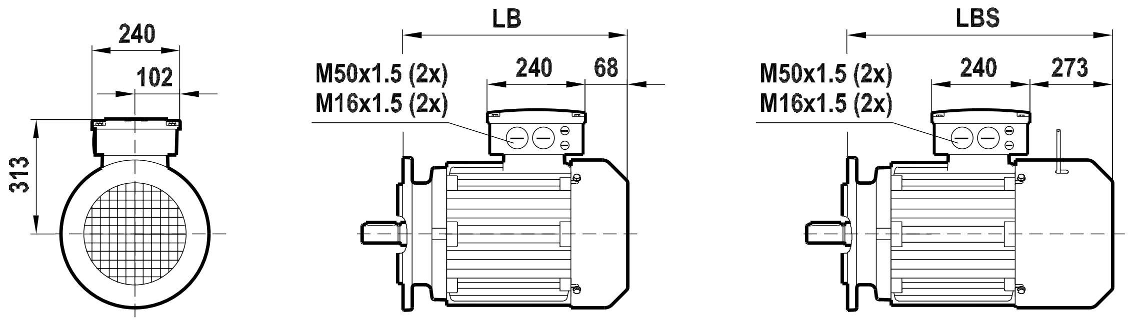
DR.160.. **DR.160..BE**



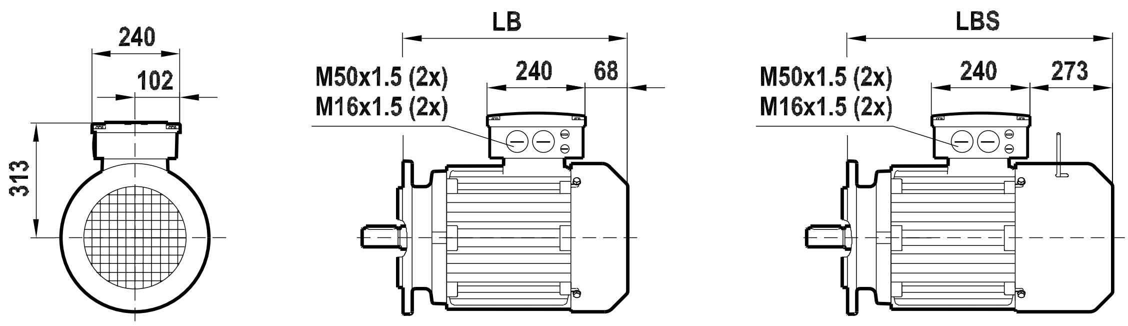
DR.180.. **DR.180..BE**



DR.200.. **DR.200..BE**



DR.225.. **DR.225..BE**



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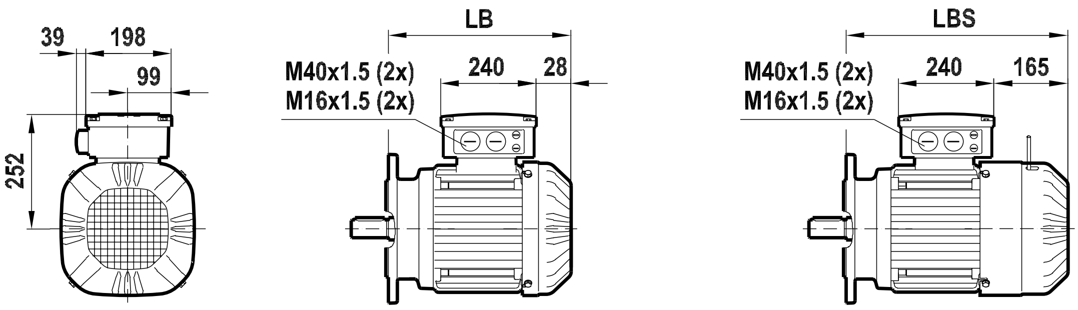
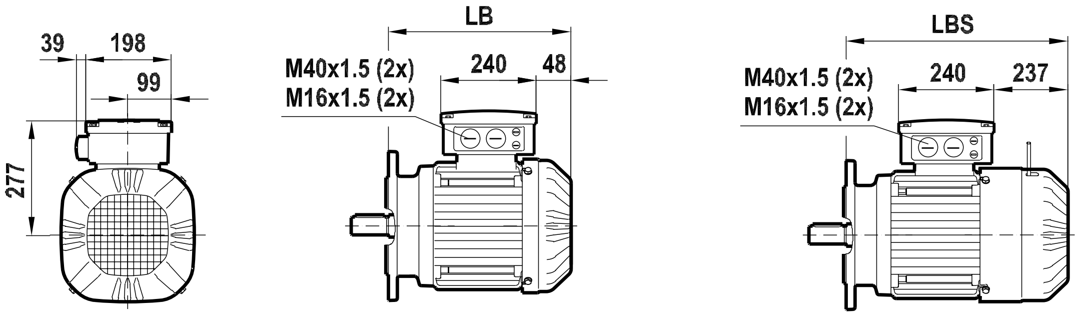
Design with connection piece.

08 480 02 08
4 (4)

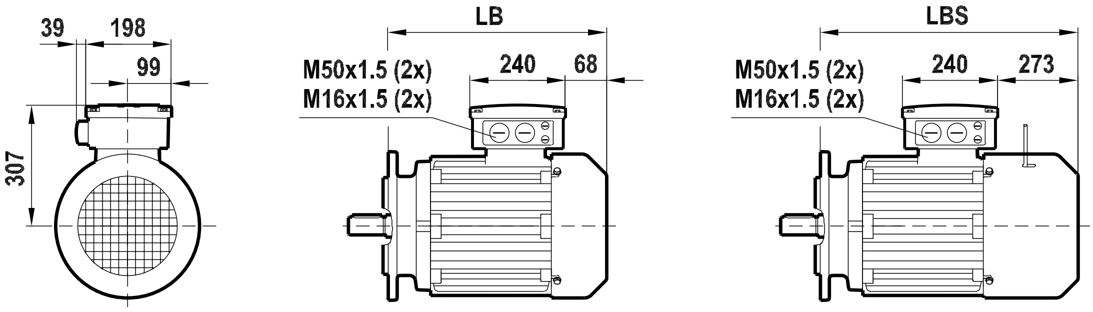
DR.160.. **DR.160..BE**



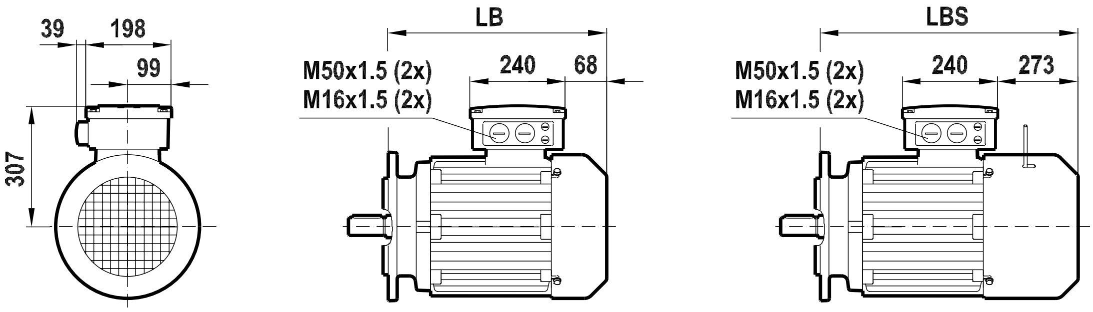
DR.180.. **DR.180..BE**



DR.200.. **DR.200..BE**



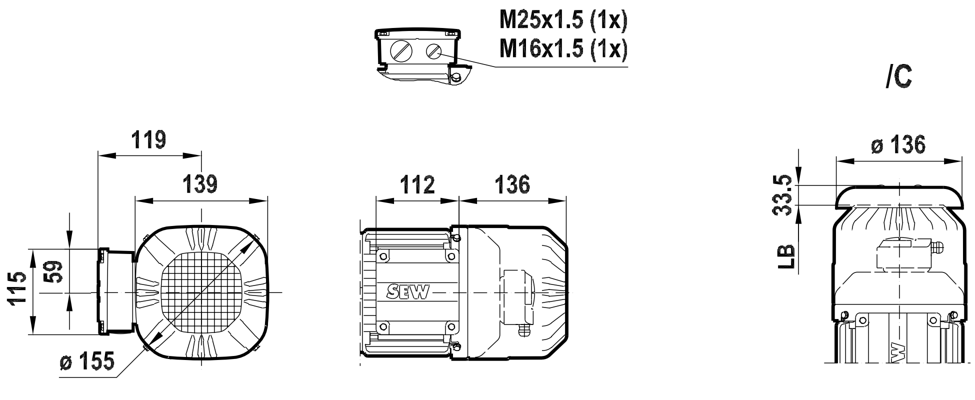
DR.225.. **DR.225..BE**

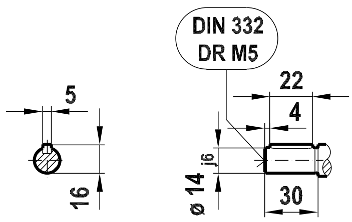


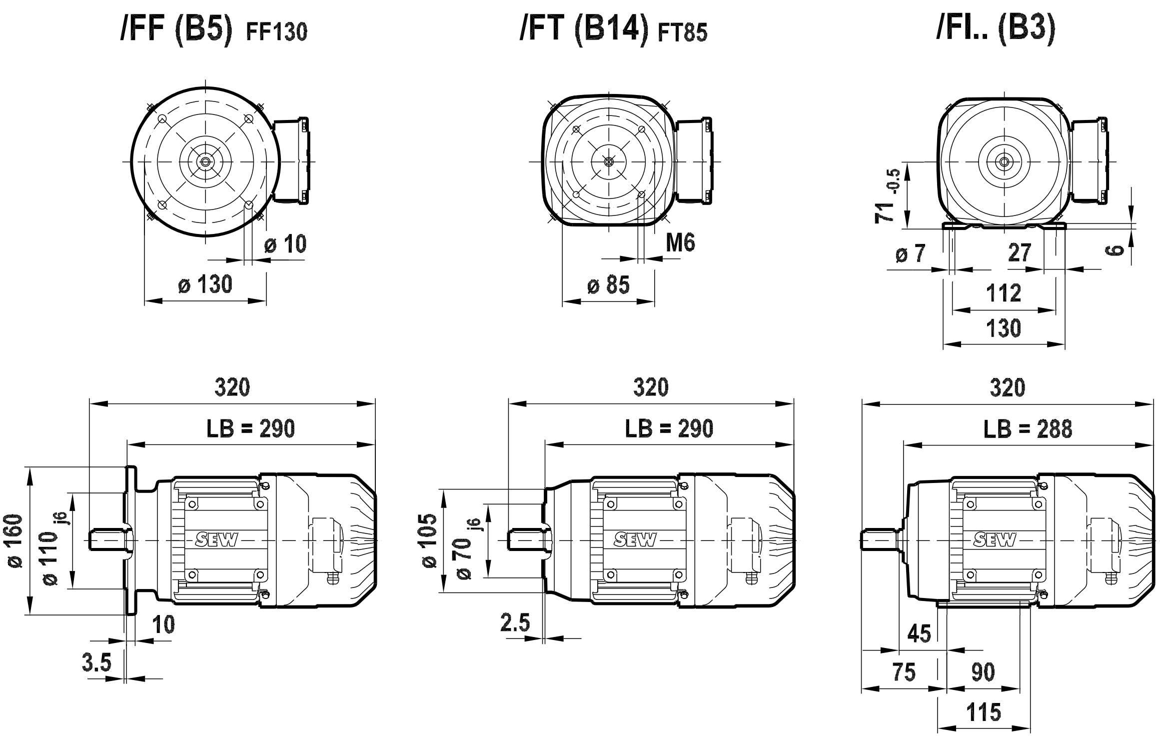
7406621323

7.7 Dimension sheets for DRL.. servomotors/servo brakemotors

DRL71S4 08 428 01 08
1 (1)







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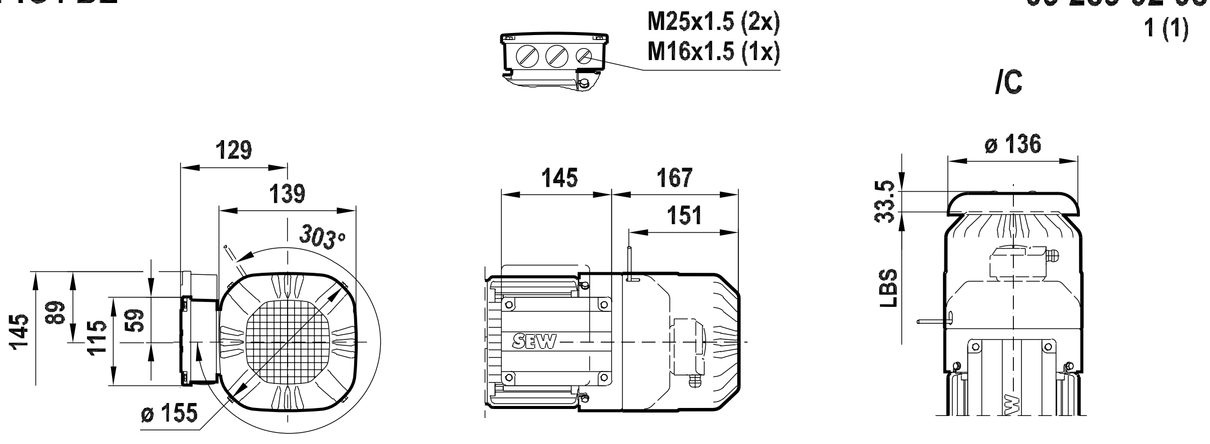
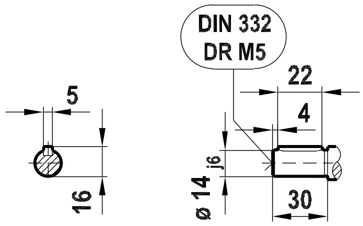
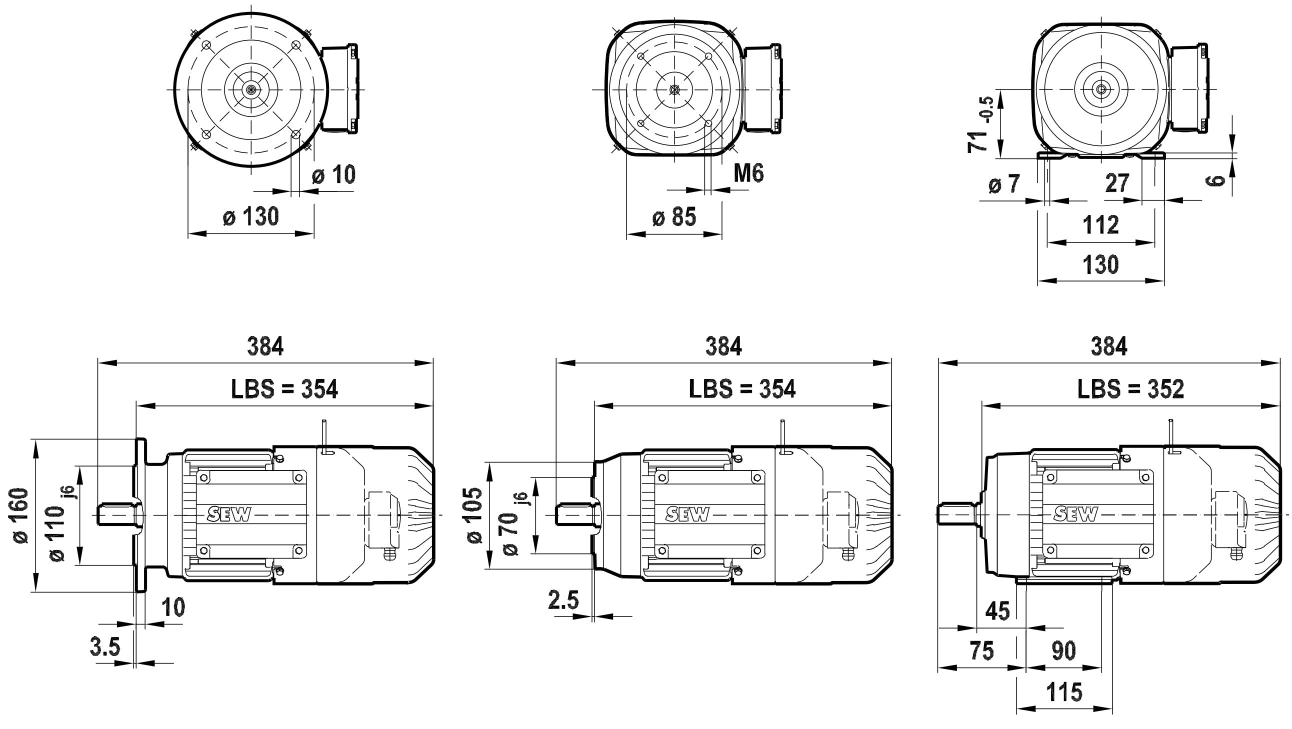
DRL71S4 BE

09 289 02 08
1 (1)





/FF (B5) FF130 /FT (B14) FT85 /FI.. (B3)



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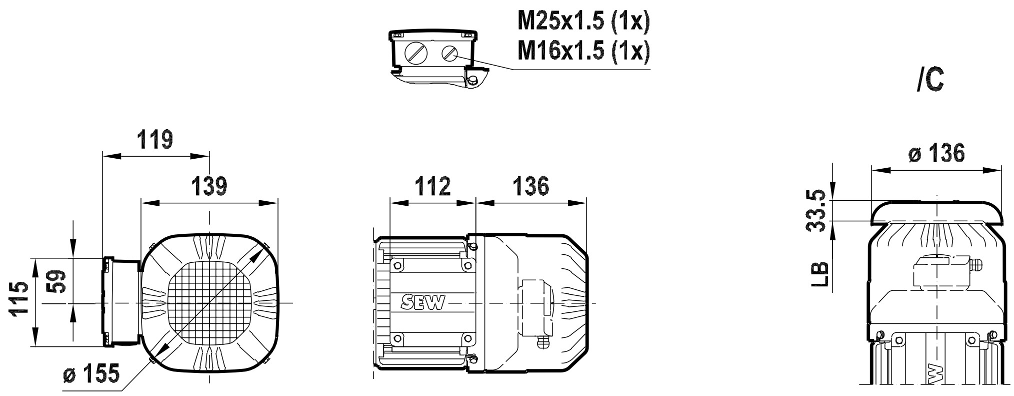
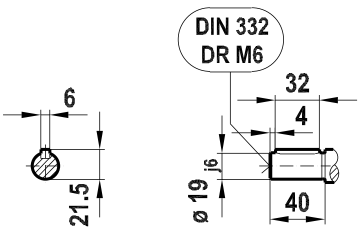
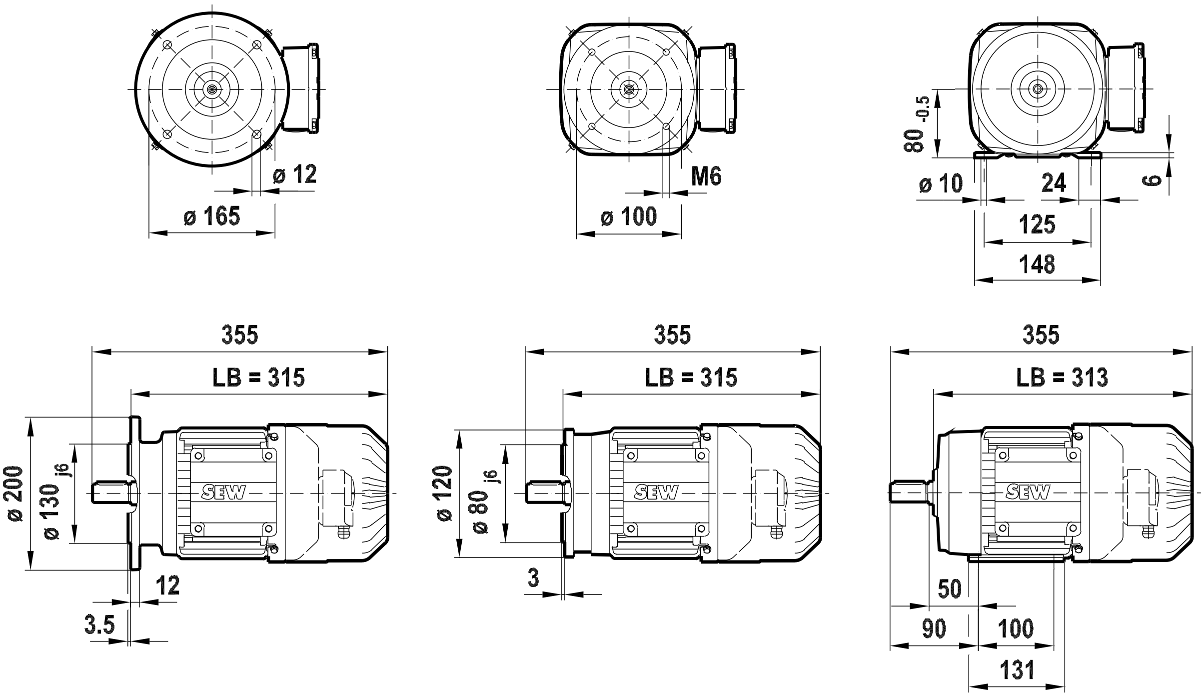
08 429 01 08
1 (1)





/FF (B5) FF165 | /FT (B14) FT100 | /FI.. (B3)



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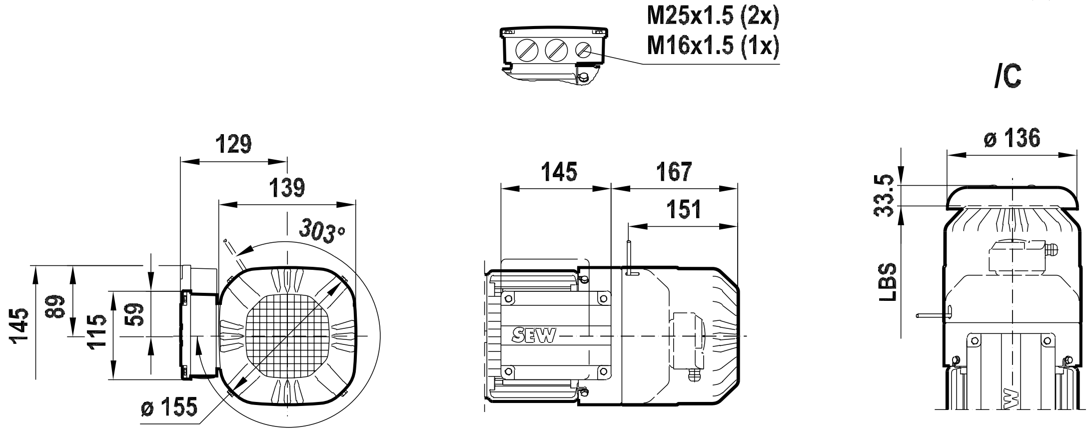
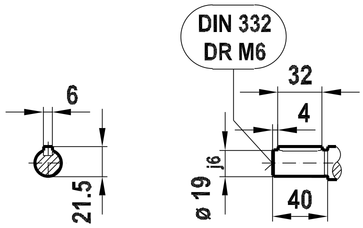
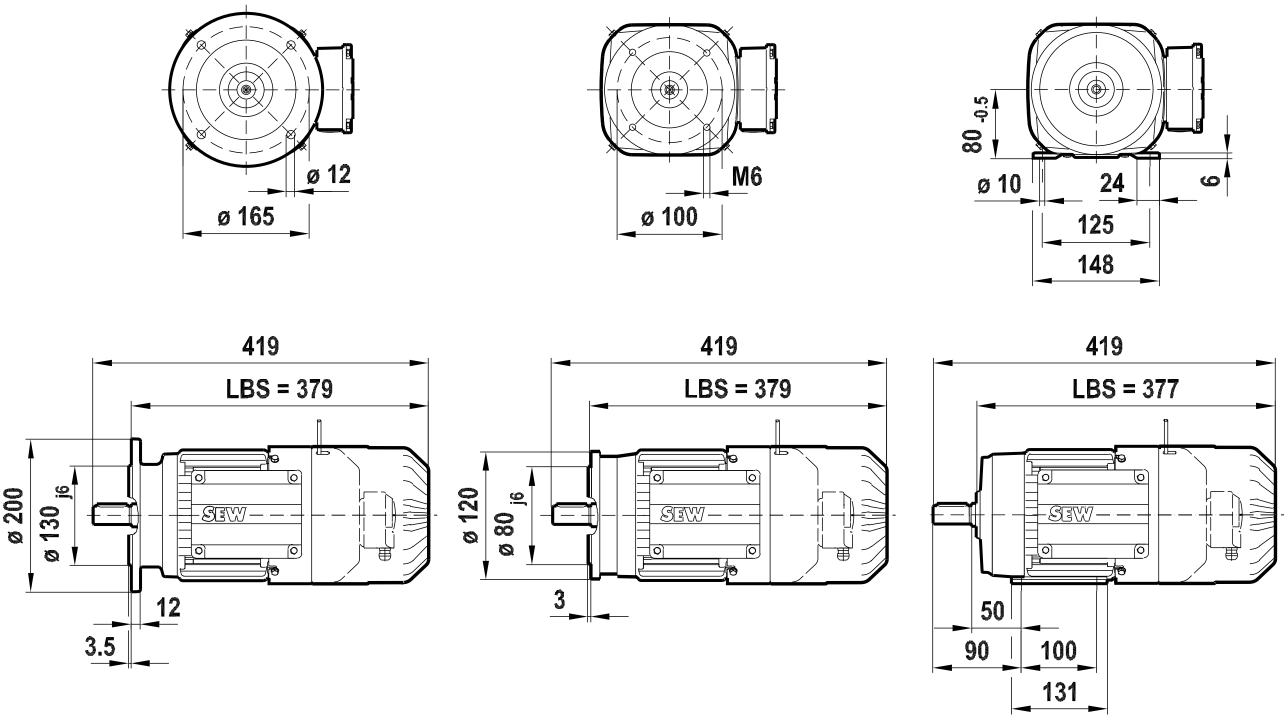
DRL71M4 BE

09 290 02 08
1 (1)





/FF (B5) FF165 | /FT (B14) FT100 | /FI.. (B3)



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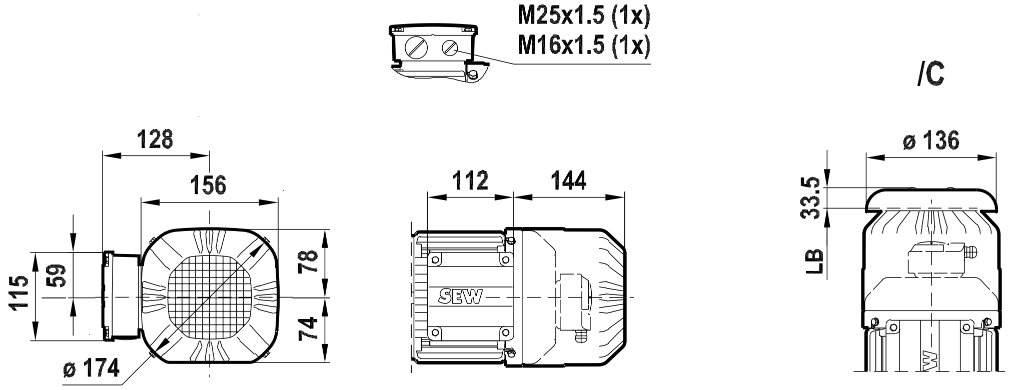
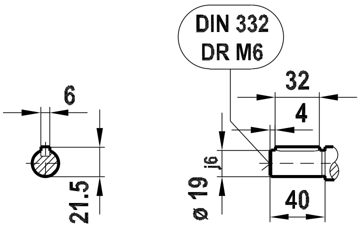
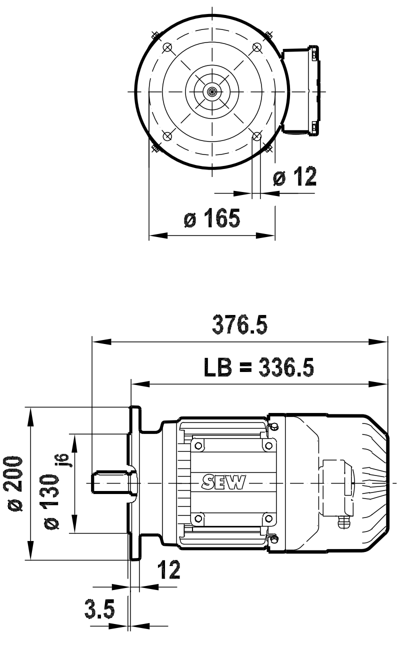
DRL80S4

08 681 00 10
1 (1)

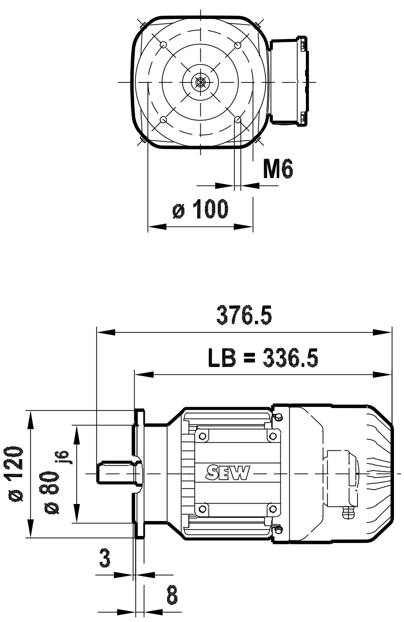




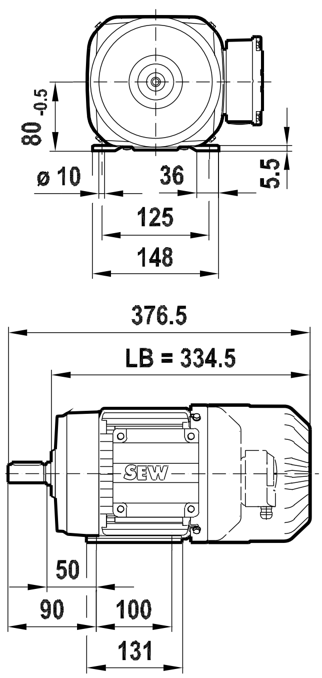
/FF (B5) FF165



/FT (B14) FT100



/FI.. (B3)



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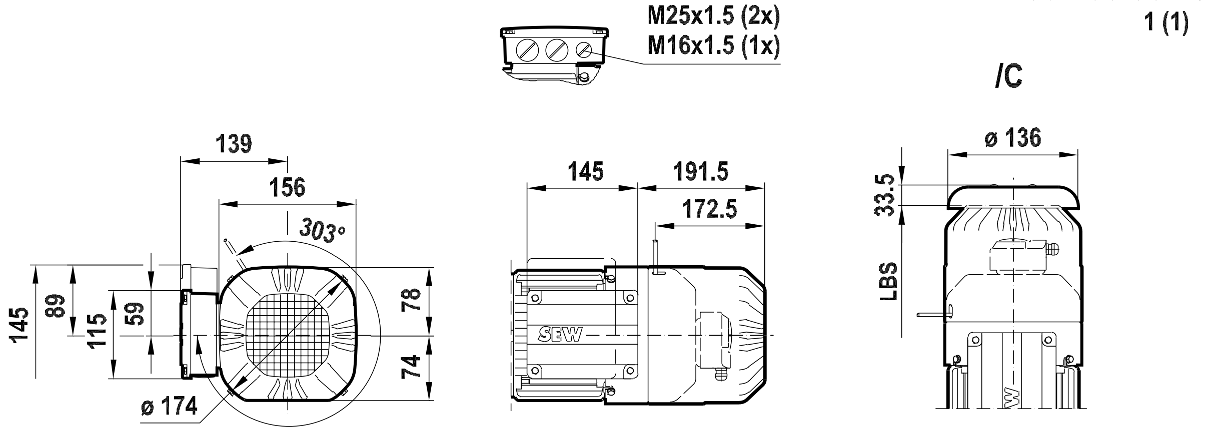
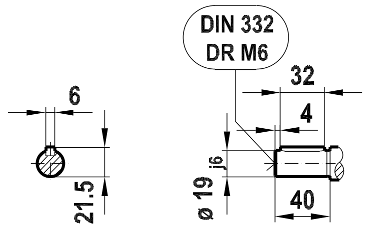
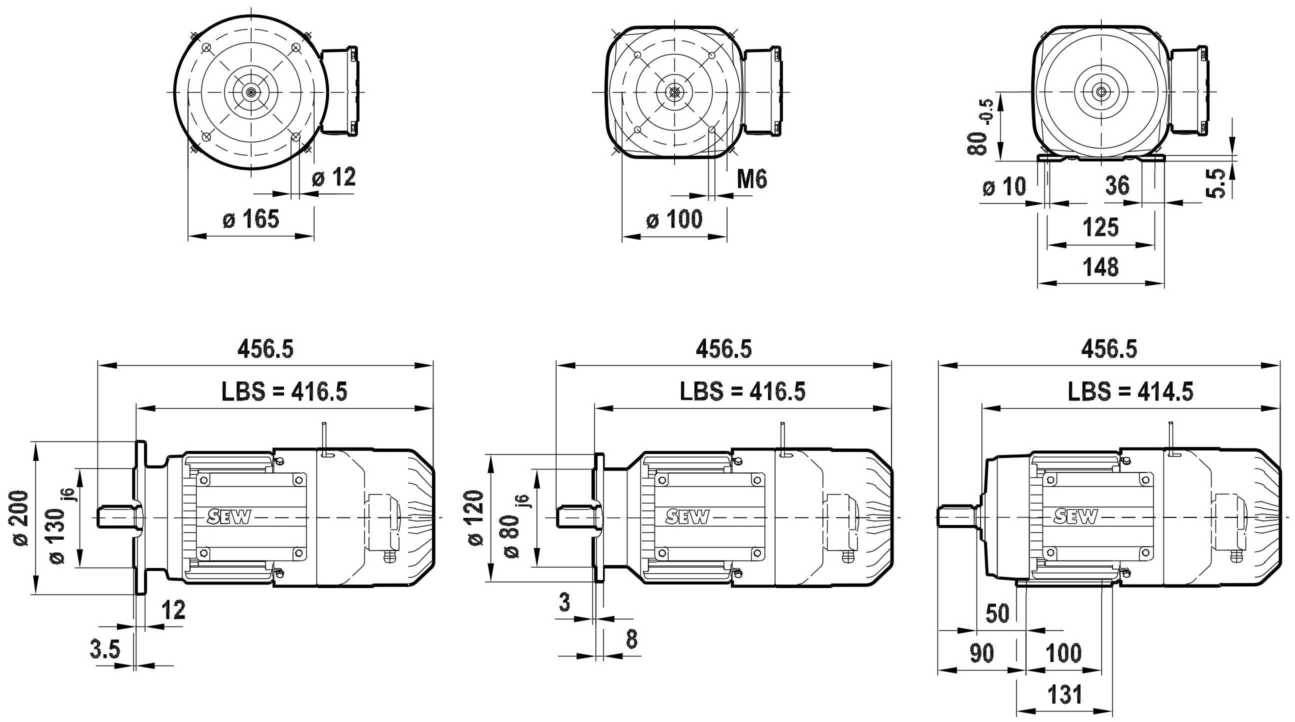
DRL80S4 BE

09 488 00 10
1 (1)





/FF (B5) FF165 | /FT (B14) FT100 | /FI.. (B3)



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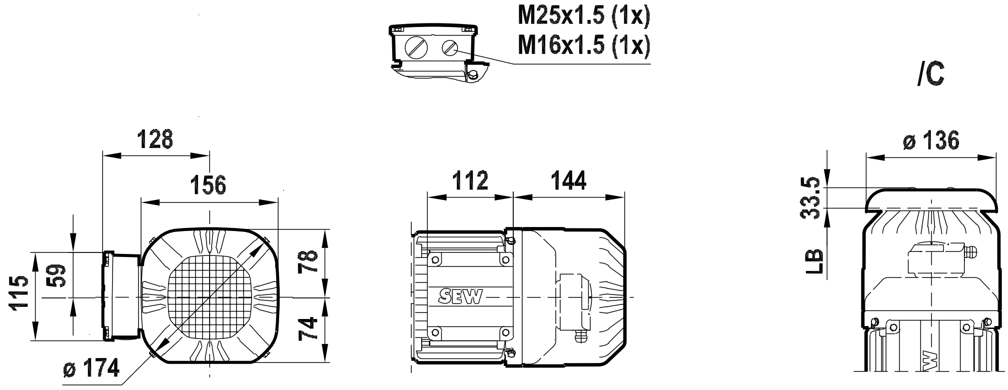
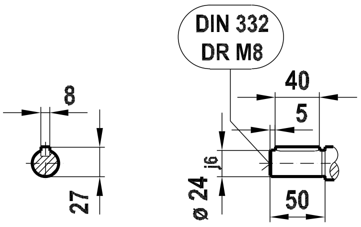
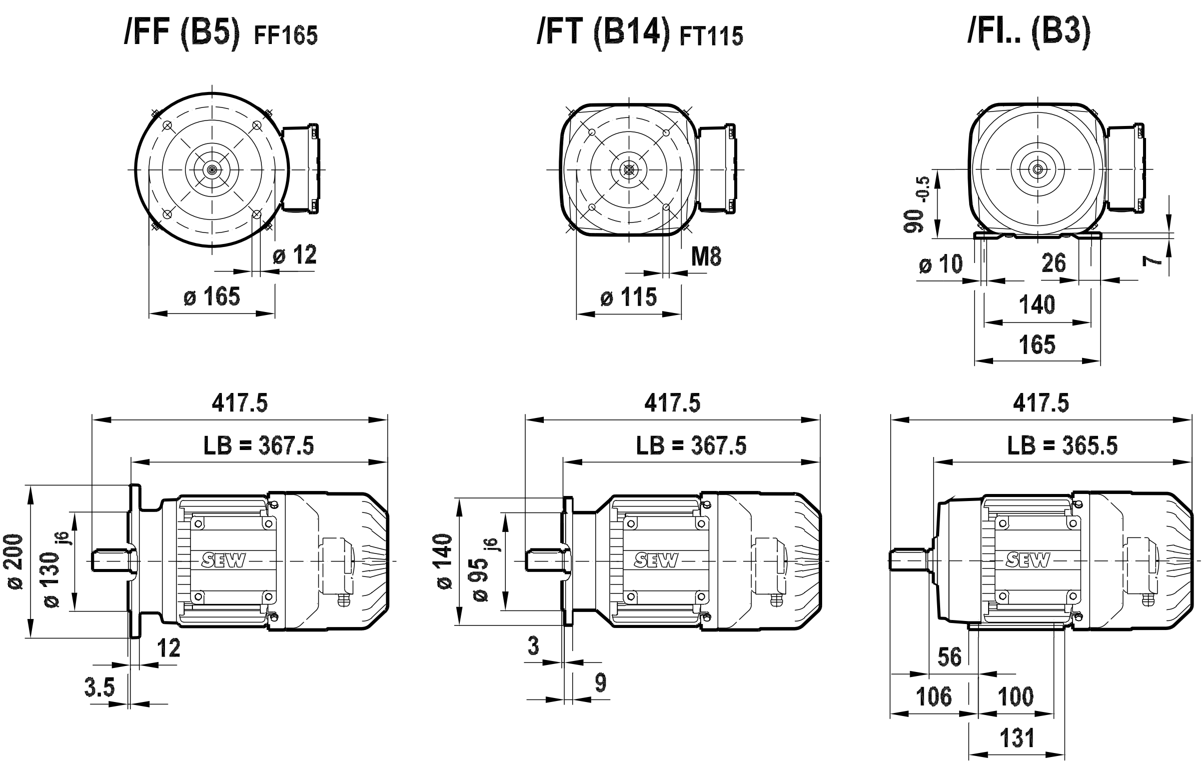
DRL80M4

08 430 00 08
1 (1)







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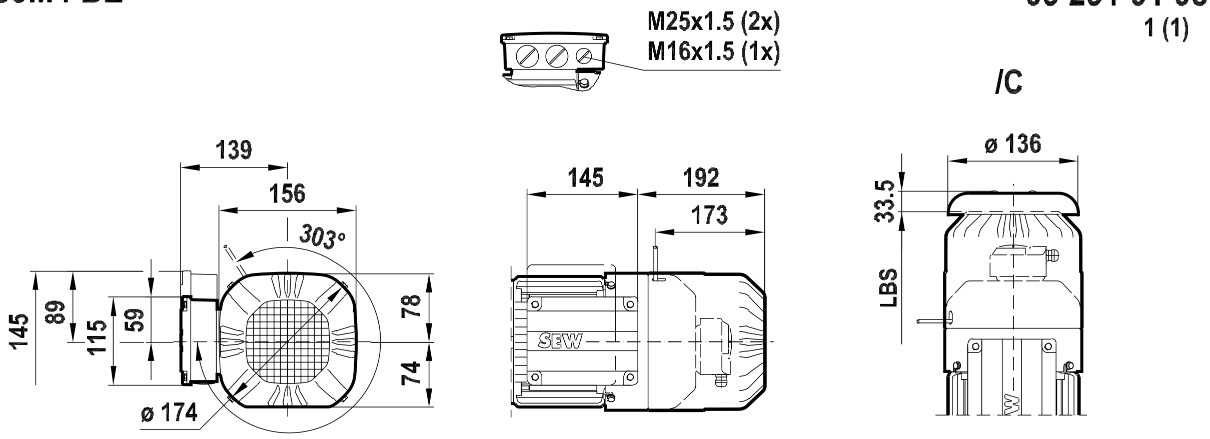
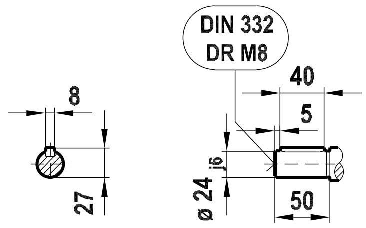
DRL80M4 BE

09 291 01 08
1 (1)

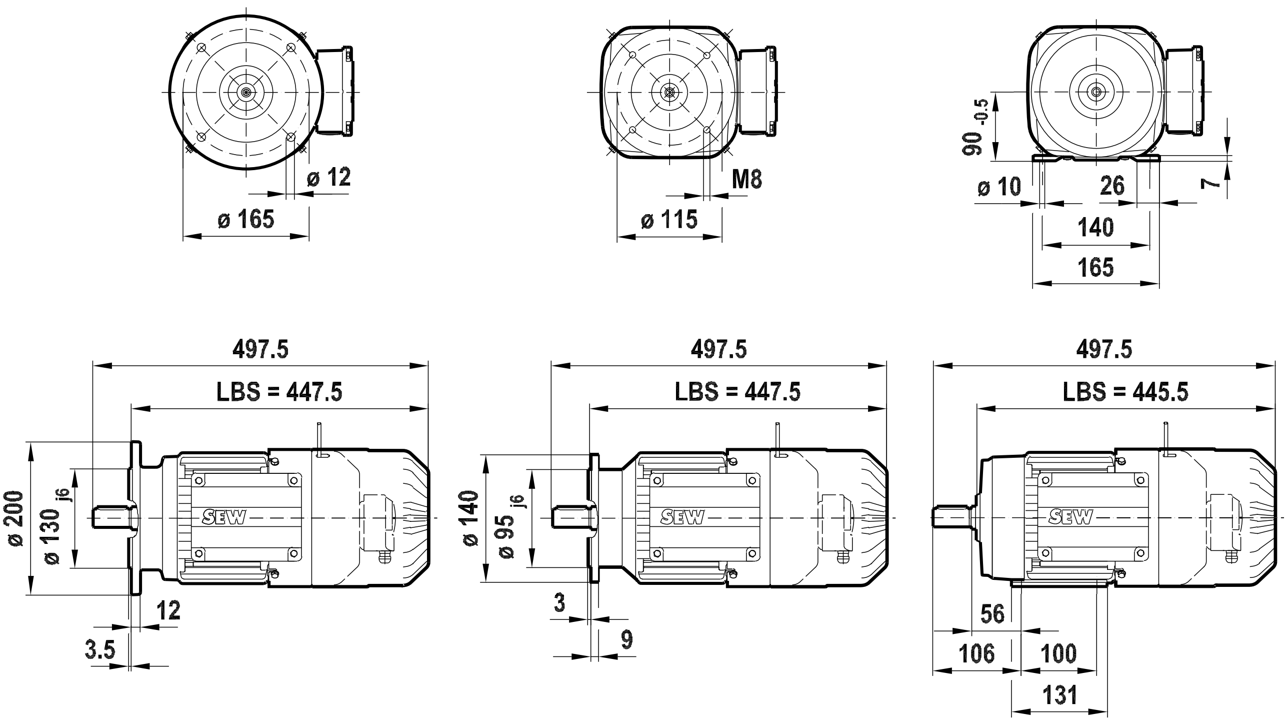




/FF (B5) FF165

/FT (B14) FT115

/FI.. (B3)



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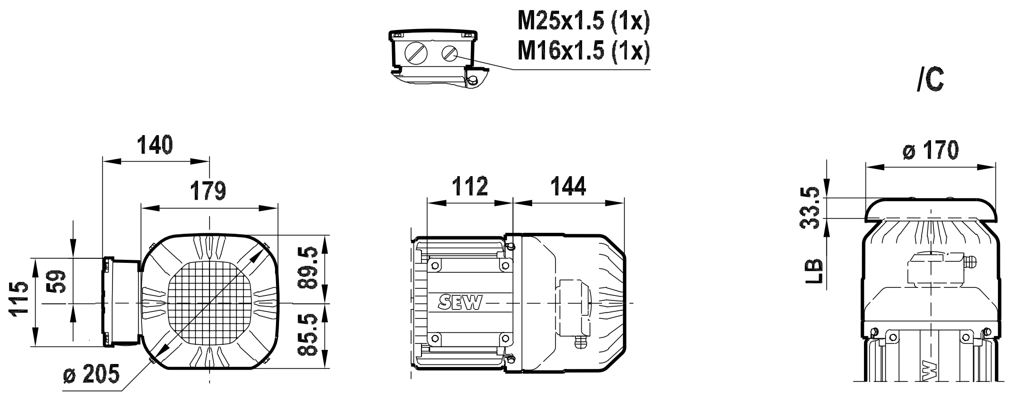
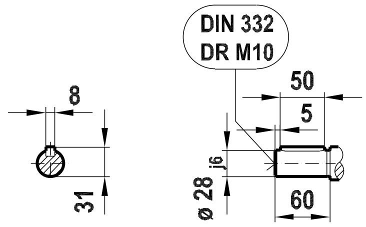
7

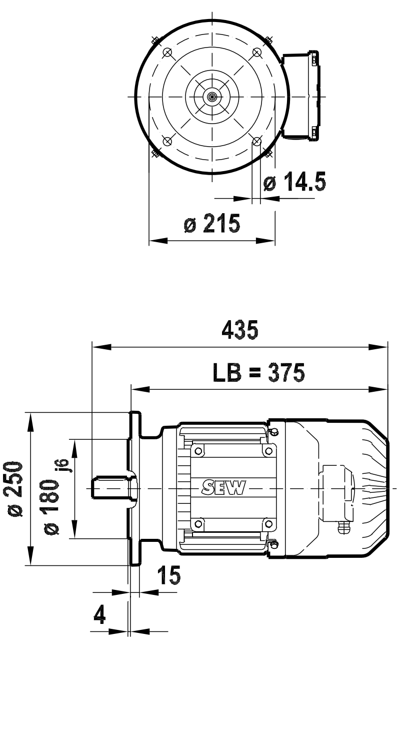
DRL90L4

08 431 00 08
1 (1)





/FF (B5) FF215



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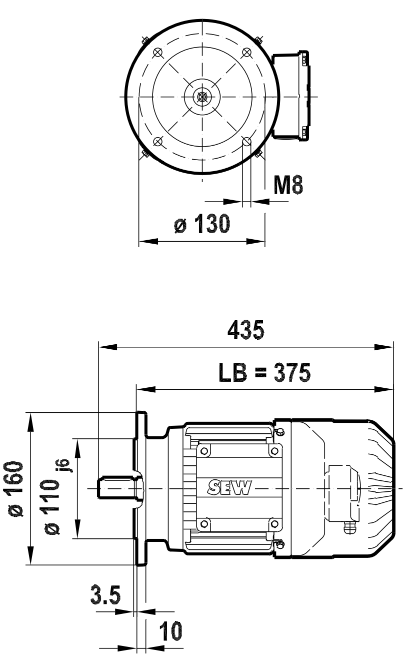

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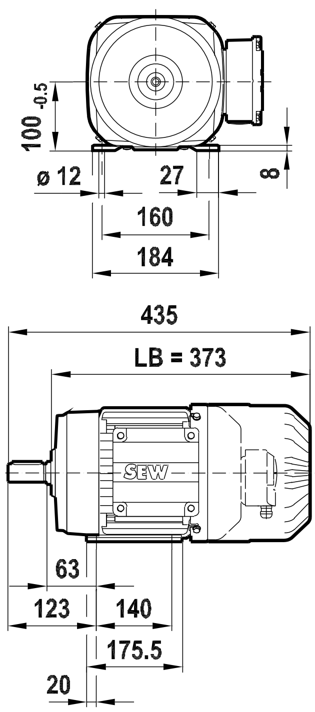

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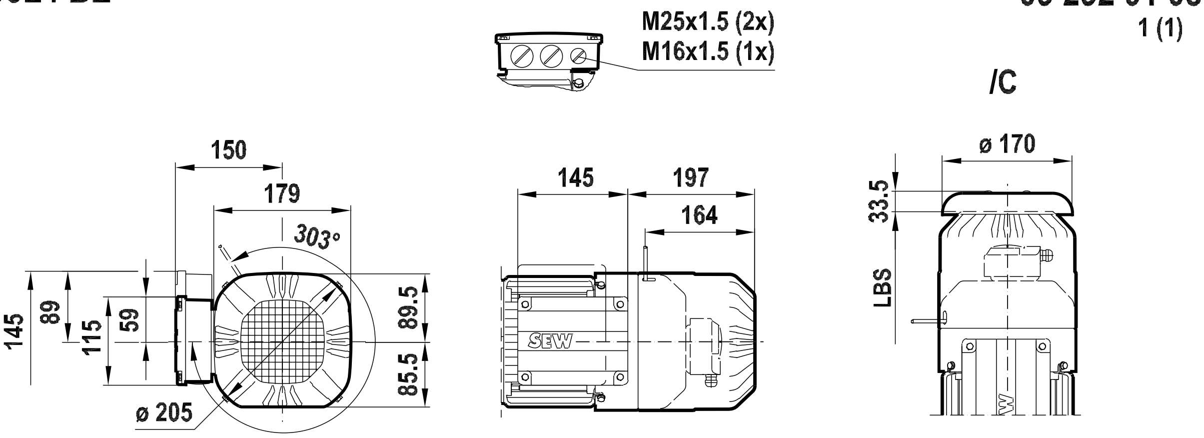

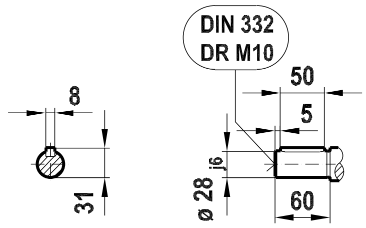

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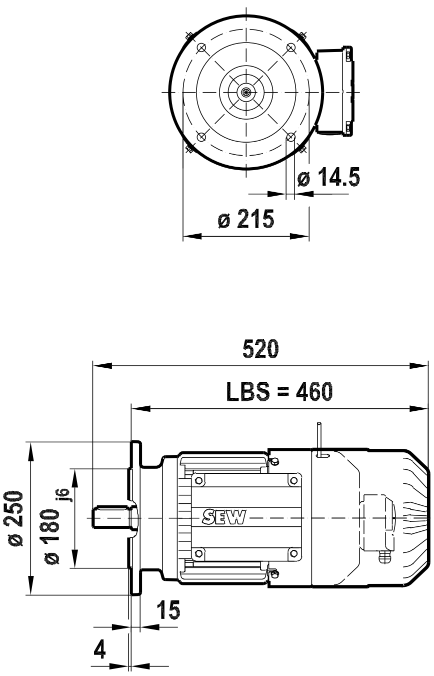

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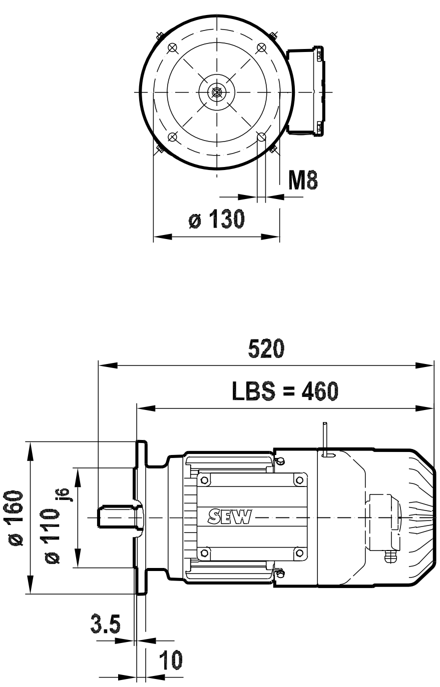

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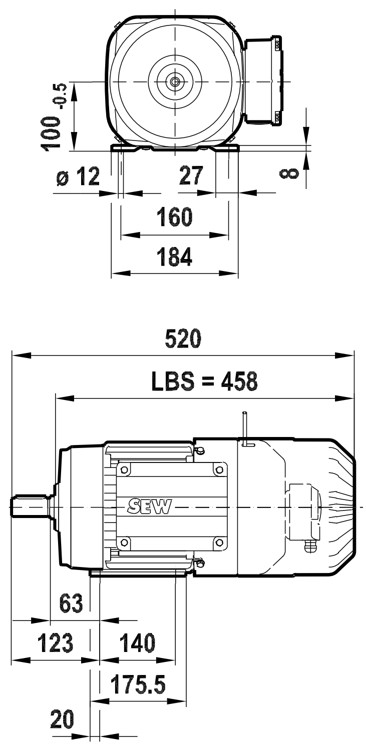

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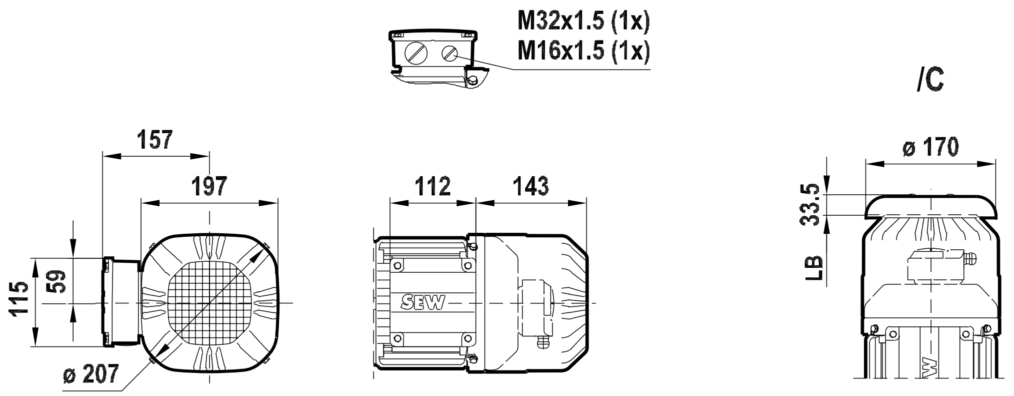

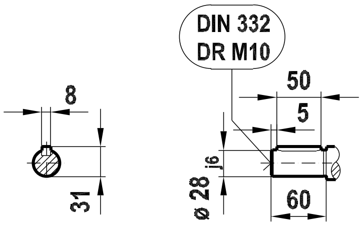

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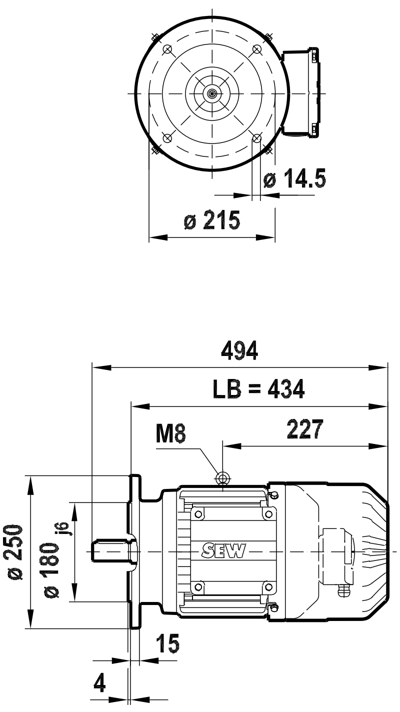

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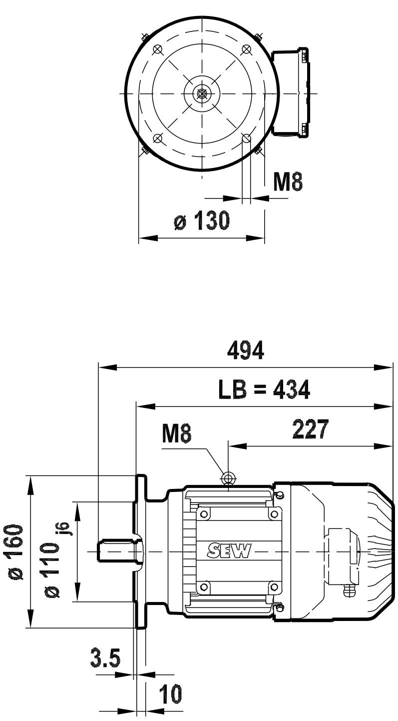

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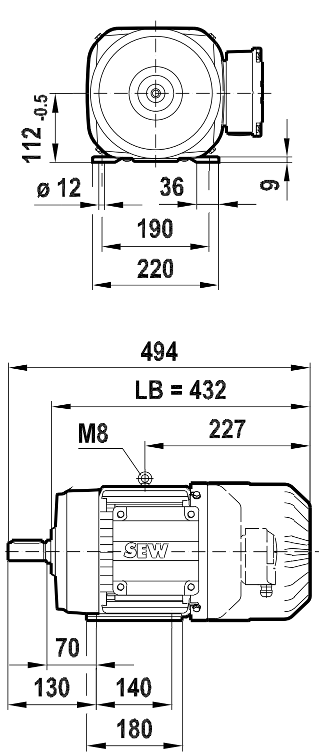

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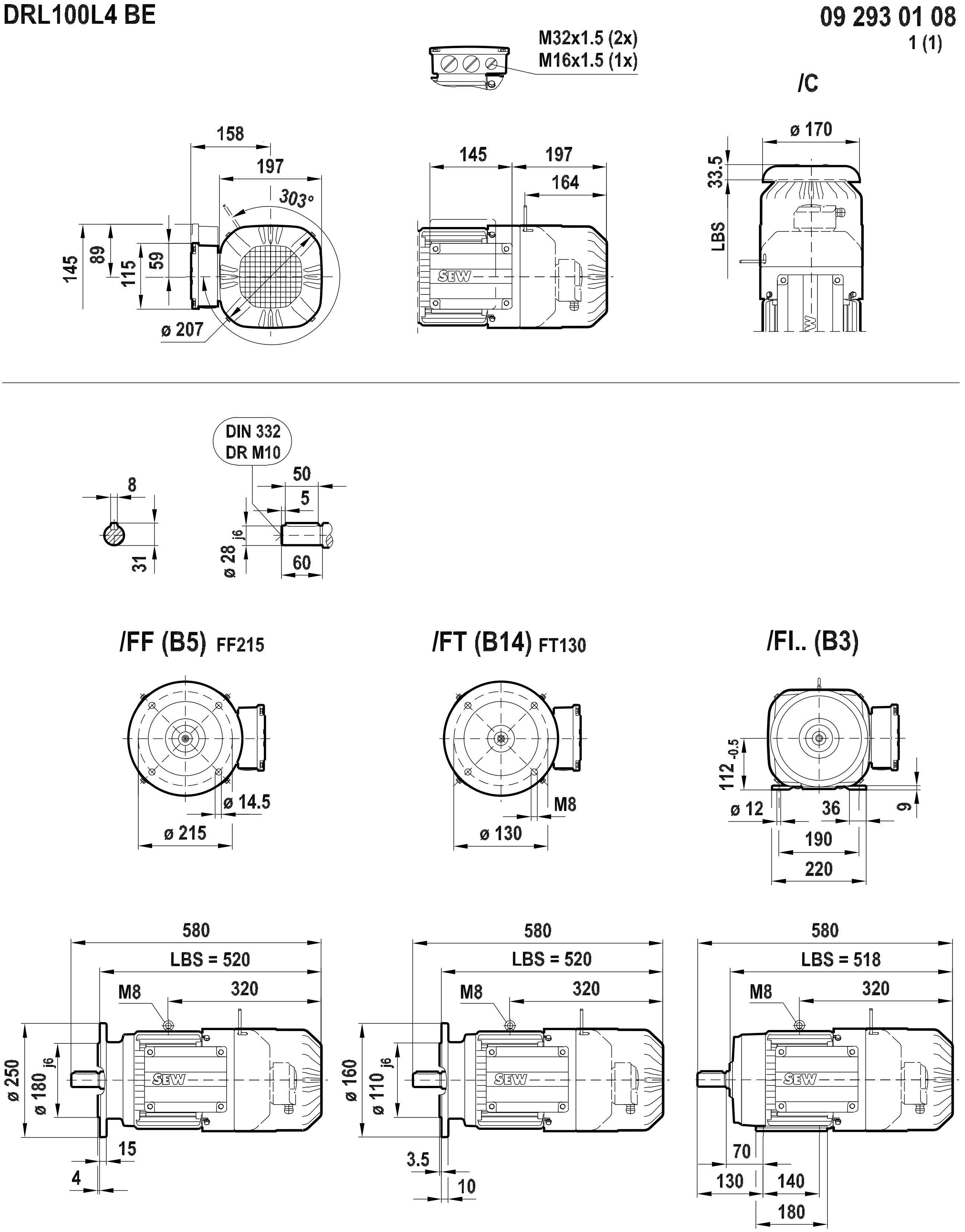

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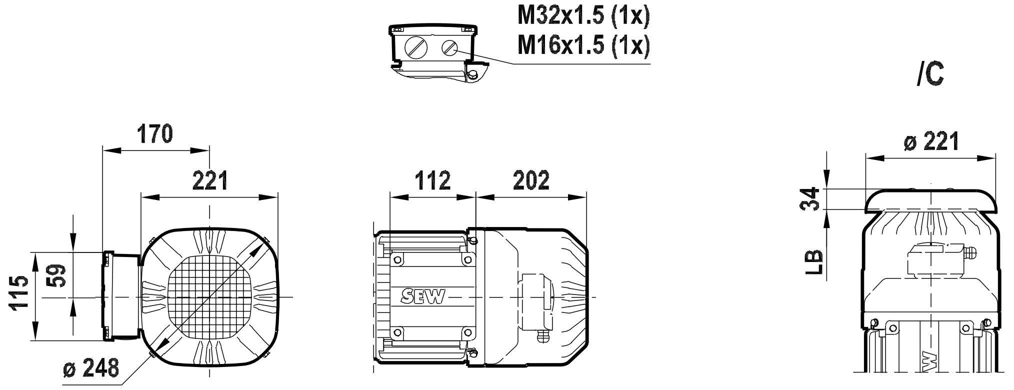

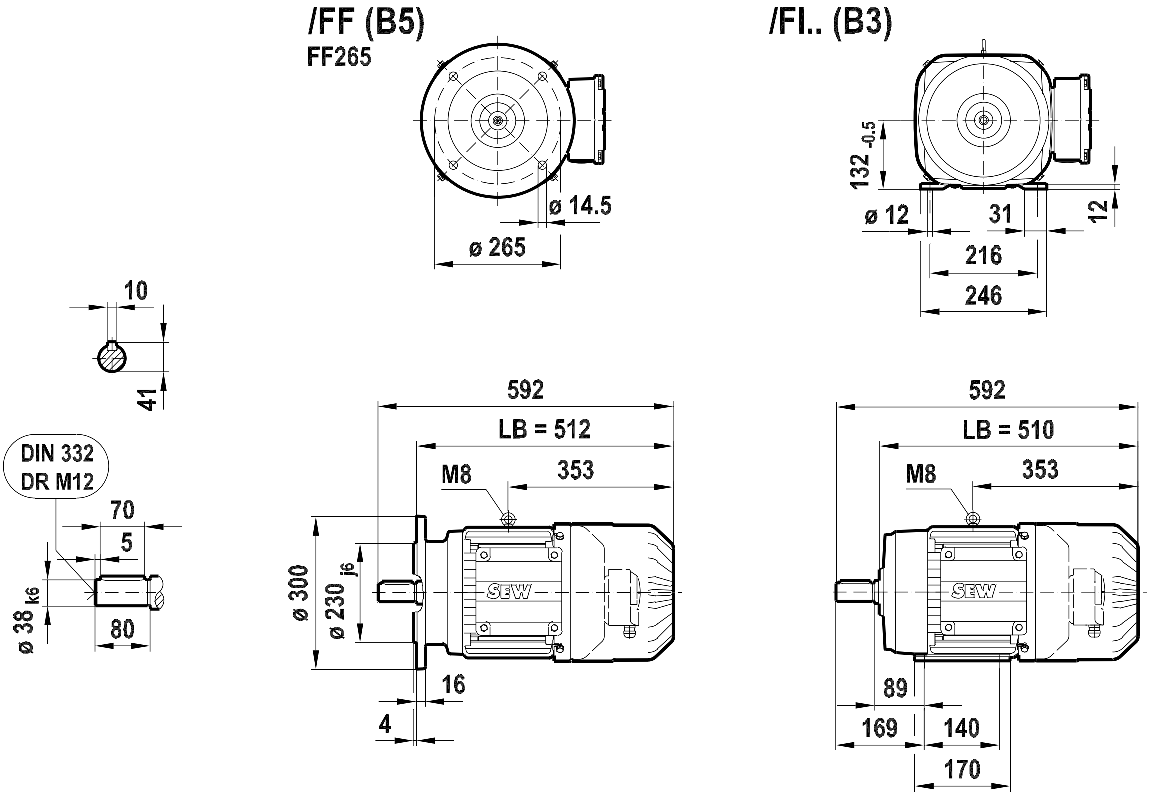

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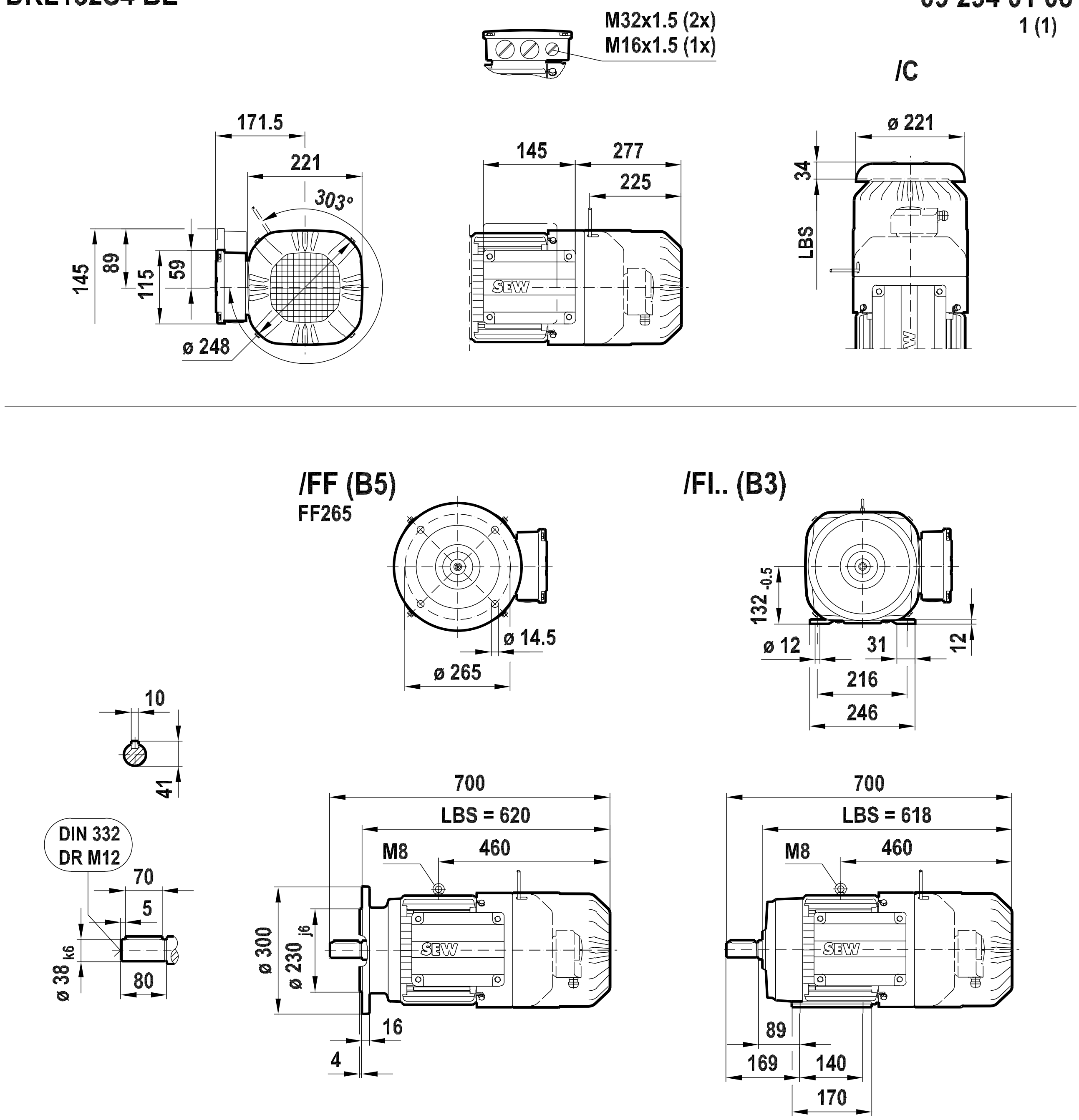

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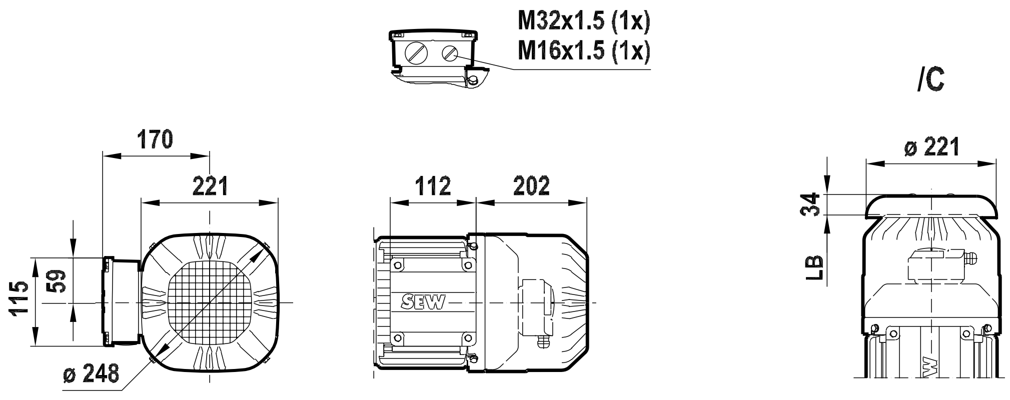

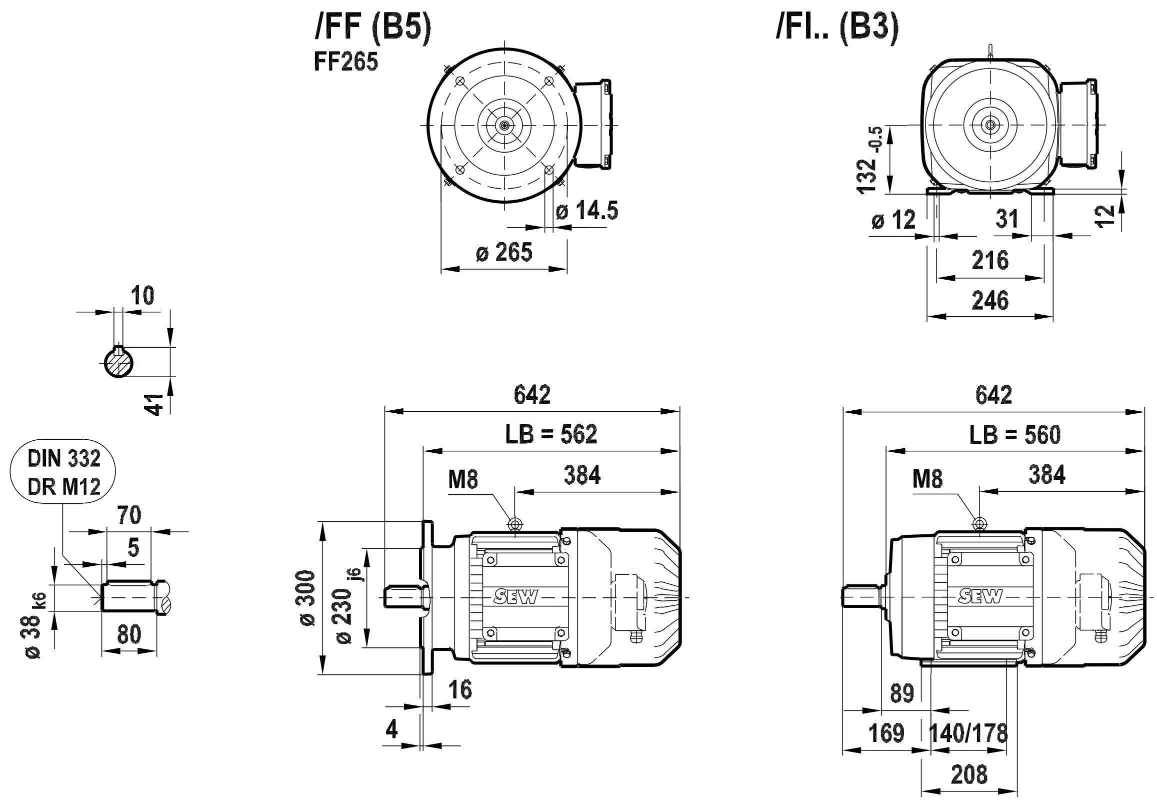

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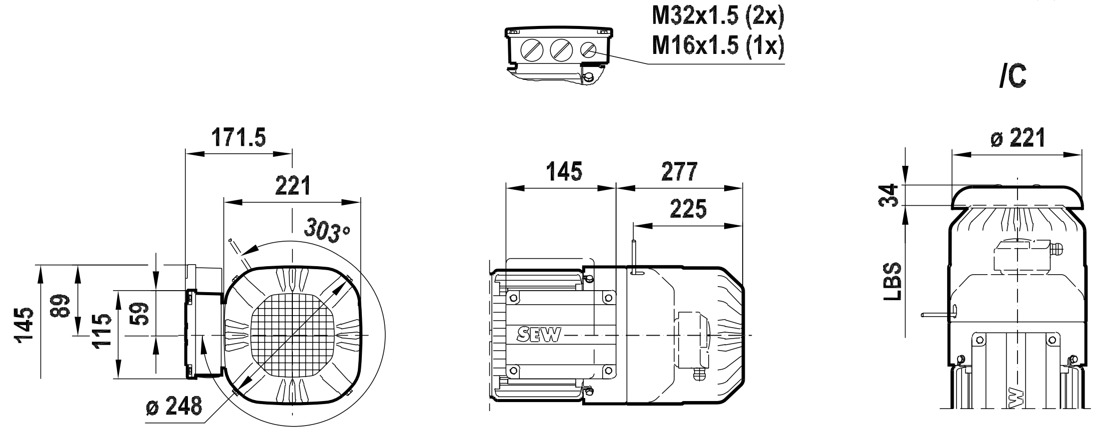

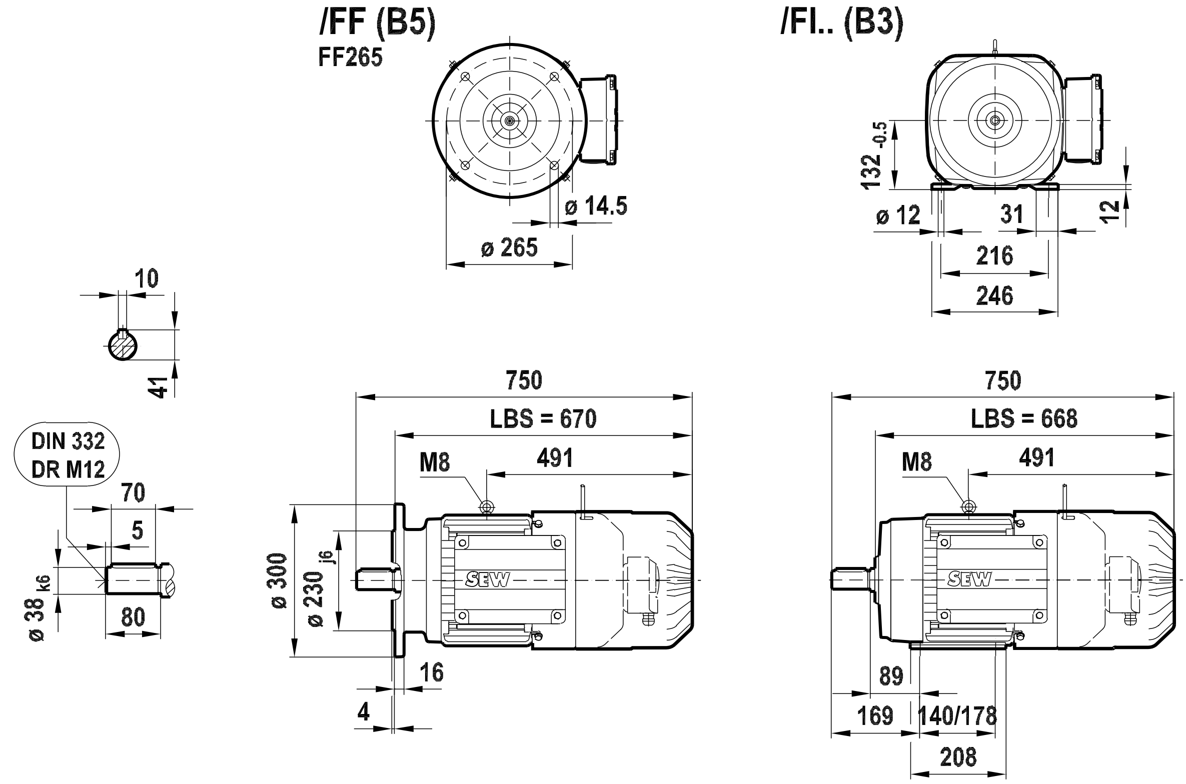

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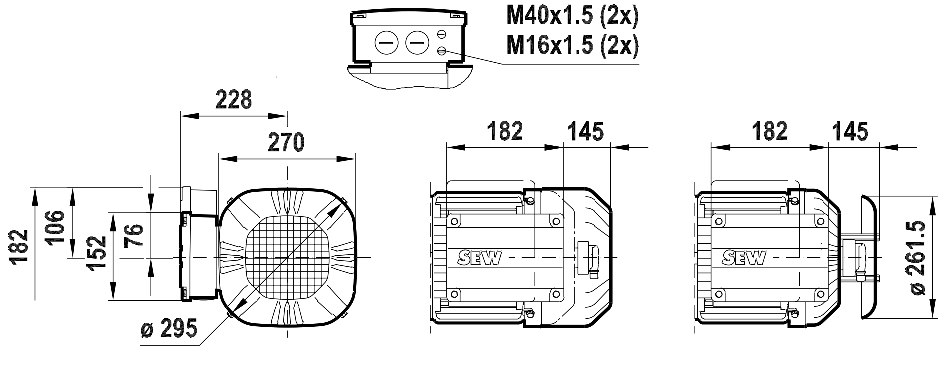

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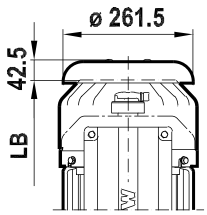

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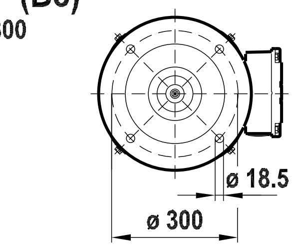

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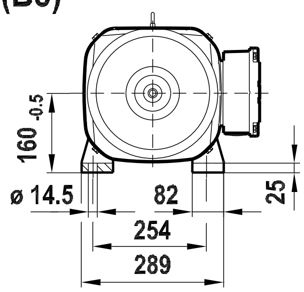

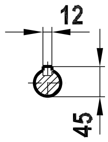

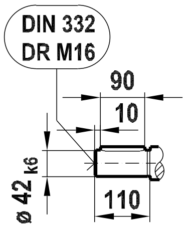

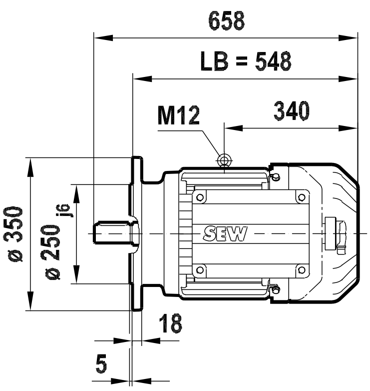

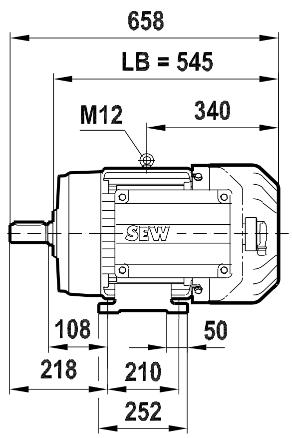

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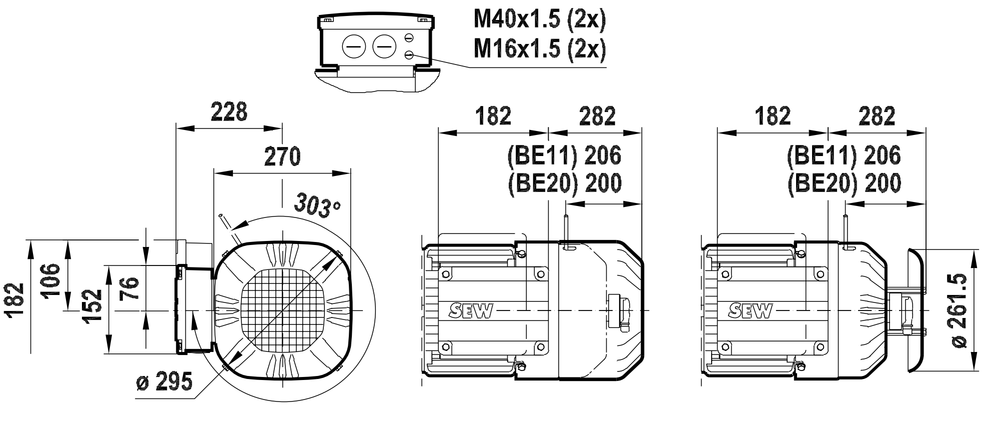

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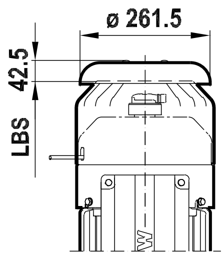

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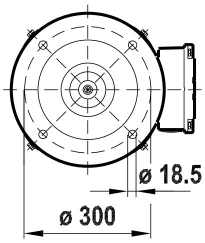

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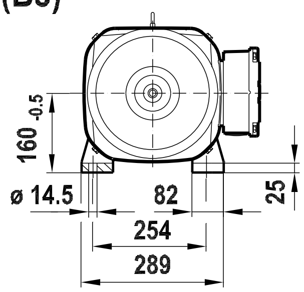

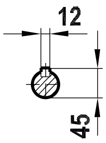

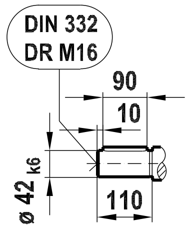

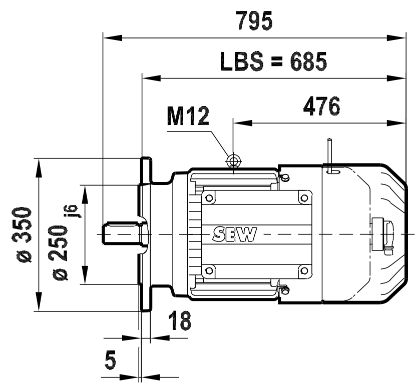

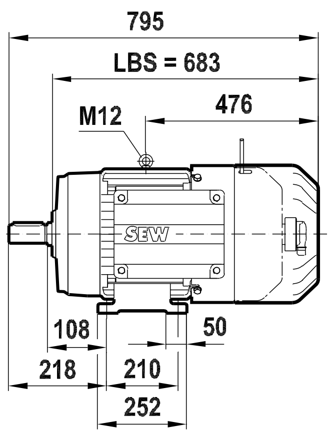

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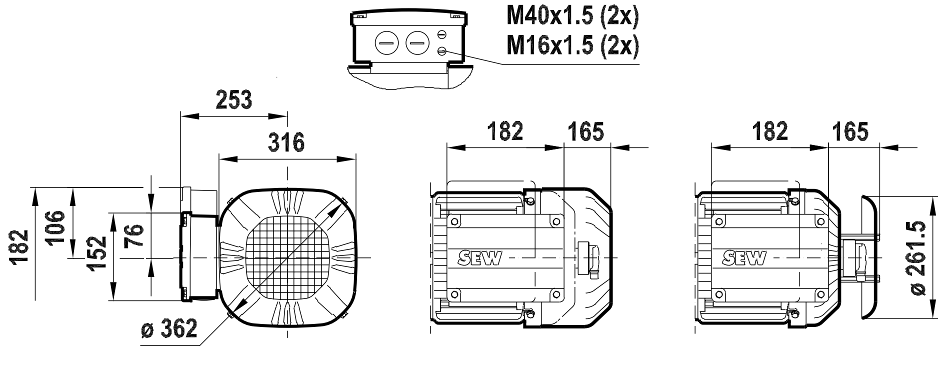

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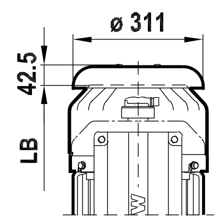

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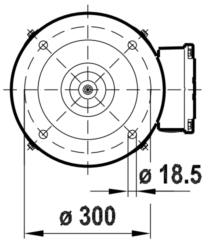

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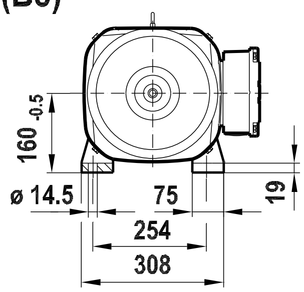

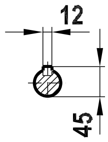

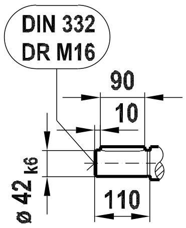

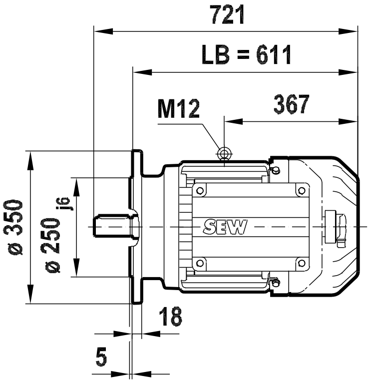

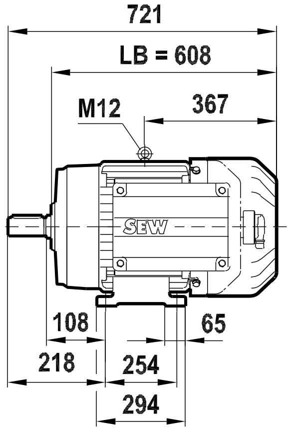

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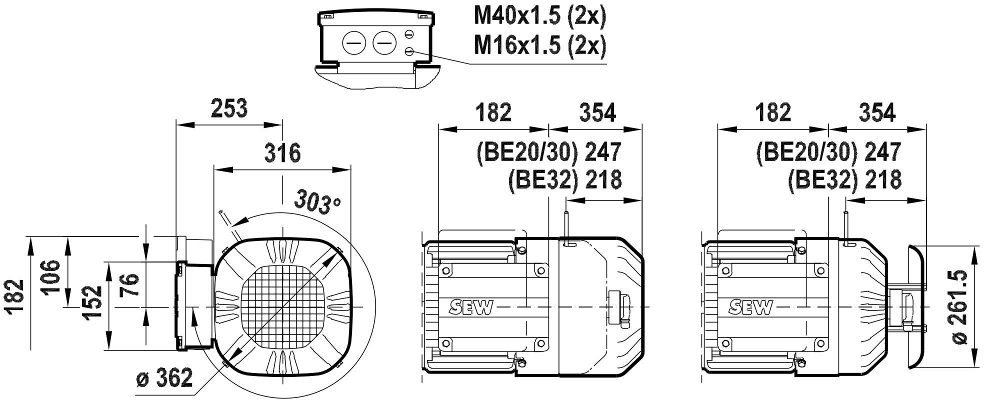

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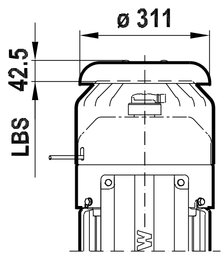

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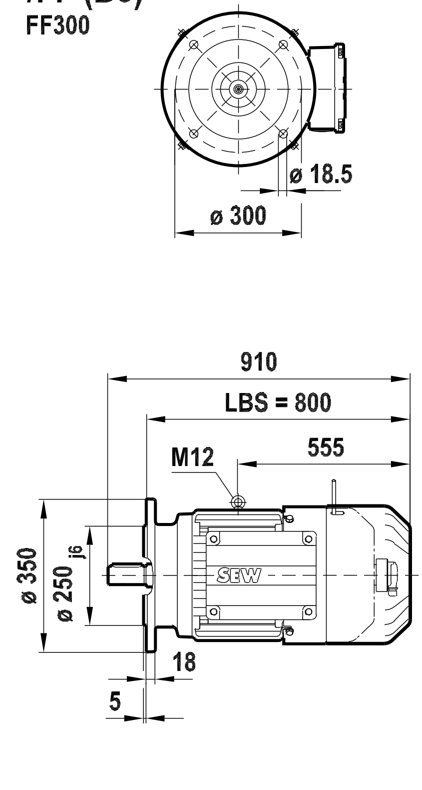

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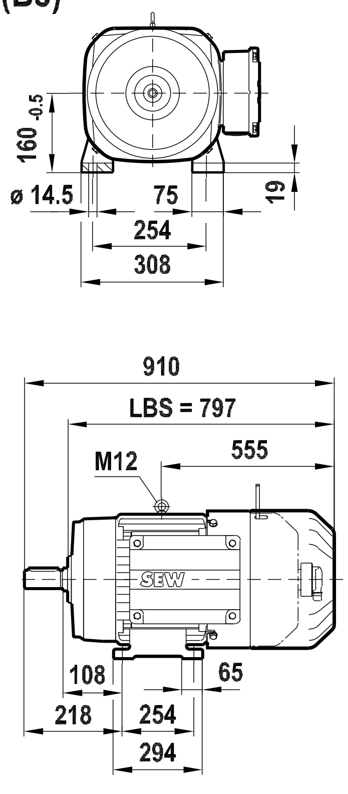

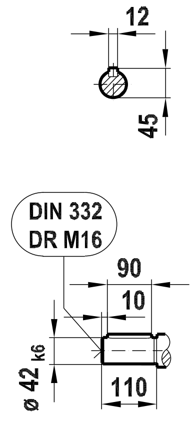

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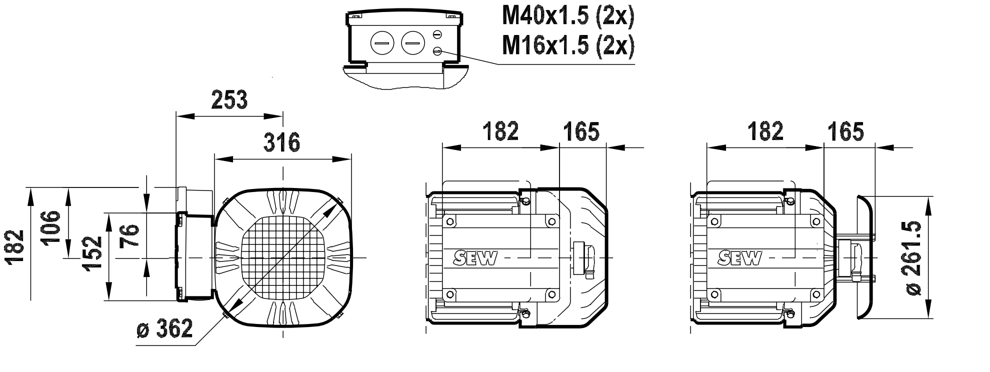

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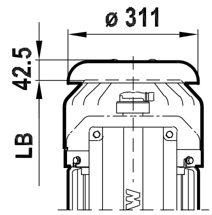

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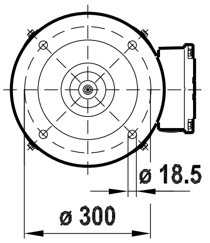

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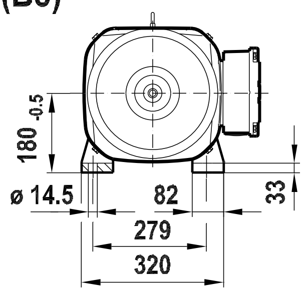

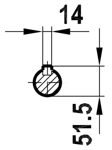

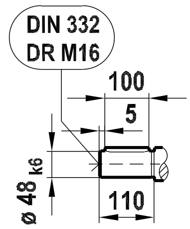

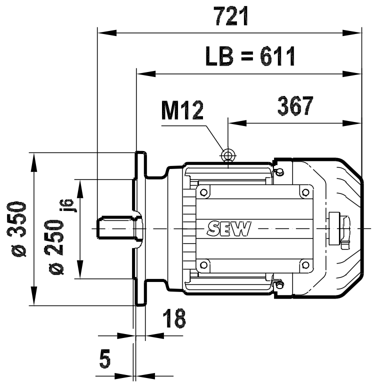

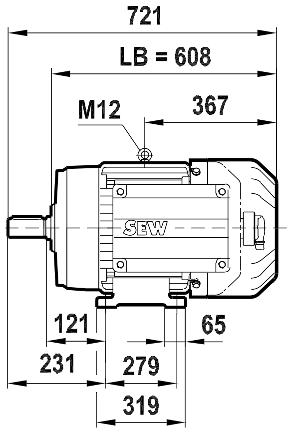

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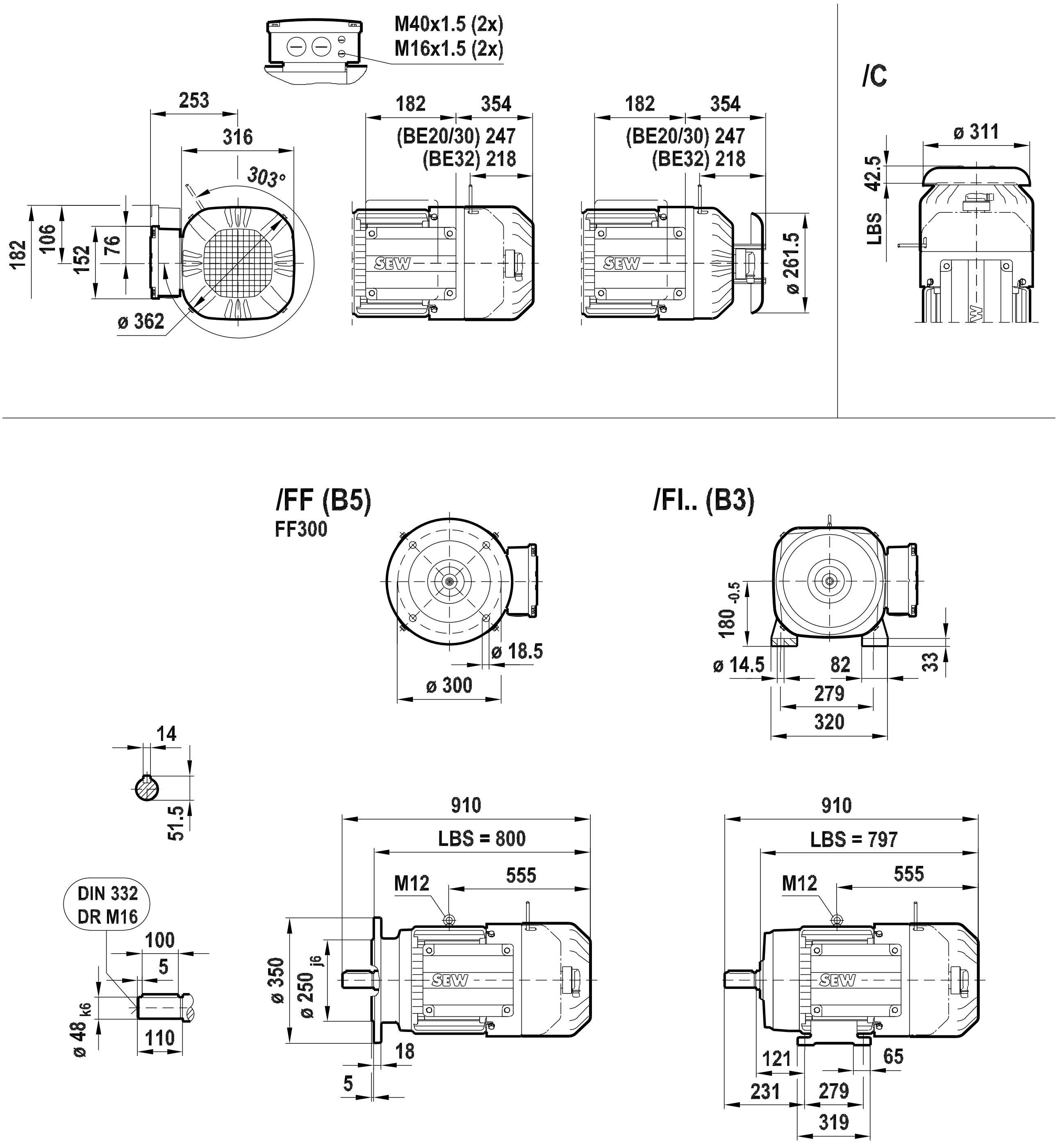

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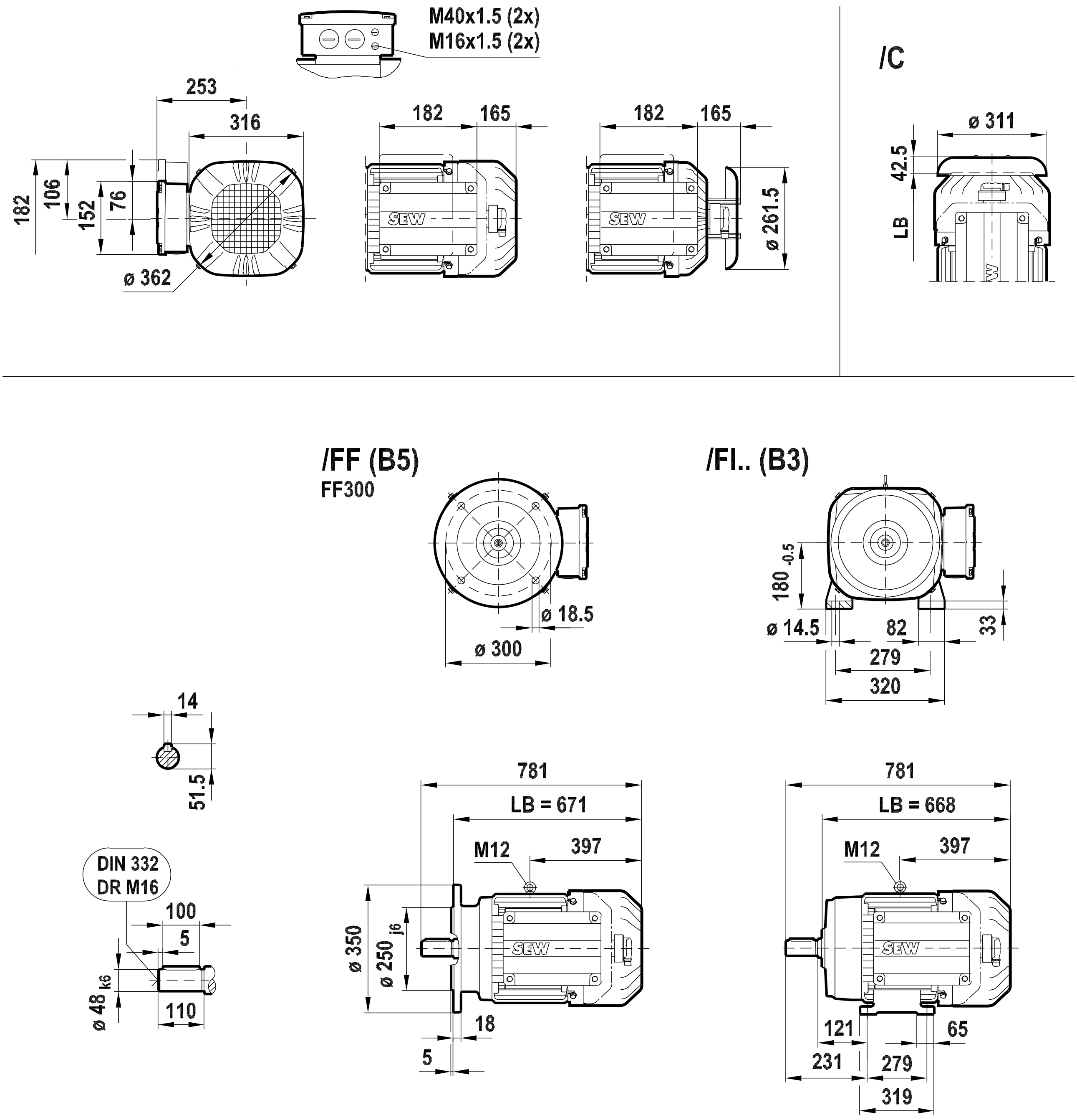

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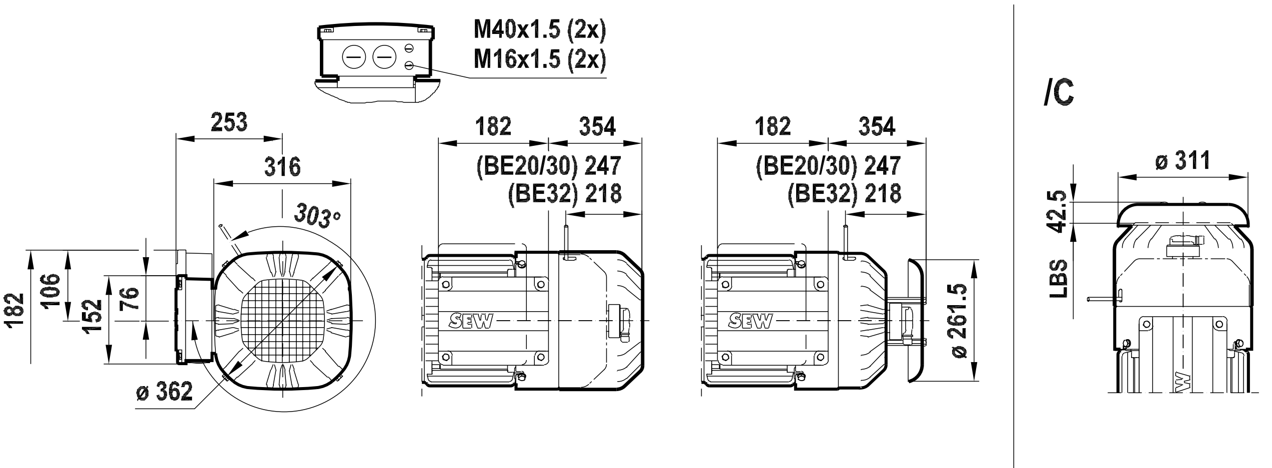

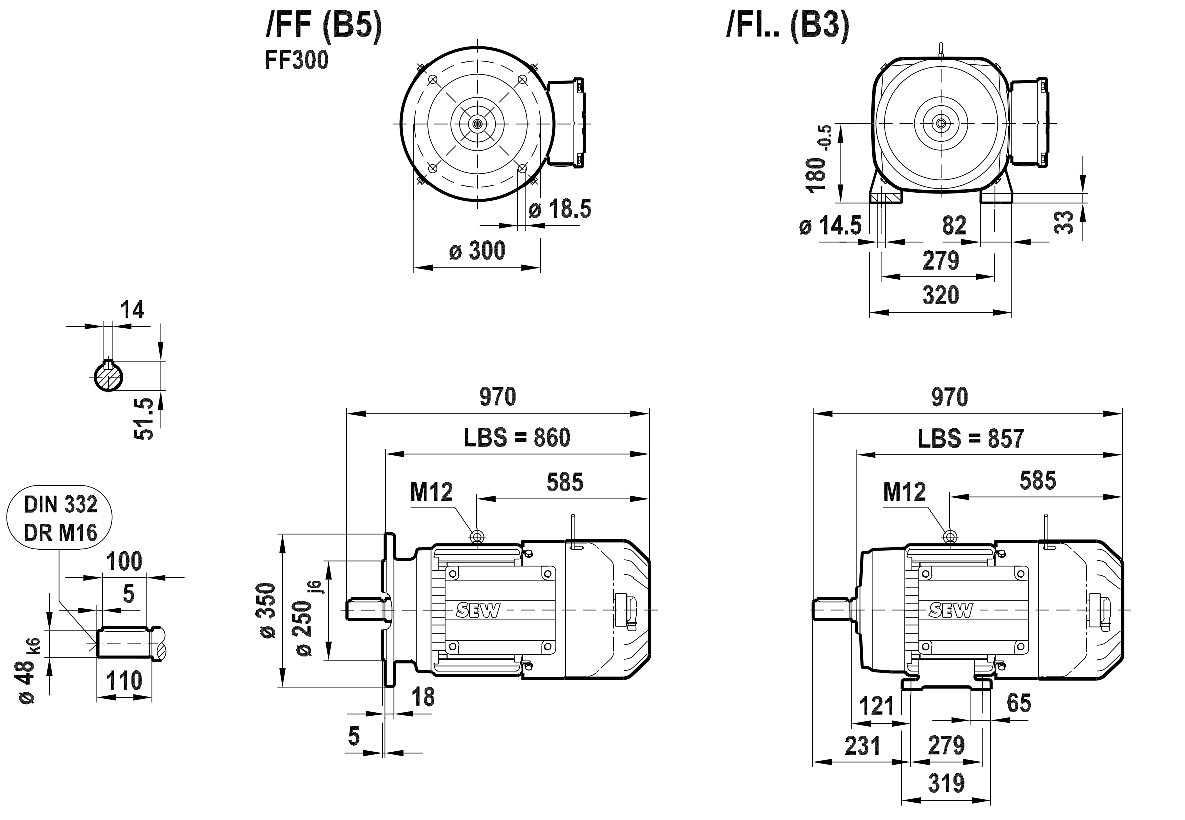

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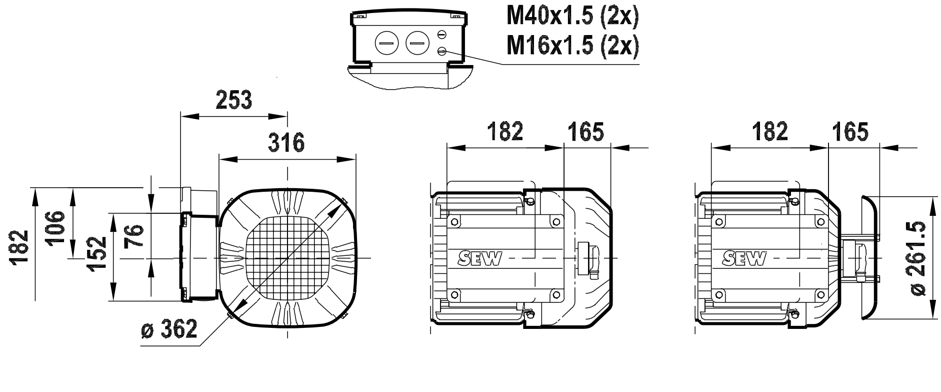

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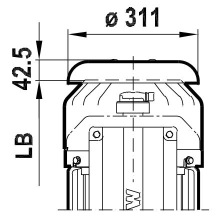

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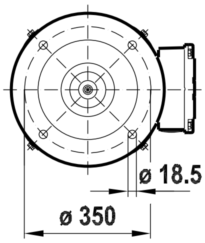

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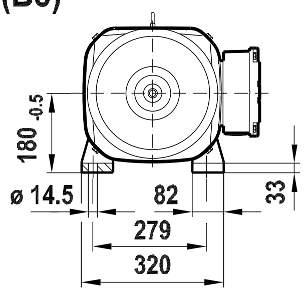

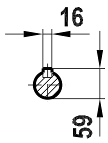

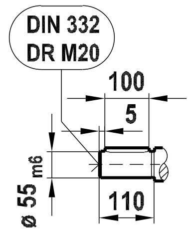

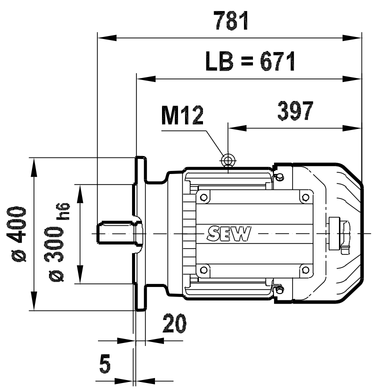

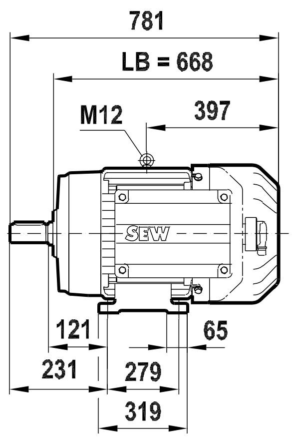

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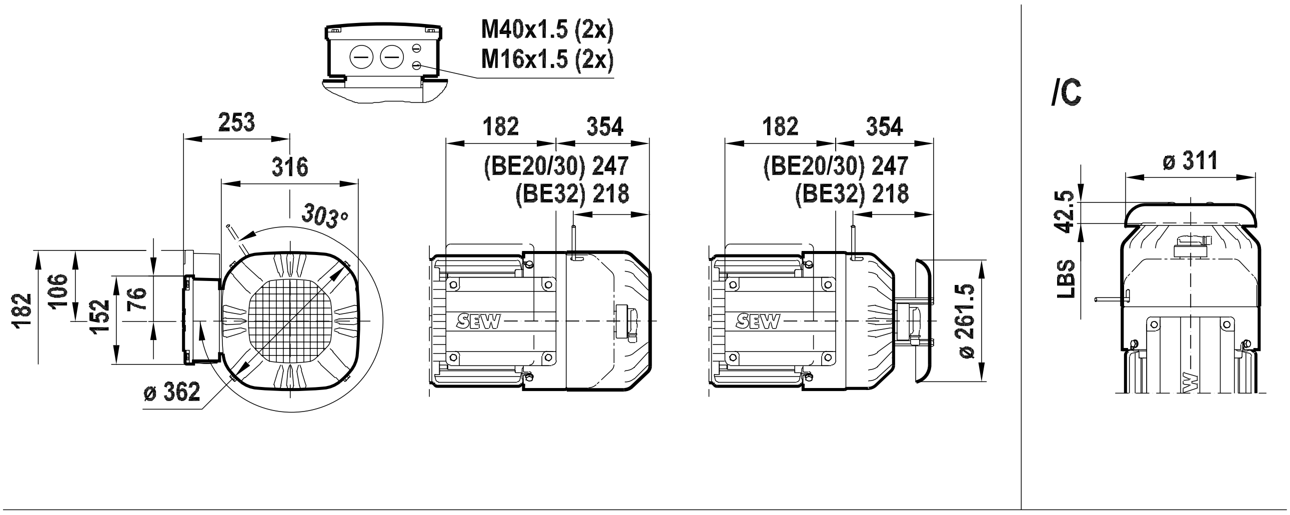

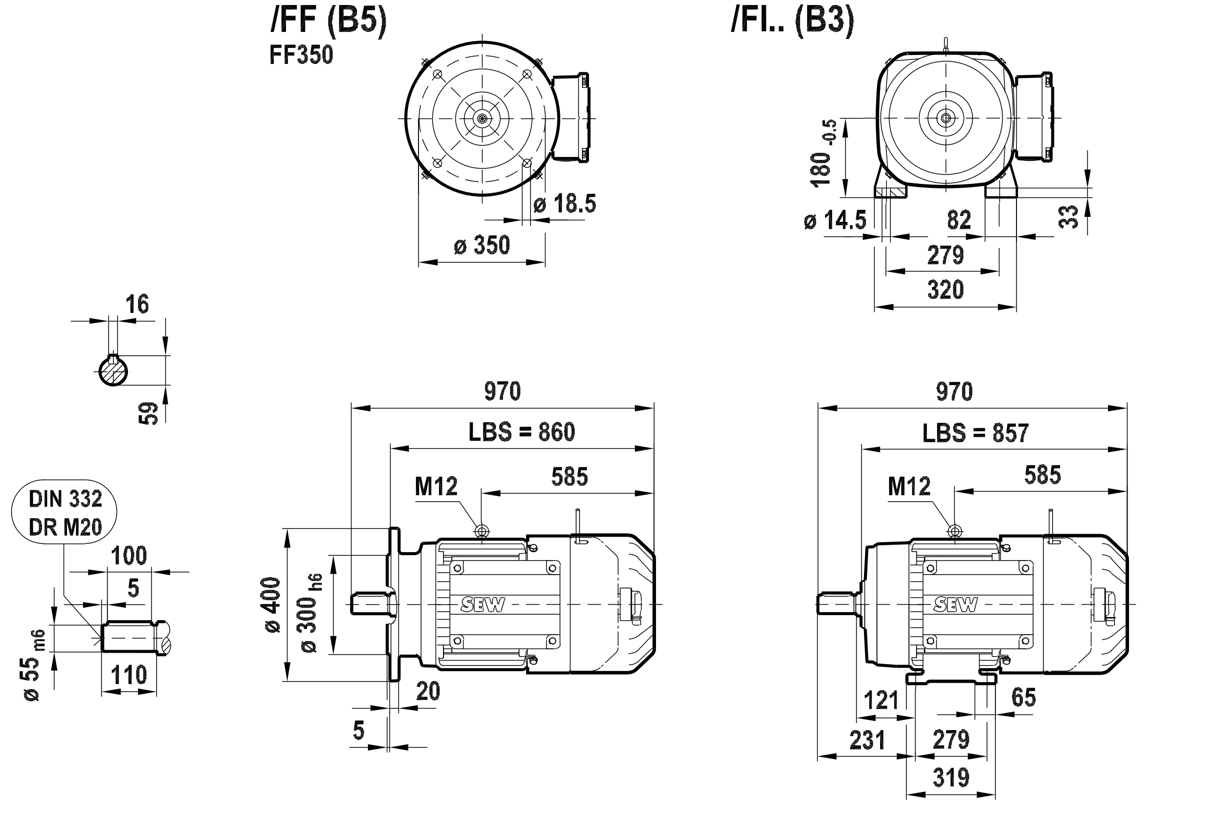

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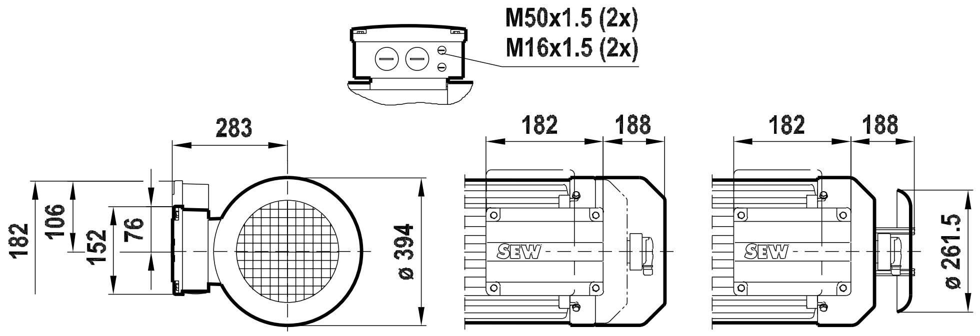

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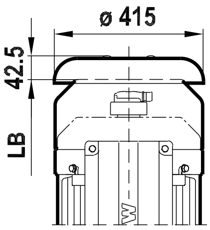

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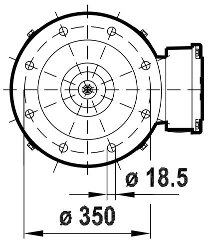

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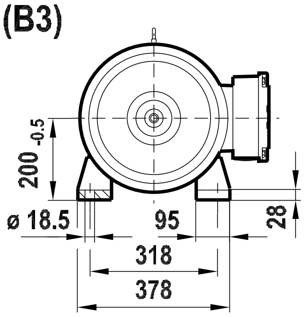

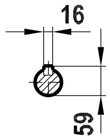

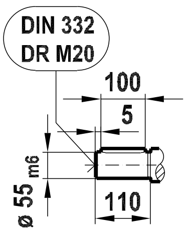

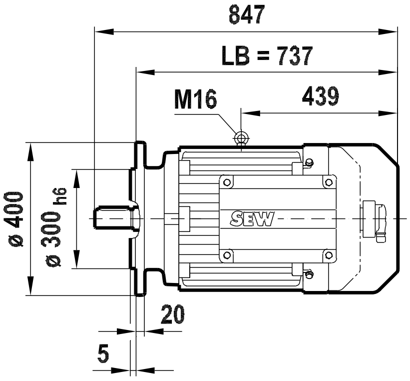

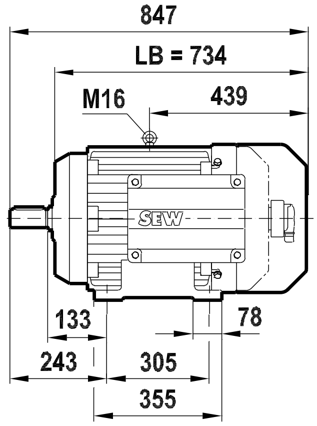

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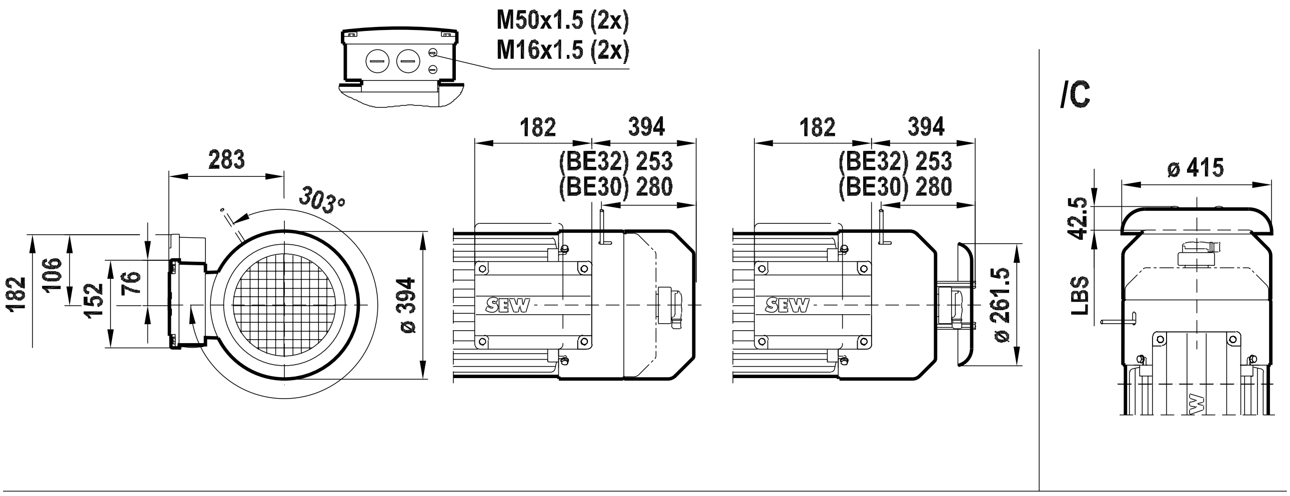

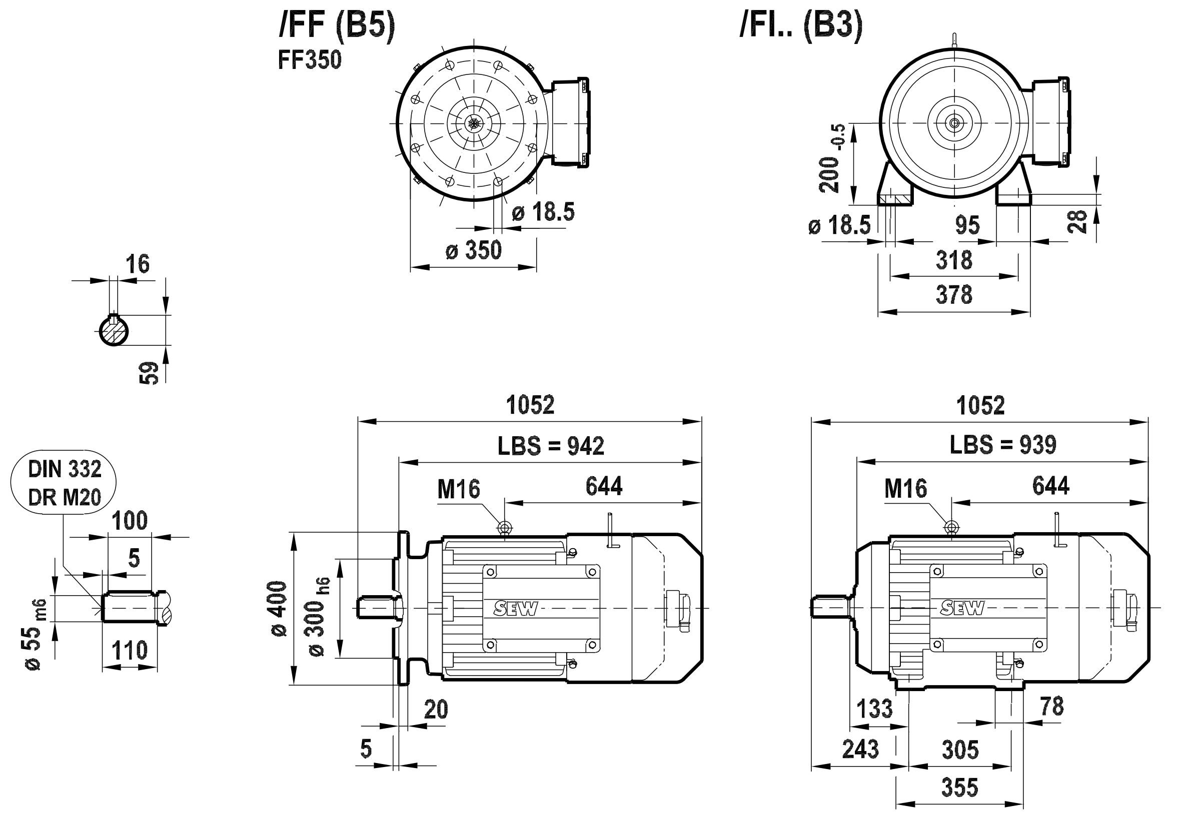

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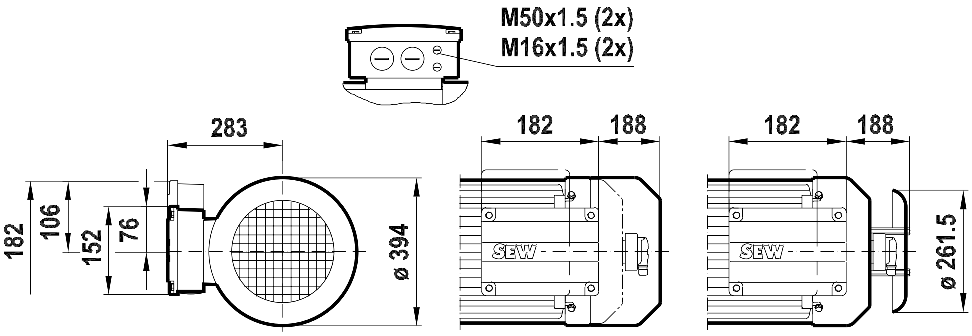

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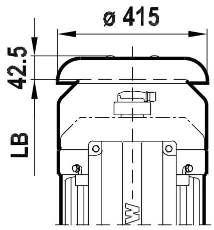

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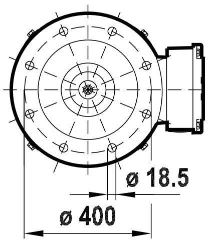

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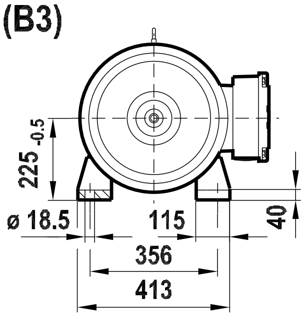

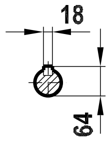

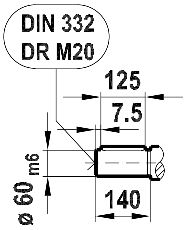

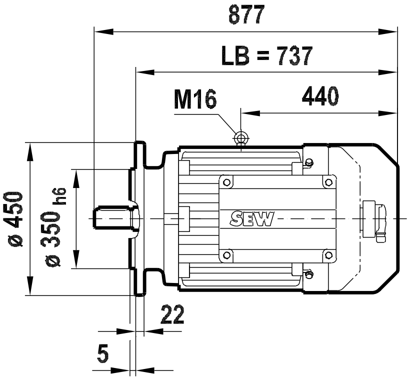

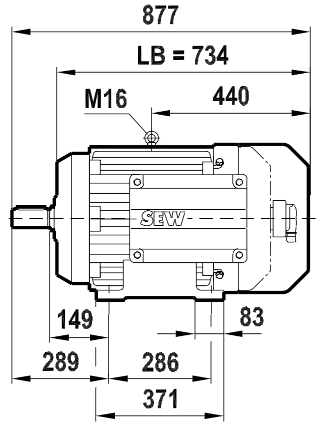

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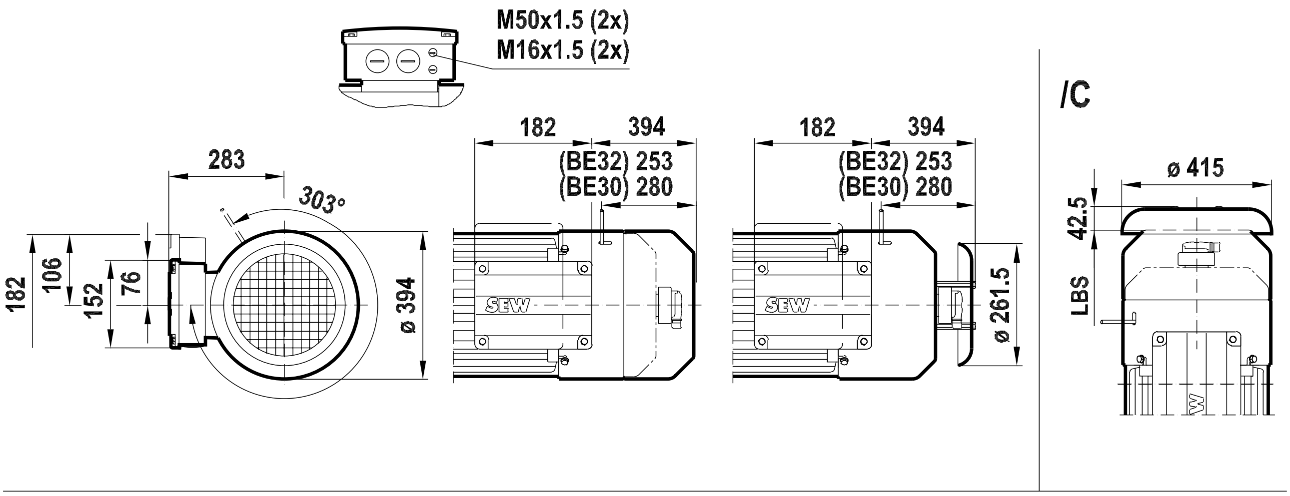

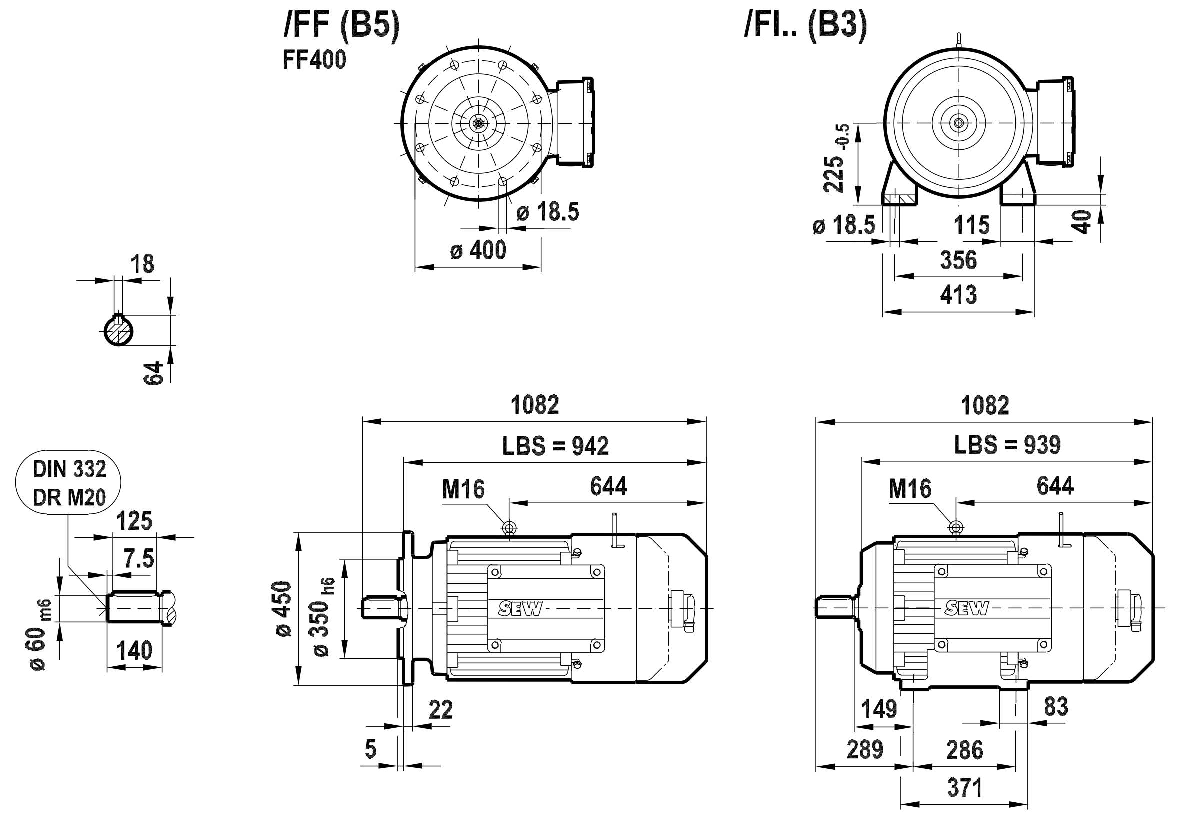

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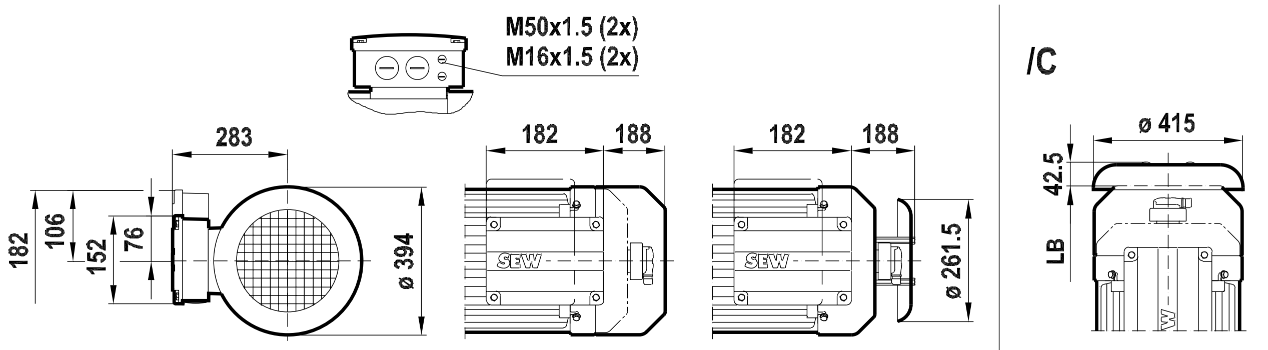

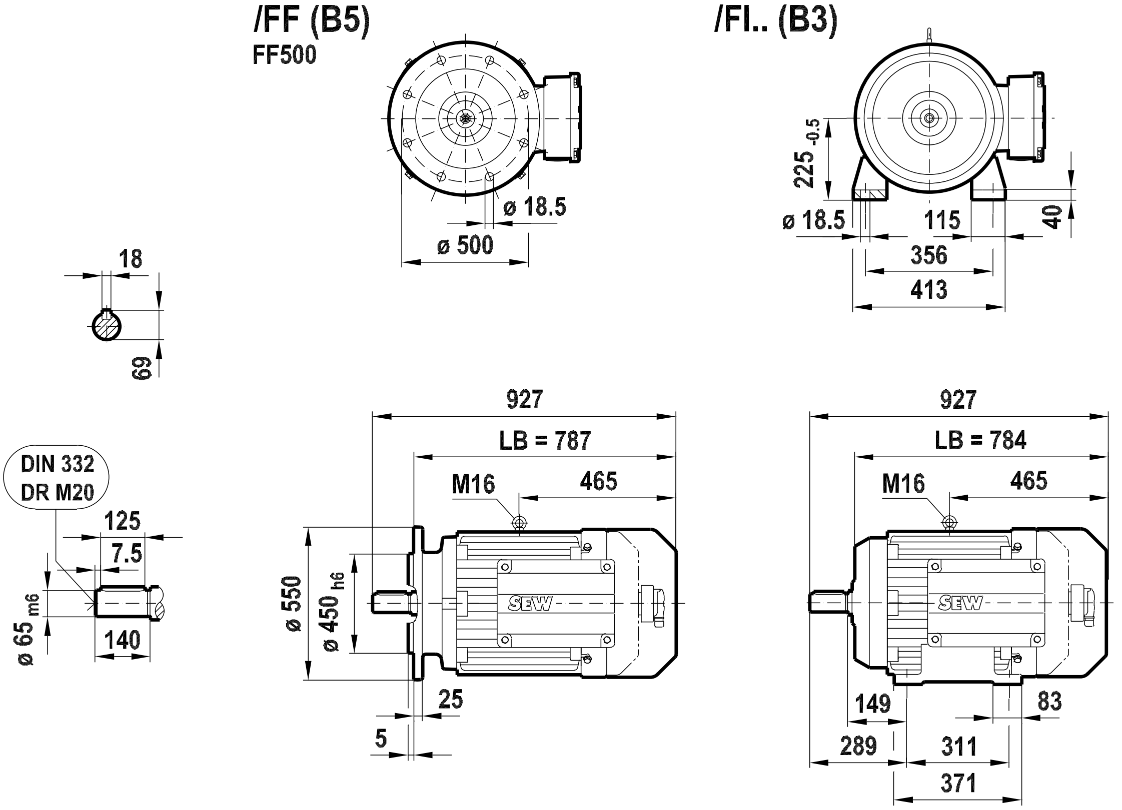

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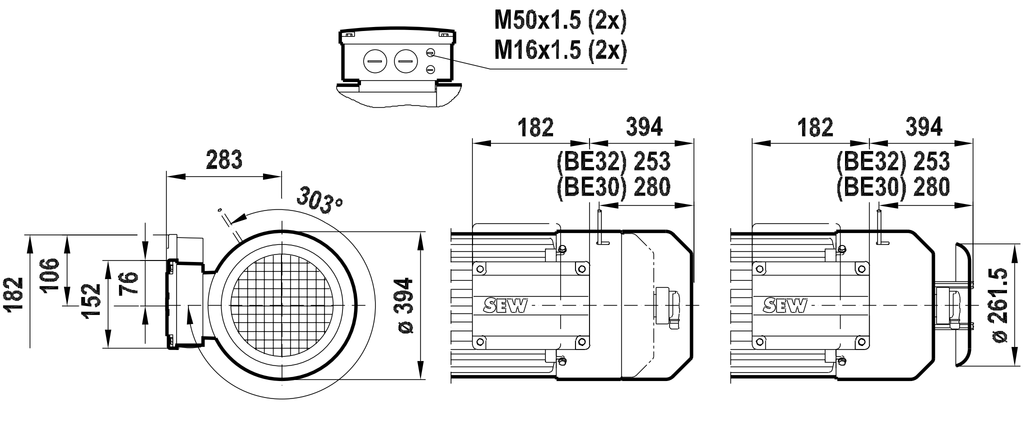

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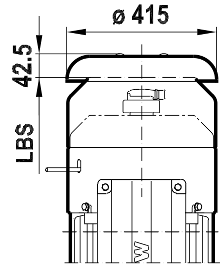

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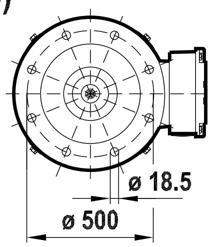

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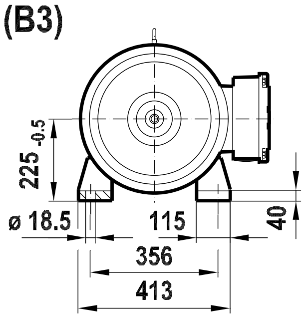

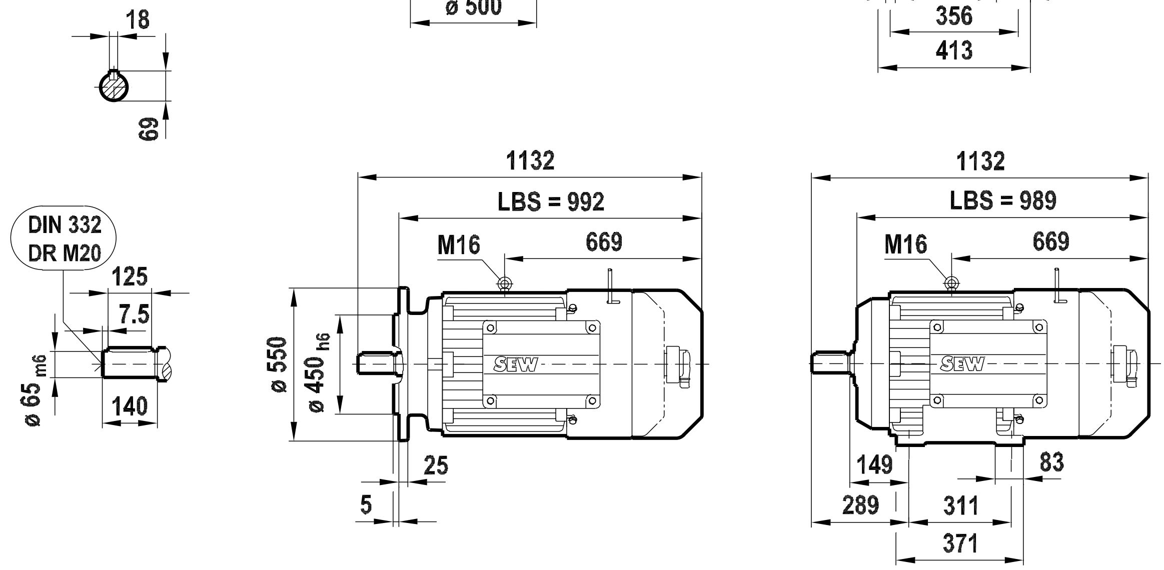

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8 BE brake

8.1 Description

8.1.1 General information

On request, SEW-EURODRIVE motors and gearmotors can be supplied with an integrated mechanical brake. The brake is a DC-operated electromagnetic disk brake that is released electrically and applied using spring force. The brake is applied in case of a power failure. It meets the basic safety requirements.

The brake can also be released mechanically if equipped with manual brake release. Two options are available for manual brake release:

1. With automatic manual brake release (..HR); a hand lever is supplied.
2. With lock-type manual brake release (..HF), a set screw is supplied.

The brake is actuated with a brake control that is either installed in the motor wiring space or in the control cabinet.

A main advantage of brakes from SEW-EURODRIVE is their very short design. The integrated construction of the SEW brakemotor permits particularly compact and sturdy solutions.

8.1.2 Description

The brake is installed on the B-side and integrated in the motor.

It is an electromagnetic, spring-loaded brake powered by energized DC voltage via a rectifier. It uses the two-coil system from SEW-EURODRIVE.

The new BE brake is designed as a modular system and a patent has been applied for. It is generally low-noise.

The principle of the modular brake on a friction disk begins from motor size DR.90. In the smaller DR.71 and DR.80 motors, the brake operates according to the principle of the BM(G) – i.e., "brake integrated" directly on the endshield.

The modular brake allows up to three brake sizes to be fitted to a single motor. The B-side endshield is to be regarded like a mounting flange, which accommodates the BE brake pre-mounted on a friction disk.

Although the integrated brake is mounted on a complete brake endshield, it can be dimensioned to suit specific requirements, just like the modular brake.

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8.2 Principles of the BE brake

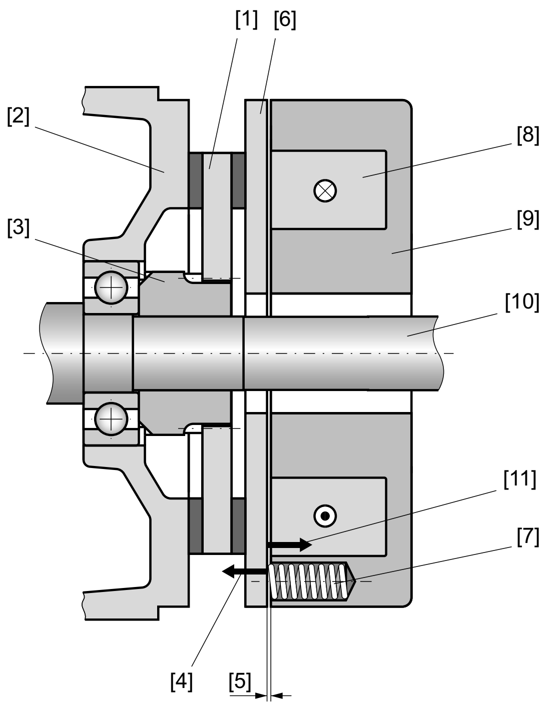
8.2.1 Basic design

The principal parts of the brake system are the brake coil itself [8] (BS accelerator coil + TS coil section = holding coil), comprising the magnet body [9] with an encapsulated winding and a tap, the moving pressure plate [6], the brake springs [7], the brake disk [1], and the brake endshield [2].

A characteristic feature of SEW brakes is their very short length. The integrated construction of the SEW brakemotor permits particularly compact and sturdy solutions.

8.2.2 Basic function

The pressure plate is forced against the brake disk by the brake springs when the electromagnet is de-energized. The motor is slowed down. The number and type of the 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 disc moves clear and the rotor can turn.



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[1] Brake disk	[7] Brake spring
[2] Brake endshield	[8] Brake coil
[3] Driver	[9] Magnet body
[4] Spring force	[10] Motor shaft
[5] Working air gap	[11] Electromagnetic force
[6] Pressure plate	

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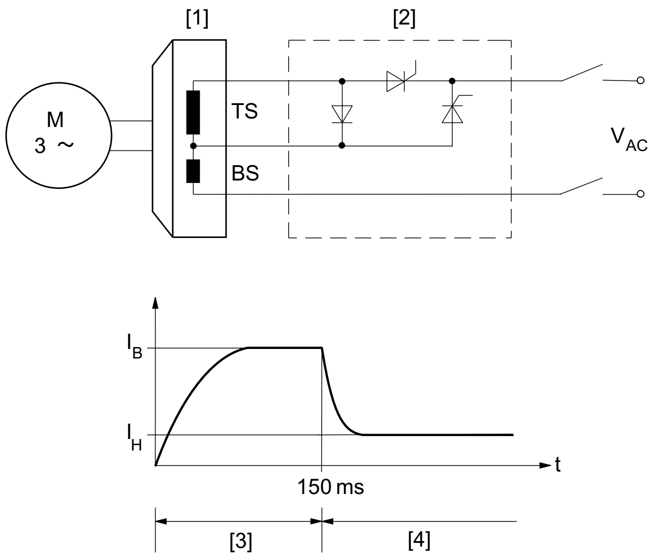
8.2.3 Particularly short response times at switch-on

In contrast to other disk brakes with a DC coil, the SEW brakes operate with a two-coil system. A special 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 disk moves clear very quickly, 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] Holding

I_B Acceleration current

I_H Holding current

BS + TS = holding coil

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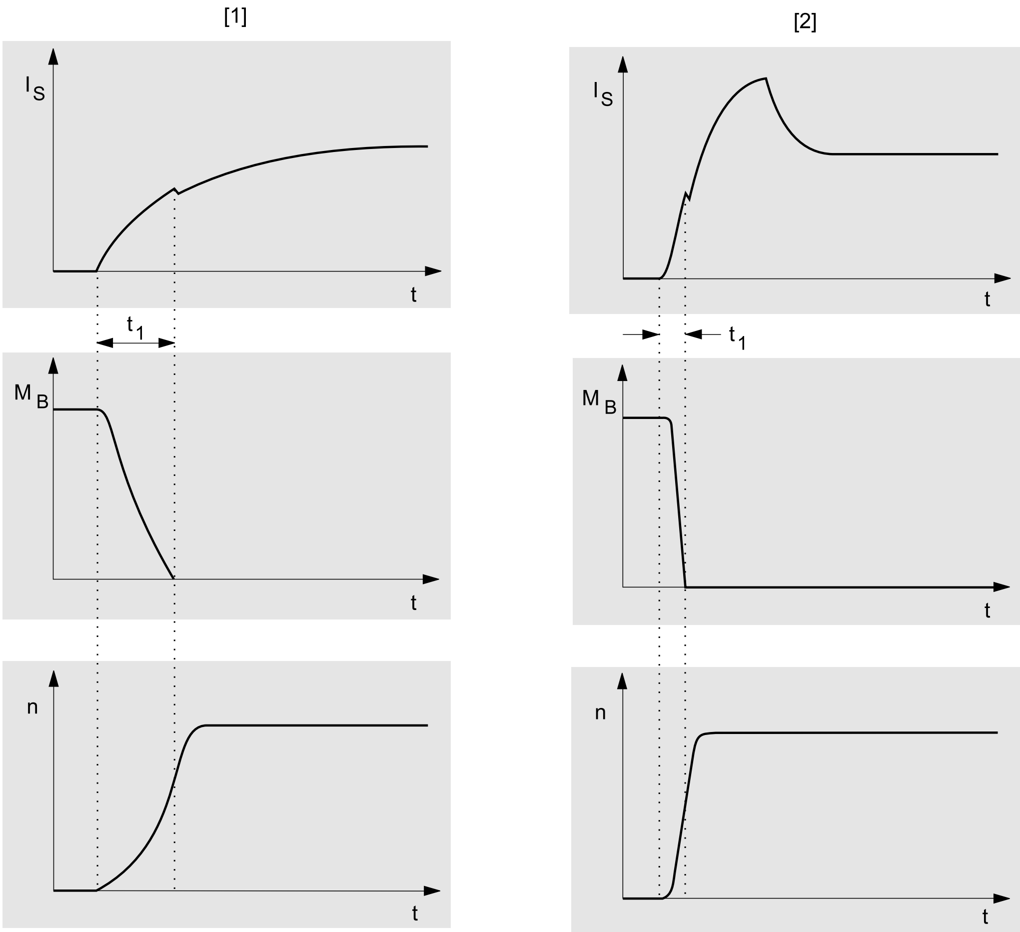
The particularly short response times of SEW brakes lead to faster motor startup time and minimal startup heating, which reduces energy consumption and brake wear during startup (see following figure). Benefits for the user: very high starting frequency and a long brake service life.



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[1] Switch-on procedure for operation with rectifier without switching electronics

[2] Switch-on procedure for operation with SEW rectifier with switching electronics, e.g., BGE (standard from size 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 SEW brake has released. The braking magnet is now only magnetized to such an extent (weak holding current) that the pressure plate is held open with a sufficient degree of safety and minimum brake heating.

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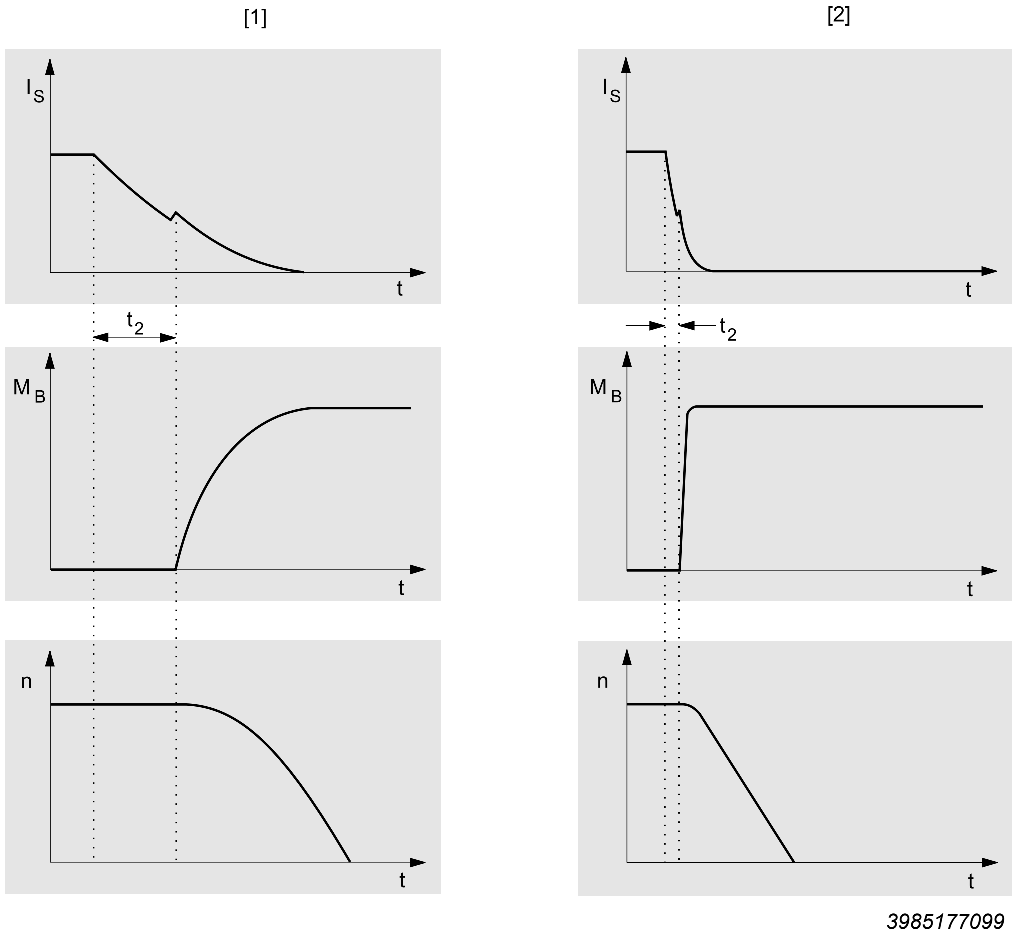
8.2.4 Particularly short response time at switch-off

A short response time means that de-excitation occurs very rapidly when the coil is switched off and the brake is applied with a very fast response time, particularly with large brakes. User benefits: very short braking distance with high repeat accuracy and a high degree of safety – e.g., for applications involving lifting drives.



[1] Brake response to cut-off in the AC circuit

[2] Brake response to cut-off in the AC and DC circuits

I_S Coil current

M_B Braking torque

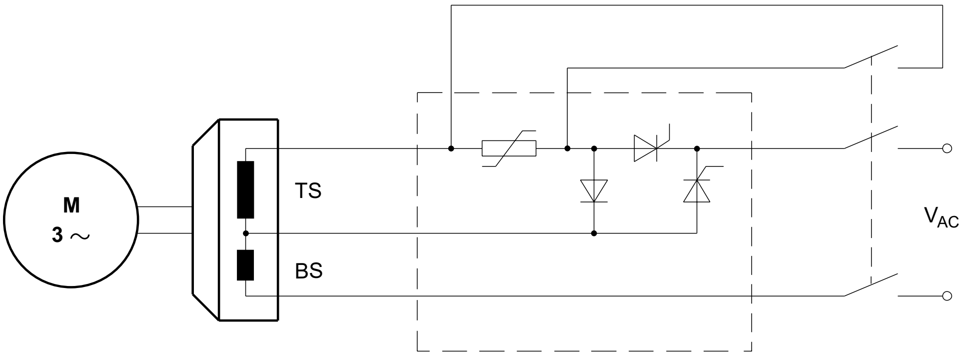
n Speed

t_2 Brake application time

The response time for the application of the brake also depends on how rapidly the energy stored in the brake coil is dissipated when the current supply is switched off. A freewheeling diode is used to dissipate the energy for a "cut-off in the AC circuit." The current decays according to an e-function.

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 significantly shorter. Conventionally, cut-off in the DC and AC circuits is implemented using an additional contact on the braking contactor (suitable for an inductive load).

Under certain conditions, you can also use SR and UR electronic relays for interrupting the DC circuit.



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8.2.5 Particularly quiet

Many applications in the power range up to approx. 5.5 kW (4-pole) require particularly quiet brakemotors to reduce noise pollution. SEW-EURODRIVE implements special design measures to meet these requirements as standard for all AC brakemotors without affecting the special dynamic features of the brake system.

8.2.6 Particularly safe

Tried and tested design components and brake controls tested in trial applications ensure that the SEW brake has a high degree of operational safety.

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8.3 The BE brake in detail

8.3.1 The add-on concept

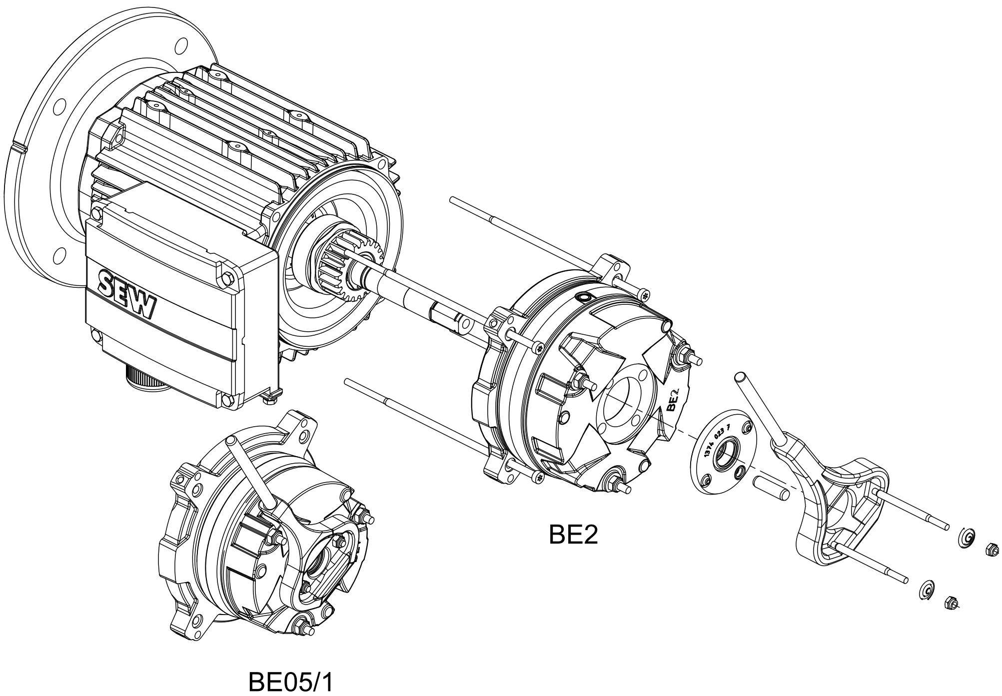
The BE.. brake is used for AC motors DR.71 – DR.315.

Main features of the brake:

- Various brake sizes can be mounted to each motor size
- Brake coil with tap
- Movable pressure plate
- Plug connector for simple electrical connection, starting at BE20
- The number of brake springs determines the braking torque
- Position of the manual brake release can be defined by the user

Integrated design

Integrated design of the brake for motor types up to size DR.80 means the B-side end-shield of the motor is an integral part of the brake with a friction surface.



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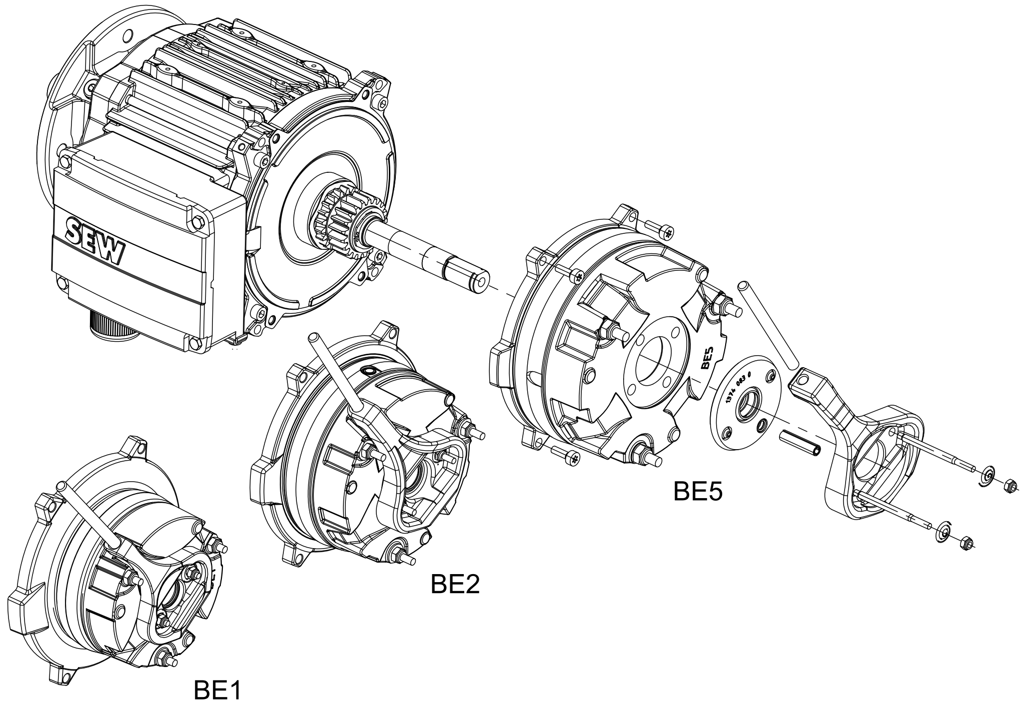
Modular design

The modular design of the brake for motor types from DR.90 means the brake has a separate friction disk. The complete bearing of the motor is maintained even when the brake is removed.



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8.3.2 Overview of brake/motor assignment

Depending on the demands placed on the brake, different brake mounting sizes are available for mounting to the respective motor.

Brake assignment

The below table shows the possible motor and BE brake assignments and possible braking torques:

Motor	Con-struc-tion	Brake	W_{insp} 10^6 J	Braking torque gradation in Nm											
				1.8	2.5	3.5	5.0	7.0	10	14	20	28	40	55	80
DR.71	Integra-ted	BE05	120	x	x	x	x								
		BE1	120				x	x	x						
DR.80		BE05	120	x	x	x	x								
		BE1	120				x	x	x						
		BE2	180				x	x	x	x	x				
DR.90	Modu-lar	BE1	120				x	x	x						
		BE2	180				x	x	x	x	x				
		BE5	390							x	x	x	x	x	
DR.100		BE2	180					x	x	x	x				
		BE5	390							x	x	x	x	x	
DR.112 DR. 132		BE5	390							x	x	x	x	x	
		BE11	640								x	x	x	x	x
DR.160		BE11	640								x	x	x	x	x
		BE20	1000										x	x	x
DR.180		BE20	1000										x	x	x

Motor	Con-struc-tion	Brake	W_{insp} 10^6 J	Braking torque gradation in Nm												
				100	110	150	200	300	400	500	600	800	1000	1200	1600	2000
DR.112 DR.132	Modular	BE11	640		x											
DR.160		BE11	640		x											
		BE20	1000		x	x	x									
DR.180		BE20	1000		x	x	x									
		BE30	1500	x		x	x	x								
		BE32	1500	x		x	x	x	x							
DR.200 DR.225		BE30	1500	x		x	x	x								
		BE32	1500	x		x	x	x	x	x	x					
		BE60	2500				x	x	x	x	x					
		BE62	2500						x		x	x				
DR.250 DR.280		BE60	2500				x	x	x	x	x					
		BE62	2500						x		x	x	x	x		
		BE120	390						x		x	x	x			
		BE122	300									x		x	x	
DR.315		BE120	390						x		x	x	x			
		BE122	300									x		x	x	x

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8.4 General information on brake configuration

8.4.1 Project planning procedure

The size of the brakemotor and its electrical connection must be selected carefully to ensure the longest possible service life.

The following aspects described in detail must be taken into account:

1. Selecting the brake/braking torque (→ 🗎 355).
2. Determining the brake voltage (→ 🗎 360).
3. Selecting the brake control and connection type (→ 🗎 360).
4. Dimensioning and routing of the cable (→ 🗎 369).
5. Selecting the braking contactor (→ 🗎 368).
6. Important design information (→ 🗎 374).
7. Motor protection switch (→ 🗎 371) if necessary (to protect the brake coil).
8. Diagnostic unit for brake monitoring (→ 🗎 522).

8.4.2 Selection criteria

Basic specification	Link/supplement/comment
Motor type	Brake type/brake control system
Braking torque [1)]	Brake springs
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**	Adjustment time (important for service)

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 brakemotor size selection and calculation of the braking data, refer to the documentation "Drive Engineering - Practical Implementation – Project Planning for Drives".

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8.5 Selecting the brake size and braking torque

The brake suitable for the relevant application is selected by means of the following main criteria:

- Required braking torque
- Required working capacity

8.5.1 Determining the required braking torque

Braking torque

The required braking torque is usually selected according to the required deceleration of the application. Depending on the application, this selection may be influenced by the following:

- Maximum permitted stopping distance
- Maximum permitted deceleration time
- Maximum permitted deceleration

The nominal braking torque values of the BE brakes have been determined and checked in accordance with DIN VDE 0580.

The "Brake assignment" table shows the possible braking torque gradation (→ 🗎 353).

As well as the braking distances and times, additional factors have to be considered to determine the actual distance and times until the application comes to a standstill (stopping distances):

- Brake response times

  Guide values can be specified (→ 🗎 388) for these times on the basis of the brake size and brake control.
- Reaction and signal transit times of the application

  These times are application-specific and must be given special consideration during project planning. If in doubt, please consult the manufacturer of your control components
- Braking torque fluctuations

  Due to the organic friction ring pads employed, the actual static holding torque or the dynamic braking torque is subject to natural fluctuations and can deviate from the nominal braking torque value depending on the ambient temperature, starting frequency, braking work done, and some other factors.

  The variation of the braking distance as a result of braking torque fluctuations has been set empirically at ± 12% of the nominal braking distance.

Braking torque in lifting applications

In the case of lifting applications and other uses with an additional static load, such as winding drives, the load torque must also be considered in addition to the selection criteria specified above.

With such applications, the selected braking torque must exceed the highest load torque (static load to be included) by at least a factor of 2 in order to ensure a reliable hold function.

If the brake is used as a pure holding brake (brake application only upon drive standstill), the minimum factor rises to 2.5 since the brake lining does not benefit from natural phases of regeneration resulting from regular dynamic braking.

INFORMATION

It is essential that the specified safety factors are taken into account during project planning, even if some application-specific standards would theoretically permit lower safety factors. Otherwise, SEW-EURODRIVE is unable to guarantee a reliable hold function.

INFORMATION

As a rule, applications with combined horizontal and vertical directions of movement (e.g., inclined conveyors or vehicles on an inclined surface) are to be treated as hoists during project planning. Please contact SEW-EURODRIVE if you are unable to explicitly classify the direction of movement of an application as vertical or horizontal.

8.5.2 Determining the required braking work

Working capacity

The working capacity of the brake is defined by the permitted braking work done W_1 per braking operation and the total permitted braking work W_{insp} until maintenance of the brake.

In general, the braking work per cycle/braking operation W_1 required for the application is initially calculated with the following formula:

$$W_1 = \frac{J_{tot} \times n^2 \times M_B}{182.4 \times (M_B \pm M_L)}$$

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W_1	= Braking work per braking operation in J
J_{tot}	= Total mass moment of inertia (related to the motor shaft) in kgm^2
n	= Motor speed in rpm
M_B	= Braking torque in Nm
M_L	= Load torque in Nm (observe the +/- character)
	+ : for vertical upward movement and horizontal movement
	- : for vertical downward movement

The permitted braking work per cycle/braking operation W_1 is specified in the chapter "Technical data of the BE brake" (→ 🗎 375). In the tables and diagrams contained in this chapter, W_1 is distinguished for different brake sizes and applications:

- Use as working brake (conventional line operation)
- Use as holding brake with emergency switching off capacity (usually controlled operation on frequency inverter).

Working brakes

In the case of working brakes, W_1 is specified on the basis of the starting frequency Z (braking operations per hour). No distinction between hoist and powertrain applications is required for working brakes.

W_1 values are specified for various line speeds of 2, 4, 6, and 8-pole drives in 50 Hz or 60 Hz supply systems. These can be found in the diagrams in the chapter "Permissible braking work of the BE brake for working brake operations" (→ 🗎 376).

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INFORMATION

As of a specific brake size, working brake operations from 2-pole line speeds can no longer be permitted. Please refer to the notes on the diagrams (→ 🗎 376) in this regard.

Holding brake with emergency switching off capacity

In the case of holding brakes with emergency switching off capacity, the brake is not used to stop the application during operation, but instead only switches when the drive is at a standstill or in the case of an emergency.

When selecting a brake, a distinction must be made between hoist and powertrain applications.

In the case of holding brakes with emergency braking operations, the same maximum values W_1 initially apply as for working brakes, whereby an hourly starting frequency of Z = 1 is assumed. Permissible values can thus be specified for the speeds 750 rpm, 900 rpm, 1200 rpm, 1500 rpm, 1800 rpm, 3000 rpm, and 3600 rpm.

The general rule applies that the diagram of the next highest speed level must be observed for any given speed.

Example:

For an actual speed of 2500 rpm, W_1 must be determined from the diagram for 3000 rpm.

INFORMATION

Calculation of intermediate values through interpolation is not permitted. However, if you should still require more accurate intermediate values, please consult SEW-EURODRIVE.

INFORMATION

The basic speed limit for emergency braking operations is 3600 rpm. As of a specific brake size (BE60 and larger), emergency braking operations from speeds over 1800 rpm can no longer be permitted. If higher speeds are required, please consult SEW--EURODRIVE.

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Increased emergency braking work for powertrain applications

For applications with purely horizontal direction of movement, such as in powertrain applications, higher levels of braking work can be permitted for emergency switching off under specific conditions. These conditions are as follows:

- Reduction of the nominal braking torque

  The selected nominal braking torque must be at least one stage below the maximum nominal braking torque of the brake size.

  Example:

  BE20 with M_{bmax} = 200 Nm, reduced to 150 Nm for powertrain with increased emergency braking work.

- Extension of braking distance

  During the braking operation, the effective dynamic braking torque can be reduced due to the heating of the brake lining. In extreme cases, the effective braking torque can be reduced to 60% of the nominal value. This must be taken into account when calculating the braking distance and braking time (extension by up to 70% in each case).

  Example:

  BE20 with M_{BNom} = 150 Nm, minimal effective torque is M_{BAct} = 90 Nm

- Increased wear of brake lining

  Due to the heating of the brake lining, the specific wear of the lining can increase significantly. In extreme cases, it can even increase by a factor of 100. This must be taken into account when determining the number of cycles until maintenance (refer to the following section).

INFORMATION

The amount of permitted braking work is dictated by the speed at which the braking operation is triggered. The lower the speed, the higher the permitted braking work.

If, during project planning, you have calculated braking work that exceeds the permitted limit values, you should first attempt to achieve a lower motor speed by changing the gear unit ratio. If you are still unable to ensure a reliable operating situation, you must either use a larger brake or reduce the travel velocity of the application.

Example:

BE20 with M_{BNom} = 150 Nm, required braking work W_1= 80 kJ at 2000 rpm. However, according to the table in the chapter "Permitted braking work of the BE brake in case of emergency switching off (→ 🗎 385)" only 65 kJ are permitted for BE20 at 2000 rpm. When the speed is reduced to 1600 rpm (by increasing the gear unit ratio by a factor of 1.25), the application becomes possible since 81 kJ are permitted at 1600 rpm.

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Determining the number of cycles until maintenance

Particularly in the case of working brakes, the maintenance intervals are usually directly dependent on the braking work done and the resulting wear of the brake linings.

To be able to approximate these intervals, the braking work until maintenance W_{insp} is specified for each brake size. This permitted braking work W_{insp} is specified in the overview table "At a glance" (→ 🗎 375).

Based on the previously calculated braking work per cycle W_1, the permitted number of braking operations until maintenance can be determined:

$$NB = \frac{W_{insp}}{W_1}$$

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NB	= Number of braking operations until maintenance
W_{insp}	= Total braking work until maintenance in J
W_1	= Braking work per braking operation in J

In principle, this calculation method also applies to holding brakes with emergency switching off capacity in hoist and powertrain applications. Here, this method can be used to determine the number of emergency braking operations until maintenance.

If the curves for increased powertrain work (→ 🗎 385) are applied for powertrain applications, the calculated number NB must be divided by 100 to take account of the increased wear in this case.

INFORMATION

In the case of holding brakes with emergency switching off capacity, the brake lining wear resulting from emergency braking operations is frequently not the decisive factor in the determination of maintenance intervals. This applies particularly to systems in which actual emergency braking operations are very rare. In such cases, please refer to the maintenance intervals in the drive operating instructions and consult SEW-EURODRIVE if necessary.

8.6 Selecting the brake voltage and brake control

Available brake voltages are specified in the chapter "Operating currents of the BE brakes" (→ 🗎 389).

The brake voltage should always be selected on the basis of the available AC supply voltage or motor operating voltage. This means the user is always guaranteed the most cost-effective installation for lower braking currents.

In the case of multi-voltage versions for which the line voltage has not been defined when the motor is purchased, the lower voltage must be selected in each case in order to achieve feasible connection conditions when the brake control is installed in the terminal box.

The standard brake voltages are listed in the following table:

Brake voltage		
Brakes	**BE05 – BE20**	**BE30 – BE122**
Voltage range	AC 220 – 242 V AC 380 – 420 V	
Nominal voltage	DC 24 V AC 230 V AC 400 V	- AC 230 V AC 400 V

For the global motors, an extended voltage range applies for the supply voltage of the brakes:

Brake voltage for global motors		
Brakes	**BE05 – BE20**	**BE30 – BE122**
Voltage range	AC 220 – 277 V AC 380 – 480 V	

Details on the motor voltages can be found in the chapter "Electrical characteristics" (→ 🗎 121).

Low potentials are often unavoidable for reasons of safety. However, they require a considerably greater investment in cables, switchgear, transformers, rectifiers, and overvoltage protection (e.g., for direct 24 V DC supply) than is the case for line voltage supply connections.

With the exception of BG and BMS, the maximum current flowing when the brake is released is 8.5 times the holding current. The voltage at the brake coil must not drop below 90% of the nominal voltage.

INFORMATION

An extended range applies for the permitted supply voltage of the global motor brakes.

If full use is made of this voltage range, the brake cannot be open (released) for long periods without cooling when the motor is stopped or operating at low speeds.

A forced cooling fan must be used if the motor is in use for more than 5 minutes at a speed of under 750 rpm.

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8.6.1 Modular brake controls for various applications

The modular concept for brakemotors permits a wide range of variations using electronic and mechanical options. The options include special voltages, mechanical manual brake release, special degrees of protection, plug connections, and special brake control systems.

Various brake controls are available for controlling disk brakes with a DC coil, depending on the requirements and the operating conditions. All brake controls are fitted as standard with varistors to protect against overvoltage.

The brake controls are either installed directly in the motor wiring space or in the control cabinet. For motors of thermal class 180 (H) and explosion-proof motors, the control system must be installed in the control cabinet.

High starting frequency

Brakemotors often demand a high starting frequency and significant external mass moments of inertia.

In addition to the basic thermal suitability of the motor, the brake needs to have a response time t_1 short enough to ensure that it is already released when the motor starts. At the same time, the acceleration required for the mass moment of inertia also has to be taken into account. Without the usual startup phase when the brake is still applied, the temperature and wear balance of the SEW brake permits a high starting frequency.

Brakes from BE5 are designed for a high starting frequency as standard.

The table below shows that, besides BGE (BME) and BSG, the brake control systems BSR, BUR, BMH, BMK, and BMP also have properties for shortening the response time in addition to their other functions.

Brake	High starting frequency	
	Brake control for AC connection	Brake control for 24 V DC connection
BE05	BGE (BSR, BUR) in terminal box or BME (BMH, BMP, BMK) in control cabinet	BSG in terminal box or BMV and BSG in control cabinet
BE1		
BE2		
BE5		
BE11		
BE20		
BE30		-
BE32		
BE60	BGE in terminal box or BME in control cabinet	
BE62		
BE120	BMP3.1	
BE122		

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High stopping accuracy

Positioning systems require high stopping accuracy.

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 braking distance variation of ±12%. The shorter the response times, the smaller the absolute value of the variation.

Cut-off in the DC and AC circuits makes it possible to shorten the brake application time t_2II considerably.

Cut-off in the DC and AC circuits is enabled by the following:

- A separate mechanical contact; see Brake control block diagrams (→ 🗎 399)
- BMP or BMK brake control with integrated voltage relay for control cabinet installation (→ 🗎 363)
- Wear-free electronic relays in the terminal box
  – Current relay (BSR) for motors with fixed speed (→ 🗎 365)
  – Voltage relay (BUR) for adjustable-speed motors (→ 🗎 366)

Relay retrofitting options suited to the motor and voltage are provided in the chapters "Installation in the control cabinet" and "Installation in the motor wiring space" (→ 🗎 363). The electronic relays can switch a maximum braking current of 1 A, thereby limiting the selection to BSR and BUR.

Low and fluctuating ambient temperatures

Brakemotors for low and fluctuating ambient temperatures are exposed to the dangers of condensation and icing. Functional limitations 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 (→ 🗎 410)).

BMH is available for motor sizes 71 – 225 and is only mounted in the control cabinet.

Increased ambient temperature or restricted ventilation

In addition to the basic considerations, increased ambient temperature, insufficient supply of cooling air, and/or thermal class 180 (H) are valid reasons for installing the brake control system in the control cabinet.

Only brake controls with electronic switching are used in order to ensure reliable switching at higher winding temperatures in the brake.

The use of BGE, BME, or BSG instead of BG, BMS, or 24 V DC direct connection is prescribed for brake sizes BE05 – BE2 in the special case represented by "electronic brake release when motor at standstill".

Special brakemotor designs for increased thermal loading have to be equipped with brake control systems in the control cabinet.

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8.6.2 Installation in control cabinet

The following table lists the technical data of brake controls for installation in the control cabinet and the assignments with regard to motor size and connection technology. The different housings have different colors (= color code) to make them easier to distinguish.

Motor sizes DR.71 – DR.315

Type	Function	Voltage	Holding current I_{Hmax} in A	Type	Part number	Color code
BMS	Without electronic switching	AC 230 – 575 V	1.0	BMS 1.4	8298300	Black
		AC 150 – 500 V	1.5	BMS 1.5	8258023	Black
		AC 42 – 150 V	3.0	BMS 3	8258031	Brown
BME	One-way rectifier with electronic switching	AC 230 – 575 V	1.0	BME 1.4	8298319	Red
		AC 150 – 500 V	1.5	BME 1.5	8257221	Red
		AC 42 – 150 V	3.0	BME 3	825723X	Blue
BMH	One-way rectifier with electronic switching and heating function	AC 230 – 575 V	1.0	BMH 1.4	8298343	Green
		AC 150 – 500 V	1.5	BMH 1.5	825818X	Green
		AC 42 – 150 V	3.0	BMH 3	8258198	Yellow
BMP	One-way rectifier with electronic switching, integrated voltage relay for cut-off in the DC circuit	AC 230 – 575 V	1.0	BMP 1.4	8298327	White
		AC 150 – 500 V	1.5	BMP 1.5	8256853	White
		AC 42 – 150 V	3.0	BMP 3	8265666	Light blue
BMP 3.1	One-way rectifier with electronic switching, integrated voltage relay for cut-off in the DC circuit.	AC 230 – 575 V	2.8	BMP 3.1	8295077	-
BMK	One-way rectifier with electronic switching, 24 V DC control input, and cut-off in the DC circuit	AC 230 – 575 V	1.0	BMK 1.4	8298335	Water blue
		AC 150 – 500 V	1.5	BMK 1.5	8264635	Water blue
		AC 42 – 150 V	3.0	BMK 3	8265674	Bright red
BMV	Brake control unit with electronic switching, 24 V DC control input, and fast cut-off	DC 24 V	5.0	BMV 5	13000063	White

Type	Design	Standard terminal box	IS integrated plug connector	IV industrial plug connector[1)] (AC.., AS.., AM.., AB.., AK.., AD..)
BMS	BMS 1.4 BMS 1.5 BMS 3	71 – 100 / BE2	71 – 100 / BE2	71 – 100 / BE2
BME	BME 1.4 BME 1.5 BME 3	71 – 225 / BE32 250, 280 /BE60/62	71 – 132 / BE11	71 – 225 / BE32
BMP	BMP 1.4 BMP 1.5 BMP 3 BMP 3.1	71 – 225 / BE32 250, 280 / BE60/62	71 – 132 / BE11	71 – 225 / BE32
BMK	BMK 1.4 BMK 1.5 BMK 3	71 – 225 / BE32	71 – 132 / BE11	71 – 225 / BE32
BMH	BMH 1.4 BMH 1.5 BMH 3	71 – 225 / BE32	71 – 132 / BE11	71 – 225 / BE32
BMV	BMV 5	71 – 180 / BE20	71 – 132 / BE11	71 – 180 / BE20

1) Observe the permitted amperage of the relevant plug connector

8.6.3 Installation in motor wiring space

The following table lists the technical data of brake control systems for installation in the motor wiring space and the assignments with regard to motor size and connection technology. The different housings have different colors (= color code) to make them easier to distinguish.

Motor sizes DR.71 – DR.315

Type	Function	Voltage	Holding current I_{Hmax} in A	Type	Part number	Color code
BG[1]	Without electronic switching	AC 230 – 575 V	1.0	BG 1.4	8278814	Black
		AC 150 – 500 V	1.5	BG 1.5	8253846	Black
		AC 24 – 150 V	3.0	BG 3	8253862	Brown
BGE	One-way rectifier with electronic switching	AC 230 – 575 V	1.0	BGE 1.4	8278822	Red
		AC 150 – 500 V	1.5	BGE 1.5	8253854	Red
		AC 42 – 150 V	3.0	BGE 3	8253870	Blue
BS[1]	Terminal block with varistor protection circuit	DC 24 V	5.0	BS24	8267634	Water blue
BSG	Brake control unit with electronic switching	DC 24 V	5.0	BSG	8254591	White
BMP 3.1	One-way rectifier with electronic switching, integrated voltage relay for cut-off in the DC circuit.	AC 230 – 575 V	2.8	BMP 3.1	8295077	-

1) BE05 – BE2 only

Type	Design	Standard terminal box	IS integrated plug connector	IV industrial plug connector[1] (AC.., AS.., AM.., AB.., AK.., AD..)
BG	BG1.4 BG1.5 BG3	71 – 100 / BE2	71 – 100 / BE2	71 – 100 / BE2
BGE	BGE1.4 BGE1.5 BGE3	71 – 280 / BE62	71 – 132 / BE11	71 – 225 / BE32
BS	BS24	71 – 100 / BE2	71 – 100 / BE2	71 – 100 / BE2
BSG	BSG	71 – 180 / BE20	71 – 132 / BE11	71 – 180 / BE20

1) Observe the permitted amperage of the relevant plug connector

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8.6.4 Installation in the wiring space of the motor with additional switching relay BSR, BUR

BSR brake control

The BSR brake control combines the BGE control unit with an electrical SR current relay. In combination with a current relay, the BGE is supplied with voltage directly from the motor terminal board, meaning that no special incoming cable is required.

When the motor is disconnected, the motor current is interrupted practically instantaneously and is used for cut-off in the DC circuit of the brake coil via the SR current relay. This feature results in particularly fast brake application despite the remanence voltage at the motor terminal board and in the brake control system.

The brake voltage is defined automatically on the basis of the motor phase voltage without further customer data (e.g. motor 230 V/400 V, brake 230 V). As an option, the brake coil can also be configured for the line-to-line voltage (e.g. motor 400 V, brake 400 V).

The current relay and brake rectifier are allocated depending on the specified motor and brake voltages when ordering.

The following table shows the allocation of SR current relays to the nominal motor current I_N in ⅄ connection and the maximum holding current of the brake I_{Hmax}.

$I_{Hmax} = I_H \times 1.3\ A_{Ac}$

Motor assignment	Current relay	Nominal motor current I_N in A in ⅄ connection	Max. holding current of the brake I_{Hmax} in A
DR.71 – 132	SR10	0.075 – 0.6	1
	SR11	0.6 – 10	1
	SR15	10 – 50	1
DR.160 – 225	SR15	10 – 30	1
	SR19	30 – 90	1

Type	Function	Voltage	Holding current I_{Hmax} in A	Type	Part number	Color code
BSR	One-way rectifier with current relay for cut-off in the DC circuit	AC 150 – 500 V	1.0	BGE 1.5 + SR 10	8253854 0826760X	Red -
			1.0	BGE 1.5 + SR 11	8253854 8267618	Red -
			1.0	BGE 1.5 + SR 15	8253854 8267626	Red -
			1.0	BGE 1.5 + SR 19	8253854 8262462	Red -
		AC 42 – 150 V	1.0	BGE 3 + SR10	8253870 0826760X	Blue -
			1.0	BGE 3 + SR11	8253870 8267618	Blue -
			1.0	BGE 3 + SR15	8253870 8267626	Blue -
			1.0	BGE 3 + SR19	8253870 8262462	Blue -

Type	Design	Standard terminal box	IS integrated plug connector	IV industrial plug connector[1)] (AC.., AS.., AM.., AB.., AK.., AD..)
BSR	BGE1.5 + SR10 BGE1.5 + SR11 BGE1.5 + SR15 BGE1.5 + SR19 BGE3 + SR10 BGE3 + SR11 BGE3 + SR15 BGE3 + SR19	71 – 225 / BE62	71 – 132 / BE11	71 – 225 / BE32

1) Observe the permitted amperage of the relevant plug connector

BUR brake control

The BUR brake control system combines the BGE control unit with an electronic UR voltage relay. In this case, the BGE control unit has a separate voltage supply because there is no constant voltage at the motor terminal board (pole-changing motors, motors operated on a frequency inverter) and because the remanence voltage of the motor (single-speed motor) would cause a delay in the brake application time.

With cut-off in the AC circuit, the UR voltage relay triggers cut-off in the DC circuit of the brake coil almost instantaneously and the brake is applied especially quickly.

The brake voltage is defined automatically on the basis of the motor phase voltage without further customer data. Optionally, other brake voltages can be defined in accordance with the following table.

Brakes	BUR (BGE + UR..) for brake control (AC V)											
	79 -123	124 -138	139 -193	194 -217	218 -243	244 -273	274 -306	307 -343	344 -379	380 -431	432 -484	485 -542
BE05	UR11	UR11	UR15	UR15	UR15	UR15	UR15	UR15	UR15	UR15	UR15	UR15
BE1	UR11	UR11	UR15	UR15	UR15	UR15	UR15	UR15	UR15	UR15	UR15	UR15
BE2	UR11	UR11	UR15	UR15	UR15	UR15	UR15	UR15	UR15	UR15	UR15	UR15
BE5	Not possible	UR11	UR15	UR15	UR15	UR15	UR15	UR15	UR15	UR15	UR15	UR15
BE11	Not possible	Not possible	Not possible	Not possible	UR15	UR15	UR15	UR15	UR15	UR15	UR15	UR15
BE20	Not possible	Not possible	Not possible	Not possible	UR15	UR15	UR15	UR15	UR15	UR15	UR15	UR15
BE30	Not possible	Not possible	Not possible	Not possible	Not possible	Not possible	UR15	UR15	UR15	UR15	UR15	UR15
BE32	Not possible	Not possible	Not possible	Not possible	Not possible	Not possible	UR15	UR15	UR15	UR15	UR15	UR15

UR15 UR11 Not possible

Type	Function	Voltage	Holding current I_{Hmax} in A	Type	Part number	Color code
BUR	Half-wave rectifier and voltage relay for cut-off in the DC circuit	AC 150 – 500 V	1.0	BGE 1.5 + UR 15	8253854 8267596	red -
		AC 42 – 150 V	1.0	BGE 3 + UR 11	8253870 8267588	blue -

Type	Design	Standard connection box	IS integrated plug connector	Industrial plug connector IV[1)](AC.., AS.., AM.., AB.., AK.., AD..)
BUR	BGE1.5 + UR15 BGE3 + UR11	71 – 225 / BE32	71 – 132 / BE11	71 – 225 / BE32

1) Note the permitted current strength of the relevant plug connector

8.6.5 Brake voltage supply via motor terminal board

The supply voltage for brakes with an AC connection is either supplied separately or taken from the supply system of the motor in the wiring space. Only motors with a fixed speed can be supplied by the motor supply voltage. The supply voltage for the brake must be supplied separately with multi-speed motors and for operation with a frequency inverter.

Furthermore, bear in mind that the brake response is delayed by the residual voltage of the motor if the brake is powered with motor supply voltage. The brake application time t_2I for cut-off in the AC circuit, (→ 🗎 388) specified in the brake's technical data, applies to a separate supply only.

Direct voltage supply to the brake from the motor terminal board or from the KCC terminal strip is only possible with constant speed motors.

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.

INFORMATION

In variable-speed motors, the brake voltage must not be picked up at the motor terminal board because the voltage there is not constant.

8.6.6 Parallel operation of several brakes with one controller

Brakes must be switched at the same time in multi-motor operation. The brakes must also be applied together when a fault occurs in one brake.

Simultaneous switching can be achieved by connecting any particular group of brakes in parallel to one brake control.

When several brakes are connected in parallel to the same brake rectifier, the total of all the operating currents must not exceed the rated current of the brake control.

INFORMATION

If a fault occurs in one brake, all brakes must be cut-off in the AC circuit.

8.7 Selection of voltage supply line and protection devices

8.7.1 Selecting the braking contactor

In view of the high current loading and the DC voltage to be switched at inductive load, the switchgear for the brake voltage and cut-off in the DC circuit either has to be a special DC contactor or an adapted AC contactor with contacts in utilization category AC 3 to EN 60947-4-1.

It is simple to select the braking contactor for line operation:

- For the standard voltages AC 230 V or AC 400 V, a power contactor with a rated power of 2.2 kW or 4 kW for AC-3 operation is selected.
- The contactor is configured for DC-3 operation with DC 24 V.

When applications require cut-off in the DC and AC circuits for the brake, it is a good idea to install SEW switchgear to perform this task.

Control cabinet installation

The brake rectifiers BMP (→ 🗎 407), BMV (→ 🗎 411) and BMK (→ 🗎 411) which perform (→ 🗎 363) the cut-off in the DC circuit internally, have been specially designed for this purpose.

Terminal box installation

The current and voltage relays SR1x (→ 🗎 365) and UR1x (→ 🗎 366), which are mounted directly on the motor, perform the same task.

Advantages compared to switch contacts:

- Special contactors with four AC-3 contacts are not required.
- 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 operate without any wear at all.
- Customers do not have to perform any additional wiring. 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.
- Two additional conductors between the motor and control cabinet are no longer required.
- No additional interference emission from contact bounce when the brake is cut-off in the DC circuit.

Semi-conductor relay

Semi-conductor relays with RC protection circuits are not suitable for switching brake rectifiers with the exception of BG and BMS.

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8.7.2 Dimensioning and routing of the cable

Select the cross section of the brake cable according to the currents in your application. Note the inrush current of the brake when selecting the cross section. When taking the voltage drop into account due to the inrush current, the value must not drop below 90 % of the rated voltage. The tables "BE brake – operating currents" (→ 🗎 389) provide information on the possible supply voltages and the resulting operating currents.

Refer to the tables below as a quick source of information for selecting the size of the cable cross sections with regard to the acceleration currents for cable lengths ≤ 50 m.

BE05 – BE122

Brakes	Minimum cable cross section of the brake cables in mm² (AWG) for cable lengths ≤ 50 meters and brake voltage (AC V)					
	24	60 DC 24 V	120	184 - 208	230	254 - 575
BE05	10 (8)					
BE1						
BE2		2.5 (12)		1.5 (16)		
BE5	1)	4 (10)				
BE11		10 (8)	2.5 (12)			
BE20						
BE30 / 32						
BE120/122						

1) Not available

BE60 / 62, BR03

Brakes	Minimum cable cross section of the brake cables in mm² (AWG) for cable lengths ≤ 50 meters and brake voltage (AC V)							
	42	48	56 DC 24 V	110	125-153	175-200	208-230	254-500
BR03				1.5 (16)				
BE60 / 62				1)			2.5 (14)	

1) Not available

Values in brackets = AWG (American Wire Gauge)

Wire 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.

Provide for a suitable equipotential bonding between drive and control cabinet.

In particular, power cables with phased currents include:

- Output cables from frequency inverters and servo inverters, soft-start units and brake units
- Supply cables to braking resistors.

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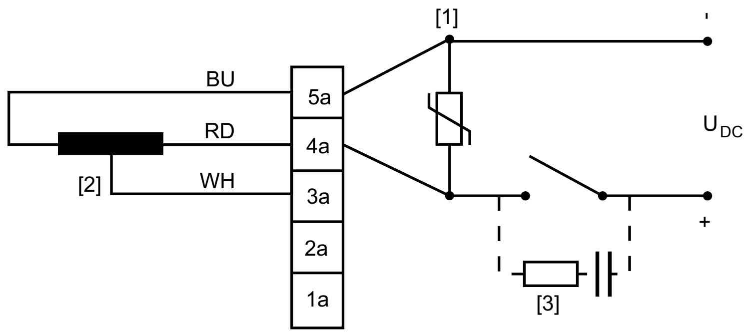
8.7.3 Varistor overvoltage protection with direct DC voltage supply

The brakes of sizes BE05 to BE2 can be operated with direct DC voltage without brake control, see technical data in chapter "BE brake – operating currents" (→ 🗎 389).

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. This must be connected in parallel to the coil according to the diagram displayed below.

The following figure shows a varistor for protecting the brake coil.



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[1]	Varistor	WH	white
[2]	Brake coil	RD	red
[3]	RC element	BU	blue

Example of a suitable varistor: SIOV-S10 K300, manufacturer EPCOS (varistor for 300 V).

INFORMATION

Please note:

The use of 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.

Only use switch contacts which are suitable for switching inductive loads to DC voltages! See chapter "Selection of braking contactor" (→ 🗎 368).

Special case: Brakes with DC 24 V supply

SEW-EURODRIVE always recommends the use of a BMV brake control for brakes with DC 24 V supply.

The BMV 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.

If the brake is not connected via a BMV brake control, then a varistor overvoltage protection is necessary as shown in the example above, although in the special case of a DC 24 V power supply, a varistor for a lower voltage should be used, e.g. SIOV-S10 K35, manufactured by EPCOS (varistor for 35 V).

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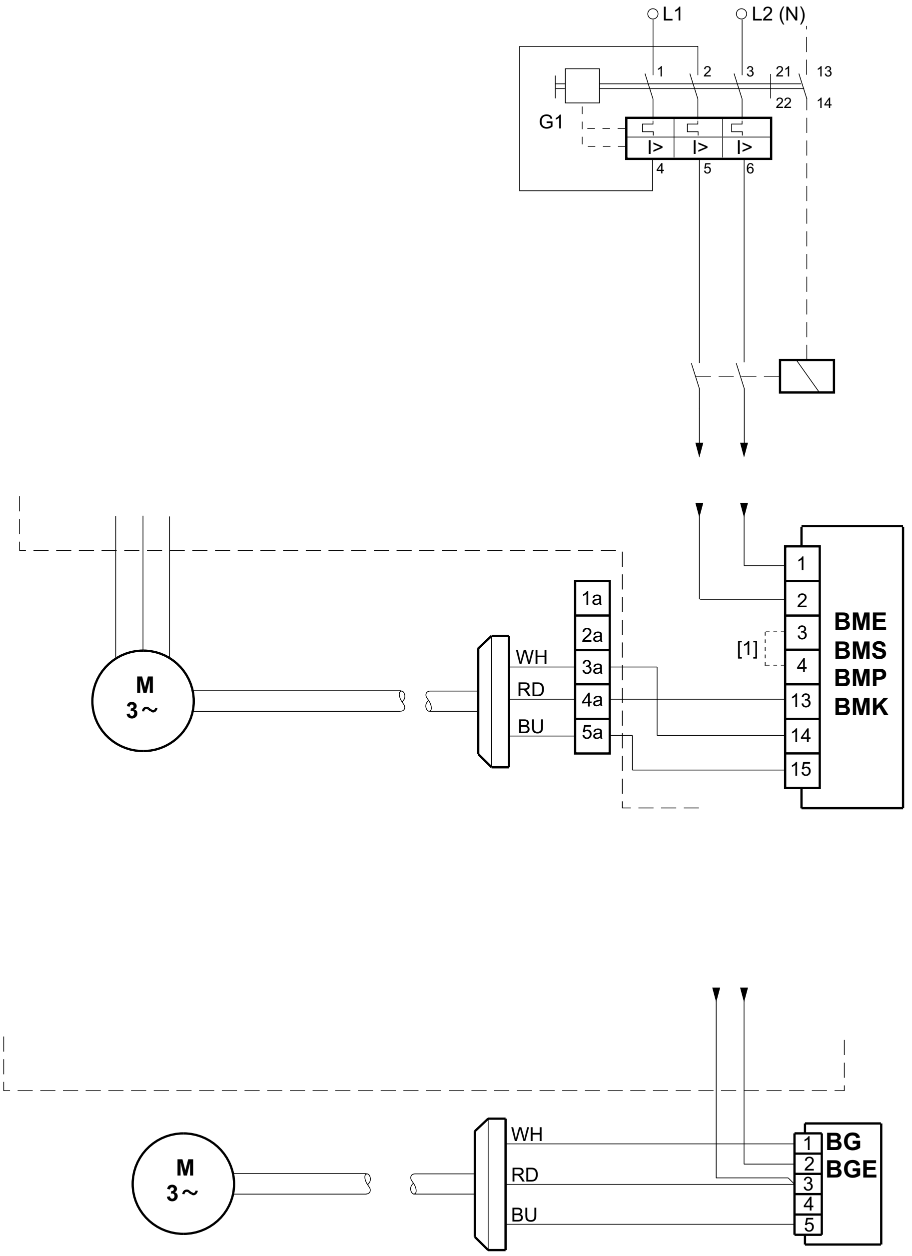
8.7.4 Motor overload circuit breaker

Motor protection switches such as ABB type M25-TM are suitable as protection against short circuits for the brake rectifier and as thermal protection for the brake coil.

Select or set the motor protection switch to 1.1 x I_H (I_H = brake holding current, r.m.s. value). For more information regarding holding current, refer to the "Installation in motor wiring space" (→ 🗎 363)section.

Motor protection switches are suitable for all brake rectifiers in the control cabinet (important: except for the BMH heating function) and in the terminal box with separate voltage supply.

Advantage: Motor protection switches prevent the brake coil from being destroyed when a fault occurs in the brake rectifier or the brake coil is connected incorrectly.



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[1] Customers must connect terminals 3 and 4 according to the relevant wiring diagram.

Key:

WH	white
RD	red
BU	blue

8.8 Brakes for global motors

The global motor brakes have an extended range of permitted supply voltage.

If full use is made of this voltage range, the brake cannot be open for long periods (released) without cooling when the motor is stopped or operating at low speeds.

A forced cooling fan must be used if the motor is in use for more than 5 minutes at a speed of under 750 rpm.

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8.9 Important design information

8.9.1 EMC (Electromagnetic compatibility)

SEW AC brakemotors comply with the relevant EMC generic standards when operated in accordance with their designated use in continuous duty connected to mains power.

Additional instructions in the frequency inverter documentation must also be taken into account for operation with frequency inverters.

The instructions on laying cables (→ 🗎 369) must always be adhered to.

8.9.2 Connection type

The electrical design team and, in particular the installation and startup personnel, must be given detailed information on the connection type and the intended brake function.

Maintaining certain brake application times may 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 passed on clearly and unambiguously to the people undertaking the work. The brake application times t_2I specified in the data summary (→ 🗎 388) for cut-off in the AC circuit only apply if there is a separate voltage supply. The times are longer if the brake is connected to the terminal board of the motor.

BG and BGE are always supplied wired up for cut-off in the AC circuit in the terminal box. The blue wire from the brake coil must be moved from terminal 5 of the rectifier to terminal 4 for cut-off in the AC and DC circuits. An additional contactor (or SR / UR) must also be connected between terminals 4 and 5.

8.9.3 Determining maintenance intervals

The time to maintenance is determined on the basis of the expected brake wear. This value is important for setting up the maintenance schedule for the machine to be used by the customer’s service personnel (machine documentation).

8.9.4 Important measuring principles

The following points must be observed during service measurements on the brakes:

The values for DC voltage specified in the data sheets only apply if brakes are supplied with DC voltage from an external source without an SEW brake control.

Due to the fact that the freewheeling arm only extends over the coil section, the DC voltage that can be measured during operation with the SEW-EURODRIVE brake control is 10% – 20% lower than the normal one-way rectification when the freewheeling arm extends over the entire coil.

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8.10 BE brake technical data

This section contains all the necessary technical data for project planning and operation.

- Braking work
  - until service (see following table)
  - for working brake actions (→ 🗎 376)
  - for emergency stop braking operations (→ 🗎 385)
- Cycle times (→ 🗎 388)
- Braking torque (see following table)
- Operating currents (→ 🗎 389)
- Resistance brake coils (→ 🗎 394)
- Brake control block diagrams (→ 🗎 399)
- Information about safety-rated brakes (→ 🗎 415)

8.10.1 At a glance: braking work, working air gap, braking torque, brake spring

The braking torque is determined depending on the nominal motor torque and corresponds approximately to double the nominal motor torque unless specified otherwise in the order.

Brakes	Braking work until maintenance	Working air gap		Brake disk	Part number damping plate	Braking torque settings					
		mm		mm		Brake torque	Type and number of			Purchase order number for Brake springs	
	10^6 J	min.[1]	max.	min.		Nm (lb-in)	Normal	blue	white	Normal	Blue/white
BE05	120	0.25	0.6	9.0	13740563	5.0 (44) 3.5 (31) 2.5 (22) 1.8 (16)	3 – – –	4 6 3 –	– – – –	0135017X	13741373
BE1	120	0.25	0.6	9.0	13740563	10 (88.5) 7.0 (62) 5.0 (44)	63 4 –	– 2 –	– – –	0135017X	13741373
BE2	180	0.25	0.6	9.0	13740199	20 (177) 14 (124) 10 (88.5) 7.0 (62) 5.0 (44)	6 2 2 – –	– 4 2 4 3	– – – – –	13740245	13740520
BE5	390	0.25	0.9	9.0	13740695	55 (487) 40 (354) 28 (248)	6 2 2	– 4 2	– – –	13740709	13740717
						20 (177) 14 (124)	– –	– –	6 4		13747738
BE11	640	0.3	1.2	10.0	13741713	110 (974) 80 (708) 55 (487) 40 (354)	6 2 2 –	– 4 2 4	– – – –	13741837	13741845
					13741713 + 13746995	28 (248)	–	3	–		
						20 (177)	–	–	4	13741837	13747789
BE20	1000	0.3	1.2	10.0	–	200 (1770) 150 (1328) 110 (974) 80 (708) 55 (487)	6 4 3 3 –	– 2 3 – 4	– – – – –	13743228	13742485
					13746758	40 (354)	–	3	–		

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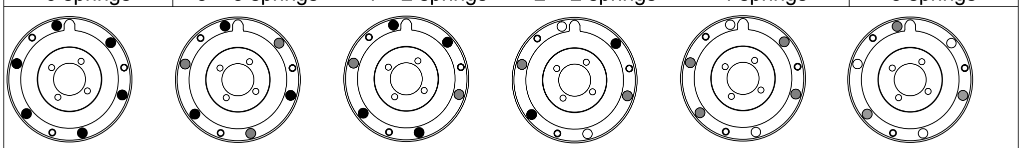
Brakes	Braking work until maintenance	Working air gap		Brake disk	Part number damping plate	Braking torque settings					
		mm		mm		Brake torque	Type and number of			Purchase order number for Brake springs	
	10^6 J	min.[1)]	max.	min.		Nm (lb-in)	Normal	blue	white	Normal	Blue/white
BE30	1500	0.3	1.2	10.0	–	300 (2655) 200 (1770) 150 (1328) 100 (885) 75 (667)	8 4 4 – –	– 4 – 8 6	– – – – –	01874551	13744356
BE32	1500	0.4	1.2	10.0	–	600 (5310) 500 (4425) 400 (3540) 300 (2655) 200 (1770) 150 (1328)	8 6 4 4 – –	– 2 4 – 8 6	– – – – – –	01874551	13744356
					13746731	100 (885)	–	4	–		
BE60	2500	0.3	1.2	1.2	–	600 (5310) 500 (4425) 400 (3540) 300 (2655) 200 (1770)	8 6 4 4 -	- 2 4 - 8	- - - - -	01868381	13745204
BE62	2500	0.4	1.2	1.2	–	1200 (10621) 1000 (8851) 800 (7081) 600 (5310) 400 (3540)	8 6 4 4 -	- 2 4 - 8	- - - - -	01868381	13745204
BE120	390	0.6	1.2	12.0	–	1000 (8851) 800 (7081) 600 (5310) 400 (3540)	8 6 4 4	- 2 4 -	- - - -	13608770	13608312
BE122	300	0.8	1.2	12.0	–	2000 (17701) 1600 (14161) 1200 (10621) 800 (7081)	8 6 4 4	- 2 4 -	- - - -	13608770	13608312

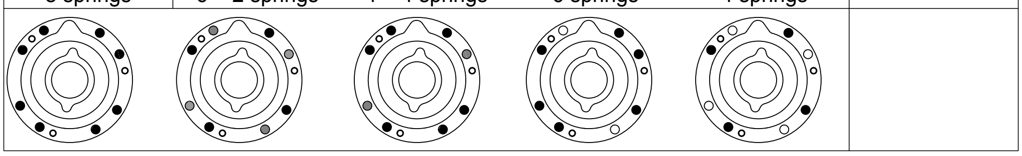
1) When checking the working air gap, note: Parallelism tolerances on the brake disk may give rise to deviations of ±0.15 mm after a test run.

The following table shows the brake spring layout:

BE05 – BE20:					
6 springs	3 + 3 springs	4 + 2 springs	2 + 2 springs	4 springs	3 springs



BE30 – BE122:					
8 springs	6 + 2 springs	4 + 4 springs	6 springs	4 springs	



8.10.2 Permissible braking work of the BE brake for working brake actions

If you are using a brake motor, you have to check whether the brake is approved for use with the required starting frequency "Z". The following diagrams show the permitted braking work W_1 per braking operation for different brakes and rated speeds. The values are given with reference to the required starting frequency "Z" in cycles/hour (1/h).

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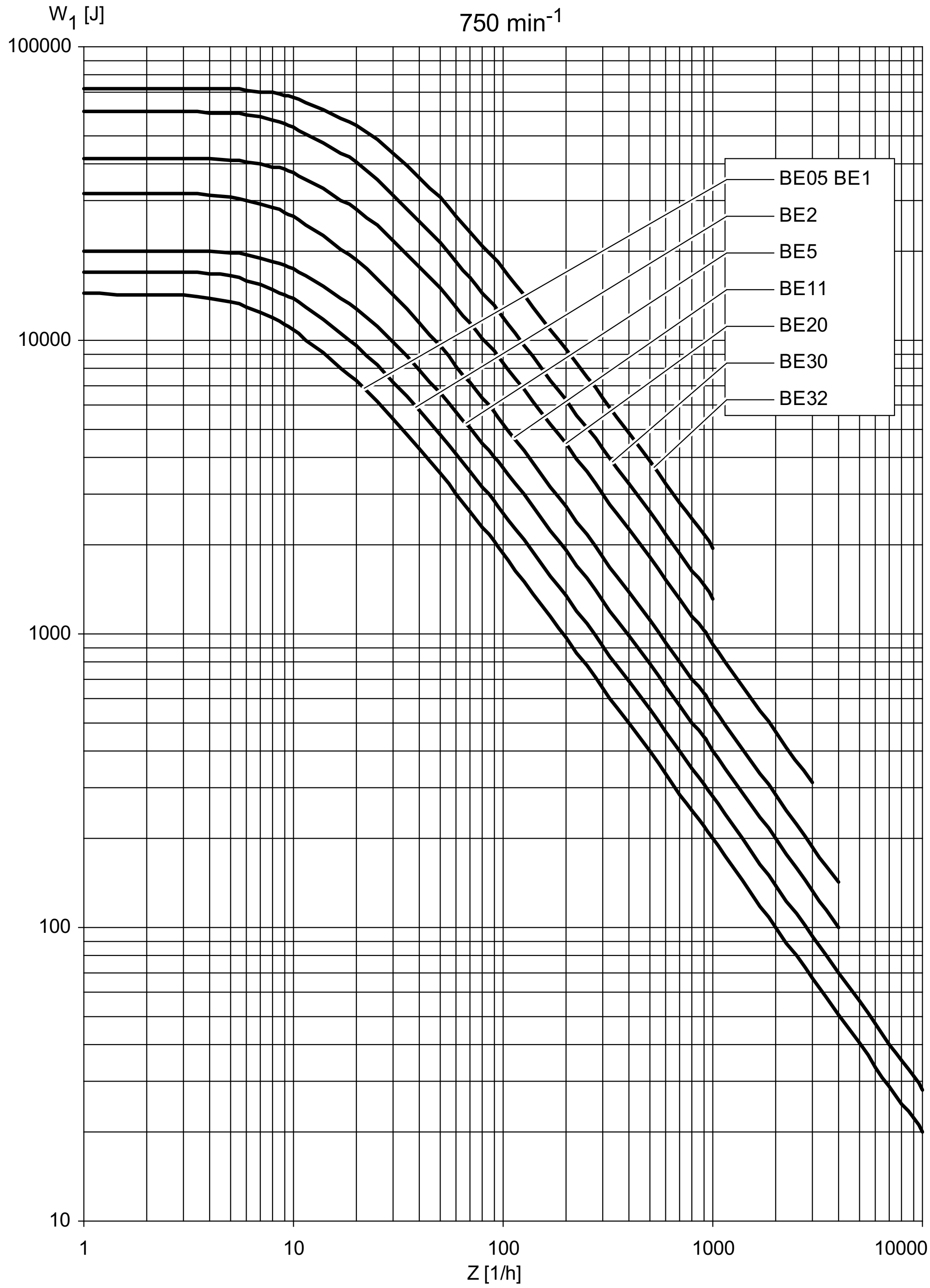
BE05, BE1, BE2, BE5, BE11, BE20, BE30, BE32



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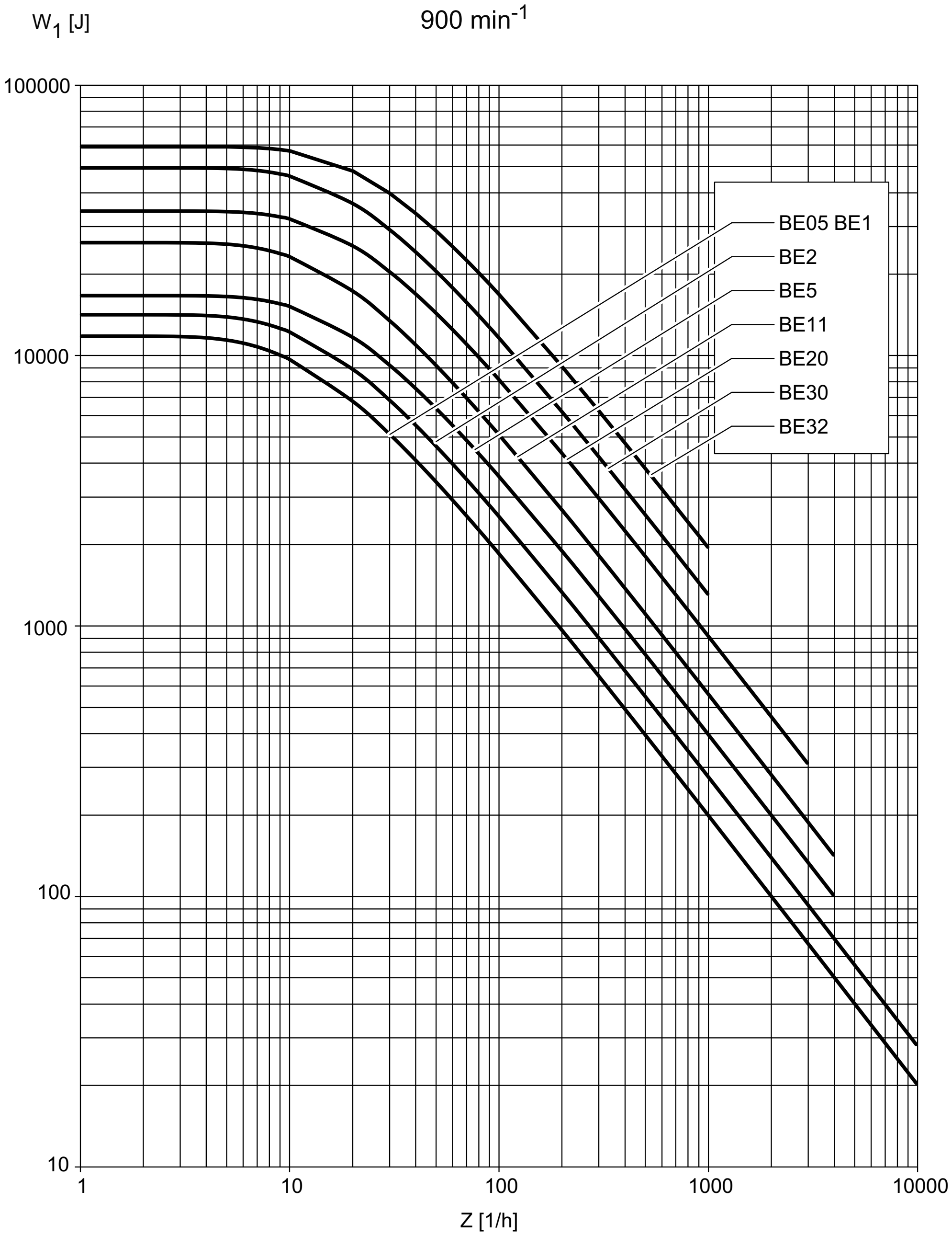
BE05, BE1, BE2, BE5, BE11, BE20, BE30, BE32



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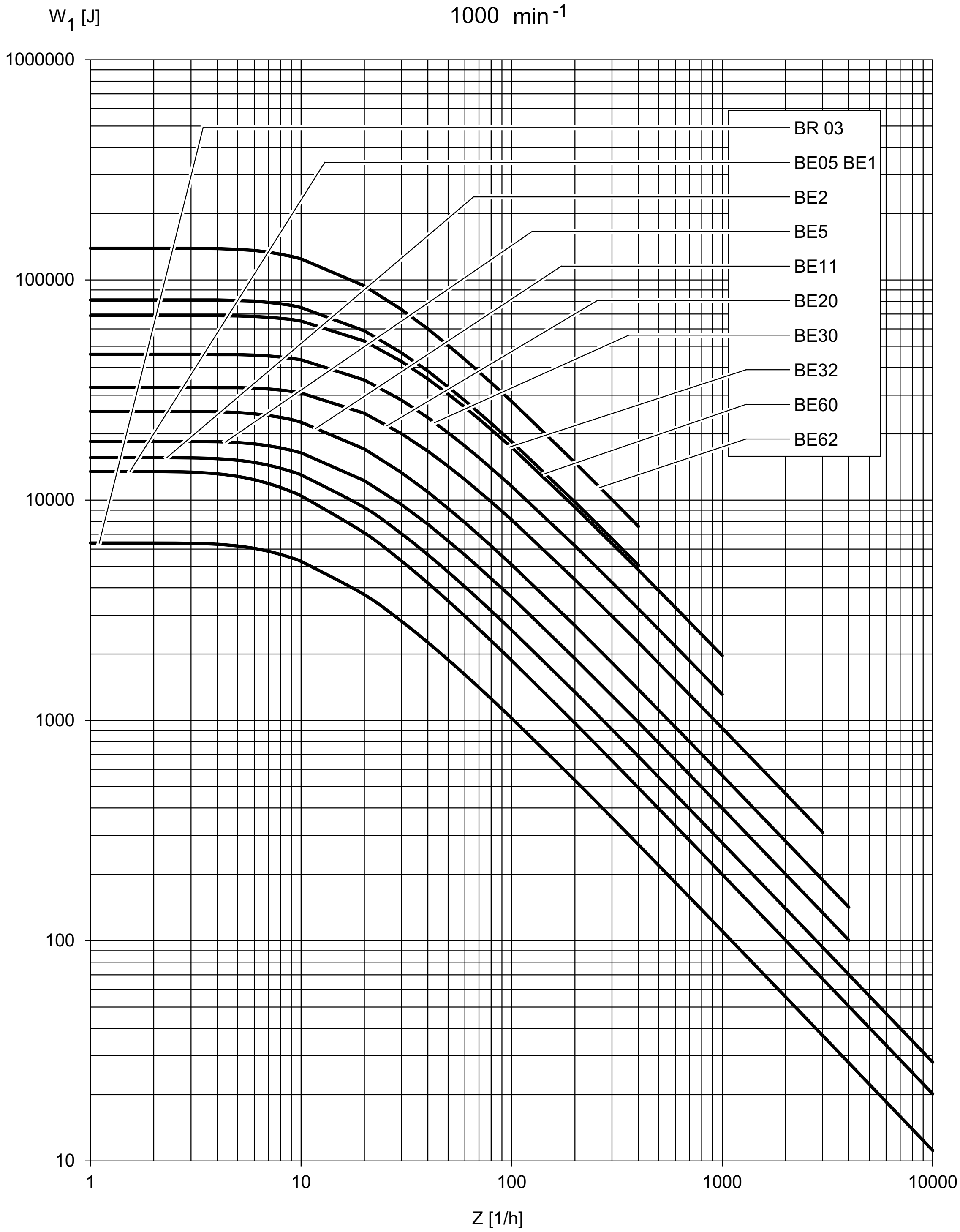
BE05, BE1, BE2, BE5, BE11, BE20, BE30, BE32, BE60, BE62



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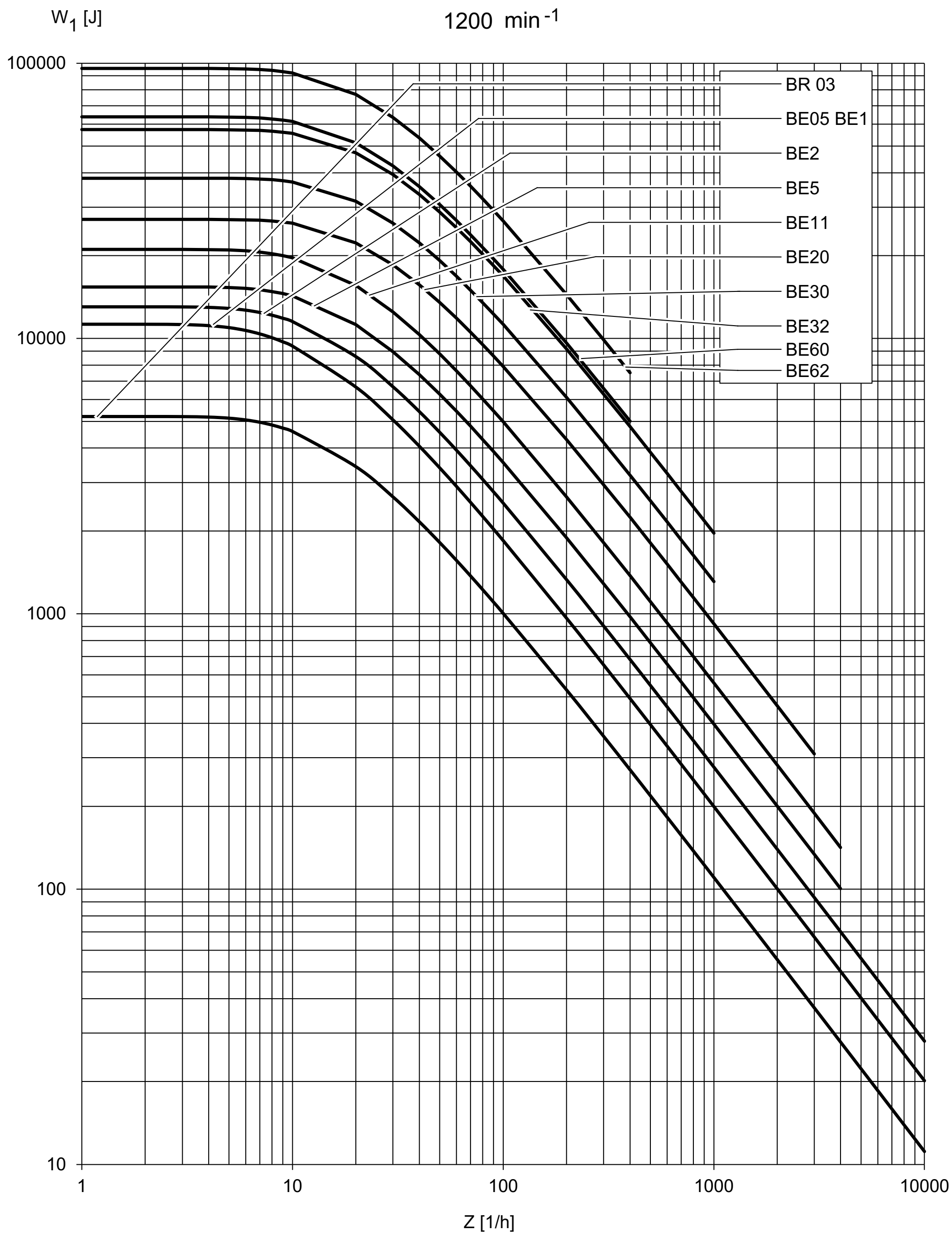
BE05, BE1, BE2, BE5, BE11, BE20, BE30, BE32, BE60, BE62



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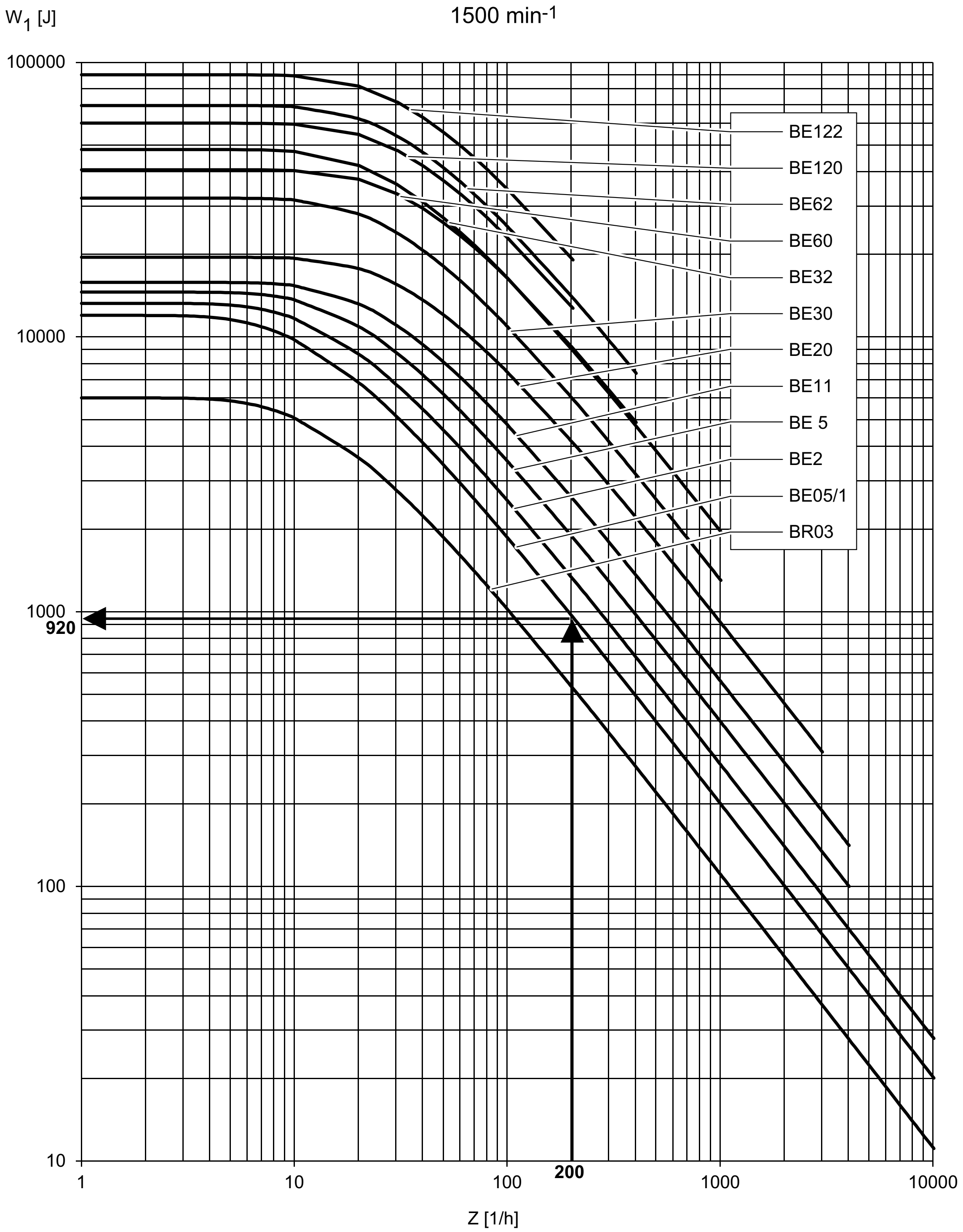
BE05, BE1, BE2, BE5, BE11, BE20, BE30, BE32, BE60, BE62, BE120, BE122



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Example: The rated speed is 1500 rpm and brake BE05 is used. At 200 braking operations per hour, the permitted braking work per braking operation is 920 J.

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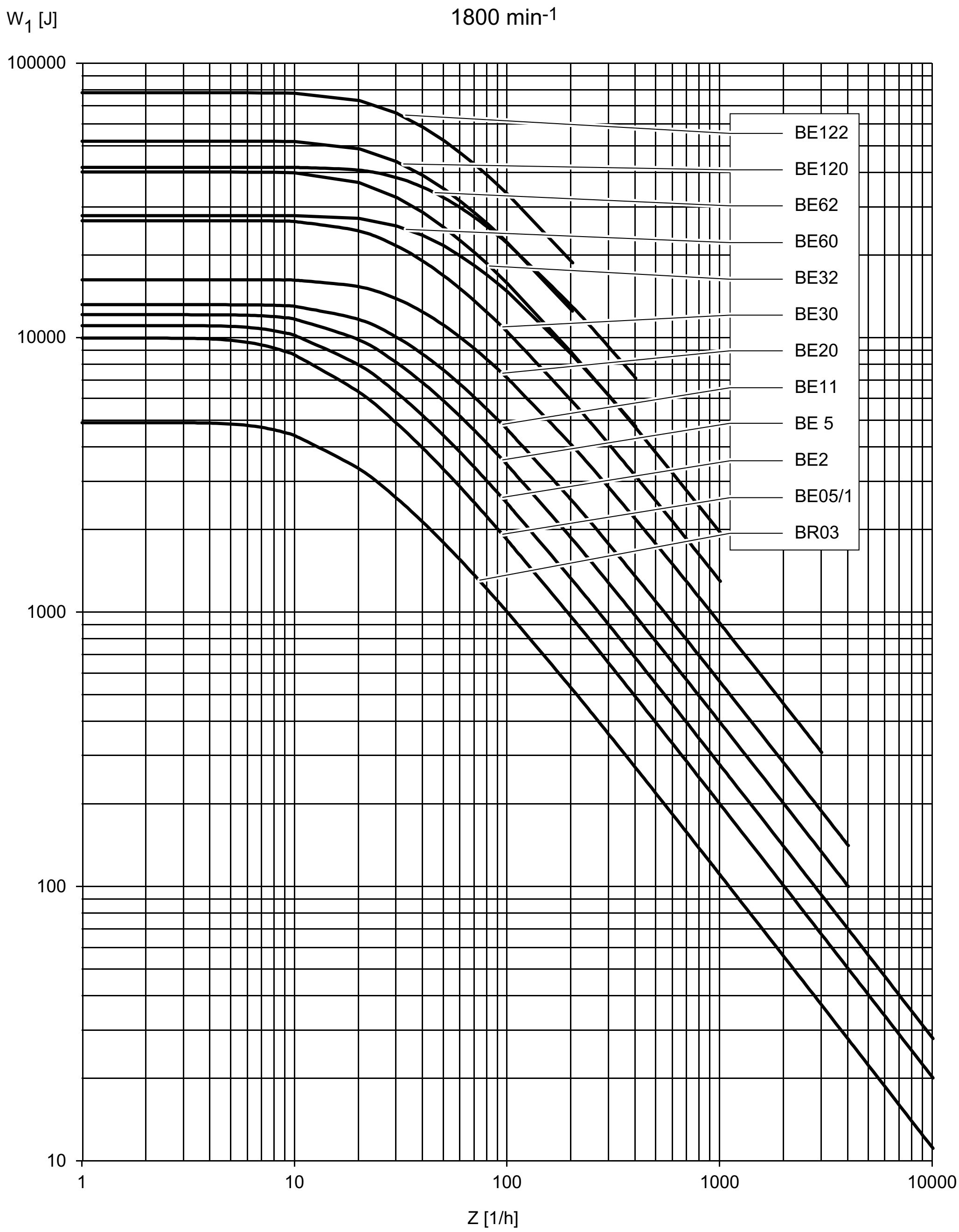
BE05, BE1, BE2, BE5, BE11, BE20, BE30, BE32, BE60, BE62, BE120, BE122



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INFORMATION

Braking operations of speeds greater than 1800 1/min are not permitted for brakes BE30, BE32, BE60, BE62, BE120 and BE122.

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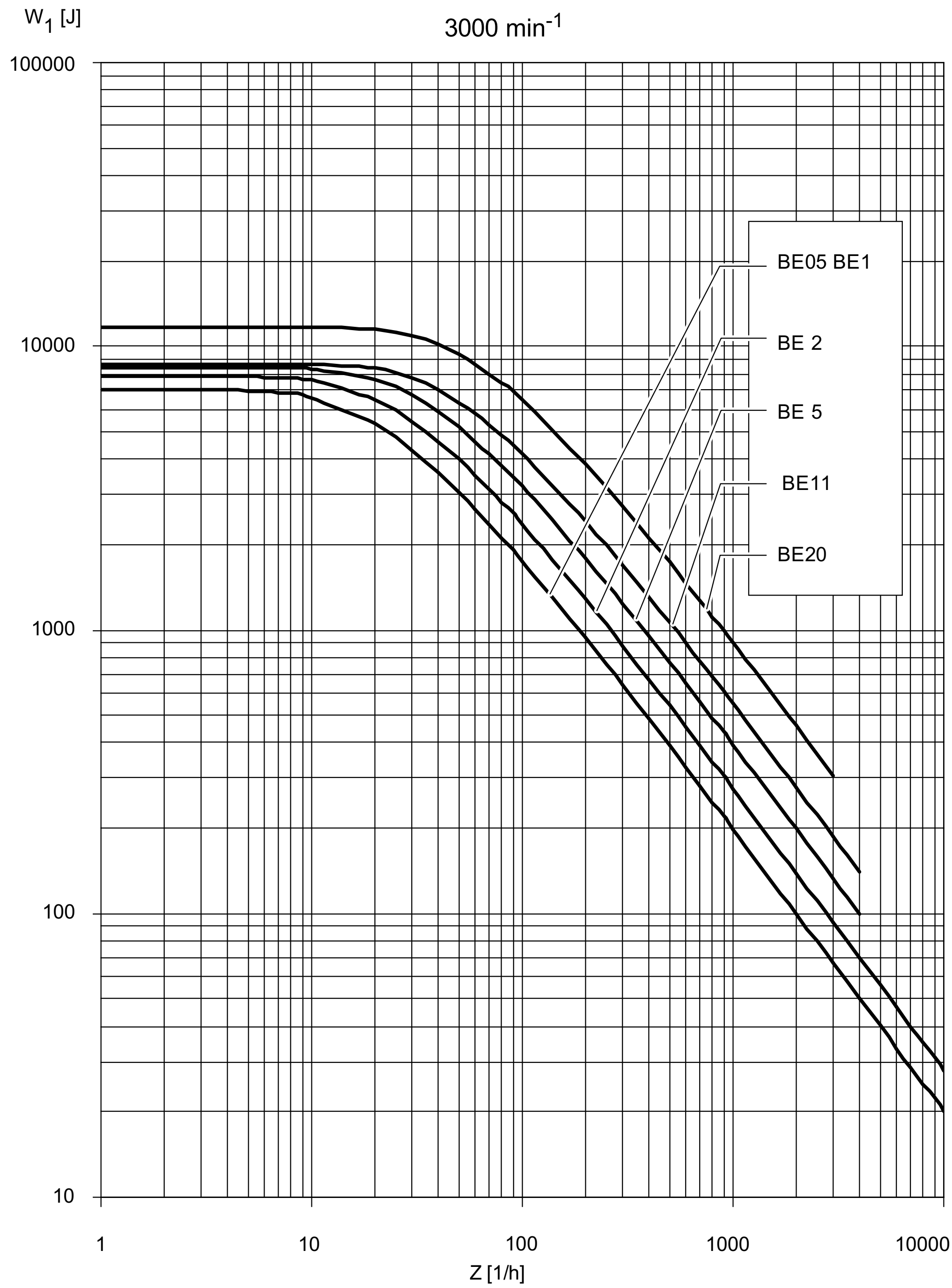
BE05, BE1, BE2, BE5, BE11, BE20



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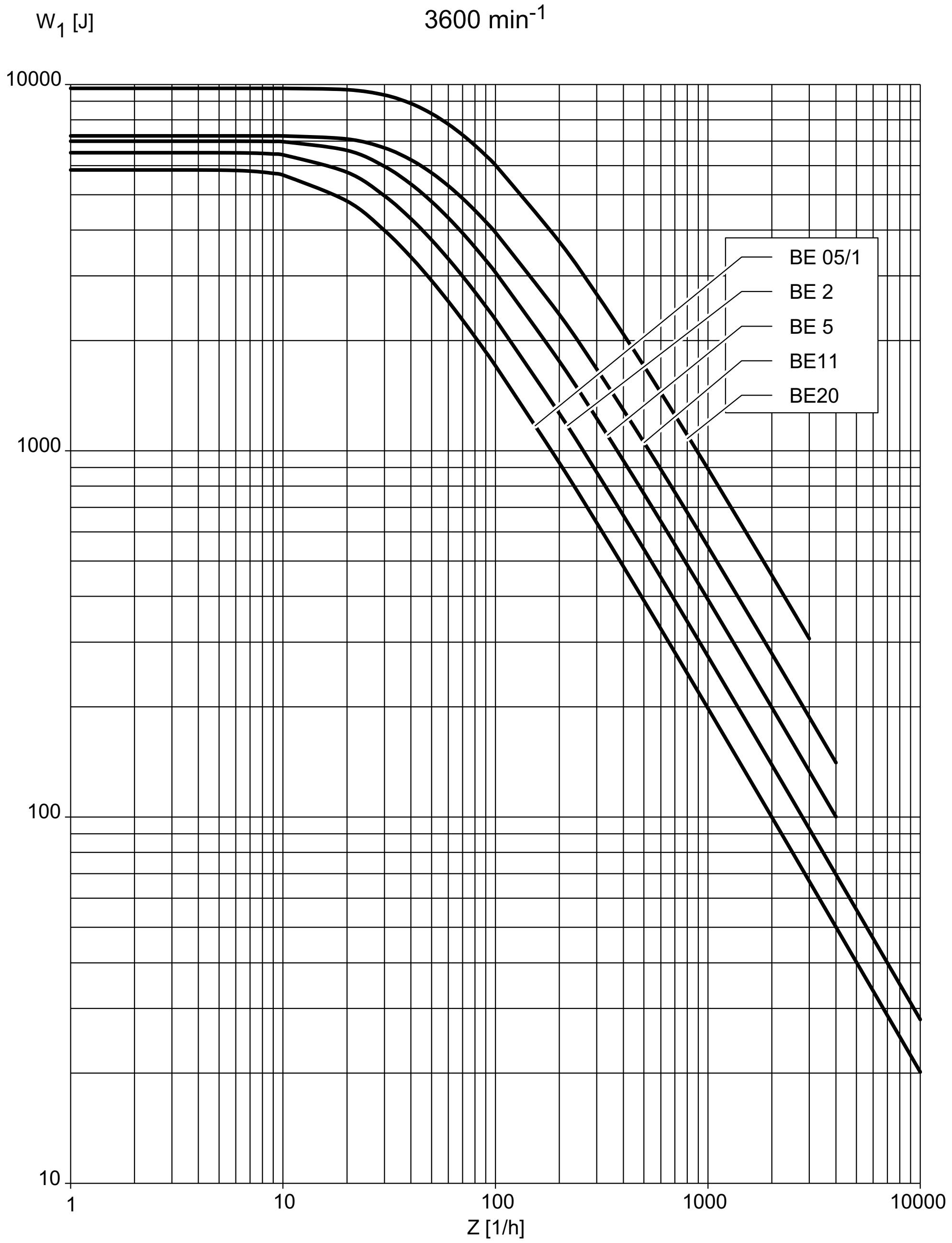
BE05, BE1, BE2, BE5, BE11, BE20



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8.10.3 Permitted braking work of the BE brake in case of emergency switching off

The permitted braking work of our brakes is defined in the known W_{max}/Z diagrams. In hoists or hoist-like applications the maximum braking work defined here must not be exceeded even in the event of emergency switching off. In contrast, substantially higher values for emergency stop braking can be permitted in applications in travel drives in connection with reduced braking torques, taking the following restrictions into consideration:

- For this type of braking, the actual braking torque can be reduced by up to 60% compared to the normal braking torque.
- The specific wear increases by a factor of a 100 compared to the default value for normal load.
- The rated braking torque must be reduced by at least one stage compared to the maximum nominal braking torque of the assigned brake.

The following diagram and the following table show the maximum permitted braking work under the conditions referred to for emergency stop braking for travel drives depending on the maximum motor speeds.

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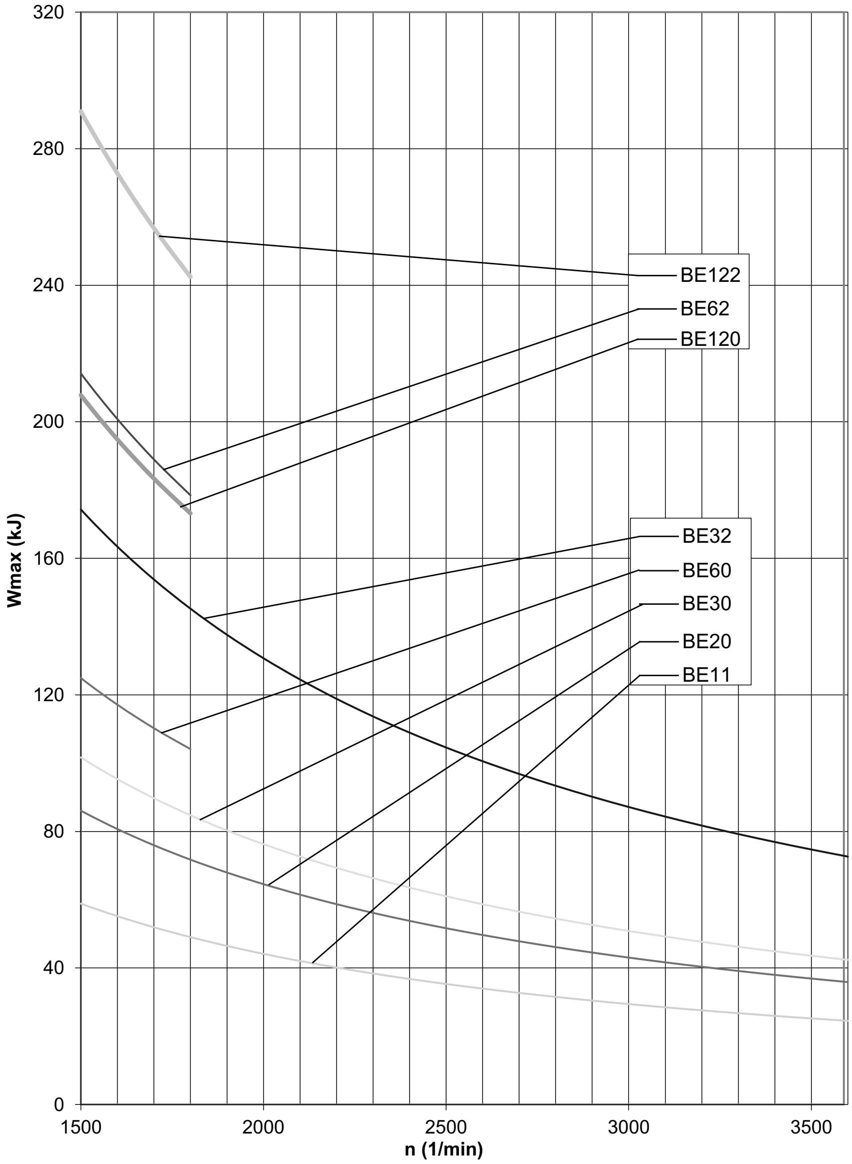
Diagram: Maximum braking work for emergency switching off for travel drives.



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If you require increased braking work for travel drive applications with brakes sizes BE05, BE1, BE2 or BE5, then please contact SEW-EURODRIVE.

	W_{max} in kJ							
n in rpm	**BE11**	**BE20**	**BE30**	**BE32**	**BE60**	**BE62**	**BE120**	**BE122**
1000	88	129	153	261	187	321	312	436
1100	80	117	139	238	170	292	283	397
1200	74	108	127	218	156	268	260	364
1300	68	99	117	201	144	247	240	336
1400	63	92	109	187	134	229	223	312
1500	59	86	102	174	125	214	208	291
1600	55	81	95	163	117	201	195	273

	W_{max} in kJ							
n in rpm	**BE11**	**BE20**	**BE30**	**BE32**	**BE60**	**BE62**	**BE120**	**BE122**
1700	52	76	90	154	110	189	183	257
1800	49	72	85	145	104	178	173	242
1900	46	68	80	138	–	–	–	–
2000	44	65	76	131	–	–	–	–
2100	42	61	73	125	–	–	–	–
2200	40	59	69	119	–	–	–	–
2300	38	56	66	114	–	–	–	–
2400	37	54	64	109	–	–	–	–
2500	35	52	61	105	–	–	–	–
2600	34	50	59	101	–	–	–	–
2700	33	48	56	97	–	–	–	–
2800	32	46	54	93	–	–	–	–
2900	30	45	53	90	–	–	–	–
3000	29	43	51	87	–	–	–	–
3100	28	42	49	84	–	–	–	–
3200	28	40	48	82	–	–	–	–
3300	27	39	46	79	–	–	–	–
3400	26	38	45	77	–	–	–	–
3500	25	37	44	75	–	–	–	–
3600	25	36	42	73	–	–	–	–

Example: If the application speed is 2000 rpm, with the BE32 brake, the permitted emergency stop braking work per cycle is 135 kJ. Please note the section "Increase emergency switching off work for travel drive applications (→ 🗎 358)".

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8.10.4 Pulse frequencies of the BE brake

The pulse frequencies of the brake generally depend on many factors, e.g. on the operating temperature of the brakes,the wear condition and the tolerances of the component parts used. A particular factor determining the pulse times is the braking torque set. The following table states guide values for the response times t_1 in operation with (BGE/BME) and without high-speed excitation (BG/BMS) and the application times for switch-off in just the AC circuit (t_2I) and DC and AC circuits (t_2II).

Brake type	t_1 in 10^{-3} s		t_2 in 10^{-3} s	
	BG/BMS	BGE/BME	t_2II	t_2I
BE05	34	15	10	42
BE1	55	10	12	76
BE2	73	17	10	68
BE5	-	35	10	70
BE11	-	41	15	82
BE20	-	57	20	88
BE30	-	60	16	80
BE32	-	60	16	80
BE60	-	90	25	120
BE62	-	90	25	120
BE120	-	120	40	130
BE122	-	120	40	130

t_1 = Response time

t_2I = Brake application time for cut-off in the AC circuit

t_2II = Brake application time for cut-off in the DC and AC circuit

INFORMATION

The times stated are guide values which were determined with the brakes at operating temperature. These may vary under real application conditions.

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8.10.5 BE brake – operating currents

The following tables list the operating currents of the brakes at differing voltages.

The acceleration current I_B (= inrush current) flows only for a short time (approx. 160 ms for BE05 – 62, 400 ms for BE120/122) when the brake is released. When using the BG, BS24, or BMS brake controller and direct DC voltage supply without control unit (only possible with brake size BE05 – BE2), increased inrush current does not occur.

The values for the holding currents I_H are r.m.s. values. Only use current measurement units that are designed to measure rms values.

Legend

The following tables list the operating currents of the brakes at differing voltages.

The following values are specified:

P_B	= Electric power consumption in the brake coil in watt.
U_N	= Nominal voltage (nominal voltage range) of the brake in V (AC or DC).
I_H	= Holding current in ampere r.m.s. value of the brake current in the supply cable to the SEW brake control.
I_G	= Direct current in ampere in the brake cable with direct DC voltage supply or = Direct current in ampere in the brake cable with DC 24 V supply via BS24, BSG, or BMV.
I_B	= Acceleration current in ampere (AC or DC) when operated with SEW brake controller for high-speed excitation.
I_B/I_H	= Inrush current ratio ESV.
I_B/I_{DC}	= Inrush current ratio ESV for DC 24 V supply with BSG or BMV.

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BE05, BE1, BE2 brake

The current values I_H (holding current) listed in the tables are r.m.s. values. Measure the r.m.s. values using only the appropriate measuring instruments. The inrush current (acceleration current) I_B only flows for a short time (ca. 160 ms) when the brake is released. There is no increased inrush current if a BG or BMS brake rectifier is used or if there is a direct DC voltage supply – only possible with brakes up to size BE2.

	BE05, BE1	BE2
Max. braking torque $M_{B\ max}$ in Nm	5/10	20
Braking power P_B in W	32	43
Inrush current ratio ESV	4	4

Rated voltage V_N		BE05, BE1		BE2	
V_{AC}	V_{DC}	I_H A_{AC}	I_G A_{DC}	I_H A_{AC}	I_G A_{DC}
	24[1)]	-	1.17	-	1.53
24 (23-26)	10	2.25	2.90	2.95	3.80
60 (57-63)	24	0.90	1.17	1.18	1.53
120 (111-123)	48	0.45	0.59	0.59	0.77
184 (174-193)	80	0.29	0.37	0.38	0.49
208 (194-217)	90	0.26	0.33	0.34	0.43
230 (218-243)	96	0.23	0.29	0.30	0.39
254 (244-273)	110	0.20	0.26	0.27	0.34
290 (274-306)	125	0.18	0.23	0.24	0.30
330 (307-343)	140	0.16	0.21	0.21	0.27
360 (344-379)	160	0.14	0.18	0.19	0.24
400 (380-431)	180	0.13	0.16	0.17	0.21
460 (432-484)	200	0.11	0.14	0.15	0.19
500 (485-542)	220	0.10	0.13	0.13	0.17
575 (543-600)	250	0.09	0.11	0.12	0.15

1) Operation with control unit BSG, BS24, BMV

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BE5, BE11, BE20 brake

The current values I_H (holding current) listed in the tables are r.m.s. values. Measure the r.m.s. values using only the appropriate measuring instruments. The inrush current (acceleration current) I_B only flows for a short time (ca. 160 ms) when the brake is released. A separate voltage supply is not possible.

	BE5	BE11	BE20
Max. braking torque $M_{B\,max}$ in Nm	55	110	200
Braking power P_B in W	49	76	100
Inrush current ratio ESV	5.8	6.7	7.5

Rated voltage V_N		BE5	BE11	BE20
V_{AC}	V_{DC}	I_H A_{AC}	I_H A_{AC}	I_H A_{AC}
	24[1)]	1.67	2.67	3.32
60 (57-63)	-	1.28	2.05	2.55
120 (111-123)	-	0.64	1.04	1.28
184 (174-193)	-	0.41	0.66	0.81
208 (194-217)	-	0.36	0.59	0.72
230 (218-243)	-	0.33	0.52	0.65
254 (244-273)	-	0.29	0.47	0.58
290 (274-306)	-	0.26	0.42	0.51
330 (307-343)	-	0.23	0.37	0.45
360 (344-379)	-	0.21	0.33	0.40
400 (380-431)	-	0.18	0.29	0.36
460 (432-484)	-	0.16	0.26	0.32
500 (485-542)	-	0.15	0.23	0.29
575 (543-600)	-	0.13	0.21	0.26

1) Operation with control unit BSG, BMV

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Brakes BE30, BE32, BE60, BE62, BE120, BE122

The current values I_H (holding current) listed in the tables are r.m.s. values. Measure the r.m.s. values using only the appropriate measuring instruments. The inrush current (acceleration current) I_B only flows for a short time (ca. 160 ms) when the brake is released. A separate voltage supply is not possible.

	BE30, BE32	BE60, BE62	BE120, BE122
Max. braking torque $M_{B\ max}$ in Nm	300 / 600	1200	1000 / 2000
Braking power P_B in W	130	195	250
Inrush current ratio ESV	8.5	9.2	4.9

Rated voltage V_N	BE30, BE32	BE60, BE62	BE120, BE122
V_{AC}	I_H A_{AC}	I_H A_{AC}	I_H A_{AC}
120 (111-123)	1.66	-	-
184 (174-193)	1.05	-	-
208 (194-217)	0.94	1.5	-
230 (218-243)	0.84	1.35	1.78
254 (244-273)	0.75	1.2	1.59
290 (274-306)	0.67	1.12	1.42
330 (307-343)	0.59	0.97	1.12
360 (344-379)	0.53	0.86	1.0
400 (380-431)	0.47	0.77	0.89
460 (432-484)	0.42	0.68	0.80
500 (485-542)	0.37	0.6	0.71
575 (543-600)	0.33	0.54	1.78

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Brake BE120, BE122

The current values I_H (holding current) listed in the tables are r.m.s. values. Measure the r.m.s. values using only the appropriate measuring instruments. The inrush current (acceleration current) I_{Acc} only flows for a short time (max. 400 ms) when the brake is released. A separate voltage supply is not possible.

	BE120	BE122
Max. braking torque $M_{B\,max}$ in Nm	1000	2000
Braking power P_B in W	250	250
Inrush current ratio ESV	4.9	4.9

Rated voltage V_N	BE120	BE122
V_{AC}	I_H A_{AC}	I_H A_{AC}
230 (218-243)	1.78	1.78
254 (244-273)	1.59	1.59
290 (274-306)	1.42	1.42
360 (344-379)	1.12	1.12
400 (380-431)	1.0	1.0
460 (432-484)	0.89	0.89
500 (485-542)	0.80	0.80
575 (543-600)	0.71	0.71

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8.10.6 Resistance brake coils

BE05, BE1, BE2 brake

	BE05, BE1	BE2
Max. braking torque $M_{B\,max}$ in Nm	5/10	20
Braking power P_B in W	32	43
Inrush current ratio ESV	4	4

Rated voltage V_N		BE05, BE1		BE2	
V_{AC}	V_{DC}	R_B	R_T	R_B	R_T
–	24 1)	4.9	14.9	3.60	11
24 (23-26)	10	0.78	2.35	0.57	1.74
60 (57-63)	24	4.9	14.9	3.60	11
120 (111-123)	48	19.6	59	14.4	44
184 (174-193)	80	49	149	36	110
208 (194-217)	90	62	187	45.5	139
230 (218-243)	96	78	235	58	174
254 (244-273)	110	98	295	72	220
290 (274-306)	125	124	375	91	275
330 (307-343)	140	156	470	115	350
360 (344-379)	160	196	590	144	440
400 (380-431)	180	245	750	182	550
460 (432-484)	200	310	940	230	690
500 (485-542)	220	390	1180	280	860
575 (543-600)	250	490	1490	355	1080

1) Operation with control unit BSG, BS24, BMV

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BE5, BE11, BE20 brake

	BE5	BE11	BE20
Max. braking torque $M_{B\,max}$ in Nm	55	110	200
Braking power P_B in W	49	76	100
Inrush current ratio ESV	5.8	6.7	7.5

Rated voltage V_N		BE5		BE11		BE20	
V_{AC}	V_{DC}	R_B	R_T	R_B	R_T	R_B	R_T
-	24[1)]	2.20	10.5	1.22	6.9	0.85	5.7
60 (57-63)	24	2.20	10.5	1.22	6.9	0.85	5.7
120 (111-123)	-	8.70	42	4.9	27.5	3.4	22.5
184 (174-193)	-	22	105	12.3	69	8.5	57
208 (194-217)	-	27.5	132	15.5	87	10.7	72
230 (218-243)	-	34.5	166	19.5	110	13.5	91
254 (244-273)	-	43.5	210	24.5	138	17	114
290 (274-306)	-	55	265	31	174	21.5	144
330 (307-343)	-	69	330	39	220	27	181
360 (344-379)	-	87	420	49	275	34	230
400 (380-431)	-	110	530	62	345	42.5	285
460 (432-484)	-	138	660	78	435	54	360
500 (485-542)	-	174	830	98	550	68	455
575 (543-600)	-	220	1050	119	670	85	570

1) Operation with control unit BSG, BMV

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Brakes BE30, BE32, BE60, BE62

	BE30, BE32	BE60, BE62
Max. braking torque $M_{B\,max}$ in Nm	300 / 600	600/1200
Braking power P_B in W	130	195
Inrush current ratio ESV	8.5	9.2

Rated voltage V_N	BE30, BE32		BE60, BE62	
V_{AC}	R_B	R_T	R_B	R_T
120 (111-123)	2.3	17.2	-	-
184 (174-193)	5.8	43	-	-
208 (194-217)	7.3	54	3.95	32.5
230 (218-243)	9.2	69	5	41
254 (244-273)	11.6	86	6.3	52
290 (274-306)	14.6	109	5.6	64
330 (307-343)	18.3	137	9.9	80
360 (344-379)	23	172	12.6	101
400 (380-431)	29	215	15.8	128
460 (432-484)	36.5	275	19.9	163
500 (485-542)	46	345	25.5	205
575 (543-600)	58	430	31.5	260

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Brake BE120, BE122

	BE120, BE122
Max. braking torque $M_{B\,max}$ in Nm	1000 / 2000
Braking power P_B in W	250
Inrush current ratio ESV	4.9

Rated voltage V_N	**BE120, BE122**	
V_{AC}	**R_B**	**R_T**
230 (218-243)	8	29.9
254 (244-273)	10.1	37.6
290 (274-306)	12.7	47.4
360 (344-379)	20.1	75.1
400 (380-431)	25.3	94.6
460 (432-484)	31.8	119
500 (485-542)	40.1	149.9
575 (543-600)	50.5	188.7

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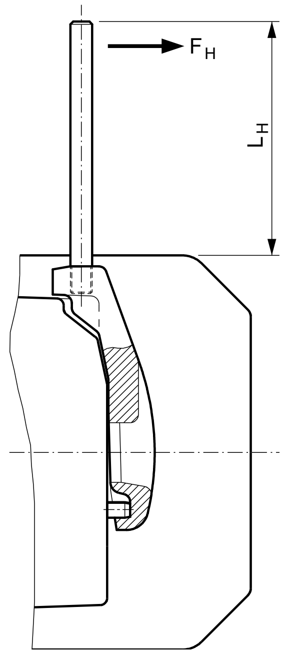
8.10.7 Actuating force for manual brake release

In brakemotors with ..HR variant “Manual brake release with automatic reengaging function,” you can release the brake manually using the lever supplied. The following table specifies the actuation force required at maximum braking torque to release the brake by hand. The values are based on the assumption that you operate the lever at the upper end. The length of that part of the manual lever projecting out of the fan guard is stated as well.

Brake type	Motor size	Actuation force F_H in N[1)]	Lever length L_H in mm
BE05	71	20	80
BE05	80	20	71
BE1	71	40	80
BE1	80	40	71
BE1	90/100	40	57
BE2	80	80	82
BE2	90/100	80	67
BE5	90/100	215	87
BE5	112/132	215	70
BE11	112/132	300	120
BE11	160	300	96
BE20	160	375	178
BE20	180	375	150
BE30/32	180	400	235
BE30/32	200/225	400	216
BE60/62	200/225	500	416
BE60/62	250/280	500	358



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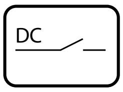
1) Tolerance of operating force: -10 % to +30 %

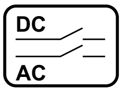
8.10.8 Brake control block diagrams

Legend

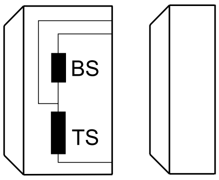
Cut-off in the AC circuit
(normal application of the brake)



Cut-off in the DC circuit
(rapid application of the brake)

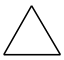


Cut-off in the DC and AC circuits
(rapid application of the brake)



Brakes
BS = accelerator coil
TS = coil section

Auxiliary terminal strip in terminal box



Motor with delta connection

Motor with star connection

Control cabinet limit

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WH	White
RD	red
BU	blue
BN	Brown
BK	Black

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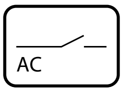
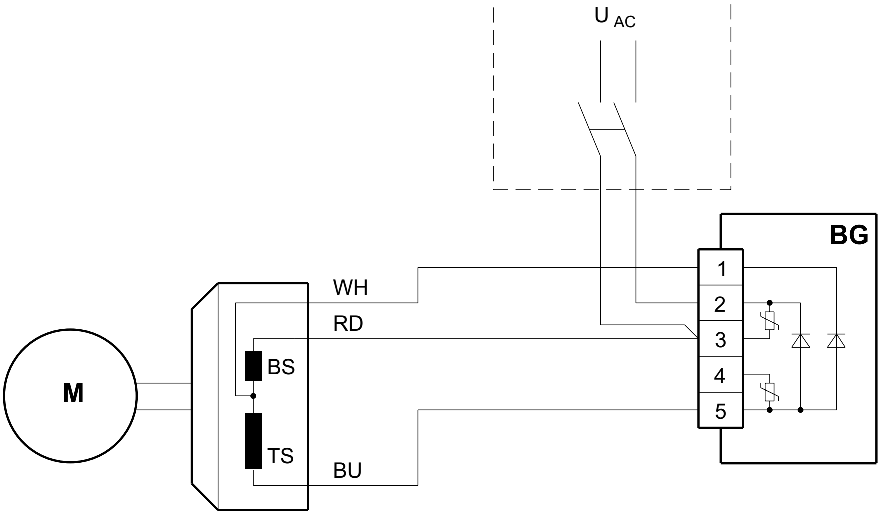
BG brake control





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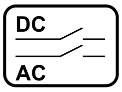

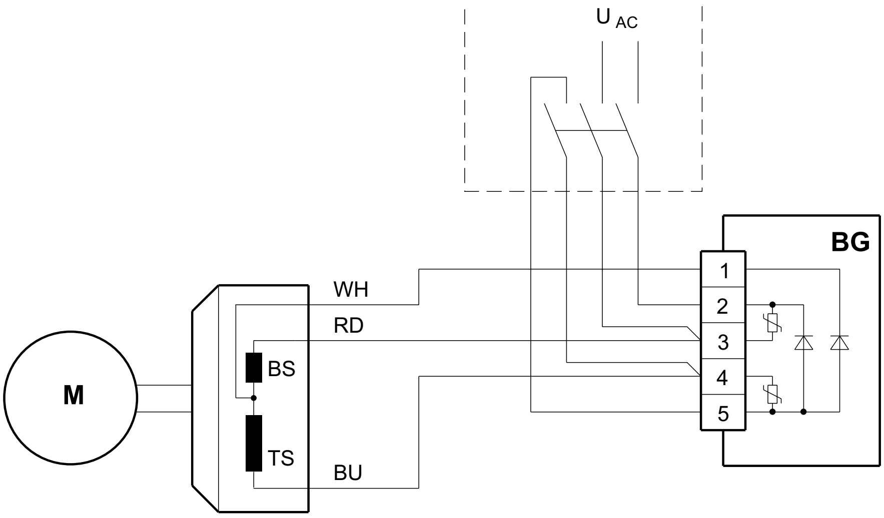

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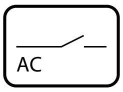
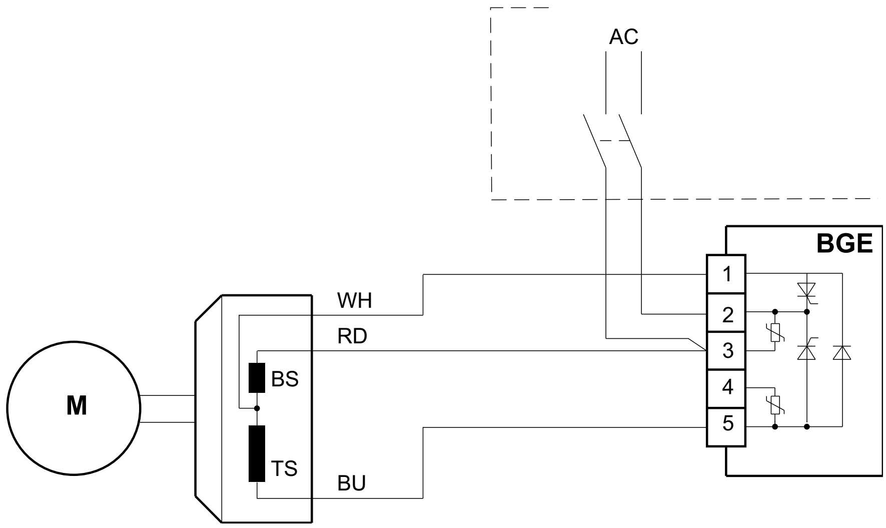
BGE brake control





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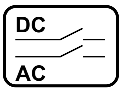

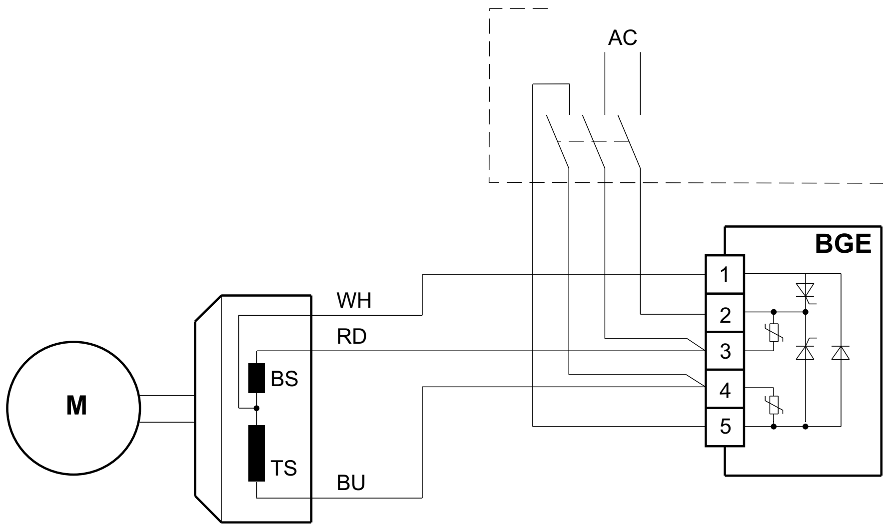

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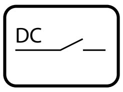
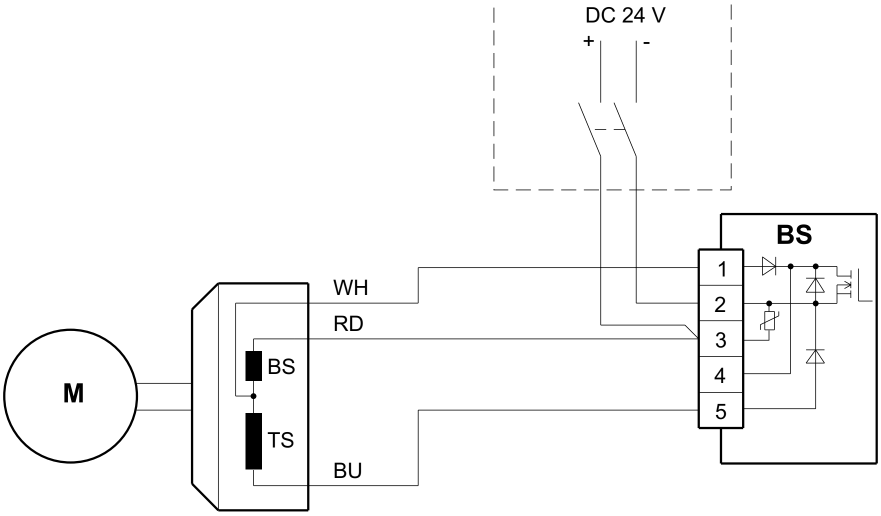
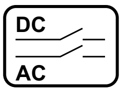
BS brake control

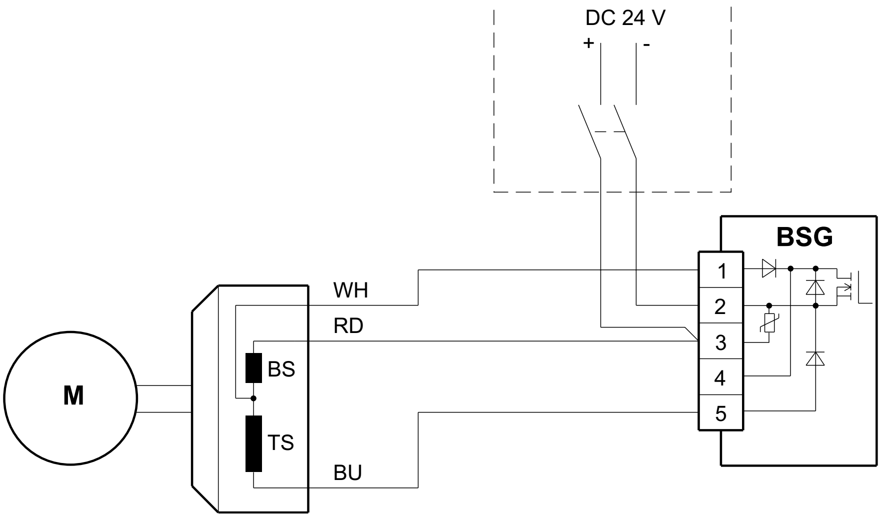




5465000459

BSG brake control





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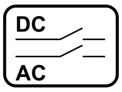
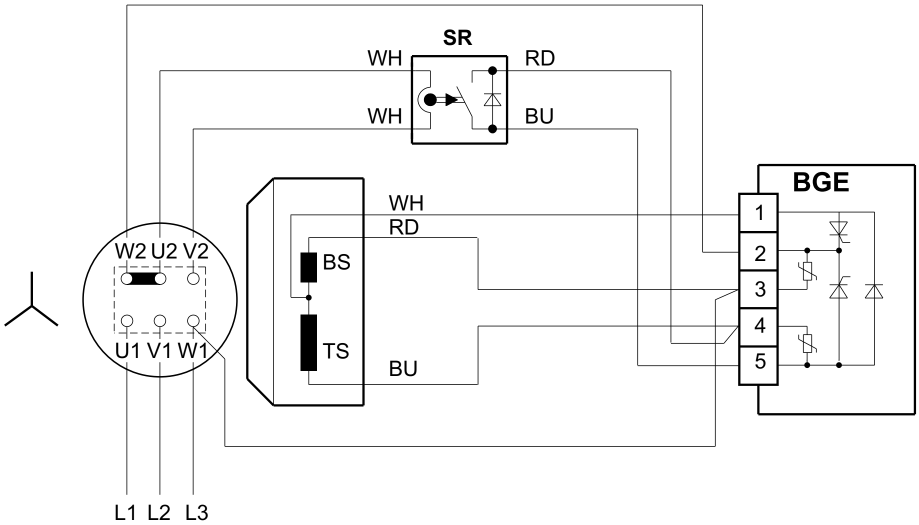
BSR brake control

Brake voltage = Phase voltage

Example: Motor 230 V △ / 400 V ⅄, brake AC 230 V





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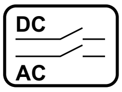
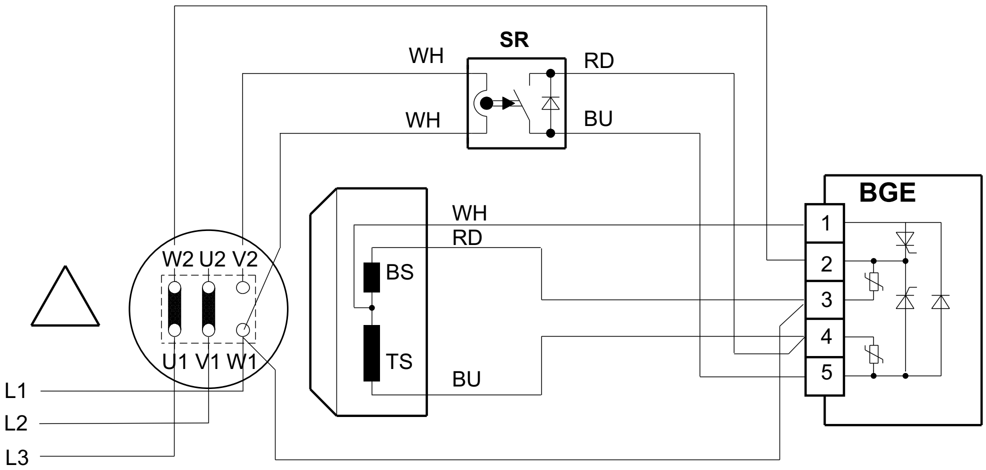
Example: Motor 400 V △ / 690 V ⅄, brake: AC 400 V





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Brake voltage = Phase-to-phase voltage

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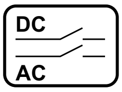
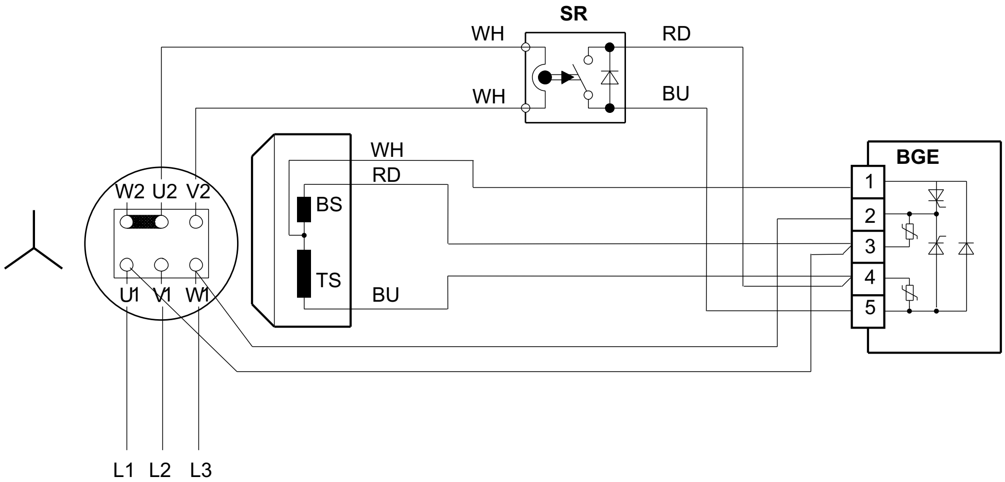
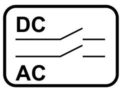
The input voltage of the brake rectifier corresponds to the line voltage of the motor, e.g. motor: 400 V ⅄ , brake: AC 400 V

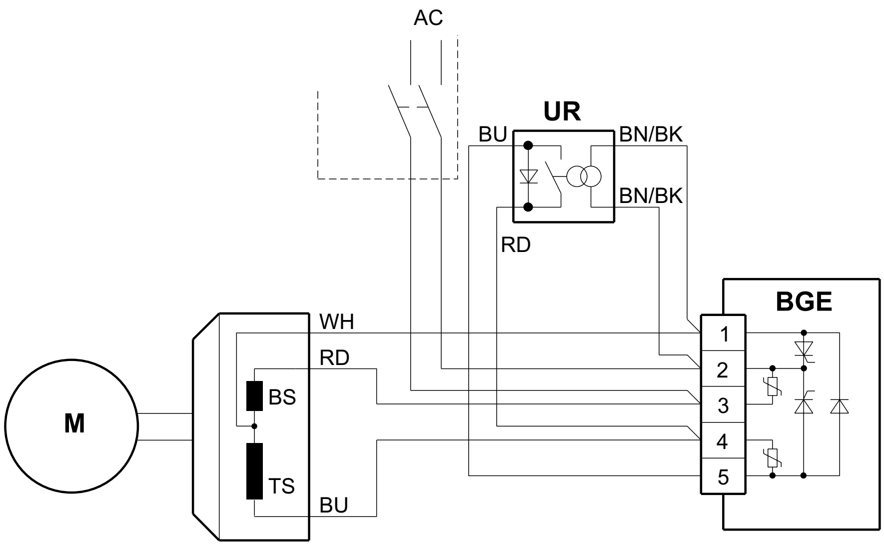




3985864075

BUR brake control





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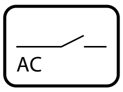
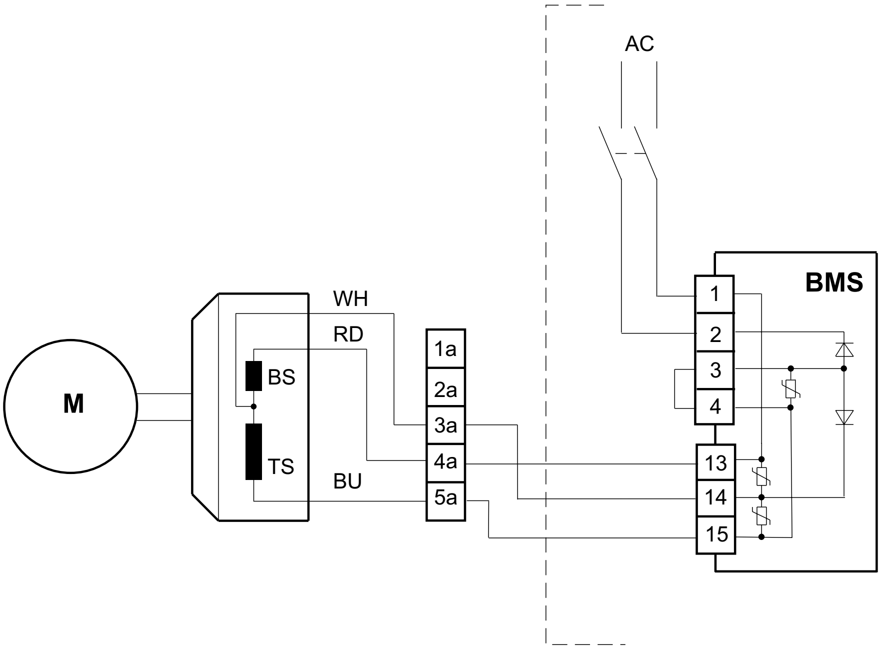
BMS brake control





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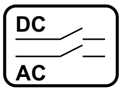

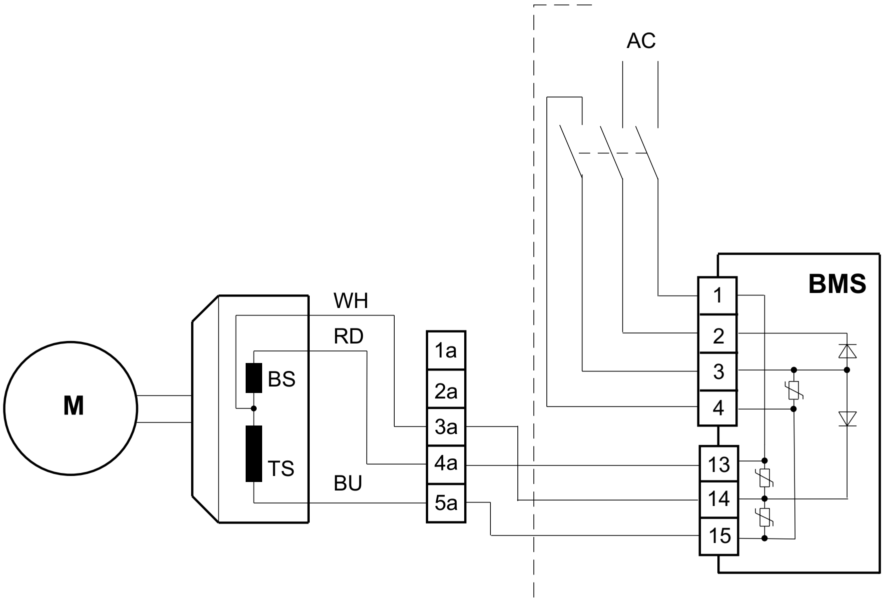

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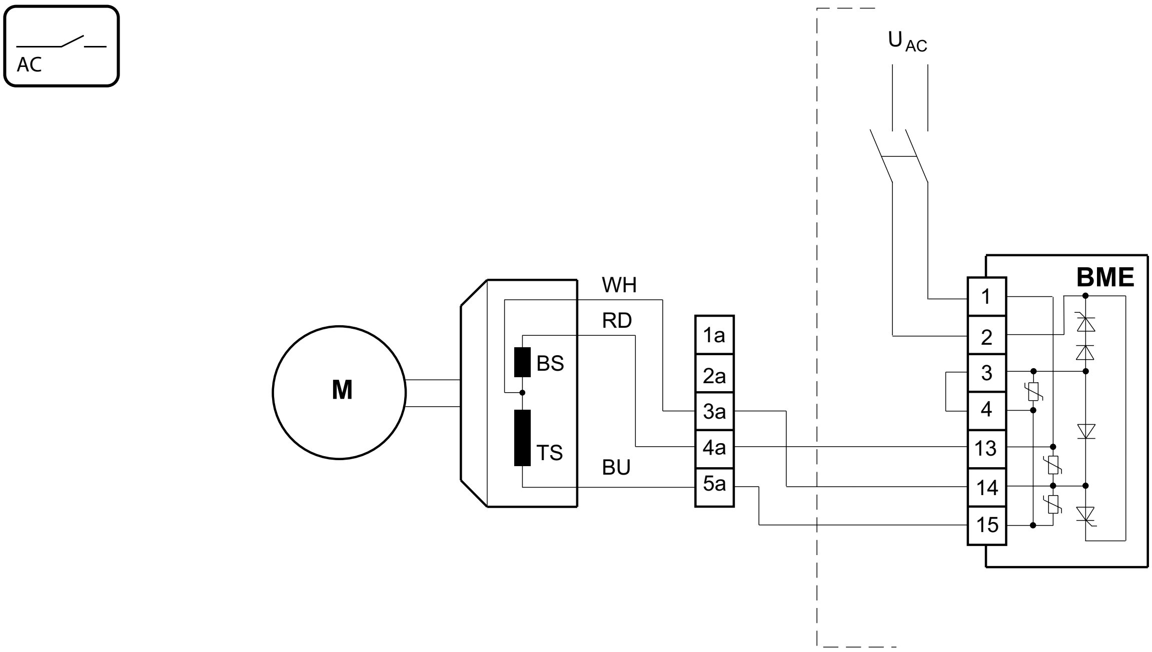
BME brake control



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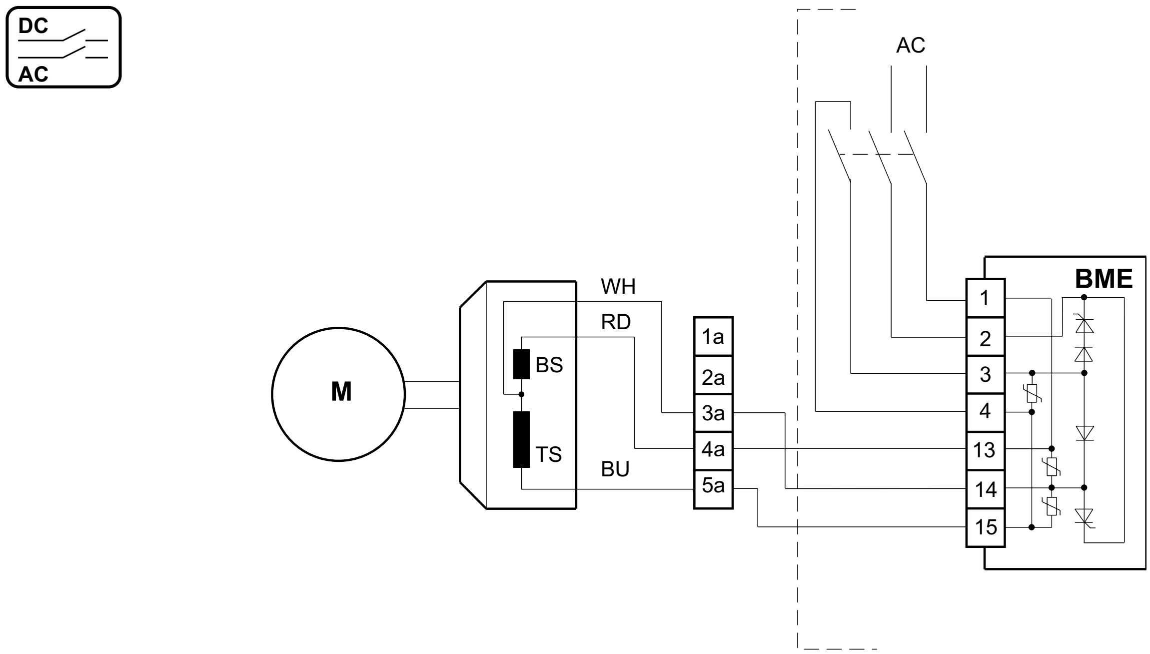

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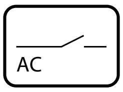
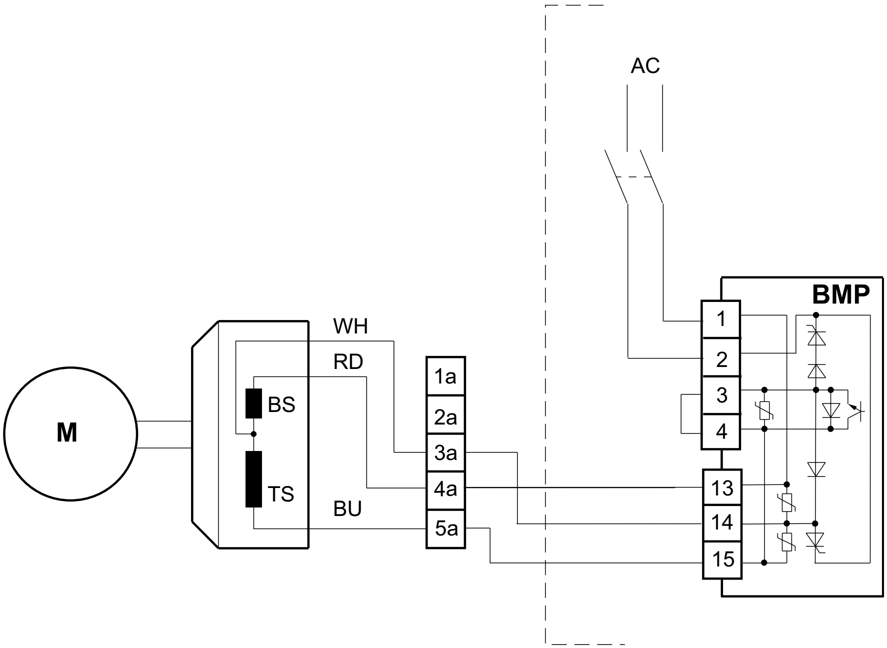
BMP brake control





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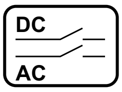
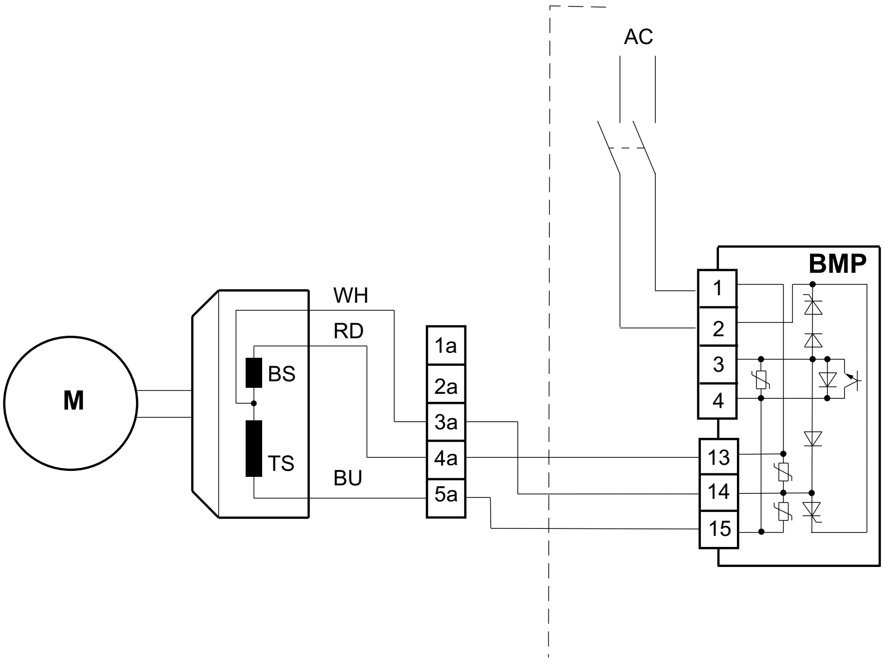
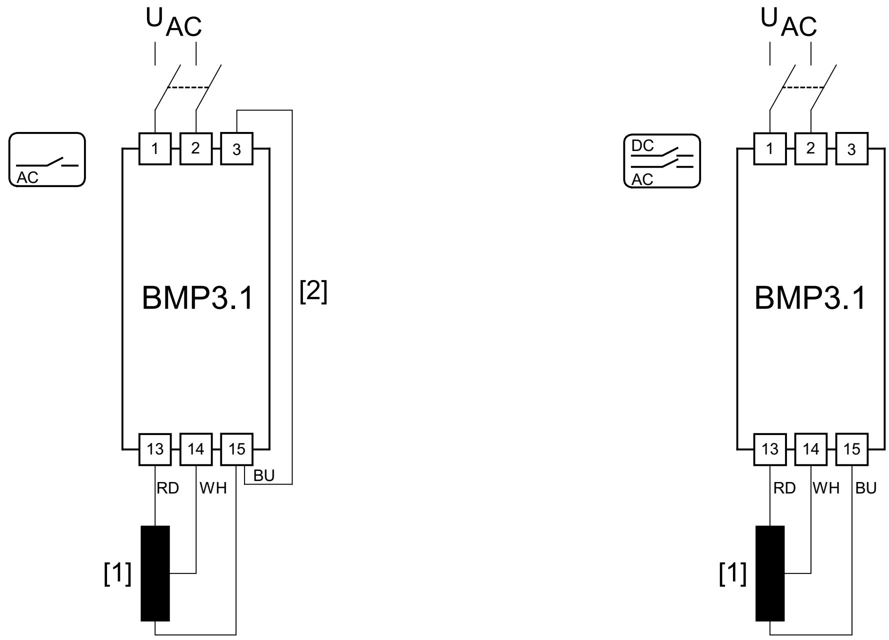




3985875339

BMP 3.1 brake control (motor)



3985878027

[1] Brake coil

[2] Jumper

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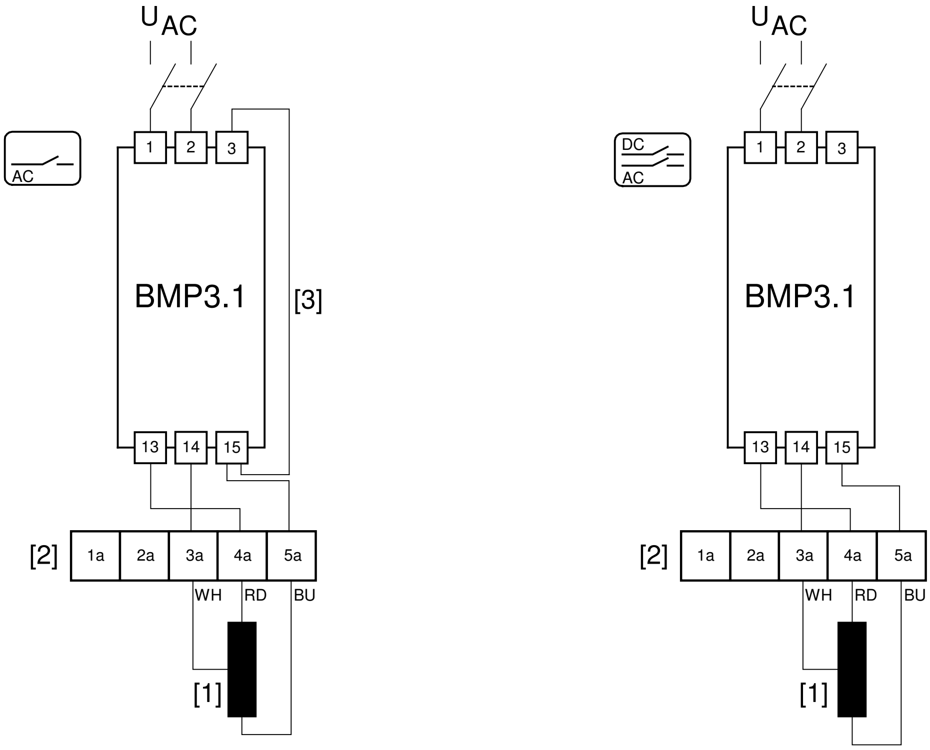
BMP 3.1 brake control (control cabinet)



3985880715

[1] Brake coil

[2] Terminal strip

[3] Jumper

INFORMATION

There is no need for the jumper in alternating current operation (AC) if connection 5a is wired directly to connection 3.

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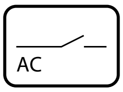
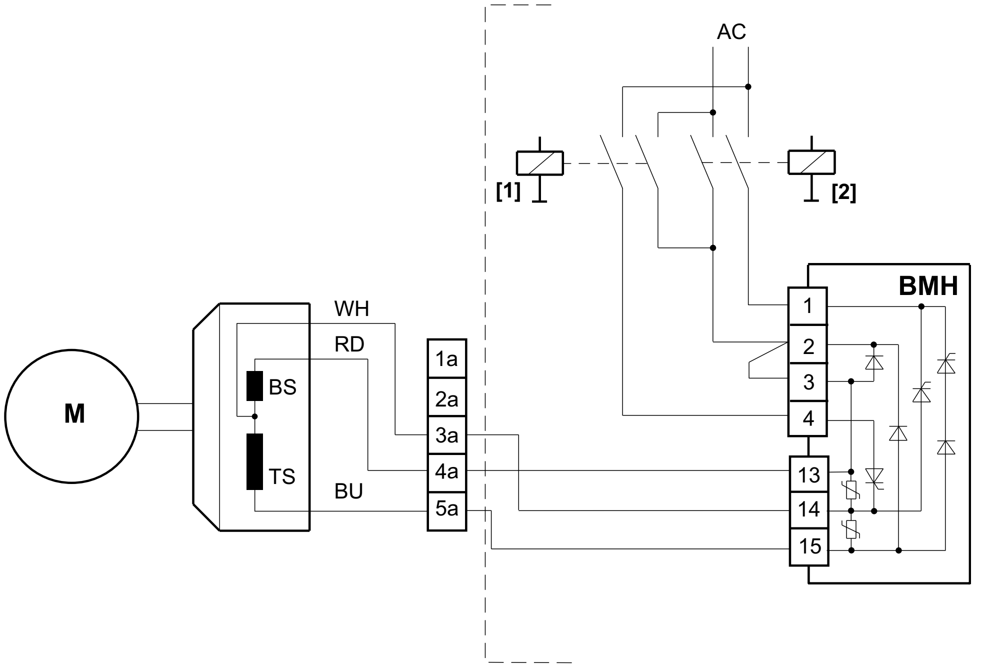
BMH brake control

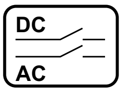


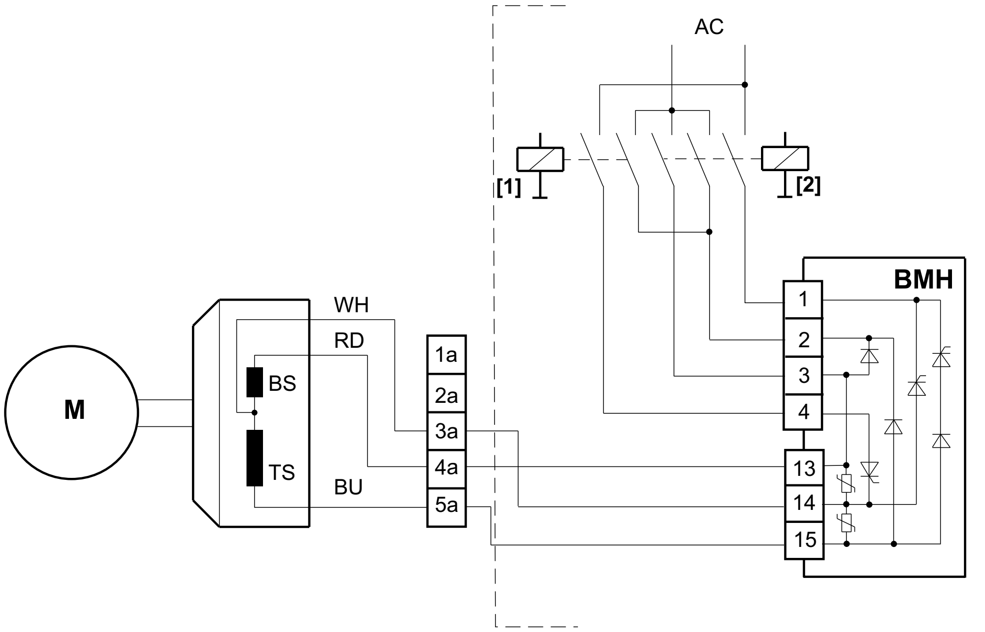


3985883787

[1] Heating

[2] Release





3985885835

[1] Heating

[2] Release

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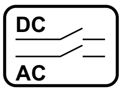
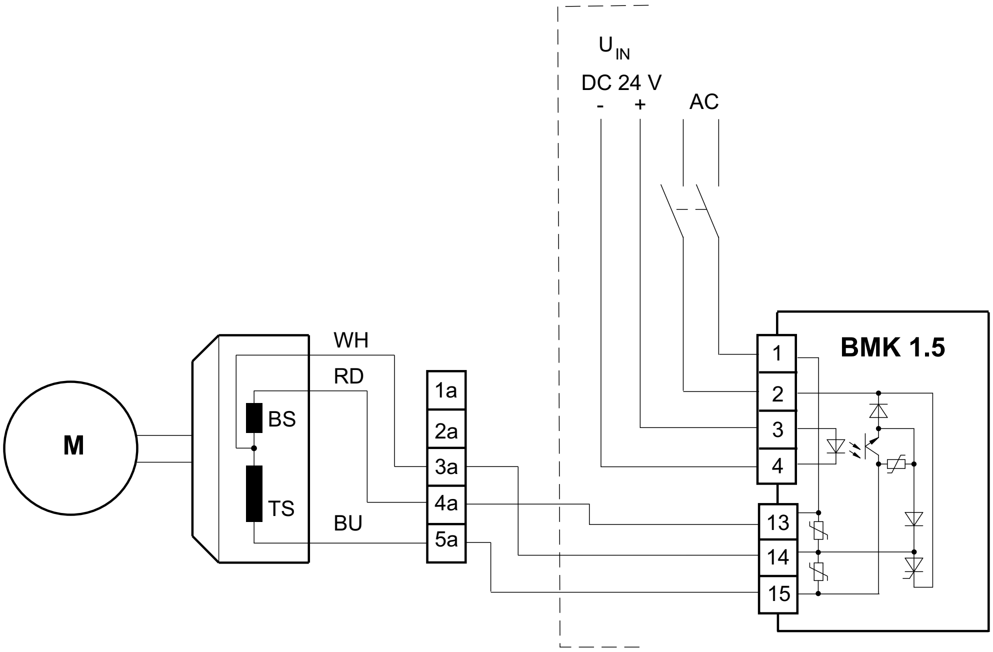
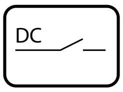
BMK brake control

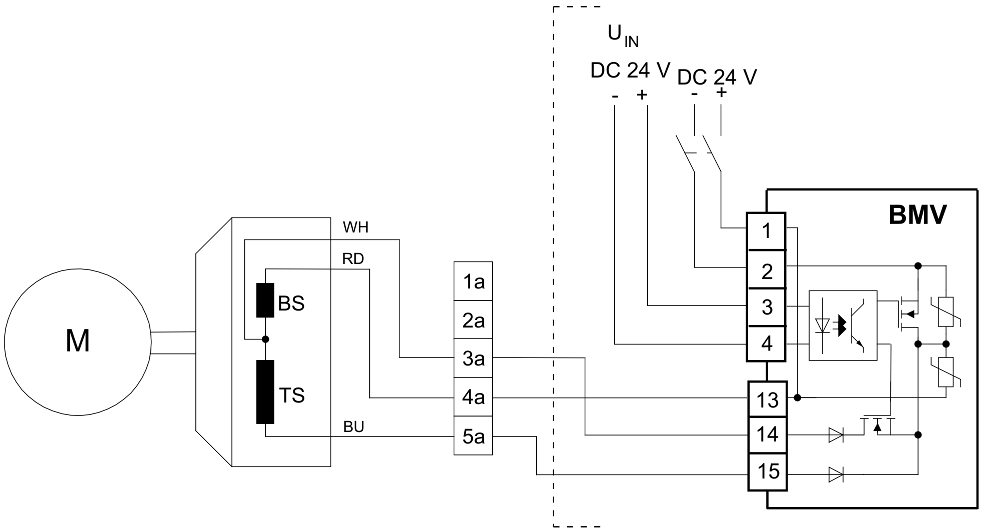




3985888907

BMV brake control





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V_{IN} = control signal

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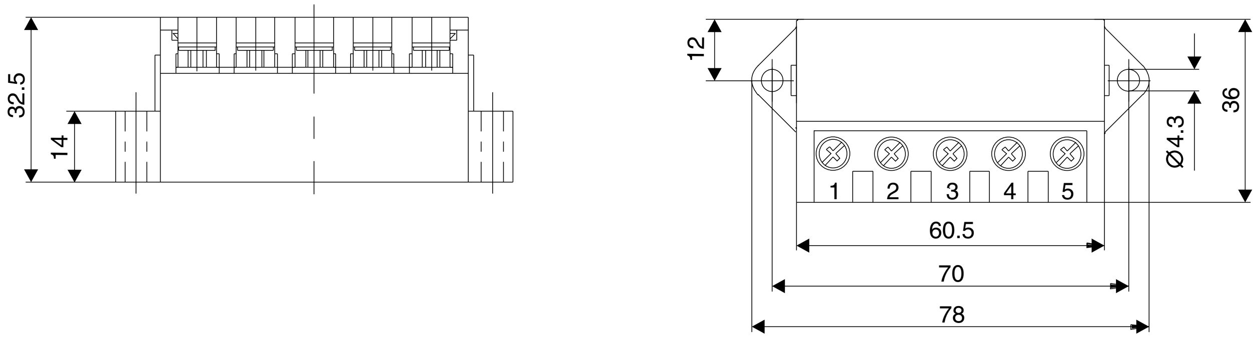
8.10.9 Dimension sheets brake controls

BG, BGE, BS, BSG



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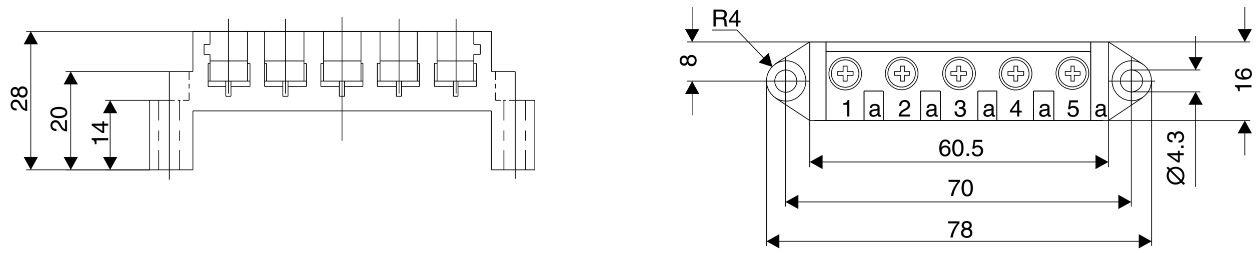
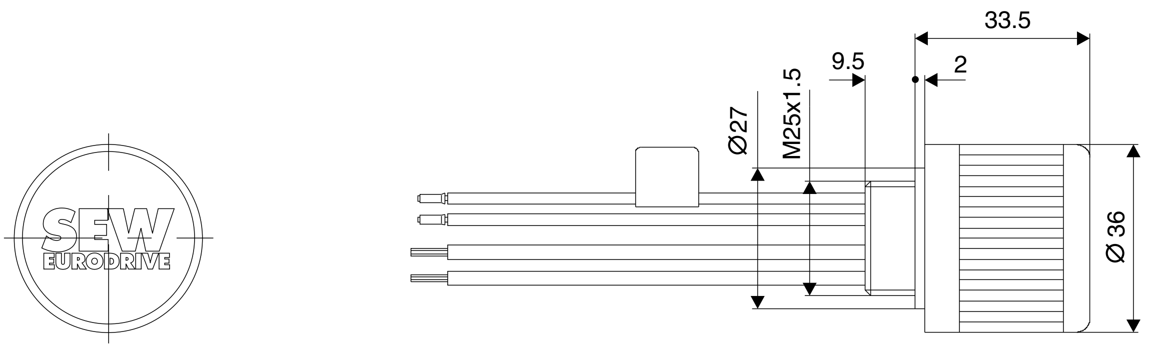
Auxiliary terminal strip

For connection of the brake coil or TF/TH and strip heaters in the wiring space of the motor



4040864011

SR10, SR11, SR15, UR11, UR15



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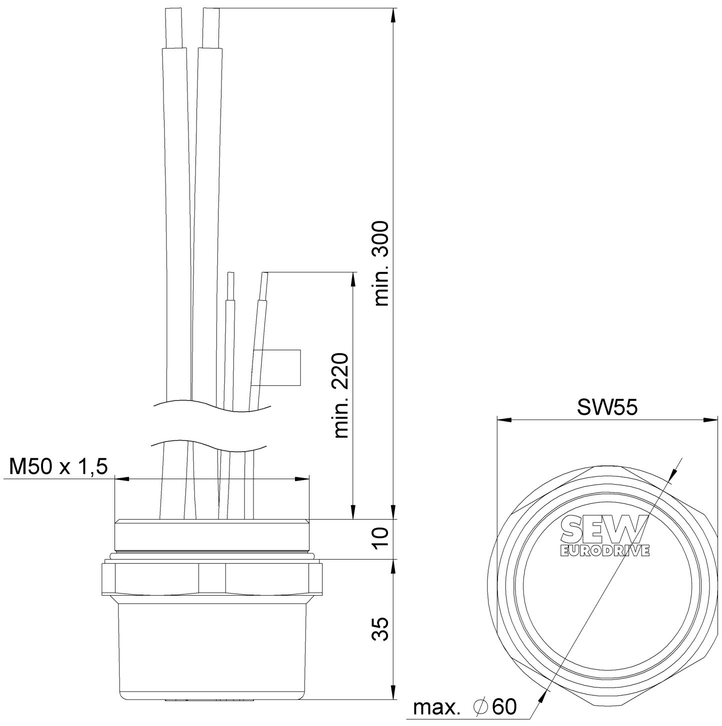
SR19



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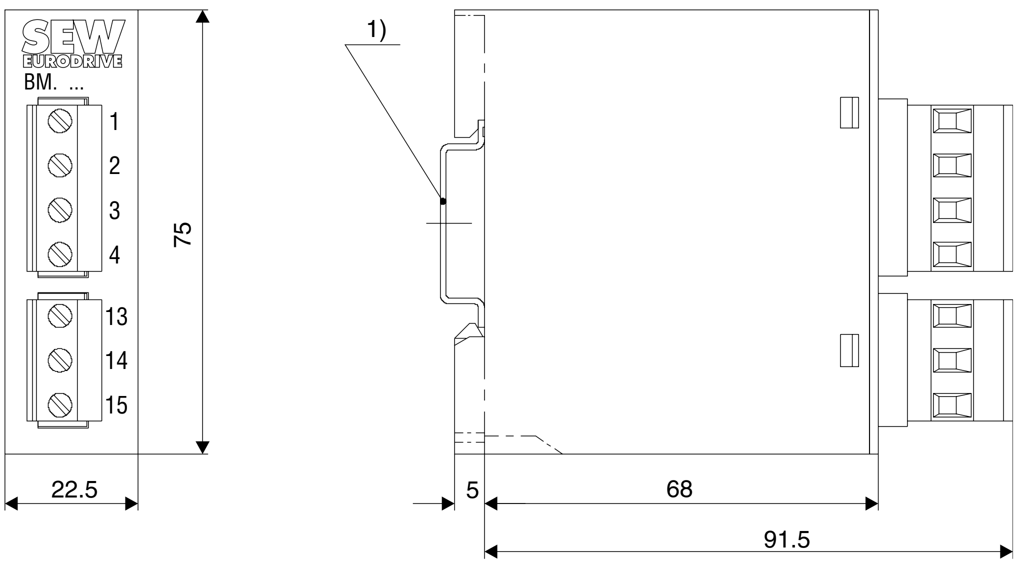
BMS, BME, BMH, BMP, BMK, BMV



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[1] Support rail mounting EN 50022-35-7.5

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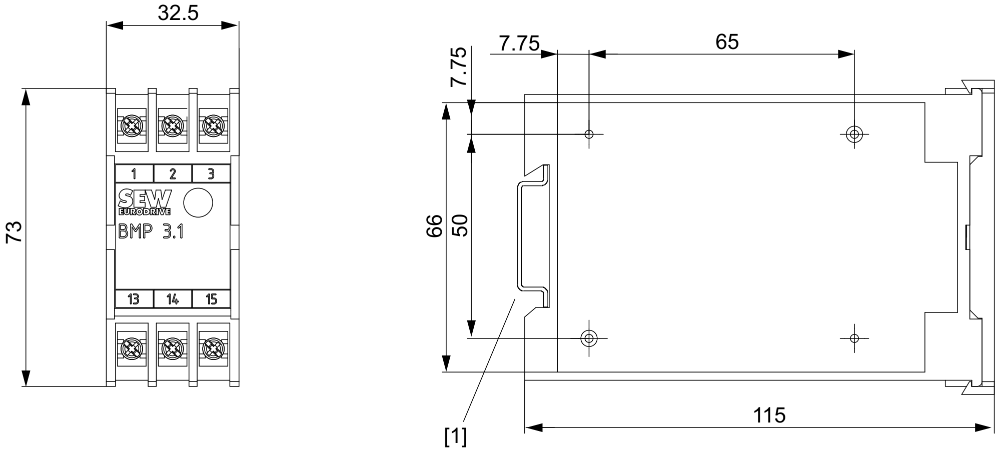
BMP3.1



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8.11 The safety-rated BE brake

8.11.1 Description

If necessary, the BE brake can also be delivered in a safety-rated design on the DR..motor.

The design is based on the regulations contained in EN 13849.

With a safety-rated brake, you can realize the following safety functions that force a standstill of a drive and safely hold the drive in its position.

- SBA (safe brake actuation)
- SBH (safe brake hold)

Performance Level

Safety-rated BE..(FS) brakes are a component in a safe braking system. The performance level of the safe brake system that can be achieved is influenced by the following factors:

- the selected safety architecture, i.e. the category according to EN ISO 13849
- how often the systems are used in the application (B10d, MTTFd)
- an available brake diagnosis (DC)
- the application in which the safe brake system is used (horizontal or vertical application).

BE brake compared to safety-rated BE brake (FS)

The table below shows the basic differences between the standard brake and the safety-rated BE brake.

	Standard BE brake	Safety-rated BE brake
Brake sizes	BE05 to BE122	BE05 to BE32
Holding brake	Yes	Yes (with emergency switching off properties)
Working brake	Yes	No
Braking torques	All	Restrictions (depending on the mounting position)
Manual brake release	HF: Yes HR: Yes	HF: No HR: Yes, retrofitting not permitted
DC direct voltage supply	Yes	No
Maintenance by the customer	Yes	No
Air gap adjustable	Yes	No
DR..motor design	All	DRS.., DRE.., DRP.., DRL..
Number of poles	All	2-, 4-, 6-pole are permitted
Approval according to directive 94/9/EC	Yes, in cat. 3 (for zone 2 / 22)	No
In combination with MOVIMOT®	Yes	Contact SEW-EURODRIVE
In combination with MOV-SWITCH®	Yes	No
In combination with motor protection /TF	Optional	Mandatory

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	Standard BE brake	Safety-rated BE brake
In combination with motor protection /TH	Optional	No
In combination with flywheel fan /Z	Optional	Restrictions for DR.90/100 with BE5
Mounting position	All	Restrictions for permitted braking torques
Category	B	1
B10d value	-	Specification per size

INFORMATION

All the other components such as the gear unit type, suitable ratio i, service factor f_B, load change, output shaft, etc. must be selected by the customer.

8.11.2 Notes on the project planning for the safety-rated BE brake

Definition of the categories

The categories classify safety-related components regarding their resistance to errors and their response in the event of an error based on the reliability and/or the structural arrangement of the parts. A higher resistance to errors means a higher potential to reduce risk.

Brake type	Category
BE.. brake without safety rating	Category B (according to EN ISO 13849)
Safety characteristics BE.. brake (FS)	Category 1 (according to EN ISO 13849)

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8.11.3 Braking work, working air gap, braking torques of the BE.. brakes (FS)

The following table lists the data for setting the BE.. brake (FS):

Brakes	Braking work until maintenance	Working air gap		Braking torques[1]
	in 10^6 J	in mm		in Nm (lb-in)
		min.[2]	max.	
BE05	120	0.25	0.6	5.0 (44) 3.5 (31) 2.5 (22) 1.8 (16)
BE1	120	0.25	0.6	10 (88.5) 7.0 (62) 5.0 (44)
BE2	165	0.25	0.6	20 (177) 14 (124) 10 (88.5) 7.0 (62) 5.0 (44)
BE5	260	0.25	0.7	55 (487) 40 (354) 28 (248) 20 (177) 14 (124)
BE11	285	0.3	0.7	110 (974) 80 (708) 55 (487) 40 (354)
BE20	445	0.3	0.7	200 (1770) 150 (1328) 110 (974) 80 (708) 55 (487)
BE30	670	0.3	0.7	300 (2655) 200 (1770) 150 (1328) 100 (885) 75 (667)
BE32	670	0.4	0.8	600 (5310) 500 (4425) 400 (3540) 300 (2655) 200 (1770) 150 (1328)

1) The braking torques are subject to a tolerance of -10% to +50 %.

2) When checking the working air gap, note: Parallelism tolerances on the brake disk may give rise to deviations of ±0.15 mm after a test run.

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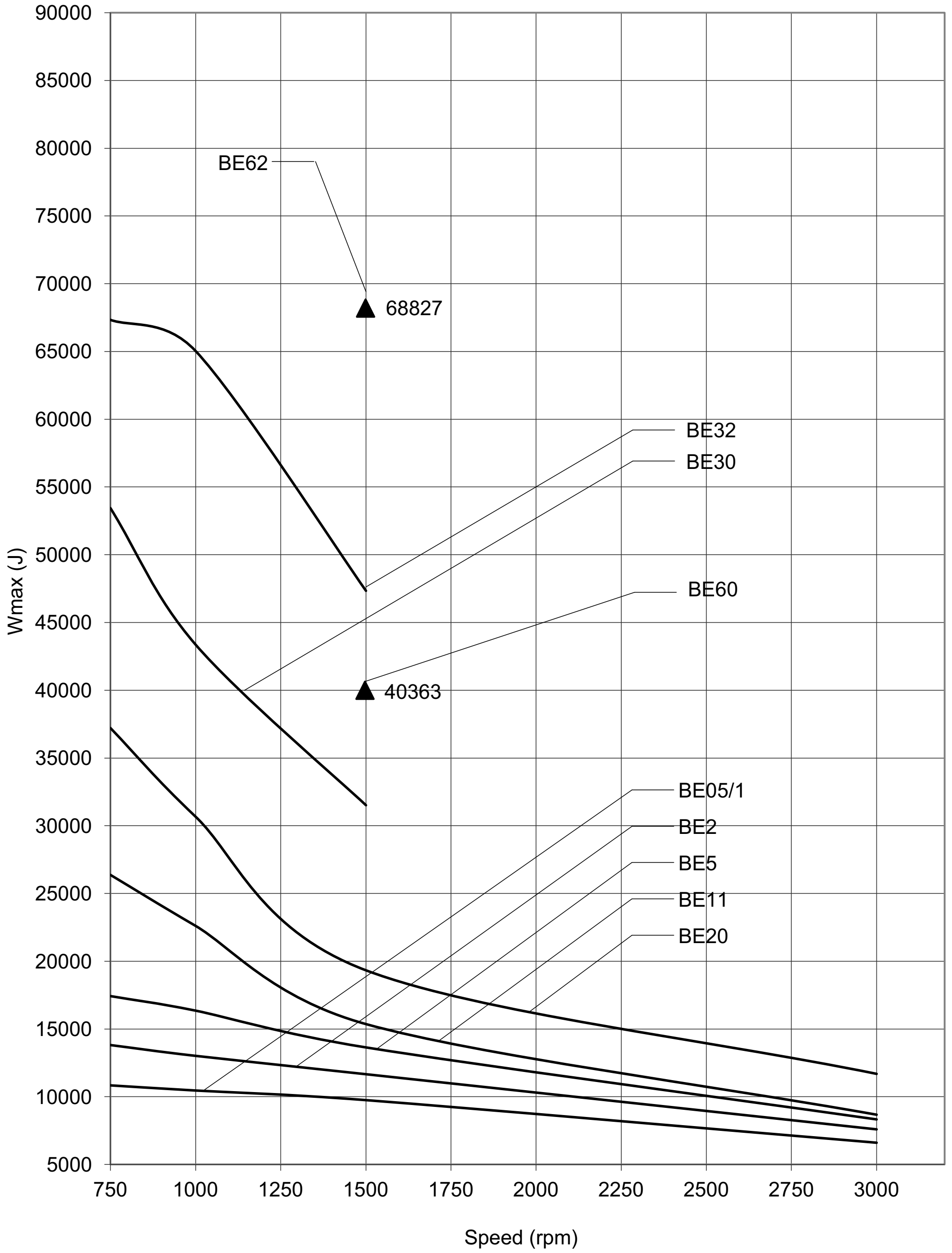
8.11.4 Permitted maximum braking work for emergency switching off for BE..(FS)

The permitted maximum braking work for emergency switching off for BE..(FS) is valid up to max. 10 switching cycles per hour for travel and hoist applications.



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8.11.5 Permitted braking work for emergency switching off for brakes BE11, BE20, BE30, BE32 on horizontal drives

The permitted braking work of our brakes is defined in the known W_{max}/Z diagrams. In hoists or hoist-like applications the maximum braking work defined here must not be exceeded even in the event of emergency switching off. In contrast, substantially higher values for emergency switching off braking can be permitted in applications in travel drives in connection with reduced braking torques, taking the following restriction into consideration:

- For this type of braking, the actual braking torque can be reduced by the factor f_M compared to the normal braking torque:

  $M_B = f_M \times M_{B\ nominal}$
- The specific wear increases by the factor f_v compared to the default value for normal load. This gives the number of cycles until servicing:

  $Z_B = W_{insp} / (W_1 \times f_V)$
- The rated braking torque must be reduced by at least one stage compared to the maximum braking torque of the assigned brake.

The following tables and diagrams show the maximum permitted braking work under the conditions referred to for emergency stop braking for travel drives depending on the maximum motor speeds.

Friction characteristics are stable up to limit curve A. The overload range begins above limit curve A and the reproducibility of results decreases. The limit curves specified can therefore only be considered as benchmark values.

Limit curve A:

The catalog specifications apply for braking underneath this curve for the total braking work until inspection (e.g. for BE20: W_{insp} = 1000 MJ).

Limit curve B:

For the area between curve A and curve B, W_{insp} must be divided by a factor of 10. The braking torque reduces to 80 % of the nominal value.

Limit curve C:

For the area between curve B and curve C, W_{insp} must be divided by a factor of 50. The braking torque reduces to 70 % of the nominal value.

Limit curve D:

For the area between curve C and curve D, W_{insp} must be divided by a factor of 100. The braking torque reduces to 60 % of the nominal value.

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BE11 brake

Value table W_{max} BE11:

n in rpm	Limit curve A BE11 (f_v = 1 / f_M = 1)	Limit curve B BE11 (f_v = 10 / f_M = 0.8)	Limit curve C BE11 (f_v = 50 / f_M = 0.7)	Limit curve D BE11 (f_v = 100 / f_M = 0.6)
1000	32	53	76	88
1100	29	48	70	80
1200	27	44	64	74
1300	25	41	59	68
1400	23	38	55	63
1500	22	35	51	59
1600	20	33	48	55
1700	19	31	45	52
1800	18	29	42	49
1900	17	28	40	46
2000	16	26	38	44
2100	15	25	36	42
2200	15	24	35	40
2300	14	23	33	38
2400	13	22	32	37
2500	13	21	31	35
2600	12	20	29	34
2700	12	20	28	33
2800	12	19	27	32
2900	11	18	26	30
3000	11	18	25	29
3100	10	17	25	28
3200	10	17	24	28
3300	10	16	23	27
3400	10	16	22	26
3500	9	15	22	25
3600	9	15	21	25

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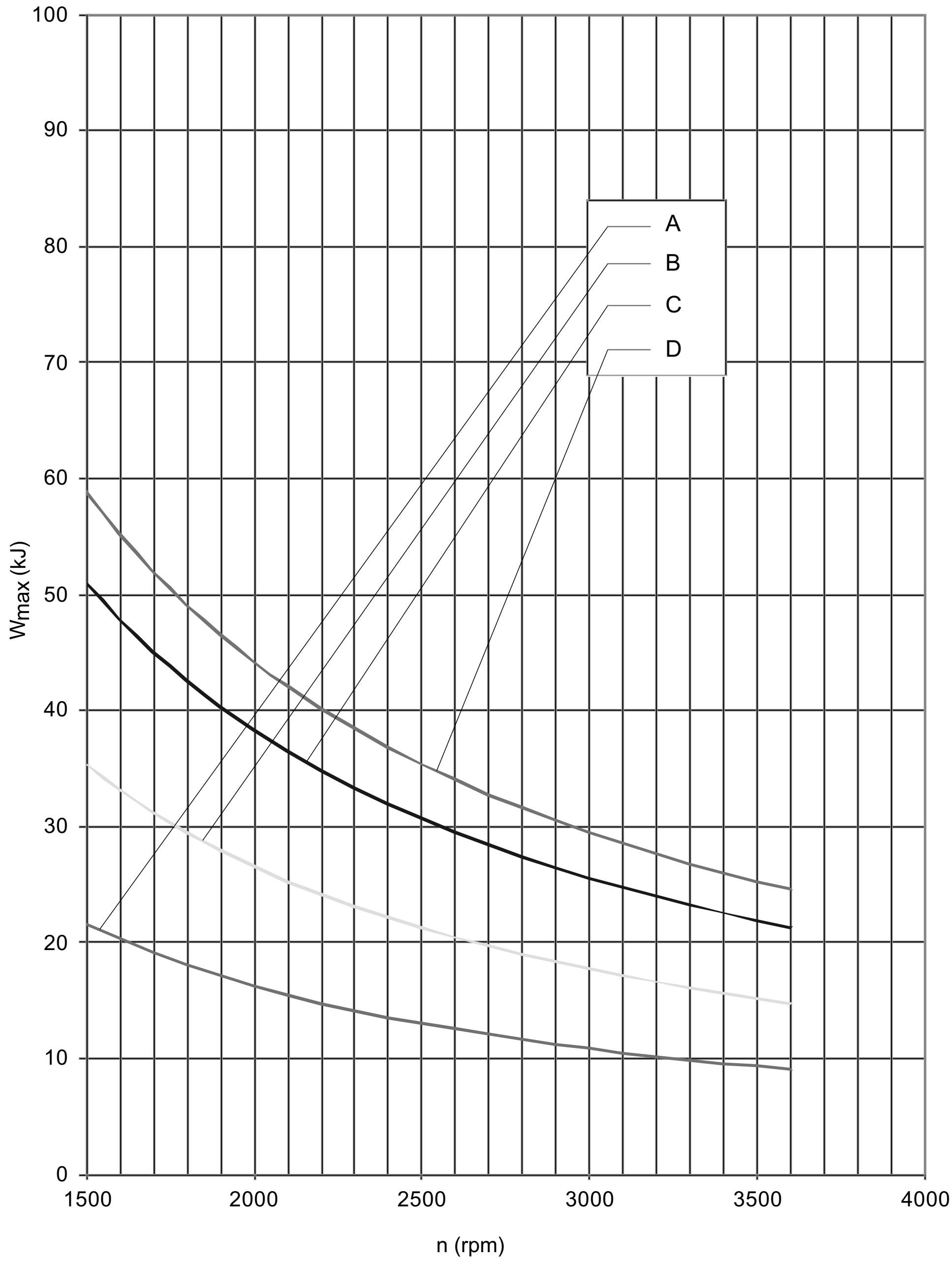
Diagram W_{max} BE11:



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BE20 brake

Value table W_{max} BE20:

n in rpm	Limit curve A BE20 (f_v = 1 / f_M = 1)	Limit curve B BE20 (f_v = 10 / f_M = 0.8)	Limit curve C BE20 (f_v = 50 / f_M = 0.7)	Limit curve D BE20 (f_v = 100 / f_M = 0.6)
1000	47	77	112	129
1100	43	70	102	117
1200	39	65	93	108
1300	36	60	86	99
1400	34	55	80	92
1500	32	52	75	86
1600	30	48	70	81
1700	28	46	66	76
1800	26	43	62	72
1900	25	41	59	68
2000	24	39	56	65
2100	23	37	53	61
2200	22	35	51	59
2300	21	34	49	56
2400	20	32	47	54
2500	19	31	45	52
2600	18	30	43	50
2700	18	29	41	48
2800	17	28	40	46
2900	16	27	39	45
3000	16	26	37	43
3100	15	25	36	42
3200	15	24	35	40
3300	14	23	34	39
3400	14	23	33	38
3500	14	22	32	37
3600	13	22	31	36

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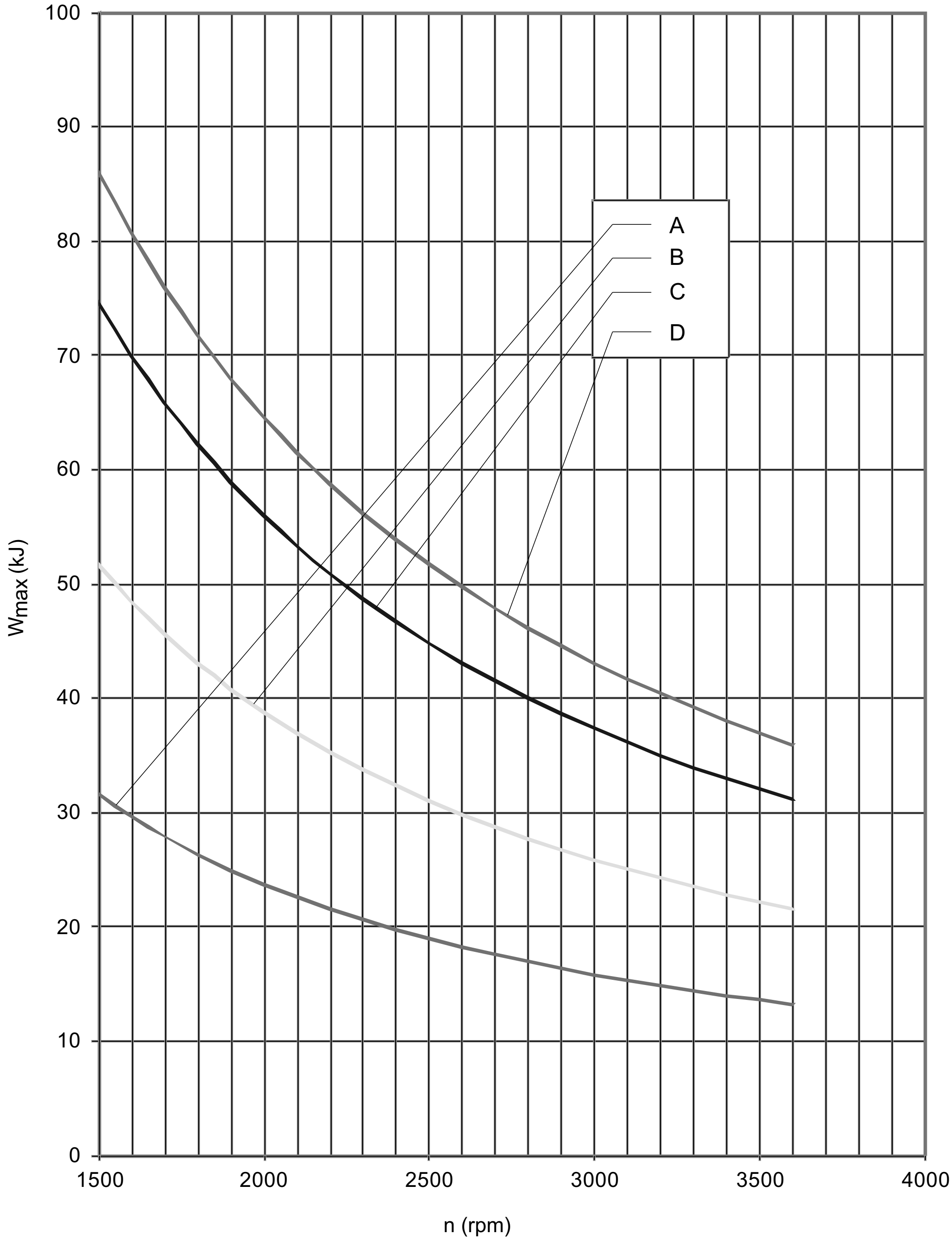
Diagram W_{max} BE20:



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BE30 brake

Value table W_{max} BE30:

n in rpm	Limit curve A BE30 (f_v = 1 / f_M = 1)	Limit curve B BE30 (f_v = 10 / f_M = 0.8)	Limit curve C BE30 (f_v = 50 / f_M = 0.7)	Limit curve D BE30 (f_v = 100 / f_M = 0.6)
1000	56	92	131	153
1100	51	83	119	139
1200	46	76	109	127
1300	43	70	101	117
1400	40	65	93	109
1500	37	61	87	102
1600	35	57	82	95
1700	33	54	77	90
1800	31	51	73	85
1900	29	48	69	80
2000	28	46	65	76
2100	27	44	62	73
2200	25	42	59	69
2300	24	40	57	66
2400	23	38	54	64
2500	22	37	52	61
2600	21	35	50	59
2700	21	34	48	56
2800	20	33	47	54
2900	19	32	45	53
3000	19	31	44	51
3100	18	30	42	49
3200	17	29	41	48
3300	17	28	40	46
3400	16	27	38	45
3500	16	26	37	44
3600	15	25	36	42

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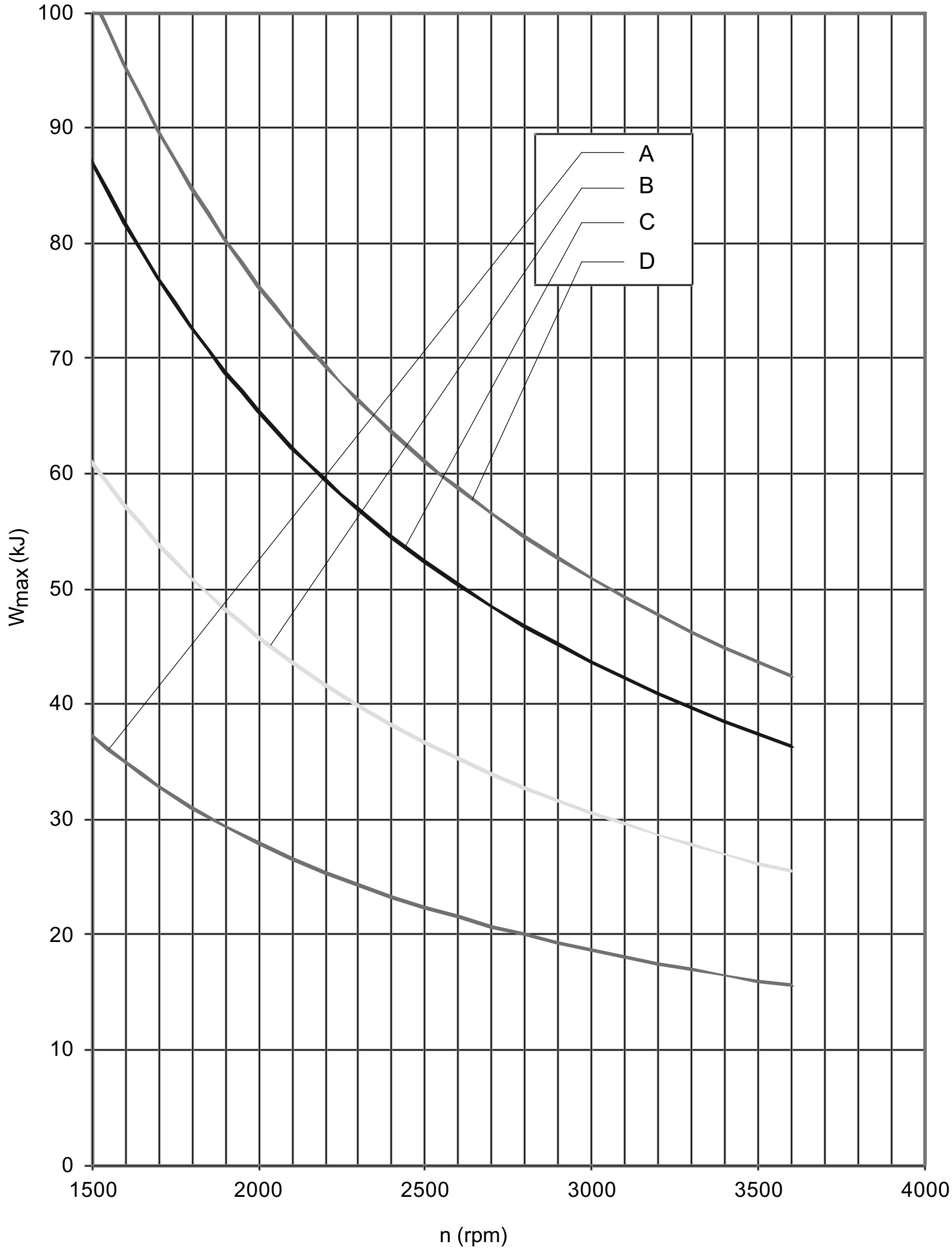
Diagram W_{max} BE30:



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BE32 brake

Value table W_{max} BE32:

n in rpm	Limit curve A BE32 (f_v = 1 / f_M = 1)	Limit curve B BE32 (f_v = 10 / f_M = 0.8)	Limit curve C BE32 (f_v = 50 / f_M = 0.7)	Limit curve D BE32 (f_v = 100 / f_M = 0.6)
1000	96	157	224	261
1100	87	143	204	238
1200	80	131	187	218
1300	74	121	172	201
1400	68	112	160	187
1500	64	105	149	174
1600	60	98	140	163
1700	56	92	132	154
1800	53	87	124	145
1900	50	83	118	138
2000	48	78	112	131
2100	46	75	107	125
2200	44	71	102	119
2300	42	68	97	114
2400	40	65	93	109
2500	38	63	90	105
2600	37	60	86	101
2700	36	58	83	97
2800	34	56	80	93
2900	33	54	77	90
3000	32	52	75	87
3100	31	51	72	84
3200	30	49	70	82
3300	29	48	68	79
3400	28	46	66	77
3500	27	45	64	75
3600	27	44	62	73

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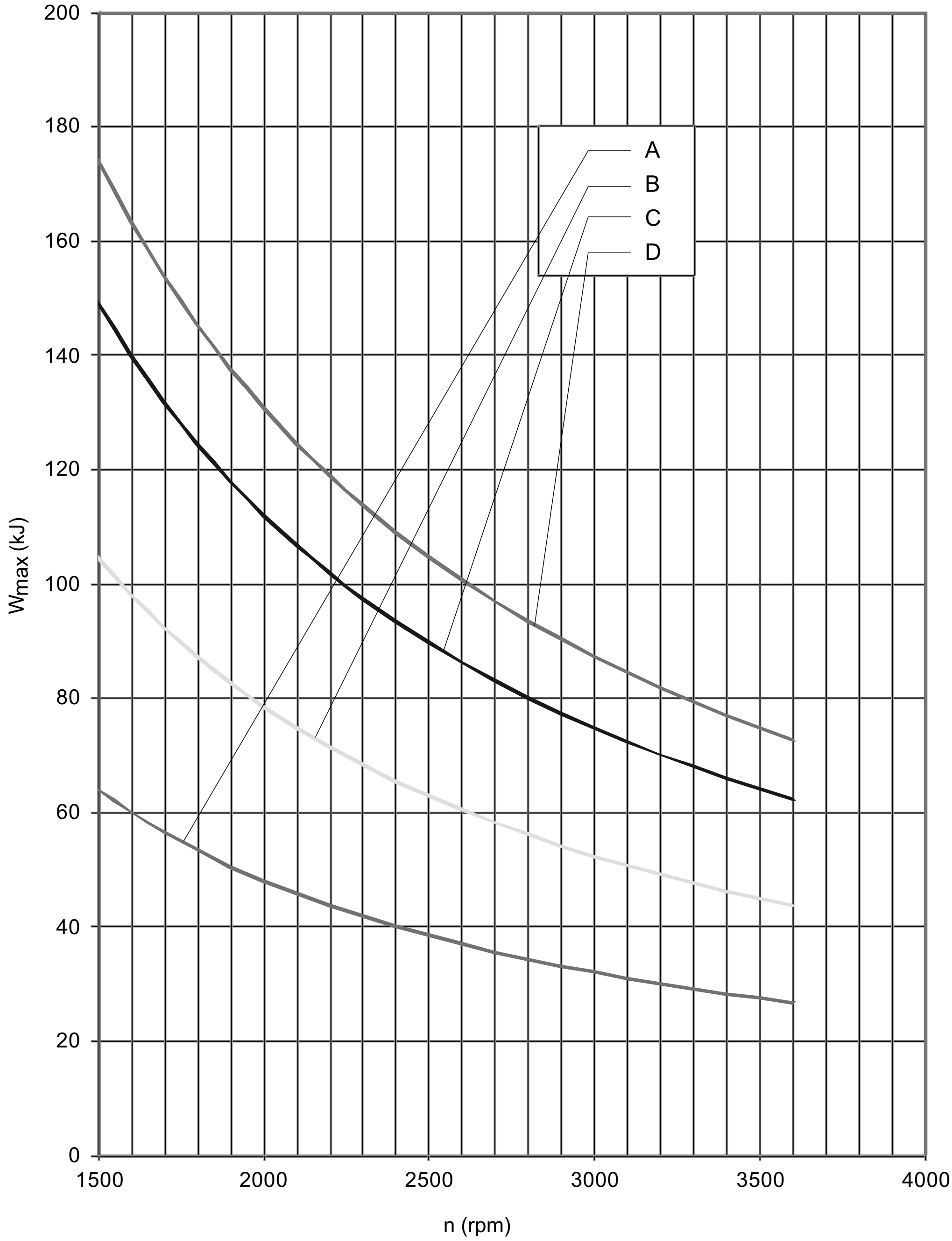
Diagram W_{max} BE32:



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8.12 BST safety-related brake control

8.12.1 Description

The safety-related BST brake module is responsible for the power supply and control of the SEW disk brakes. The design is based on the regulations contained in EN 13849-1.

The following safety functions can be realized using the safety-related brake module:

- SBC (safe brake control according to EN ISO 61800-5-2)

8.12.2 Performance level

The safety-related BST brake module was developed and tested according to the following safety requirements:

- Performance level d according to EN ISO 13849-1

8.12.3 Safety concept

- The safety-related BST brake module features the following connection options:
  - an external, fail-safe safety relay

    or
  - an external fail-safe safety controller.
- Disconnecting the safe control voltage $V_{24\ V\ safe}$ means the connected brake is disconnected from the power supply. The power supply required for releasing the brake is interrupted safely.
- Instead of separating the brake control galvanically from the power supply using contactors or switches, the safe disconnection safely prevents the power semiconductors in the safety-related BST brake module from being activated. This means that all connected brakes are de-energized although the supply voltage is still present at the safety-related BST brake module.

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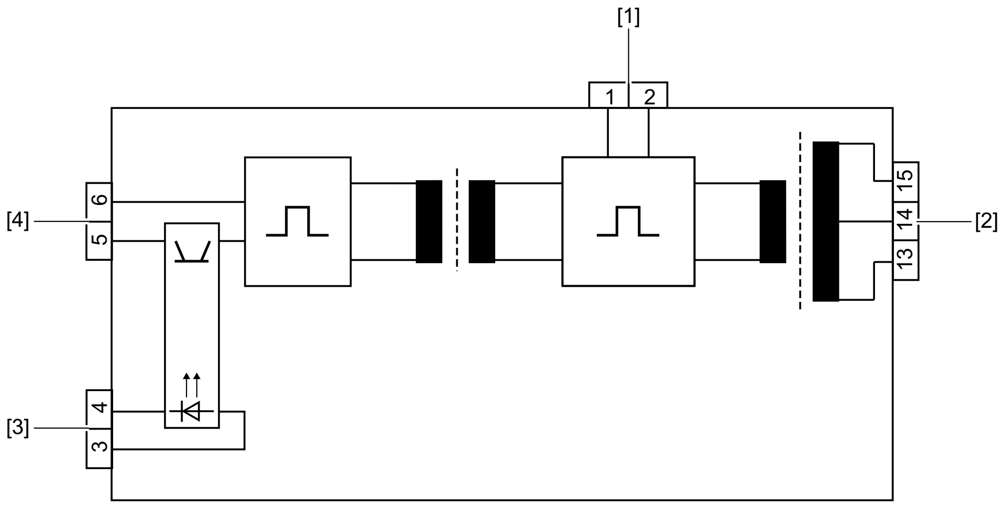
8.12.4 BST break module block diagram



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[1] DC link voltage V_{DC} (terminal 1/2) input

[2] Brake (terminal 13/14/15) output

[3] Functional control voltage $V_{24\ V\ in}$ (terminal 3/4) input

[4] Safety-related control voltage $V_{24\ V\ safe}$ (terminal5/6) input

8.12.5 BST brake module - technical data

The following table lists the technical data of the BST brake modules for installation in the control cabinet and the assignments with regard to motor size and connection technology.

Type	Function	Voltage	Holding current	Type designation	Part number
BST	Safety-related brake module	AC 230 V	DC 1.2 A	BST 1.2S	13001337
		AC 400 V	DC 0.7 A	BST 0.7S	13000772
		AC 460 V	DC 0.6 A	BST 0.6S	08299714

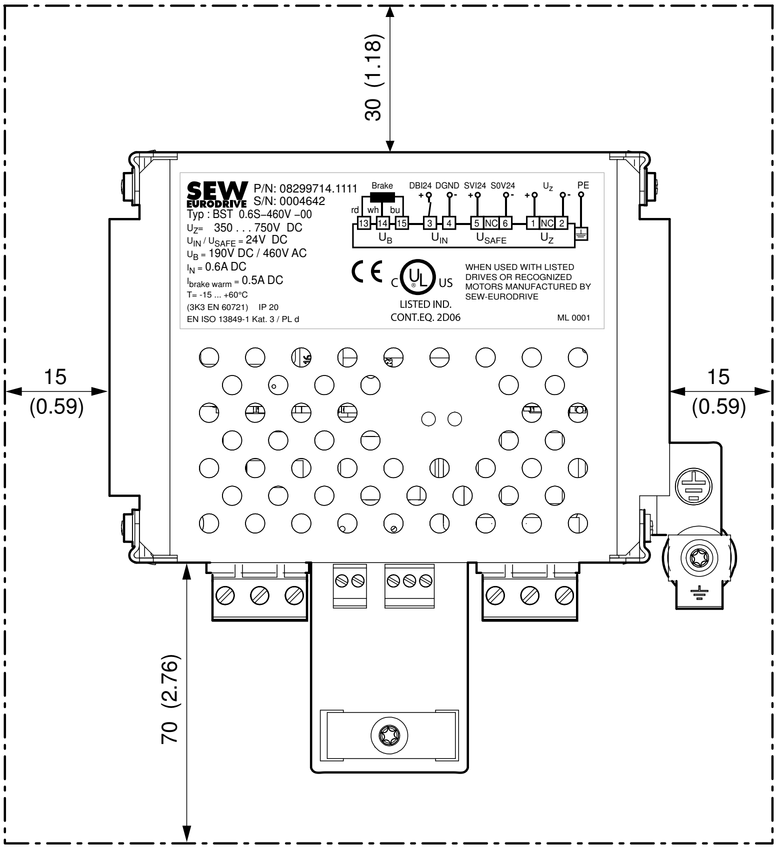
Type	Type designation	Standard connection box	IS /plug connector	IV /plug connector (/AC.., /AS.., /AM.., /AB.., /AD.., /AK..)
BST	BST 1.2S	DR.71 – 225 BE05 – BE32	DR.71 – 132 BE05 – BE11	DR.71 – 225 BE05 – BE32
	BST 1.0S	DR.71 – 225 BE05 – BE32	DR.71 – 132 BE05 – BE11	DR.71 – 225 BE05 – BE32
	BST 0.7S	DR.71 – 225 BE05 – BE32	DR.71 – 132 BE05 – BE11	DR.71 – 225 BE05 – BE32

Information on design

The BST brake module is used within the application with a standard brake or a safety-related brake.

Dimension drawing

The following dimension drawing shows the space required in the control cabinet.



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9 Encoders

9.1 Product description

9.1.1 Description

The encoder types in the DR.. modular motor system were developed in such a way that the requirement has been met for both a fully integrated design and a design which is as short as possible.

For motor size	Design
DR.71 – 132	Integrated in the motor
	Mounting via spread shaft
DR.160 – 280	Mounting via plug-in shaft
DR.315	Mounting via hollow shaft
DR.71 – 280	Mounting via coupling and solid shaft

See project planning note (→ 🗎 438) and technical data (→ 🗎 441).

9.1.2 Type designation

The type designation of the encoder or encoder mounting adapter is arranged in a four-digit, position coded structure.

The first position of the type designation defines the design of the encoder or encoder mounting adapter:

ID	Description
E	Incremental encoder
A	Absolute encoder
X	Encoders provided by the customer / encoder mounting adapter

The second position of the type designation states the mechanical design of the encoder mounting or the encoder mounting adapter:

ID	Description
I	Integrated in the motor
S	Spread shaft
G	Plug-in shaft with end thread
V	Solid shaft with coupling
H	Hollow shaft

The third position of the type designation shows the version of the encoder or encoder mounting adapter:

ID	Description
7	Series version of the motor
0 – 5	Identify of mounting adapter

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The fourth position of the type designation states the electrical interface of the encoder or encoder mounting adapter:

ID	Brief description
S	Sin/Cos
R	TTL (RS422) for U = 9 – 30 V
C	HTL
W	RS485 (Multi-Turn) + Sin/Cos
Y	SSI (Multi-Turn) + Sin/Cos or TTL(RS422)
A	Mounting device
6, 2, 1	Frequency

9.1.3 Pin assignment

You find the pin assignment of the respective encoder in the "Prefabricated cables" (→ 🗎 562) chapter.

9.1.4 Standardized mounting device for encoder

Type designation

/ES7A, /EG7A, /EH7A, EV7A

Description

The encoder from SEW-EURODRIVE is not included in the scope of delivery. Only prepared for installation of an encoder. The motor shaft is predrilled and an additional protective cover is mounted.

Principle of installation:

DR.71 – 132 .../ES7A

The encoder is connected as non-positive connection with the motor shaft bore using a spread shaft. The torque arm is attached to the fan guard from outside.

Bore with Ø 10 mm.

DR.160 – 280 .../EG7A

The encoder with outer thread on the encoder shaft is fastened in the shaft bore (with internal thread). The torque arm is attached to the fan guard from inside.

Bore with Ø 14 mm, and additional end thread in M6.

DR.315 .../EH7A

The hollow shaft encoder is mounted on the B-side motor shaft end Ø 38 mm.

DR.71 – 280 .../EV7A

The encoder is attached using a coupling, encoder: EV7A, centering flange Ø 50 mm, coupling for shaft Ø 10 mm.

See technical data (→ 🗎 450).

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9.1.5 Non-SEW encoder mounting

Type designation

/XV..

Description

This type of mounting allows the use of non-SEW encoders in motors from SEW-EURODRIVE. The encoder requested by the customer is installed by SEW.

A fan guard with encoder mount allows the encoder to be mounted on the motor shaft. The encoder shaft is connected to the motor shaft via spread shaft coupling.

The non-SEW encoder can also be mounted by the customer. In this case the mounting adapter /XV.A must also be ordered.

The part of the second shaft end which is still protruding following the encoder mounting must be secured with either an extended fan guard or with a cover.

See technical data (→ 🗎 450).

9.1.6 Mechanical interface for mounting non-SEW encoders by the customer

Type designation

Non-SEW encoder mounting devices

- /XV0A Any shaft diameter and centering
- /XV1A Shaft diameter 6 mm; centering 50 mm
- /XV1A Shaft diameter 10 mm; centering 50 mm
- /XV3A Shaft diameter 12 mm; centering 80 mm
- /XV3A Shaft diameter 11 mm; centering 85 mm
- /XV5A Shaft diameter 12 mm; centering 45 mm

Description

The non-SEW mounting adapter allows non-SEW encoders to be mounted to the motor via a shaft coupling.

The non-SEW encoder is not yet installed, only the mechanical interface is prepared for mounting the encoder.

The encoder shaft is connected to the motor shaft via a coupling.

See technical data (→ 🗎 450).

9.1.7 Built-in encoder

Type designation

/EI71, /EI72, /EI76, /EI7C

Description

Sensor scan of a magnetic pole ring which is integrated within the plastic fan.

Suitable for simple positioning and speed monitoring tasks.

The sensor unit is located directly behind the B-side endshield, when a brake motor is used, on two spacers behind the brake coil or behind the backstop for a motor with a backstop.

The E17 encoders can be evaluated as follows:

- MOVITRAC® in the technology version: Evaluation via "Simple positioning" application software
- MOVIFIT® FC with "technology" function level
- MOVIMOT® with fieldbus interfaces MQ (with EI71, 2 and 6) and MF (with EI71)
- MOVIPRO® with encoder option
- MOVIDRIVE®
- MOVIAXIS®

The safety-rated encoder EI7C FS can be evaluated as follows:

- MOVIFIT® FC: Functional safety with safety option S12

See technical data (→ 🗎 445).

Connection technology, see chapter "Built-in encoder cable" (→ 🗎 591).

9.2 Designs

9.2.1 Encoders

The following designs are available:

Incremental encoder

These encoders provide an incremental resolution of a single motor revolution.

ID	Description
EI7	+ letter or number for the resolution of the electrical interface EI7C = 24 periods/revolution, EI71= 1 periods/revolution, EI72 = 2 periods/revolution, EI76 = 6 periods/revolution
ES7	+ letter for the electrical interface (→ 🗎 431)
EG7	+ letter for the electrical interface (→ 🗎 431)
EV7	+ letter for the electrical interface (→ 🗎 431)

Absolute encoder

These encoders provide an incremental resolution of a single motor revolution and also count the number of motor revolutions, which is equivalent to absolute information regarding the position.

ID	Description
AS7	+ letter for the electrical interface (→ 🗎 431)
AG7	
AV7	

9.2.2 Encoder mounting adapters

A SEW encoder is prepared for mounting with the use of the encoder mounting adapter.

The following encoder mounting adapter designs are available for SEW encoders:

ID	Description
ES7A	for SEW spread-shaft encoders on DR.71 – 132
EG7A	for SEW Plug-in shaft encoders with end thread DR.160 – 280
EV7A	for SEW spread-shaft encoders on DR.71 – 225

9.2.3 Encoders provided by the customer

Encoders

The mounting adapters allow a customer encoder to be mounted on the DR..motor.

The following designs of customer encoders and encoder mounting adapters are available:

ID	Mounting device
XV0	+ letter for the electrical interface
XV1	
XV2	
XV3	
XV4	
XV5	

The encoder is supplied mounted on the motor if it

- is provided by the customer

  or
- is bought by SEW-EURODRIVE according to customer data.

Electrical interfaces

The electrical interfaces in the chapter "Type designation" (→ 🗎 431) represent only some of the options for encoders provided by the customer. Customer encoders have already been mounted in DR..motors with the following interfaces:

ID	Brief description
B	HTL, without inverted signals
S	DeviceNet
E	EnDat
N	CAN bus
P	PROFIBUS
T	TTL (RS422) with U = 5 V and sensor lines

INFORMATION

Encoders provided by the customer which are supplied fitted cannot undergo functional final inspection however.

Encoder mounting adapters

The alternative to delivery with a fitted customer encoder is the mounting adapter.

ID	Mounting device
XV0A	for encoders shown in the chapter "Encoder mounting adapter – SEW encoders" (→ 🗎 450)
XV1A	
XV2A	
XV3A	
XV4A	
XV5A	

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Addition mounting adapter for encoders provided by the customer can be requested from SEW-EURODRIVE. It is possible to combine hollow shaft encoders with the second shaft end of DR..motors.

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9.3 General information on drive selection

9.3.1 Speed sensors

Speed sensors, which can be mounted to 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.

9.3.2 Encoder connection

When connecting the encoders to the inverters, always follow the operating instructions for the inverter and the wiring diagrams supplied with the encoders.

- The maximum line length (inverter – encoder) is 100 m for the following cable capacitance:
  - < 83 nF/km (core / core) according to DIN VDE 0472 part 504
  - < 110 nF/km (core / shield)
- The potential clamped core cross section is 0.20 – 0.5 mm^2
- Use shielded cables with twisted pair conductors and make sure they are grounded on both ends over a large surface area:
  - At the encoder in the cable gland or in the encoder plug
  - To the inverter on the electronics shield clamp and/or to the housing of the sub D plug
- Install the encoder cables separately from the power cables, maintaining a distance of at least 200 mm (7.87 in).
- Encoder with screw fitting: Observe the permitted diameter of the encoder cable to ensure that the cable gland functions correctly.

9.3.3 Connection alternatives

Encoder types /ES7, /EG7, /EV7 and /AS7, /AG7, /AV7 can be delivered in three connection variations:

- with connection cover
- with connection cover, cable length 0.3 m and M23 connector
- without connection cable

SEW-EURODRIVE recommends to use prefabricated encoder cables (→ 🗎 562).

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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9.4 Overview of the electrical interfaces

9.4.1 Overview of built-in encoders

Electrical interface HTL (push-pull)

Designation	To match the motor size	Encoder type	Mounting type	Specification Periods/revolution	Power supply V
EI7C	71 – 132	Built-in encoder	Integrated	24	DC 9 – 30
EI76				6	
EI72				2	
EI71				1	

9.4.2 Overview of incremental encoders

Electrical interface Sin / Cos with 1 V_{ss}

Designation	To match the motor size	Encoder type	Mounting type	Specification Periods/revolution	Power supply V
ES7S	71 – 132	Add-on encoder	Shaft-centered	1024	DC 7 – 30
EG7S	160 – 280				
EH7S	315		Hollow shaft		DC 10 – 30
EV7S	71 – 280		Coupling		DC 7 – 30

Electrical interface HTL (push-pull)

Designation	To match the motor size	Encoder type	Mounting type	Specification Periods/revolution	Power supply V
ES7C	71 – 132	Add-on encoder	Shaft-centered	1024	DC 4.75 – 30
EG7C	160 – 280				
EH7C	315		Hollow shaft		DC 10 – 30
EV7C	71 – 280		Coupling		DC 4.75 – 30

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Electrical interface TTL (RS422)

Designation	To match the motor size	Encoder type	Mounting type	Specification Periods/revolution	Power supply V
ES7R	71 – 132	Add-on encoder	Shaft-centered	1024	DC 7 – 30
EG7R	160 – 280				
ES7C[1)]	71 – 132				DC 4.75 – 5.25
EG7C[1)]	160 – 280				
EH7R	315		Hollow shaft		DC 10 – 30
EH7T	315				DC 5
EV7R	71 – 280		Coupling		DC 7 – 30

1) ES7C and EG7C can also be used as TTL (RS422) due to the wide range voltage supply

9.4.3 Overview of absolute encoders

Electrical interface RS485 (Multi-Turn) + Sin / Cos with 1 V_{ss}

Designation	To match the motor size	Encoder type	Mounting type	Specification Periods/revolution	Power supply V
AS7W	71 – 132	Absolute encoder (Multi-Turn)	Shaft-centered	2048	DC 7 – 30
AG7W	160 – 280				
AV7W	71 – 280		Coupling		

Electrical interface SSI (Multi-Turn) + Sin / Cos with 1 V_{ss}

Designation	To match the motor size	Encoder type	Mounting type	Specification Periods/revolution	Power supply V
AS7Y	71 – 132	Absolute encoder SSI® (Multi-Turn)	Shaft-centered	2048	DC 7 – 30
AG7Y	160 – 280				
AV7Y	71 – 280		Coupling		

Electrical interface SSI (Multi-Turn) + TTL (RS422)

Designation	To match the motor size	Encoder type	Mounting type	Specification Periods/revolution	Power supply V
AH7Y	315	Absolute encoder SSI® (Multi-Turn)	Hollow shaft	2048	DC 9 – 30

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9.5 Encoder technical data

The following tabular overviews detail the encoders' technical data, sorted based on the electrical interfaces and sizes.

9.5.1 Sin/Cos encoder

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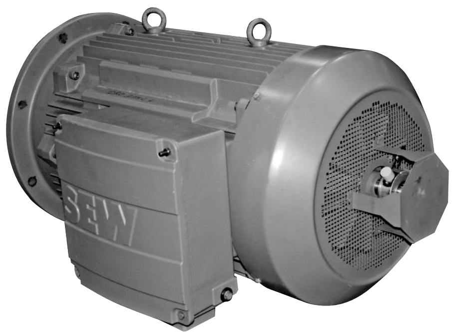
Encoders		ES7S	EG7S
For motor size		**DR.71 – 132**	**DR.160 – 280**
Mounting type		Shaft-centered; spread shaft / plug-in shaft	
Supply voltage U_B	V	DC 7– 30	
Max. current consumption I_{in}	mA	140	
Output amplitude per track U_{high} U_{low}	V_{ss}	1	
Signal output		Sine/cosine	
Output current per track $I_{out, RMS}$	mA	10	
Max. pulse frequency f_{max}	kHz	150	
Pulses (sine cycles) per A, B Revolution C		1024 1	
Phase angle A : B		90° ± 3°	
Data memory		1920	
Vibration resistance at 10 Hz – 2 kHz	m/s^2	≤ 100 pursuant to EN 60068-2-6	
Shock resistance	m/s^2	≤ 1000 pursuant to EN 60068-2-27	≤ 2000 pursuant to EN 60068-2-27
Maximum speed n_{max}	rpm	6000	
Ambient temperature[1)]	°C	-30 to +80	-30 to +60
		pursuant to EN 60721-3-3, class 3K3	
Degree of protection		IP66 (EN 60529)	
Connection		Terminal strip in pluggable connection cover	
Clamping range of the cable gland	mm	Ø 5 – 10	
Additional weight	kg	1.1	1.4

1) Ambient temperature for safety-rated encoders

See Product description (→ 🗎 431).



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Encoders		EH7S
For motor size		DR.315
Mounting type		Hollow shaft
Supply voltage U_B	V	DC 10 – 30
Max. current consumption I_{in}	mA	130
Output amplitude U_{high} U_{low}	V_{ss}	1
Signal output		Sine / Cosine
Output current per track $I_{out, RMS}$	mA	10
Max. pulse frequency f_{max}	kHz	180
Periods per revolution A, B C		 1024 1
Phase angle A : B		90° ± 10°
Data memory		-
Vibration resistance at 10 Hz – 2 kHz	m/s^2	≤ 100 pursuant to EN 60068-2-6
Shock resistance	m/s^2	≤ 2000 pursuant to EN 60068-2-27
Maximum speed n_{max}	rpm	6000, 2500 at 60 °C
Ambient temperature	°C	-40 to +60 pursuant to EN 60721-3-3, Class 3K3
Degree of protection		IP65 according to EN 60529
Connection		12-pin plug connector
Additional weight	kg	2.85

See Product description (→ 🗎 431).

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9.5.2 TTL (RS422)

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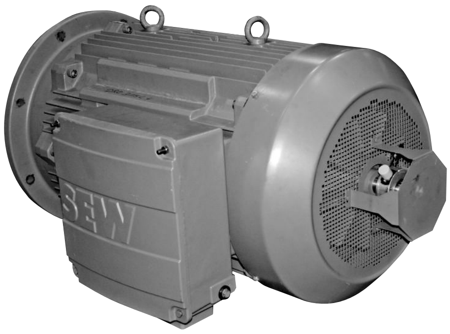
Encoders		ES7R	EG7R
For motor size		DR.71 – 132	DR.160 – 280
Mounting type		Shaft-centered; spread shaft / plug-in shaft	
Supply voltage U_B	V	DC 7 – 30	
Max. current consumption I_{in}	mA	160	
Output amplitude U_{high} U_{low} (for terminating resistance = 120 Ω)	V	 ≥ 2.5 ≤ 1.1	
Signal output		TTL (RS422)	
Output current per track $I_{out, RMS}$	mA	25	
Max. pulse frequency f_{max}	kHz	120	
Periods per revolution A, B C		 1024 1	
Pulse duty factor		1 : 1 ± 10 %	
Phase angle A : B		90° ± 20°	
Vibration resistance at 10 Hz – 2 kHz	m/s^2	≤ 100 pursuant to EN 60068-2-6	≤ 2000 pursuant to EN 60068-2-6
Shock resistance	m/s^2	≤ 100 pursuant to EN 60068-2-27	≤ 2000 pursuant to EN 60068-2-27
Maximum speed n_{max}	rpm	6000	
Ambient temperature	°C	-30 to +60 pursuant to EN 60721-3-3, Class 3K3	
Degree of protection		IP66 according to EN 60529	
Connection		Terminal strip in pluggable connection cover	
Clamping range of the cable gland	mm	Ø 5 – 10	
Additional weight	kg	1.1	1.4

See Product description (→ 🗎 431).



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Encoders		EH7R	EH7T
For motor size		**DR.315**	
Mounting type		Hollow shaft	
Supply voltage U_B	V	DC 10 – 30	DC 5
Max. current consumption I_{in}	mA	140	
Output amplitude U_{high} U_{low}	V	 ≥ 2.5 ≤ 0.5	
Signal output		TTL (RS422)	
Output current per track $I_{out, RMS}$	mA	20	
Max. pulse frequency f_{max}	kHz	300	
Periods per revolution A, B C		 1024 1	
Pulse duty factor		1 : 1 ± 20 %	
Phase angle A : B		90° ± 20°	
Vibration resistance at 10 Hz – 2 kHz	m/s^2	≤ 100 pursuant to EN 60068-2-6	
Shock resistance	m/s^2	≤ 2000 pursuant to EN 60068-2-27	
Maximum speed n_{max}	rpm	6000, 2500 at 60 °C	
Ambient temperature	°C	-40 to +60 pursuant to EN 60721-3-3, Class 3K3	
Degree of protection		IP65 according to EN 60529	
Connection		12-pin plug connector	

See Product description (→ 🗎 431).

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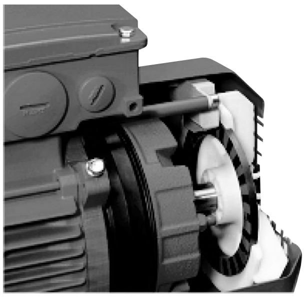
9.5.3 HTL sensor



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Encoders		EI7C	EI76	EI72	EI71
For motor size		DR.71 – 132			
Mounting type		integrated			
Supply voltage U_B	V	DC 9 – 30			
Max. current consumption I_{in}	mA	120			
Output amplitude U_{high} U_{low}	V	V_{cc} - 3.5 to V_{cc} 0 to 3			
Signal output		HTL (push-pull)			
Output current per track I_{out}	mA	± 60			
Max. pulse frequency f_{max}	kHz	1.44			
Periods per revolution A, B C		24 0	6 0	2 0	1 0
Pulse duty factor		1 : 1 ± 20 %			
Phase angle A : B		90° ± 20°			
Vibration resistance at 5 Hz – 2 kHz	m/s^2	≤10 g (98.1 m/s²) pursuant to EN 60068-2-6			
Shock resistance	m/s^2	≤100 g (981 m/s²) pursuant to EN 60068-2-27			
Maximum speed n_{max}	rpm	3600			
Ambient temperature	°C	Motor: -30 to +60 Encoders: -30 to +85			
Degree of protection		IP66			
Connection		Connection unit in the terminal box or M12 (8- or 4-pin)			

See Product description (→ 🗎 433).

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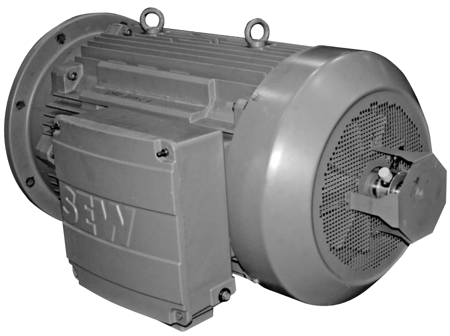
Encoders		ES7C	EG7C
For motor size		DR.71 – 132	DR.160 – 280
Mounting type		Shaft-centered; spread shaft / plug-in shaft	
Supply voltage U_B	V	DC 4.75 – 30	
Max. current consumption I_{in}	mA	250	
Output amplitude per track U_{high} U_{low} U_b = 4.75 – 6 V, terminating resistance = 120 Ω	V_{ss}	≥ 2.5 ≤ 1.1	
Output amplitude per track U_{high} U_{low} U_b = 6 – 30 V, terminating resistance = 1 – 3 kΩ	V_{ss}	≥ U_b - 2.5 ≤ 3	
Signal output		Extended HTL[1)]	

Encoders		ES7C	EG7C
For motor size		DR.71 – 132	DR.160 – 280
Output current per track $I_{out, RMS}$	mA	60	
Max. pulse frequency f_{max}	kHz	120	
Pulses (sine periods) per A, B Revolution C		1024 1	
Pulse duty factor		1 : 1 ± 10 %	
Phase angle A : B		90° ± 20°	
Vibration resistance at 10 Hz – 2 kHz	m/s²	≤ 100 pursuant to EN 60068-2-6	
Shock resistance	m/s²	≤ 100 pursuant to EN 60068-2-27	≤ 2000 pursuant to EN 60068-2-27
Maximum speed n_{max}	rpm	6000	
Ambient temperature	°C	-30 to +60 pursuant to EN 60721-3-3, Class 3K3	
Degree of protection		IP66 according to EN 6052	
Connection		Terminal strip in pluggable connection cover	
Clamping range of the cable gland	mm	Ø 5 – 10	
Additional weight	kg	0.35	0.35

1) for Ub = 4.75 – 6 V can be used as TTL (RS422) encoder

See Product description (→ 🗎 431).



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Encoders		EH7C
For motor size		DR.315
Mounting type		Hollow shaft
Supply voltage U_B	V	DC 10 – 30
Max. current consumption I_{in}	mA	225
Output amplitude per track U_{high} U_{low} U_b = 10 – 30 V, terminating resistance = 1 – 3 kΩ	V_{ss}	 ≥ U_b- 2.5 ≤ 3
Signal output		HTL
Output current per track $I_{out, RMS}$	mA	30
Max. pulse frequency f_{max}	kHz	300
Pulses (sine cycles) per A, B Revolution C		 1024 1
Pulse duty factor		1 : 1 ± 20 %
Phase angle A : B		90° ± 20°
Vibration resistance at 10 Hz – 2 kHz	m/s²	≤ 100 pursuant to EN 60068-2-6
Shock resistance	m/s²	≤ 2000 pursuant to EN 60068-2-27
Maximum speed n_{max}	rpm	6000, 2500 at 60 °C
Ambient temperature	°C	-40 to +60 pursuant to EN 60721-3-3, Class 3K3
Degree of protection		IP65 (EN 60529)
Connection		12-pin plug connector

See Product description (→ 🗎 431).

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9.5.4 RS485 (Multi-Turn) + Sin / Cos

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Encoders		AS7W	AG7W
For motor size		**DR.71 – 132**	**DR.160 – 280**
Mounting type		Shaft-centered: spread shaft / plug-in shaft	
Supply voltage U_B	V	DC 7 – 30	
Max. current consumption I_{in}	mA	140	
Output amplitude	V	1	
Signal output		Sine/cosine	
Output current per track $I_{out, RMS}$	mA	10	
Max. pulse frequency f_{max}	kHz	200	
Periods per revolution A, B C		2048 -	
Phase angle A : B		90° ± 3°	
Absolute encoder scanning code		Binary code	
Resolution • Single-turn • Multi-turn		8192 increments / revolution 65536 revolutions	
Data transmission of absolute value		Asynchronous, serial (RS485)	
Serial data output		Driver to EIA RS485	
Serial clock input		Optocoupler, recommended driver to EIA RS485	
Data memory		1920 Byte	
Vibration resistance at 10 Hz – 2 kHz	m/s^2	≤ 100 pursuant to EN 60068-2-6	≤ 2000 pursuant to EN 60068-2-6
Shock resistance	m/s^2	≤ 100 pursuant to EN 60068-2-27	≤ 2000 pursuant to EN 60068-2-27
Maximum speed n_{max}	rpm	6000	
Ambient temperature[1)]	°C	-30 to +60 pursuant to EN 60721-3-3, Class 3K3	
Degree of protection		IP66 according to EN 60529	
Connection		Terminal strip in pluggable connection cover	
Clamping range of the cable gland	mm	Ø 5 – 10	
Additional weight	kg	1.15	1.45

1) Ambient temperature for safety-rated encoders

See Product description (→ 🗎 431).

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9.5.5 SSI (Multi-Turn) + Sin / Cos

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Encoders		AS7Y	AG7Y
For motor size		**DR.71 – 132**	**DR.160 – 280**
Mounting type		Shaft-centered: spread shaft / plug-in shaft	
Supply voltage U_B	V	DC 7 – 30	
Max. current consumption I_{in}	mA	140	
Output amplitude	V	1	
Signal output		Sine/cosine	
Output current per track $I_{out, RMS}$	mA	10	
Max. pulse frequency f_{max}	kHz	200	
Periods per revolution A, B C		 2048 -	
Phase angle A : B		90° ± 3°	
Absolute encoder scanning code		Gray Code	
Resolution • Single-turn • Multi-turn		 4096 increments / revolution 4096 revolutions	
Data transmission of absolute value		Synchronous, serial (SSI)	
Serial data output		Driver to EIA RS485	
Serial clock input		Optocoupler, recommended driver to EIA RS485	
Clock rate	kHz	Permitted range: 100 – 2000 (max. 100 m cable length with 300 kHz)	
Clock-pulse space period	ms	12 – 30	
Vibration resistance at 10 Hz – 2 kHz	m/s^2	≤ 100 pursuant to EN 60068-2-6	≤ 2000 pursuant to EN 60068-2-6
Shock resistance in m/s^2	m/s^2	≤ 100 pursuant to EN 60068-2-27	≤ 2000 pursuant to EN 60068-2-27
Maximum speed n_{max}	rpm	6000	
Ambient temperature[1)]	°C	-30 to +60 pursuant to EN 60721-3-3, Class 3K3	
Degree of protection		IP66 according to EN 60529	
Connection		Terminal strip in pluggable connection cover	
Clamping range of the cable gland	mm	Ø 5 – 10	
Additional weight	kg	1.15	1.45

1) Ambient temperature for safety-rated encoders

See Product description (→ 🗎 431).

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9.5.6 SSI (Multi-Turn) Sin/Cos or TTL (RS422)

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Encoders		AH7Y
For motor size		**DR.315**
Mounting type		Hollow shaft
Supply voltage U_B	V	DC 9 – 30
Max. current consumption I_{in}	mA	160
Output amplitude U_{high} U_{low}	V_{ss}	 ≥ 2.5 ≤ 0.5
Signal output		TTL (RS422)
Output current per track $I_{out, RMS}$	mA	20
Max. pulse frequency f_{max}	kHz	120
Periods per revolution A, B C		 2048 -
Pulse duty factor		1 : 1 ± 20 %
Phase angle A : B		90° ± 20°
Absolute encoder scanning code		Gray Code
Resolution		
• Single-turn • Multi-turn		4096 increments / revolution 4096 revolutions
Data transmission of absolute value		Synchronous, serial (SSI)
Serial data output		Driver to EIA RS485
Serial clock input		Optocoupler, recommended driver to EIA RS485
Clock rate	kHz	Permitted range: 100 – 800 (max. 100 m cable length with 300 kHz)
Clock-pulse space period	ms	12 – 30
Data memory		-
Vibration resistance at 10 Hz – 2 kHz	m/s^2	≤ 100 pursuant to EN 60068-2-6
Shock resistance	m/s^2	≤ 2000 pursuant to EN 60068-2-27
Maximum speed n_{max}	rpm	3500
Ambient temperature	°C	-20 to +60 pursuant to EN 60721-3-3, Class 3K3
Degree of protection		IP56 according to EN 60529
Connection		Terminal strip on encoder
Clamping range of the cable gland	mm	Ø 5 – 10
Additional weight	kg	4.55

See Product description (→ 🗎 431).

9.6 Technical data for the encoder mounting adapters

9.6.1 Encoder mounting adapters – SEW encoders

To retrospectively mount SEW encoders, the DR.. series motors can be fitted with a corresponding encoder mounting adapter, if desired.

The dimensions of the SEW encoder mounting adapters are displayed in the "Motor dimension sheets" (→ 🗎 203) chapter.

Encoder mounting adapter	**ES7A**	**EG7A**	**EH7A**
For motor size	**DR.71 – 132**	**DR.160 – 280[1)]**	**DR.315**
Mounting type of encoder	Shaft-centered		Hollow shaft
Motor shaft design	10 mm bore	14 mm bore with M6 threaded end	Shaft end 38 mm ×116 mm
Suitable for encoder	ES7S	EG7S	EH7S
	ES7R	EG7R	-
	AS7Y	AG7Y	AH7Y
	AS7W	AG7W	-

1) Brakemotor DR.250/280: EV7A

INFORMATION

The DR.250/280 motor can be delivered with the EG7A encoder mounting adapter, while the DR.250/280.. BE brakemotor can be delivered with the EV7A encoder mounting adapter.

See Product description (→ 🗎 432).

See the "Motor dimension sheets" (→ 🗎 203) chapter.

9.6.2 Encoder mounting adapter – customer encoder

On request, DR.. series motors can be equipped with various encoder mounting adapters for mounting customer-specific encoders from different manufacturers.

These encoders are usually attached using three encoder clamps (bolts with eccentric disks). The encoder shaft is connected to the motor shaft via a coupling.

The encoder is not included in the scope of delivery of SEW-EURODRIVE but is purchased and installed by the customer itself.

The dimensions of the customized encoder mounting adapters are displayed in the "Motor dimension sheets" (→ 🗎 203) chapter. Please request the necessary dimension sheets from SEW-EURODRIVE, if required.

INFORMATION

The combinations with forced cooling fan requires knowledge of the clearance lengths of the encoder to be mounted. Several forced cooling fan hoods with different lengths are available. Please contact SEW-EURODRIVE for more information.

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Encoder mounting adapter	XV0A	XV1A	XV2A	XV3A	XV4A	XV5A
For motor size	**DR.71 – 225**					
Mounting type of encoder	Flange centered with coupling					
Encoder shaft design	Any	6 mm	10 mm	12 mm	11 mm	12 mm
Centering	Any	50 mm	50 mm	80 mm	85 mm	45 mm
Suitable for encoder	Provided by the customer or by SEW-EURODRIVE on behalf of the customer.					

See Product description (→ 🗎 432).

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9.7 Safety-rated encoder technical data

The following table displays the data that is valid for all safety-rated encoder types ES7S, EG7S, AS7W, AG7W, AS7Y and AG7Y.

Designation	Value
Ambient temperature of encoder	-30 °C to +85 °C
Ambient temperature of motor	-20 °C to +40 °C
Storage temperature	-15 °C to +70 °C
Maximum speed	6000 rpm
Vibration resistance according to EN 60068-2-6	≤100 m/s^2 ≈ 10 g (at 10 Hz to 2 kHz)
Maximum angular acceleration	10^4 rad/s^2
Degree of protection according to EN 60529	IP66

9.7.1 Sin / Cos encoder data

The following table displays the data that is valid for all safety-rated encoder types ES7S and EG7S.

Designation	Value
Operating voltage	DC +7 to +30 V
Current consumption without load	100 mA
Resolution	sin/cos interface
	1024 periods/revolution
Accuracy	0.0194° (70 angular seconds) [1)]
Shock resistance according to EN 60068-2-27	ES7S: ≤ 1000 m/s^2 ≈ 100 g (6 ms)
	EG7S: ≤ 2000 m/s^2 ≈ 200 g (6 ms)

1) Due to the stiffness of the torque arm, you have to take into account an automatically resetting ± 0.6 ° twist (depending on the direction of rotation) of the encoder housing compared to the encoder shaft.

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9.7.2 HTL built-in encoder data

The following table displays the data that is valid for all safety-rated built-in encoder types EI7C FS.

Designation	Value
Operating voltage	DC +19.2 to +30 V
Current consumption without load	120 mA
Resolution of the incremental section	HTL interface
	24 periods/revolution
Max. output current per track	± 30 mA
Signal period tolerance	± 4 m%
Vibration resistance according to EN 60068-2-6	10 g (98.1 m/s^2); 5 – 2000 Hz
Shock resistance according to EN 60068-2-27	100 g (981 m/s^2); 6 ms
Ambient temperature of motor	-30 to +60
Ambient temperature of encoder	-30 to +85

9.7.3 Data on the RS485 in connection with Sin / Cos encoders

The following table displays the data that is valid for all safety-rated encoder types AS7W and AG7W.

Designation	Value
Operating voltage	DC +7 to +30 V
Current consumption without load	100 mA
Resolution of the incremental section	sin/cos interface
	2048 periods/revolution
Accuracy of the incremental section	0.0194° (70 angular seconds) 1)
Resolution of the absolute section	SSI interface, gray-coded
	12 bits = 4096 revolutions (single-turn)
	12 bits = 4096 revolutions (multi-turn)
Accuracy of the absolute section	± 1 LSB (least significant bit)
Cycle frequency of the absolute section	100 kHz to 800 kHz
Shock resistance according to EN 60068-2-27	AS7Y: ≤ 1000 m/s^2 ≈ 100 g (6 ms)
	AG7Y: ≤ 2000 m/s^2 ≈ 200 g (6 ms)

1) Due to the stiffness of the torque arm, you have to take into account an automatically resetting ± 0.6 ° twist (depending on the direction of rotation) of the encoder housing compared to the encoder shaft.

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9.7.4 Data on the multi-turn SSI in connection with Sin / Cos encoders

The following table displays the data that is valid for all safety-rated encoder types AS7Y and AG7Y.

Designation	value
Operating voltage	DC +7 to +30 V
Current consumption without load	100 mA
Resolution of the incremental section	sin/cos interface
	2048 periods/revolution
Accuracy of the incremental section	0.0194° (70 angular seconds) [1)]
Resolution of the absolute section	RS485 interface
	13 bits = 8192 revolutions (single-turn)
	16 bits = 65536 revolutions (multi-turn)
Accuracy of the absolute section	± 1 LSB (least significant bit)
Shock resistance according to EN 60068-2-27	AS7W: ≤ 1000 m/s^2 ≈ 100 g (6 ms)
	AG7W: ≤ 2000 m/s^2 ≈ 200 g (6 ms)

1) Due to the stiffness of the torque arm, you have to take into account an automatically resetting ± 0.6 ° twist (depending on the direction of rotation) of the encoder housing compared to the encoder shaft.

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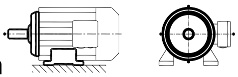
10 Other options and design types

10.1 Output options

10.1.1 Foot-mounted motors

Type designation 

/FI

SEW motor with IEC/EN feet and A-side endshield.

- IEC 60072-1: 1991
- EN 50347: 2003

Description

The /FI foot-mounted motor is a motor design with shaft ends and feet pursuant to IEC 60072-1 / EN 50347.

The shaft and foot dimensions for the 2-, 4- and 6-pole motors with standard efficiency (DRS..) and high efficiency (DRE..) are designed according to the motor power.

For the 2-, 4- and 6-pole DRP.. motors, the foot dimensions comply with EN 50437 wherever possible.

The feet on the DRM.. torque motors and the asynchronous DRL.. servomotors are constructed in line with the DRS.. motor.

According to EN 50347, each power rating is assigned the corresponding shaft height. Some DRS.. motors allow for the implementation of a higher power rating in a smaller size (e.g. DRS100LC4 with 4 kW).

If an application requires a non-EN compliant shaft height, the motor can be equipped with another foot height instead.

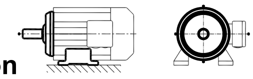
EN 50437 includes the entire foot geometry in a single designation:

- Shaft height (H)
- Distances between the foot holes (A and B)
- Distance from the foot holes to the shaft shoulder (C)
- Diameter of the foot holes (K)

Example

Designation pursuant to EN 50347	Dimensions
160M	H = 160 mm
	A = 254 mm (transverse to the shaft)
	B = 210 mm (parallel to the shaft)
	C = 108 mm
	K = 14.5 mm

SEW-EURODRIVE indicates the foot designation and the dimensions of the shaft end in summary form on the nameplate. All the foot dimensions are detailed in the order confirmation documents.

Type designation 

/F.A, /F.B

SEW motor with universal foot variant.

Description

The feet, which can be bolted to the motor that has been ordered, are included separately when delivering the universal foot-mounted motor. They are not assembled prior to delivery, as is the case for standard /FI foot-mounted motors.

The customer is responsible for mounting the feet. A foot-mounted motor can be designed with a customized terminal box position (0°, 180°, 270°). This is beneficial for spare part management, as a universal motor can simply be used to manufacture a motor with a specific terminal box position.

The universal foot version allows for the following designs thanks to the universally mountable feet:

- Flange-mounted motor
- Foot-mounted motor with fixed foot position
- Foot-mounted motor with variable foot position without feet (stator prepared to mount feet)
- Foot-mounted motor with variable foot position with feet

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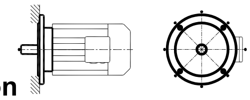
10.1.2 Flange-mounted motors

Four designs are available for selection for flange-mounted motors:

- IEC/EN flange-mounted motors with bore: /FF
- IEC/EN flange-mounted motors with threads: /FT
- NEMA flange-mounted motors with inch threads: /FC
- Flange-mounted motor with different dimensions to IEC/EN: /FL

Type designation



/FF

SEW motor with IEC/EN flange with through bores.

- IEC 60072-1: 1991
- EN 50347: 2003

Description

The flange-mounted motor in the /FF design is the design with the through bores in the flange. It is similar to the IEC IM B5 basic flange design.

The flange dimensions for 2-, 4- and 6-pole motors with Standard Efficiency (DRS..), High Efficiency (DRE..) or Premium Efficiency (DRP..) are based on the power rating according to EN 50347.

EN 50437 includes the entire flange geometry in a single designation:

- Hole circle diameter (FF)
- Centering diameter (Z)
- Outer diameter (D)
- Bore diameter (S)
- Number of bores (K)

Example

Designation pursuant to EN 50347	Dimensions
FF265	FF = 265 mm
	Z = 230 mm
	D = 300 mm
	S = 14.5 mm
	K = 4

SEW-EURODRIVE indicates the flange designation and the dimension of the outer diameter as well as the dimensions of the shaft end in summary form on the nameplate. All the flange dimensions are detailed in the order confirmation documents.

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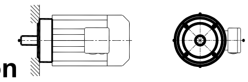
Type designation 

/FT

SEW motor with IEC/EN flange with metric threads.

- IEC 60072-1: 1991
- EN 50347: 2003

Description

The flange-mounted motor in the /FF design is the design with the threads in the flange. It is similar to the IEC IM B14 basic flange design.

The flange dimensions for 2-, 4- and 6-pole motors with Standard Efficiency (DRS..), High Efficiency (DRE..) or Premium Efficiency (DRP..) are based on the power rating according to EN 50347.

EN 50437 includes the entire flange geometry in a single designation:

- Hole circle diameter (FT)
- Centering diameter (Z)
- Outer diameter (D)
- Thread dimensions (M)
- Number of bores (K)

Example

Designation pursuant to EN 50347	Dimensions
FT115	FT = 115 mm
	Z = 95 mm
	D = 140 mm
	M = 8 mm
	K = 4

SEW-EURODRIVE indicates the flange designation and the dimension of the outer diameter as well as the dimensions of the shaft end in summary form on the nameplate. The flange dimensions are detailed in the order confirmation documents.

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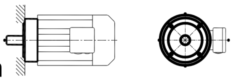
Type designation 

/FC

SEW motor with NEMA-C-Face flange with inch dimensions and threads.

- NEMA MG1

Description

The flange-mounted motor in the /FC design is the design with the inch dimensions and threads in the flange. It is similar to the IM B14 flange form, but is called C-Face pursuant to the NEMA-MG1.

The flange dimensions for 2-, 4- and 6-pole motors with Standard Efficiency (DRS..), High Efficiency (DRE..) or Premium Efficiency (DRP..) are based on the power rating according to the US NEMA MG1 standard.

C-Face dimensions:

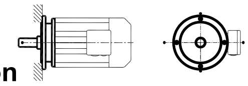
- Hole circle diameter (M)
- Centering diameter (N)
- Outer diameter (P)
- Thread dimensions (S)
- Number of bores (K)

Example

SEW designation	Dimensions	For motor size
FC 5.875“	M = 5.875“	DR. 71, DR. 80 and DR.90
	N = 4.5“	
	P = 6.5“	
	S = 3/8“-16	
	K = 4	
FC 7.25“	M = 7.25“	DR.90 and DR.100
	N = 8.5“	
	P = 8.875“	
	S = 1/2“-13	
	K = 4	

Note: 1" = 25.4 mm

SEW-EURODRIVE indicates the flange designation and the dimension of the outer diameter as well as the dimensions of the shaft end on the nameplate. The flange dimensions are detailed in the order confirmation documents.

Type designation 

/FL

SEW motor with flanges with through bores or threads that differ from IEC/EN.

- IEC 60072-1: 1991
- EN 50347: 2003

Description

The flange-mounted motor in the /FL design is the design with flange dimensions that deviate from IEC/EN, with through bores or threads in the flange. It is similar to the IEC IM B5 or IM B14 basic flange design.

The flange dimensions for 2-, 4- and 6-pole motors with Standard Efficiency (DRS..), High Efficiency (DRE..) or Premium Efficiency (DRP..) are based on the power rating that deviate from EN 50347.

EN 50437 includes the entire flange geometry in a single designation:

- Hole circle diameter (FL)
- Centering diameter (Z)
- Outer diameter (D)
- Diameter of the bores (S) or thread dimensions (M)
- Number of bores (K)

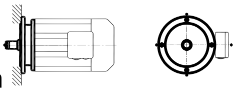
Example

SEW designation	Dimensions
FL265	FL = 265 mm
	Z = 230 mm
	D = 300 mm
	S = 14.5 mm or K = 14.5 mm
	K = 4

SEW-EURODRIVE indicates the flange designation and the dimension of the outer diameter as well as the dimensions of the shaft end in summary form on the nameplate. The flange dimensions are detailed in the order confirmation documents.

10.1.3 Integral motors for the SEW gear unit series

Type designation



/FG

SEW motors for mounting to gear units.

Description

The /FG flange-mounted motor design is used for mounting the motor onto the SEW gear unit for the DR.. series. The flange dimensions are implemented according to the SEW work standards for gear unit mounting.

Based on EN 50347, the gear unit mounting flange is also identified with the hole circle and diameter information.

- Hole circle diameter (FG)
- Outer diameter (D)

Example

SEW designation	Dimensions
FG100 DFG100	FG = 100 mm
	D = 120 mm

The shaft end is manufactured as a pinion shaft end in line with the motor power. This means that the DRS.., DRE.. and DRP.. motors, the DRM.. torque motors and the DRL.. servomotors can have different pinion shaft ends for a motor size and length.

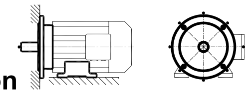
Motors sold separately and prepared for mounting to a gear unit are assigned the designation /FG in the product type and catalog designation. This designation is eliminated if the motor is delivered together with the gear unit (as conventional gearmotor).

10.1.4 Foot- and flange-mounted motors

Three designs are available for foot- and flange-mounted motors.

- IEC/EN foot-/flange-mounted motor with bores: FE
- IEC/EN foot-/flange-mounted motor with threads: FY
- Integral motor with flange and foot: FM

Type designation



/FE

SEW motor with IEC/EN flange with through bores and feet.

- IEC 60072-1: 1991
- EN 50347: 2003

Description

The foot- and flange-mounted motor in the /FE design is the foot-mounted motor design with the through bores in the flange. It is similar to the IEC IM B35 basic flange design.

The shaft and foot dimensions for the 2, 4 and 6 pole motors with standard efficiency (DRS..) and high efficiency (DRE..) are designed according to the motor power. For the 2-, 4- and 6-pole DRP.. motors, wherever possible.

According to EN 50347, each power rating is assigned the corresponding shaft height. Some DRS.. motors allow for implementing a higher power rating in a smaller size (e.g. DRS100LC4 with 4 kW).

The flange dimensions for 2-, 4- and 6-pole motors with Standard Efficiency (DRS..), High Efficiency (DRE..) or Premium Efficiency (DRP..) are based on the power rating according to EN 50347.

EN 50437 includes the entire foot geometry in a single designation:

- Shaft height (H)
- Distances between the foot holes (A and B)
- Distance from the foot holes to the shaft shoulder (C)
- Diameter of the foot holes (K)

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Example

Designation pursuant to EN 50347	Dimensions
160M	H = 160 mm
	A = 254 mm (transverse to the shaft)
	B = 210 mm (parallel to the shaft)
	C = 108 mm
	K = 14.5 mm

EN 50437 also includes the entire flange geometry in a single designation:

- Hole circle diameter (FF)
- Centering diameter (Z)
- Outer diameter (D)
- Bore diameter (S)
- Number of bores (K)

Designation pursuant to EN 50347	Dimensions
FF265	FF = 265 mm
	Z = 230 mm
	D = 300 mm
	S = 14.5 mm
	K = 4

SEW-EURODRIVE indicates the summarized foot designation, the flange designation and the dimension of the outer diameter as well as the dimensions of the shaft end in summary form on the nameplate. The foot and flange dimensions are detailed in the order confirmation documents.

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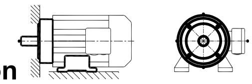
Type designation 

/FY

SEW motor with IEC/EN flange with threads and feet.

- IEC 60072-1: 1999
- EN 50347: 2003

Description

The foot- and flange-mounted motor in the /FY design is the foot-mounted motor design with the through bores in the flange. It is similar to the IEC IM B34 basic flange design.

The shaft and foot dimensions for the 2, 4 and 6 pole motors with standard efficiency (DRS..) and high efficiency (DRE..) are designed according to the motor power. For the 2-, 4- and 6-pole DRP.. motors, wherever possible.

According to EN 50347, each power rating is assigned the corresponding shaft height. Some DRS.. motors allow for implementing a higher power rating in a smaller size (e.g. DRS100LC4 with 4 kW).

The flange dimensions for 2-, 4- and 6-pole motors with Standard Efficiency (DRS..), High Efficiency (DRE..) or Premium Efficiency (DRP..) are based on the power rating according to EN 50347.

EN 50437 includes the entire foot geometry in a single designation:

- Shaft height (H)
- Distances between the foot holes (A and B)
- Distance from the foot holes to the shaft shoulder (C)
- Diameter of the foot holes (K)

Example

Designation pursuant to EN 50347	Dimensions
160M	H = 160 mm
	A = 254 mm (transverse to the shaft)
	B = 210 mm (parallel to the shaft)
	C = 108 mm
	K = 14.5 mm

EN 50437 includes the entire flange geometry in a single designation:

- Hole circle diameter (FT)
- Centering diameter (Z)
- Outer diameter (D)
- Thread dimensions (M)
- Number of bores (K)

Designation pursuant to EN 50347	Dimensions
FT115	FT = 115 mm
	Z = 95 mm
	D = 140 mm
	M = 8 mm
	K = 4

SEW-EURODRIVE indicates the summarized foot designation, the flange designation and the dimension of the outer diameter as well as the dimensions of the shaft end in summary form on the nameplate. The foot and flange dimensions are detailed in the order confirmation documents.

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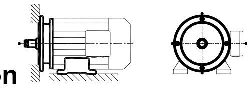
Type designation 

/FM

SEW motor for mounting to gear units and feet.

Description

The combined foot-mounted and integral motor in the /FM design is the foot-mounted motor design with an oil-tight flange for mounting to the SEW gear units.

The foot dimensions for the 2-, 4- and 6-pole motors with standard efficiency (DRS..) and high efficiency (DRE..) are designed according to the motor power. For the 2-, 4- and 6-pole DRP.. motors, wherever possible.

The feet on the DRM.. torque motors and the DRL.. servomotors are constructed in line with the DRS.. motor.

The flange dimensions are implemented according to the SEW work standards for gear unit mounting.

The shaft end is manufactured as a pinion shaft end in line with the motor power. This means that the DRS.., DRE.. and DRP.. motors, the DRM.. torque motors and the DRL.. servomotors can have different pinion shaft ends for a motor size and length.

EN 50437 includes the entire foot geometry in a single designation:

- Shaft height (H)
- Distances between the foot holes (A and B)
- Distance from the foot holes to the shaft shoulder (C)
- Diameter of the foot holes (K)

Example

Designation pursuant to EN 50347	Dimensions
160M	H = 160 mm
	A = 254 mm (transverse to the shaft)
	B = 210 mm (parallel to the shaft)
	C = 108 mm
	K = 14.5 mm

Based on EN 50347, the gear unit mounting flange is also identified with the hole circle and diameter information.

- Hole circle diameter (FG)
- Outer diameter (D)

SEW designation	Dimensions
FG250 D300	FG = 250 mm
	D = 300 mm

Motors sold separately with feet and prepared for mounting to a gear unit are assigned the designation /FM in the product type and catalog designation. The /FM designation is also added, if the motor with feet is delivered completely assembled with the gear units as a conventional gearmotor.

SEW-EURODRIVE only indicates the summarized foot designation, the gear unit flange designation and the dimensions of the outer diameter as well as the dimensions of the outer diameter and the dimensions of the pinion shaft end in summary form on the nameplate for the integral motor for the gear unit.

The foot and flange dimensions are detailed in the order confirmation documents.

The above information is not indicated on the nameplate and the order documents if the gearmotor is delivered fully assembled.

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10.2 First shaft end

10.2.1 Key and keyway

Type designation

None

Description

The foot-mounted stand-alone motors and/or flange-mounted stand-alone motors are manufactured in series with a keyway and key pursuant to IEC 60072-1: 1991 and delivered with a full key pursuant to DIN 6885 Sheet 1 (ISO 773) Form A.

The shaft balancing takes place pursuant to the standards using a half key in accordance with DIN 6885 Sheet 3.

The sizes and dimensions can be found in the relevant dimension sheets in the "DR.. motors/brakemotors dimension sheets" (→ 🗎 203) chapter.

Drive selection

If the motor is to be used to replace an old motor, the motor's rotor can also be balanced with a full key based on the information provided by the customer. This is identified with a "V" on the shaft end face.

10.2.2 Special-order shaft end

Type designation

None

Description

SEW-EURODRIVE can also deliver shaft ends of the foot-mounted stand-alone motors and/or flange-mounted stand-alone motors that differ from the series design:

- with a smooth shaft without keyway
- with a half key
- with other key forms
- with two keys
- with special lengths
- and special dimensions

Please contact SEW-EURODRIVE if required. Sketches of how the shafts are to be constructed are also helpful to explain your requirements.

Drive selection

The permitted overhung and axial loads and the dimensions of the special shaft end are documented separately.

10.3 Second shaft end

The motors are also available with a B-side shaft end. This second shaft end is constructed with a traditional keyway, in derogation of IEC 60072-1: 1991, and key pursuant to DIN 6885 Sheet 1 Form A (ISO 773) and delivered with a full key (Form A).

However, the shaft balancing takes place pursuant to the standards with a half key in accordance with DIN 6885 Sheet 3.

The sizes and dimensions can be found in the relevant dimension sheets in the "DR.. motors/brakemotors dimension sheets" (→ 🗎 203) chapter.

The designs depend on the motor size and length and not the power or the number of poles.

These are supplied in series

- with a cover for motors/brakemotors DR.71 to DR.132,
- without a cover for motors/brakemotors DR.160 to DR.315, as the diameter of the second shaft end is so large that damage during transport is unlikely.

  A cover can be ordered for these sizes.

10.3.1 Second shaft end - standard

Type designation

/2W

Description

The standard design of the second shaft end is generally smaller than described in EN 50347 for each number of poles and power.

SEW-EURODRIVE has decided to take this path in order to meet the demand for combination with different brake sizes.

The DR. 71 to DR. 315 motor sizes can be delivered with the second shaft end in a standard design.

The possible dimensions can be found in the following Tables (→ 🗎 470) or Dimension Sheets (→ 🗎 203).

Drive selection

- For permitted combinations see the "Second shaft end" (→ 🗎 154) chapter.
- For permitted loads see the "Overhung and axial loads" (→ 🗎 156) chapter.

10.3.2 Second shaft end - reinforced

Type designation

/2W

Description

The reinforced design of the second shaft end was developed as an alternative. This design considers the maximum possible dimension of the second shaft end and can only be combined with one brake size.

The DR. 71 to DR. 225 motor sizes can optionally be delivered with the stronger second shaft end.

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The possible dimensions can be found in the following Tables (→ 🗎 470) or Dimension Sheets (→ 🗎 203).

Drive selection

- For permitted combinations see the "Second shaft end" (→ 🗎 154) chapter.
- For permitted loads see the "Overhung and axial loads" (→ 🗎 156) chapter.

Assignment tables

Key:

Type	Icon
Series	•
Reinforced option	x
Not possible	–

Dimensions of the 2W	DR.71S	DR.71M	DR.80S	DR.80M	DR.90M	DR.90L	DR.100M	DR.100L/LC
11 × 23	•	•	x	–	–	–	–	–
14 × 30	–	–	•	•	•	•	•	•
19 × 40	–	–	–	x	x	x	x	x

Dimensions of the 2W	DR.112M	DR.132S	DR.132M/MC	DR.160S	DR.160M/MC
19 × 40	•	•	•	–	–
24 × 50	x	x	–	–	–
28 × 60	–	–	x	•	•
38 × 80	–	–	–	x	x

Dimensions of the 2W	DR.180S	DR.180M	DR.180L/LC	DR.200L	DR.225S	DR.225M/MC
38 × 80	•	•	•	–	–	–
42 × 110	x	x	–	–	–	–
48 × 110	–	–	x	•	•	•
55 × 110	–	–	–	x	x	x

Dimensions of the 2W	DR.250M	DR.280S	DR.280M	DR.315K	DR.315S	DR.315M	DR.315M
55 × 110	•	•	•	–	–	–	–
70 × 140	–	–	–	•	•	•	•

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10.4 Oil seals

10.4.1 Nitride butadiene (NBR) oil seals

Type designation

None

Description

SEW-EURODRIVE uses nitride butadiene (NBR) oil seals in the series motors and gearmotors.

In accordance with DIN ISO 1629: 1995, the material NBR is part of the rubber group with the designation "R".

Drive selection

NBR oil seals are installed in motors with a standard temperature range of -20 °C to +40 °C, but are also in use for temperatures of -40 °C.

10.4.2 Fluorocarbon rubber (FKM) oil seals

Type designation

None

Description

SEW-EURODRIVE uses fluorocarbon rubber (FKM) oil seals in the 2-pole DR.. motor series as well as the 4-pole DRL.. motors and gearmotors.

FKM oil seals are also an option for use with all motor types.

In accordance with DIN ISO 1629: 1995, the material FK is part of the rubber group with the designation "M".

Drive selection

FKM oil seals can be used down to a temperature of -25 °C.

For gearmotors, the lubricant has an influence on whether fluorocarbon rubber (FKM) oil seals are permitted.

10.5 Backstop

10.5.1 Backstop

The mechanical backstop can be used in order to prevent the rotor from running backwards on motors that have been switched off.

Type designation

/RS

Description

A backstop is used to block or exclude a direction of rotation of the motor. The blocking direction is defined as looking onto the fan guard.

Blocking direction specification:

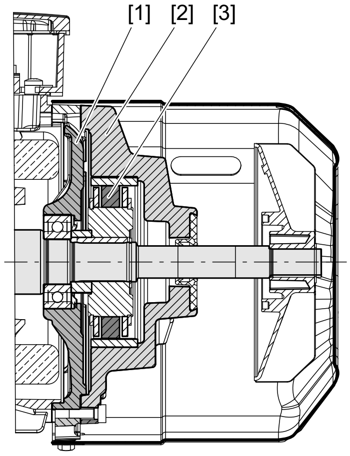
CW: Clockwise

CCW: Counter Clockwise

The backstop is installed instead of the brake.

The locking torque reaches at least 2 times the motor's maximum torque, with the exception of the DRS132MC4, which only reaches 160%.

Similar to the installation principle of the brake (integrated or premounted on a friction disk), the backstop can also be installed in different ways:



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The following figure shows the structure of the backstop RS.

1	Brake endshield
2	RS housing
3	Sprag ring

INFORMATION

When installing a motor on a gear unit, please note the direction of rotation of the output shaft and the number of stages. Specify the direction of rotation for the motor or gearmotor when placing your order.

The backstop is designed for motors in grid operation. Please contact SEW-EURODRIVE when operating a motor with backstop on an inverter.

Do not startup the motor in the blocking direction. Note the correct phase angle when connecting the motor.

For inspection purposes, you can operate the backstop once with half the motor voltage in the blocking direction:

Please note: Specify the direction of rotation for the motor or gearmotor when placing your order.

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The dimensions of the DR.71 – 132 motors with installed backstop/RS can be found in the special dimension sheets (→ 🗎 308). The Brakemotor (/BE) (→ 🗎 203)dimension sheets apply for sizes DR. 160 – 315.

Motor sizes	Rated locking torque Nm	Lift-off speed of clamping parts rpm	Maximum speed	Ambient temperature
71	95	890	5000	-40 °C to +60 °C
80	130	860		
90 / 100	370	750		
112 / 132	490	730	4500	
160	700	700		
180	1400	610		
200 / 225	2500	400	4000	
250 / 280	2600	400	2600	
315	6300	320	2500	

Drive selection

- The RS backstop operates maintenance-free above the lift-off speed.
- Please consult SEW-EURODRIVE for operation below lift-off speed.
- The /RS backstop is not available for torque motors DRM, as these motors cannot achieve the lift-off speed.

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10.6 Bearing options

10.6.1 Current-insulated rolling bearings

Type designation

/NIB

Description

The same size B-side bearings are also available in a current-insulated design for motor sizes DR.250, DR.280 and DR.315. The current insulation is achieved by an insulated bearing surface.

Drive selection

SEW-EURODRIVE recommends using these bearings when operating the motor on a frequency inverter.

10.6.2 Lubrication device

Type designation

/NS

Description

The installation of the relubrication device is optional for motor sizes 250, 280 and 315. The A- and B-side bearings are relubricated with grease via the externally accessible grease nipples in Form A pursuant to DIN 71412.

The following greases are used on-site, depending on the ambient temperature. The greases can also be purchased separately from SEW-EURODRIVE in 400 g packaging units.

Ambient temperature	Manufacturer	Type	DIN designation
-20 °C to +80 °C	Esso	Polyrex EM	K2P-20
-40 °C to +60 °C	SKF	GXN	K2N-40

The relubrication intervals must be individually adapted to the application. The motor generally has to be inspected and the used grease removed after 6 to 8 relubrications.

Drive selection

The relubrication device is recommended for motor sizes 250, 280 and 315 for the following uses:

- Motors in vertical mounting position
- for permanent speeds over 1800 1/min
- for an ambient temperature of over 60 °C.

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10.6.3 Reinforced A-side bearings

Type designation

/ERF

Description

Reinforced A-side bearings are also available for motor sizes DR.250, DR.280 and DR.315. The /ERF option can only be delivered together with relubrication device /NS.

For gearmotors, the reinforced A-side bearings are only required for a few gear ratios. These gear ratios are marked in the speed-performance overview. The /ERF and /NS options are included in the price.

Drive selection

The use of the /ERF option is identified after determining the necessary axial and overhung application loads. Please note the drive selection in the "Bearing types used" (→ 🗎 147) chapter.

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10.7 Condensation drain hole

10.7.1 Number of bores depending on the mounting position

Type designation

/DH

Description

Motor standard IEC 60034-5 only defines the mounting positions in vertical or horizontal levels, please also see the "AC motor mounting positions" (→ 🗎 90) chapter.

SEW-EURODRIVE also provides inclined and moving mounting positions. These are identified based on the descriptions in the "Mounting positions" (→ 🗎 144) chapter.

The number of condensation drain holes required is determined by the relevant mounting position.

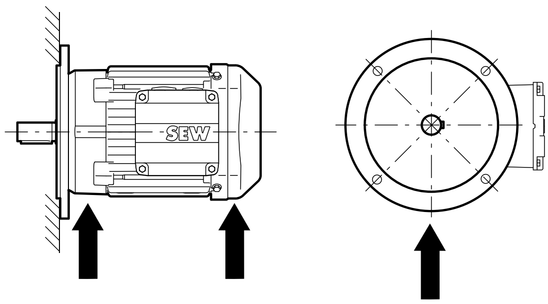
The condensation drain holes are closed with an element on delivery and must be opened regularly in order to drain any condensation. The intervals depend on the application and the environment and must be specified individually.

The bores are not always precisely positioned at 0°, 90° 180° or 270°. They may differ by a few degrees due to the mechanical design of the flange.

Horizontal mounting position

The motors receive two bores, one each on the A- and B-side, at the lowest points of the motor, normally placed in the flanges and motor covers, see the arrows in the diagram.

IM B5 example:



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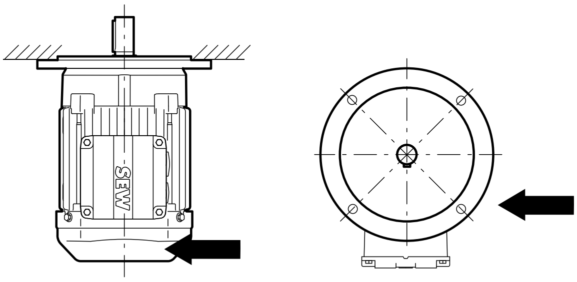
Vertical mounting position

The motors receive one bore, either on the A- or B-side, at the lowest point of the motor, normally placed in the flange or the motor cover, see the arrows in the diagram.

IM V3 example:



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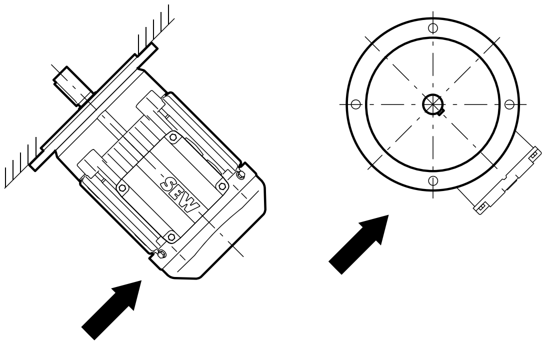
Inclined mounting positions

The motors receive one or two bore(s), either on the A- and/or B-side, at the lowest point of the motor, normally placed in the flanges or the motor covers, see the arrows in the diagram.

B5/V3/45° example:



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Inclined mounting positions: IM B5 situation

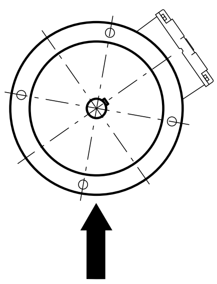
In the IM B5 mounting position, there is the special feature that the movement around the motor axis does not result in a new mounting position designation. As a result, SEW-EURODRIVE has combined this with a familiar feature for the mounting position.

The angle of rotation around the motor axis is defined as follows based on the position of the terminal box:

- clockwise (CW)
- counter-clockwise (CCW)

Example: IM B5 with terminal box position 0 (R) is installed with a 30° offset in the clockwise direction.

Information when ordering B5/CCW/30°:



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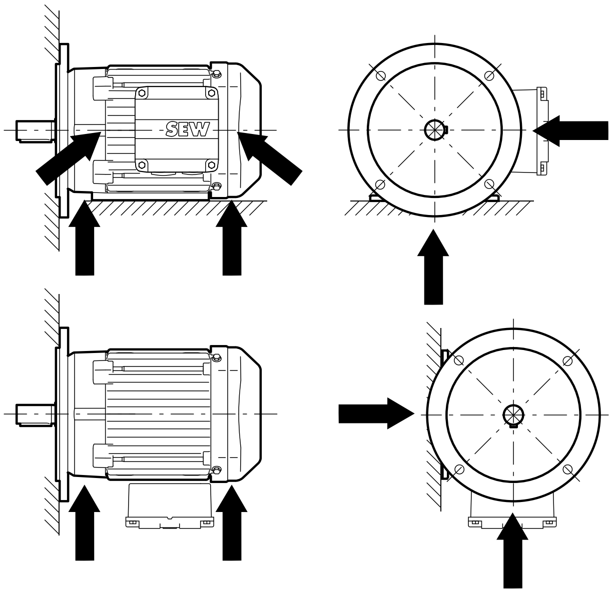
Moving mounting position

The motors receive two or four bores, one or two each on the A- and B-side, at the lowest points of the motor in the end positions, normally placed in the flanges and motor covers, see the arrows in the diagram.

B35/B65/0-90° example:



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Moving mounting position: IM B5 situation

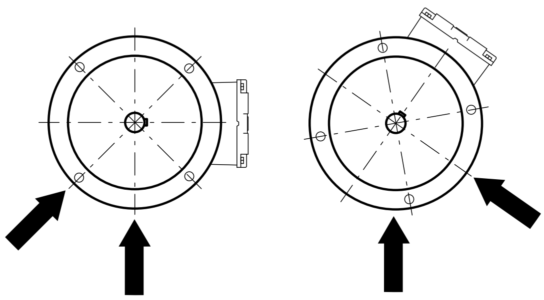
In the IM B5 mounting position, there is the special feature that the movement around the motor axis does not result in a new mounting position designation. As a result, SEW-EURODRIVE has combined this with a familiar feature for the mounting position.

The angle of rotation around the motor axis is defined as follows based on the position of the terminal box:

- clockwise (CW)
- counter-clockwise (CCW)

Example: IM B5 with terminal box position 0 (R) is installed with a 30° offset in the clockwise direction.

Information when ordering B5/CCW/0-70°:



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Drive selection

The necessity of fitting the motor with condensation drain holes must be identified based on the following criteria:

- The humidity in the ambient air (condensation drain holes are recommended for a relative humidity > 95%).
- The frequency with which the motor is turned on and off, the heating and the cooling of the motor, the suction of humid ambient air, the risk of penetration of external water.

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10.7.2 Fan guard

Type designation

None

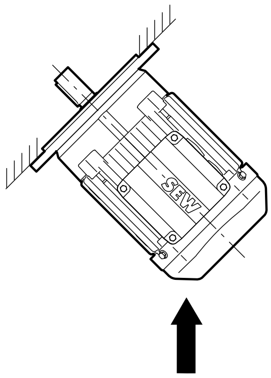
Description

If there is the risk that liquid could remain in the fan guard, such as in the event of inclined or moving mounting positions with the fan guard underneath, waste water bores in the fan guard can be used to ensure drainage.

Inclined mounting position

The motors receive a bore at the lowest point of the fan guard, see the arrow in the following diagram.

B5/V3/45° example:



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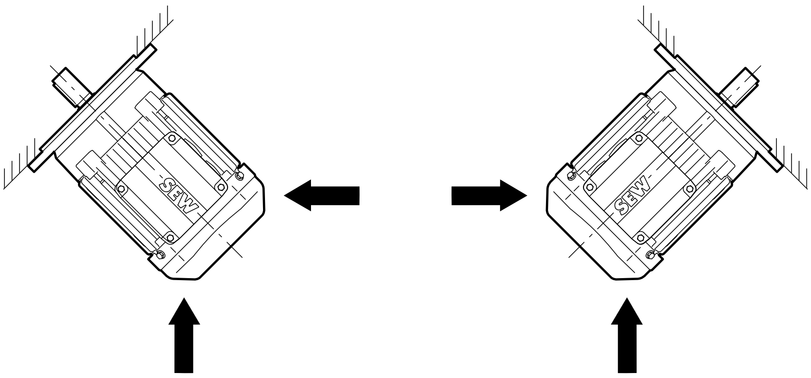
Moving mounting position

The motors receive a bore at the lowest points of the fan guard in the end positions, see the arrows in the following diagram.

B5/V3/45-135° example:



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Drive selection

Please quote the mounting position specification in your order.

10.7.3 Dependency on corrosion protection

Type designation

None

Description

SEW-EURODRIVE assumes an increased water penetration in the event of the optional selection of the /DH condensation drain hole. As a result, SEW-EURODRIVE recommends also ordering the corrosion protection (KS) and the surface protection (OS1). A higher surface protection may be selected as an option.

Drive selection

The recommendation with KS and OS1 must be taken into account when ordering the /DH option.

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10.8 Degree of protection

10.8.1 Degree of protection IP54 and higher

Type designation

None

Description

The basic degree of protection for motors is IP54, please also refer to the "Degrees of protection pursuant to EN 60034 (IEC 60034-5)" (→ 🗎 139) chapter.

The motor is also available with the following degrees of protection:

- IP6x: Increased dust protection: IP6
- IPx5 / IPx6: Increased water protection: IP56 or IP66

The basic brake option is also designed in IP54 and can be supplied in the following degrees of protection:

- IP65 with increased dust protection
- IP56 or IP66 with increased water protection. Additional measures are taken for this option.

The /DUB brake monitoring option can be designed in degree of protection IP54 or IP55. Even higher degrees of protection are structurally impossible.

The degrees of protection for other options and designs are indicated in the relevant descriptions.

Drive selection

The relevant degree of protection must be carefully selected, as otherwise there is the risk of damage to the motor.

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10.8.2 Special degree of protection IP46

Type designation

None

Description

If the penetration of water into the motor cannot be ruled out, a drive solution with the following criteria can be provided:

- Degree of protection IP56
- Combination with epoxy casting resin
  - for the stator winding
    and
  - the terminal box opening at the stator
    and
- permanently open /DH condensation drain holes
- KS corrosion protection
  and
- surface protection, at least OS1.

This IP46 design is possible for motors without brakes in sizes 71 – 132 for all number of poles without further add-ons.

Drive selection

Please contact SEW-EURODRIVE if required.

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10.9 Ventilation options

10.9.1 Additional flywheel mass

Type designation

/Z

Description

The motor can optionally be equipped with additional flywheel mass Z, the flywheel fan, to achieve a smoother startup and braking behavior of line-operated motors. The fan gives the motor an additional mass moment of inertia J_Z. The flywheel fan is replaced with the standard fan, the outer motor dimensions remain the same.

It can be installed on motor sizes DR.71 – DR.160 with and without a brake.

The flywheel fan is used instead of the PVC or aluminum fan. It increases the mass moment of inertia of the rotor so that the motor responds smoother to acceleration or braking torques.

The technical data for the 4-pole motor is displayed in the table below. A combination with all other number of poles is also possible.

10

Drive selection

Note the following points:

- Note the additional flywheel mass inertia when determining the permitted switching frequency. Multiply the permitted no-load starting frequency Z_0 by the factor 0.8 or use a forced cooling fan.
- Set the total mass moment of inertia on the motor side $J_{ges} = J_{Mot} + J_Z - J_{PA}$.
- Take the additional weight into account during fitting.
- Counter-current braking and running against a stop are no longer permitted.
- Not available in vibration grade "B".

Additional flywheel mass inertia:

For motor	J_Z 10^{-4} kgm²	J_{PA} 10^{-4} kgm²	J_{Mot} 10^{-4} kgm²	$J_{Mot} + J_Z - J_{PA}$ 10^{-4} kgm²	Increase in inertia %	Mass m_Z kg
DR.71S4	21.3	0.34	4.9	25.9	529	1.3
DR.71M4			7.1	28.1	396	
DR.80S4	37.9	0.97	14.9	51.8	348	1.8
DR.80M4			21.5	58.4	272	
DR.90M4	100	1.32	35.5	134	377	3.4
DR.90L4			43.5	1425	326	
DR.100M4	135		56	191	341	3.5
DR.100L4	150		68	218	321	3.8
DR.100LC4			90	240	267	
DR.112M4	200	5.55	146	340	233	4.5
DR.132S4			190	384	202	
DR.132M4	300		255	549	215	6.4
DR.132MC4			340	634	186	
DR.160S4	500	5.97	370	864	234	7.3
DR.160M4			450	944	210	
DR.160MC4			590	1084	184	

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10.9.2 Aluminum fan

Type designation

/AL

Description

The aluminum fan is used instead of the PVC fan if the expected ambient temperature exceeds +60 °C or drops below -20 °C.

The fan's permitted temperature range is -40 °C to +100 °C.

It can be installed on motor sizes DR.71 – 315 with and without a brake.

Due to the air volume required for cooling, different aluminum fan sizes can be used for some sizes and number of poles. The assignment can be found in the following table.

Drive selection

Please note the following:

- Note the aluminum fan inertia when determining the permitted switching frequency.
- The switching frequency Z_0 does not need to be reduced.

Aluminum fan inertia:

For motor	J_{AL} 10^{-4} kgm²	J_{PA} 10^{-4} kgm²	J_{Mot} 10^{-4} kgm²	$J_{Mot} + J_{AL} - J_{PA}$ 10^{-4} kgm²	Increase in inertia %	Mass m_{AL} kg
DRS71S2, ..S4 DRS71S4/2, ..S8/2	2.69	0.34	4.9	7.25	148 %	0.18
DRS71S6, DRS71S8/4			8.1	10.45	129 %	
DR.71M2, ..M4 DRS71M4/2, ..M8/2			7.1	9.45	133 %	
DR.71M6 DRS71M8/4			11.7	14.05	120 %	
DR.80S2, ..S4, ..S6 DRS80S8/2	4.31	0.97	14.9	18.24	122 %	0.22
DR.80M2, ..M4, ..M6 DRS80M4/2, ..M8/2, ..M8/4			21.4	24.74	116 %	
DR.90M2, ..M4 DRS90M4/2, ..M8/2, ..M8/4	6.97	1.32	35.4	41.05	116 %	0.32
DR.90L2, ..L4 DRS90L8/2, ..L8/4			43.7	49.35	113 %	
DR.90L6			43.4	49.05	113 %	
DR.100M2, ..M4 DRS100M4/2, ..M8/2, ..M8/4			56.0	61.65	110 %	
DR.100M6			55.6	61.25	110 %	
DR.100L2, ..L4 DRS100L4/2, ..L8/4			68.3	73.95	108 %	
DR.100L6			67.8	73.45	108 %	
DR.100LC2, ..LC4			89.8	95.45	106 %	
DRS100LC6			88.2	93.85	106 %	
DR.112M2			113	118.7	105 %	
DR 112M4			146	151.7	104 %	
DR.132S2 DRS132S4/2			146	151.7	104 %	
DRE132S4			190	195.7	103 %	
DR.132M2 DRS132M4/2			193	198.7	103 %	
DRE132MC2			239	244.7	102 %	

For motor	J_{AL} 10^{-4} kgm²	J_{PA} 10^{-4} kgm²	J_{Mot} 10^{-4} kgm²	J_{Mot} + J_{AL} - J_{PA} 10^{-4} kgm²	Increase in inertia %	Mass m_{AL} kg
DR.112M6	16.17	5.55	145	155.6	107 %	0.53
DRS112M4 DRS112M8/2, ..M8/4			146	156.6	107 %	
DR.132S6			188	198.6	106 %	
DRS132S4 DRS132S8/4			190	200.6	106 %	
DR.132M6			250	260.6	104 %	
DR.132M4 DRS132M8/2, ..M8/4			253	263.6	104 %	
DR.132MC6			337	347.6	103 %	
DR.132MC4			340	350.6	103 %	
DR.160S4 DRS160S4/2, ..S8/4	61.2	5.97	370	425.2	115 %	0.96
DRS160S6			520	575.2	111 %	
DR.160M4 DRS160M4/2, ..M8/4			448	503.2	112 %	
DR.160M6			633	688.2	109 %	
DR.160MC4			593	648.2	109 %	
DRP180S4			895	950.2	106 %	
DRP180M4			1110	1165	105 %	
DRP180L4			1300	1355	104 %	
DRP180LC4			1680	1735	103 %	
DRS160MC4	65.7	16.27	593	642.4	108 %	1.00
DR.180S4 DRS180S8/4			895	944.4	106 %	
DR.180M4			1110	1159	104 %	
DR.180L4 DRS180L8/4			1300	1349	104 %	
DR.180LC4			1680	1729	103 %	
DR.200L4 DRS200L8/4	157	16.85	2360	2500	106 %	1.77
DR.225S4 DRS225S8/4			2930	3070	105 %	
DR.225M4 DRS225M8/4			3430	3570	104 %	
DRS225MC4	369	16.85	4330	4682	108 %	2.85
DR.250M4			6200	6552	106 %	
DR.280S4			8870	9222	104 %	
DRP280M4			8770	9222	104 %	
DR.280M4	454	117	8870	9307	104 %	2.97
DR.315K4	370	86.47	18400	18684	102 %	3.48
DR.315S4			22500	22784	101 %	
DR.315M4			27900	28184	101 %	
DR.315L4			31900	32184	101 %	

The bigger the motor size, the lower the influence of the aluminum fan.

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10.9.3 Built-in encoder

Type designation

/EI7.

Description

The magnet ring in the fan of the built-in encoder increases the mass moment of inertia.

It can be installed on motor sizes DR.71 – 225 with and without a brake.

The technical data for the 4-pole motor is displayed in the table below. A combination with all other number of poles is also possible.

Drive selection

Please note the following:

- Note the inertia of the magnet ring fan when determining the permitted switching frequency.
- The switching frequency Z_0 does not need to be reduced.

For motor	J_{EI7}	J_{PA}	J_{Mot}	$J_{Mot} + J_{EI7} - J_{PA}$	Increase in inertia	Mass m_{EI7}
	10^{-4} kgm²	10^{-4} kgm²	10^{-4} kgm²	10^{-4} kgm²	%	kg
DR.71S4	2.8	0.3	4.9	7.2	147	0.17
DR.71M4			7.1	9.4	132	
DR.80S4	3.4	1.0	14.9	17.2	115	0.21
DR.80M4			21.5	23.8	111	
DR.90M4	11.7	1.3	35.5	45.6	128	0.43
DR.90L4			43.5	53.6	123	
DR.100M4			56	66.1	118	
DR.100L4			68	78.4	115	
DR.100LC4			90	100	111	
DR.112M4	16.1	1.3	146	160	110	0.51
DR.132S4			190	204	107	
DR.132M4			255	269	105	
DR.132MC4			340	354	104	

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10.10 Fan guard options

10.10.1 Canopy

Type designation

/C

Description

If a vertical motor design with upright fan guard is used, there is the risk that parts will penetrate through the fan grille into the ventilation area. This can be protected as follows:

- by structural measures in the system or the machine

  or
- by using a canopy.

The canopy can be retrofitted to the fan guard.

It can be installed on motor sizes DR.71 – 315 with and without a brake.

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Drive selection

For additional lengths due to the protection canopy, refer to the Motor dimension sheets (→ 🗎 199).

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10.10.2 Air filter

Type designation

/LF

Description

In an environment with high amounts of dust or suspended particles, the air circulation required to cool the motor blows these particles around. In unfavorable conditions, this leads to the constant increase in particle deposits between the cooling fins, which can no longer be blown away by the cooling air flow.

In the worst case, the space between the cooling fins is completely filled and the motor is no longer cooled, resulting in the thermal risk that it may be destroyed.

In these operating conditions, an air filter can be used to prevent this effect.

Conversely, the filtered particles must continuously be removed from the filter, as otherwise ventilation can no longer take place.

As a result, the air filter is fastened to the inner guard by a short external guard using a single bolt.

Drive selection

The additional lengths and the space for removing the fixing guard must be considered as part of the selection process, please refer to the "Air filter" (→ 🗎 152) chapter.

No maintenance intervals can be specified due to the individuality of each drive and the environment where it is installed.

10.10.3 Reduction of the noise level

Type designation

/LN

Description

Low-noise fan guards 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 5 – 8 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 of the following motors:

- 2-pole motors in the sizes mentioned above
- MOVIMOT® combinations in delta connection type
- some reduction ratios for gear sizes K19 / K29.

Drive selection

Replacing a standard fan guard with a low noise design does not affect the drive selection.

10.10.4 Axially separable fan guard for brakemotors

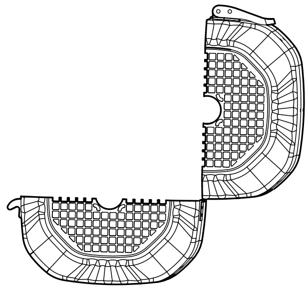
Type designation

None

Description

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 remove the brake fan guard.

If this space is not structurally possible in the system or machine, the axially separable fan guard is an option that still allows the brake to be inspected.



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This special fan guard design is available for brakemotor sizes DR. 71 – DR. 225, as well as in combination with the option of a second shaft end.

Drive design

Instead of the axial space to remove the brakemotor fan guard, enough radial space is now required around the fan guard in order to open the guard, see the "Axially separable fan guard on the brakemotor" (→ 🗎 150) chapter.

10.10.5 Non-ventilated motors

SEW-EURODRIVE provides two alternatives for non-ventilated motors:

- Option /U: non-ventilated without fan
- Option /OL: non-ventilated closed B-side

Type designation

/U or /OL

Description

/U design:

The improvements described in the "Air filter" (→ 🗎 490) chapter can also be achieved by not installing a fan.

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 two to three sizes larger for the same power output.

/OL design:

An alternative to the non-ventilated motor (without fan) is the motor design for which the fan guard is not installed. The rotor is reduced to the extent that the B-side end-shield can be implemented as a closed design.

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.

Drive selection

/U design:

This design is possible for sizes DR.71 – DR.280. Please contact SEW-EURODRIVE to find out the exact size for the required power.

/OL design:

This design is possible for sizes DR.71 – DR.280. Please contact SEW-EURODRIVE to find out the exact size for the required power.

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10.11 Motor protection

10.11.1 Motor protection

Types

SEW-EURODRIVE provides four fundamental types of thermal motor protection for the motors:

- Temperature sensor /TF
- Temperature switch /TH
- Temperature sensor /KY
- Temperature sensor /PT

Drive selection

Information on the design can be found in the "General project planning information" (→ 🗎 77) chapter.

More information can be found in the "Thermal characteristics" (→ 🗎 129) chapter.

Take the information of that chapter into account for your selection.

Trigger temperatures

Thermal motor protection is realized by TF temperature sensors or TH bimetallic switches built into the end winding of the motors. To make the motor protection as reliable as possible, the trigger temperature is slightly lower than the limit value of the thermal classification. Temperature sensor TF and bimetallic switch TH are available with the following trigger temperatures:

Thermal class	Nominal response temperature /TF	Rated switching temperature /TH
155 (F)	150 °C	150 °C
180 (H)	170 °C	170 °C

10.11.2 TF temperature sensor

Type designation

/TF

Description

Thermal motor protection prevents the motor from overheating and causing irreparable damage. The TF is a triple PTC thermistor. One TF is installed in every motor phase and then connected in series.

A PTC thermistor is a resistance whose resistance value rises significantly from a nominal response value as the temperature rises. Please refer to the following characteristic curve.

The temperature sensor /TF can be designed as follows:

- in thermal class 155 (F)
- in thermal class 180 (H)
- in a double version
  - for warning in 130 (B) and for disconnection in 155 (H),
  - for warning in 155 (F) and for disconnection in 180 (H).

Please contact us if you are considering the double /TF design.

Notes on the selection

The positive temperature coefficient (PTC) temperature sensors comply with DIN 44082.

Resistance measurement (measuring instrument with V ≤ 2.5 V or < 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 isolation of the temperature sensor circuit. If the temperature reaches an excessive level, the thermal protection function must be brought into effect immediately.

INFORMATION

The temperature sensor /TF may not be subjected to voltages > 30 V.

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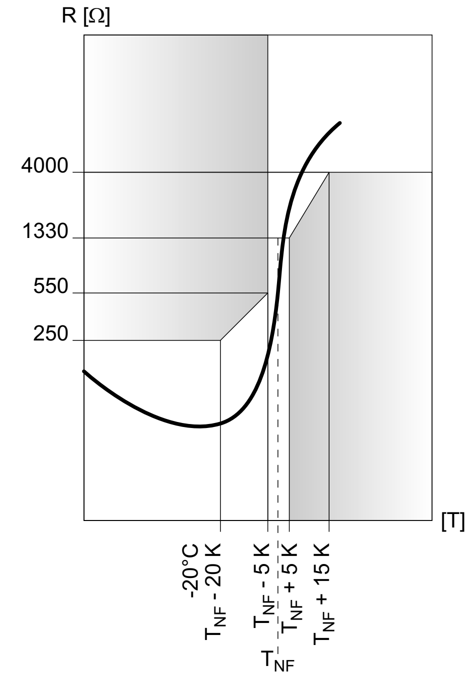
The below figure shows the characteristic curve of a TF with reference to the nominal response temperature (referred to as T_{NF}).



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10.11.3 TH temperature switch

Type designation

/TH

Description

Thermal motor protection prevents the motor from overheating and causing irreparable damage. The TH is a triple bimetallic switch. One TH is installed in every motor phase and then connected in series.

A bimetallic switch is a switching element with contact, which opens the contact when the switching temperature is reached. The motor can then be shutdown using a controller. When the motor cools down, it does not immediately switch back to the rated switching temperature (NST) but only switches once it is approx. 40 K below the rated switching temperature (reset temperature RST), see the following characteristic curve.

The time it takes for the reset temperature to be reached is in the high double-digit minute range.

The /TH can be designed as follows:

- in thermal class 155 (F)
- in thermal class 180 (H)
- in a double version
  - for warning in 130 (B) and for disconnection in 155 (H)
  - for warning in 155 (F) and for disconnection in 180 (H),

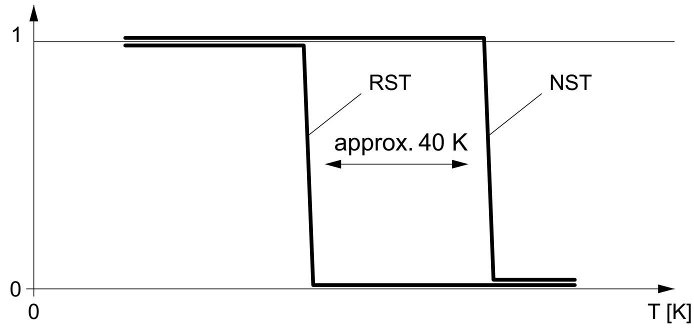
Please contact us if you are considering the double /TH design.

Notes on the selection

The thermostats are connected in series 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 Rated switching temperature

10.11.4 KY temperature sensor

Type designation

/KY

Description

Thermal motor protection prevents the motor from overheating and causing irreparable damage. The temperature sensor only provides indirect protection, as only one sensor value is determined, which first has to be analyzed.

The /KY consists of a KTY84-130 semiconductor sensor, which has been installed in one of the three motor windings. This also means that the /KY is not a replacement for the motor protection with /TF or /TH.

The inverter and the KY sensor value can only take on the function of motor protection when it is used in combination with an inverter containing the thermal motor model.

The /KY constantly changes its resistance value and provides an accurate reflection of the current temperature in the end turns, please refer to the following characteristic curve. The /KY has no reference to a thermal class and can be installed in addition to the /TF or /TH.

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Notes on the selection

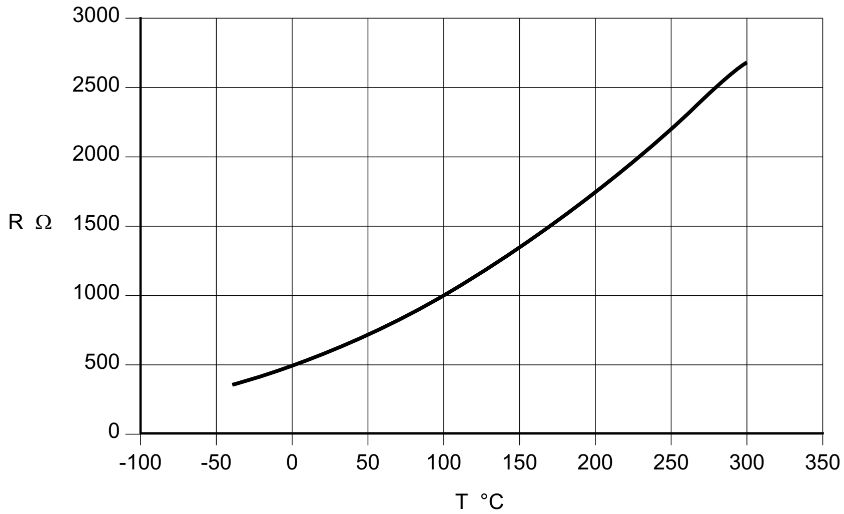
The KTY84-130 temperature sensor continuously detects the motor temperature.

Type	KTY84-130
Connection	red conductor = + blue conductor = -
Total resistance at 20 – 25° C	540 Ω < R < 640 Ω
Test current	< 3 mA

INFORMATION

The poles of the temperature sensor /KY must be connected correctly, otherwise an incorrect measurement result will be issued.

Typical characteristic curve of a KTY:



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10.11.5 PT temperature sensor

Type designation

/PT

Description

Thermal motor protection prevents the motor from overheating and causing irreparable damage. The temperature sensor only provides indirect protection, as only one sensor value is determined, which first has to be analyzed.

The /PT design consists of a platinum sensor or three PT100 platinum sensors, which are installed in one of the three or in all three motor windings. For the design with three PT100, the sensors are already connected in series in the end turns.

Unlike the KTY semiconductor sensor, the platinum sensor has an almost linear characteristic curve and is more accurate. The inverter /PT option can take on the function of motor protection when it is used in combination with an inverter containing the thermal motor model.

The /PT resistance value displays linear changes and provides an accurate reflection of the current temperature in the end turns, please refer to the following characteristic curve. The /PT has no reference to a thermal class and can be installed in addition to the /TF or /TH.

Notes on the selection

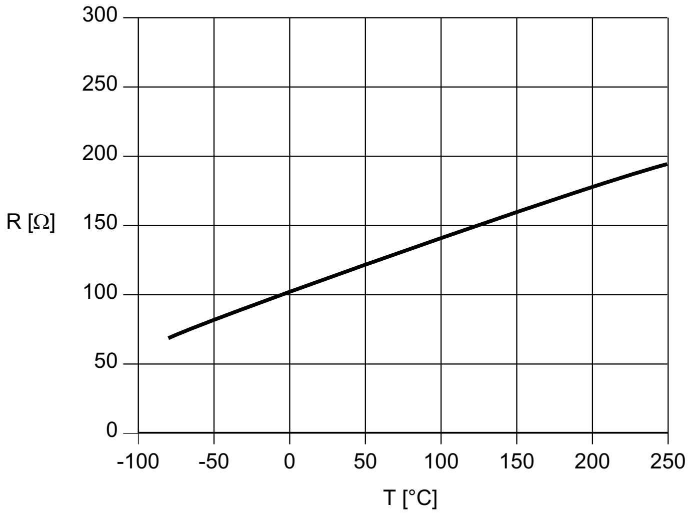
The PT100 temperature sensor continuously detects the motor temperature. One or three PT100 sensors are used depending on the requirements.

Type	1 × PT100	3 × PT100
Connection	Red/white	
Total resistance at 20 – 25 °C	107 Ω < R < 110 Ω	321 Ω < R < 330 Ω
Test current	< 3 mA	

INFORMATION

The temperature sensor /PT is unipolar, so interchanging the incoming cables does not change the measurement result.

Characteristic curve of a PT100:



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10.12 Insulation

10.12.1 Reinforced insulation

Type designation

/RI

Description

SEW-EURODRIVE recommends to use reinforced insulation for motors operated on frequency inverters at voltages > 500 V.

Notes on the selection

Permitted pulse voltages can be found in the "DR.. AC motors with inverters from other manufacturers" (→ 🗎 198).

10.12.2 Reinforced winding insulation with increased resistance against partial discharge

Type designation

/RI2

Description

For motors operated on frequency inverters at voltages > 690 V, or if DC link voltages rise to over 724 V, SEW-EURODRIVE recommends to use reinforced insulation with increased resistance against partial discharge.

This option is available for DRS.., DRE.. and DRP.. motor sizes 112M – 315L.

Notes on the selection

Permitted pulse voltages can be found in the "DR.. AC motors with inverters from other manufacturers" (→ 🗎 198).

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10.13 Anti-condensation heating

10.13.1 Anti-condensation heating

Type designation

None

Description

The motors can be equipped with anti-condensation heating if required.

The recommended or prescribed use of anti-condensation heating depends on the ambient temperature.

- Ambient temperature below 0 °C: the use of anti-condensation heating is recommended.
- Ambient temperature below -20 °C, with expected condensation: the use of anti-condensation heating is mandatory.

  The anti-condensation heating must be activated for temperatures below -20 °C as long as the motor is switched off.

The anti-condensation heating connection voltage is 230 V.

The following differences arise depending on the motor size:

- The heating capacity is between 28 W and 150 W.
- The strip heaters are either only installed around the end turn/turns on the A-side or on the A- and B-side.

They are connected to an auxiliary terminal strip in the terminal box. The connections are marked as H1 and H2.

Notes on the selection

Please contact SEW-EURODRIVE if you require other connection voltages.

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10.14 Winding protection

10.14.1 Humidity and acid protection

Type designation

None

Description

Humidity and acid protection is another measure used to protect the motor. This option allows the motors to be used in warm and humid environments or in atmospheres that contain solvents.

Further information is available in the "Humidity and acid protection and tropicalization" (→ 🗎 58) chapter.

Available for all motor sizes DR.71 – 315.

Notes on the selection

Please contact SEW-EURODRIVE if required.

10.14.2 Tropicalization

Type designation

None

Description

Tropicalization is another measure used to protect the motor. This option allows the motors to be used in warm and humid or tropical environments.

Further information is available in the "Humidity and acid protection and tropicalization" (→ 🗎 58) chapter.

Available for all motor sizes DR.71 – 315.

Notes on the selection

Please contact SEW-EURODRIVE if required.

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10.15 Pole-changing motors

10.15.1 8/4-, 4/2-, 8/2-pole DRS.. motors

Type designation

8/4, 4/2, 8/2

Description

Instead of a design with a single speed, SEW-EURODRIVE offers two different types of multi-speed motors in three different pole number combinations.

- Dahlander windings

  The 4/2-pole and 8/4-pole DRS.. motors are available with a Dahlander winding. The characteristic feature of this winding is that all winding phases are constantly in use. Rotating fields with a ratio of 2:1 are created only as a result of connecting the different parts of the winding.

- Separate winding

  8/2-pole DRS.. motors are available with a separate winding. The characteristic feature of this winding is that two windings are built into the motor, but only one of them can be connected to the supply system. This means it is possible to combine rotating fields with a range of ratios. SEW-EURODRIVE only uses a 4:1 ratio.

Drive selection

The drive selection for multi-speed motors takes place after careful calculation.

SEW-EURODRIVE is happy to perform the calculation and the drive selection for you if required.

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10.16 Forced cooling fan

10.16.1 Forced cooling fan

Type designation

/V

Description

The motors and brakemotors can be equipped with a forced cooling fan /V option if required. A forced cooling fan is usually not required for motors operated off the power supply in continuous duty.

SEW-EURODRIVE recommends a forced cooling fan for the following applications:

- Mains-operated drives with high starting frequency
- Mains-operated drives with additional flywheel mass Z (flywheel fan)
- Inverter drives with a setting range ≥ 1:20
- Inverter drives that have to produce the rated torque at low speeds or even at standstill.

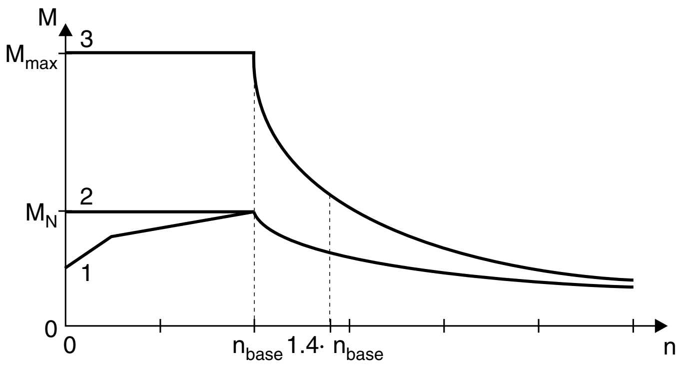
The forced cooling fan is installed in order to ensure motor cooling independent of the motor speed. This means the motor can permanently deliver the full nominal torque at low speeds without the risk that the motor will overheat.

With forced cooling, the PVC fan installed as standard on the motor shaft is removed. The sheet metal hood of the forced cooling fan changes from a cylindrical shape to the typical octagonal shape. The length of the forced cooling fan guard varies depending on the motor options, such as brake or encoder. This also applies to the punched grooves, for example in the case of manual brake release or incoming cable to the encoder.

The cooling effect for forced air cooling is at least equivalent with self-ventilation.

The following figure shows a typical speed-torque characteristic for a dynamic inverter drive, for example with MOVIDRIVE® MDX61B with encoder feedback option (DEH11B) in the CFC operating mode.

A forced cooling fan must be used if the load torque in the 0 – n_{base} is above curve 1. Without a forced cooling fan, there is 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 forced cooling
n_{base}	= Rated speed (transition speed) of the motor	3	= Maximum torque

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Notes on the selection

The possible connection voltage data is displayed in the "Forced cooling fan voltage" (→ 🗎 124) chapter.

Further technical data is displayed in the following tables.

The forced cooling fan /V can be combined with all encoders described in the "Encoders" (→ 🗎 431) chapter.

Please take into account that the potential additional length of the overall drive.

10.16.2 Technical data for DR.71 – 132../V (50 Hz)

Forced cooling fan			**/V**				
For motor size			**71**	**80**	**90**	**100**	**112/132**
Frequency	Hz		50				
Current consumption	A_{AC}	1~	0.10	0.11	0.29	0.28	0.28
		Δ	0.11	0.10	0.37	0.35	0.34
		⅄	0.06	0.06	0.20	0.19	0.19
Maximum power consumption	W		31	31	91	91	97
Air discharge rate	m³/h		60	60	170	210	295
Ambient temperature	°C		-20 to +60 (-4 to +140)				
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		1.7	1.9	2.1	2.1	2.35
Certificates			CSA, UR				

10.16.3 Technical data DR.71 – 132../V (24 V DC)

Forced cooling fan		**/V**				
For motor size		**71**	**80**	**90**	**100**	**112/132**
Voltage	V_{DC}	24				
Current consumption	A_{DC}	0.44	0.52	0.75	1.1	1.64
Maximum power consumption	W	10.5	12.5	18	28.6	39.4
Air discharge rate	m³/h	60	60	170	210	295
Ambient temperature	°C	-20 to +60				
Degree of protection		IP66				
Electrical connection		Terminal strip 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	1.7	1.9	2.1	2.1	2.35
Certificates		CSA, UR				

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10.16.4 Technical data DR.160 – 315../V (50 Hz)

Forced cooling fan			**/V**				
For motor size			**160**	**180**	**200/225**	**250/280**	**315**
Frequency	Hz		50				
Current consumption	A_{AC}	1~	0.40	0.45	-	-	-
		Δ	0.50	0.56	0.96	1.64	1.64
		⅄	0.29	0.32	0.32	0.58	0.58
Maximum power consumption	W		124	118	285	454	454
Air discharge rate	m³/h		450	780	1350	1400	2500
Ambient temperature	°C		-20 bis +60 1)				
Degree of protection			IP66				
Electrical connection			Terminal board in terminal box of forced cooling fan with 6 M4 bolts. Connection 1~ with supplied CB running capacitor				
Max. cable cross section	mm²		4 × 1.5				
Thread for cable gland			1 × M16 × 1.5				
Additional weight	kg		3	7.1	8.6	15	15.4
Certificates			CSA, UR				
Identification according to VO327/2011			-	-	Yes		

1) At voltages > 500 V, the temperature range -20°C to +40°C applies for size DR.180

10

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10.17 Terminal box

10.17.1 Cable gland

Type designation

None

Designation

The terminal boxes of the motors are supplied as standard with a sufficient number of threads in the terminal box wall so that the appropriate supply cables and be connected and the cable glands affixed.

Depending on the country and electrical regulations, the terminal boxes feature different thread types as standard or as a customer option.

The following table shows an excerpt from these regulations:

Type	Metric thread	Conical inch thread
IEC	Standard	Optional
USA, Canada	Optional	Standard
Global motor	Standard	Optional
Brazil	Standard	Optional
South Korea	Standard	Optional
Japan	Standard	Optional

The individual standard designs of the terminal boxes for motors and brakemotors are shown in the dimension sheets (→ 🗎 203).

The standard terminal boxes for motors and brakemotors of the sizes DR.71 – 180 are made from aluminum. In the case of DR.200 – 315, the terminal boxes are made from gray cast iron.

Any options or versions that are connected in the terminal box require a larger terminal box. It is therefore possible that the terminal box otherwise available in these cases is supplied in gray cast iron as standard.

SEW-EURODRIVE supplies its terminal boxes without cable glands as standard. The threads in the terminal box are sealed with plugs upon delivery. In normal ambient temperatures, these are made from plastic, while metal plugs are used for temperatures below -20°C or in excess of +80°C.

Notes on configuration

If you would like SEW-EURODRIVE to deliver the drive with fitted cable glands, please specify the manufacturer, type, and positioning of the cable glands with your order.

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10.17.2 Larger terminal box

Type designation

None

Description

For sizes DR.71 – 180, an optional terminal box made from gray cast iron is also available.

Any options that are connected in the terminal box require a larger terminal box. It is therefore possible that the terminal box otherwise available in these cases is supplied in gray cast iron as standard.

The terminal box for sizes DR.315K4 and DR.315S4 is supplied as a weight-optimized option. The larger and heavier terminal box for sizes DR.315M4 and DR.315L4 can also be supplied for the smaller DR.315 models.

Notes on configuration

The terminal boxes made from gray cast iron for sizes DR.71 – 180 have different dimensions to those specified in the chapter "Dimension sheets" (→ 🗎 203). When ordering and in the case of restricted installation space, please request the terminal box dimensions separately.

If the larger terminal box for sizes DR.315K/S is required, we ask that you provide the relevant specifications with your order.

10.17.3 Connection pieces

Type designation

None

Description

Larger, gray cast iron terminal boxes with a connection piece are also available as an option for sizes DR.160 – 225.

The connection piece can be removed from the terminal box to enable the initial fitting of the supply cables. This greatly facilitates the connection process, particularly when installing in restricted spaces.

The connection pieces are available with the following threads:

Type	Symbol
Combination possible	•
Combination not possible	–

Thread	DR.160	DR.180	DR.200	DR.225
2 × M40 × 1.5 + 2 × M16 × 1.5	•	•	–	–
2 × M50 × 1.5 + 2 × M16 × 1.5	•	•	•	•
2 × M63 × 1.5 + 2 × M16 × 1.5	–	–	•	•
1 × 1¼"-11.5 + 2 × ½"-14	•	–	–	–
2 × 1½"-11.5 + 1 × ½"-14	•	–	•	•
2 × 1½"-11.5 + 2 × ½"-14	–	•	•	•

Notes on configuration

The gray cast iron terminal boxes with connection pieces for DR.160 – 225 have different dimensions to those specified in the chapter "Dimension sheets for motors/brakemotors with gray cast iron terminal boxes" (→ 🗎 309).

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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10.18 Integrated plug connector

10.18.1 Complete plug connector

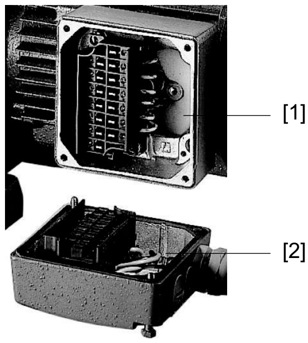
Type designation

/IS

Description

This 12-pin plug connector is characterized by the following criteria:

- It replaces the terminal board
- It is fully integrated in the terminal box
- It is a development of SEW-EURODRIVE



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[1] IS male connector

[2] IS female connector

The star or delta connection is realized with a variable terminal link. The variable terminal link is included in the delivery. It features the necessary jumpers for star connection on the one side and the three jumpers for the delta connection on the other side. This variable terminal link is included in the scope of delivery.

The /IS option is available for motors of sizes 71 – 132.

The delivery comprises the IS female and male connectors. The connection of the winding and optional connections of the brake and auxiliary devices are performed on the male connector in the factory.

Notes on configuration

The 12 contacts of the IS plug connector are generally used as follows:

- 6 contacts for motor winding
- 4 contacts for brake connection
- 2 contacts for auxiliary devices (e.g., thermal motor protection)

In conjunction with the variable terminal link, core cross sections of max. 2.5 mm^2. Without the variable terminal link, the connectable cross section increases to 4 mm^2.

The maximum current per contact is 16 A at a maximum ambient temperature of +40°C.

Type	Unit	IS
Plug connector for motor size		DR. 71 – 132
Number of contacts		12

Type	Unit	IS
Grounding (PE)		2 additional contacts
Connection to contacts		Screw connection
Contact type		Blade/bushing
Maximum voltage (IEC)	V_{AC}	690
Maximum voltage (CSA)	V_{AC}	600
Maximum contact load	A_{AC}	16
Degree of protection		Corresponding to motor degree of protection IP54, optional IP55, IP56, IP65, IP66
Ambient temperature	°C	-40 to +40
Certification		UL certification provided in conjunction with motor

The position of the cable entry can be decided by the customer during startup and does not have to specified in the order. The item is always delivered with position "normal".

10.18.2 Motor-side plug connector

Type designation

/ISU

Description

In the case of the /ISU option, only the motor-side part of the /IS plug connector is supplied. All other properties correspond to those of the /IS plug connector.

The /ISU connector is used when the IS female connector is supplied with a prefabricated cable.

This option is available for motors of sizes 71 – 132.

The delivery comprises the IS lower section mounted on the motor side and a cover. The connection of the winding and optional connections of the brake and auxiliary devices are performed on the male connector in the factory.

Notes on configuration

The position of the cable entry is decided by the customer during startup according to the prefabricated cable.

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10.18.3 Replacement of DT/DV motors with DR.. motors with /ISU plug connectors in size 1

Type designation

/ISU

Description

In the case of the /ISU option, only the motor-side part of the /IS plug connector is supplied. All other properties correspond to those of the /IS plug connector.

This option is available for motors of sizes 71 – 90.

The delivery comprises the size 1 IS lower section mounted on the motor side and a cover of the corresponding size. The connection of the winding and optional connections of the brake and auxiliary devices is performed on the male connector in the factory.

Notes on configuration

The position of the cable entry was defined during the original installation and can generally be retained.

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10.19 Installed plug connectors

The installed plug connector is based on two Harting systems: Han 10 and Han Modular in various configurations.

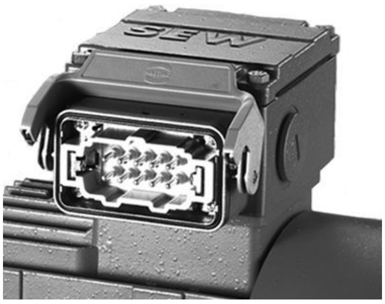
- HAN® 10 ES
- HAN® 10 E
- HAN® Modular in four different configurations.

The mating connectors are not included in the scope of delivery of SEW-EURODRIVE.

10.19.1 HAN® 10ES / 10E

Type designation

/AS.., /AC.., or /IV



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Description

These mounted plug connectors are based on Harting systems. The following series are used:

- HAN® 10 ES: contacts with cage clamp, SEW designation: /AS..
- HAN® 10 E: contacts with crimp connection, SEW designation: /AC..

The extensive possibilities for mounting a plug connector on the side of the terminal box are offered in the following variations:

- Single clip longitudinal closure (third character in SEW designation with "E")
- Twin clip transverse closure (third character in SEW designation with "B")

Due to the increasing use of AC motors on frequency inverters, the built-on housing is supplied in EMC design.

The built-on housing of the plug connector is not a separate component, but part of the terminal box.

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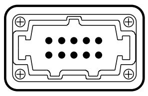
Notes on configuration

The 10 contacts of the HAN® 10ES / 10E are used in the most diverse assignment configurations.

Type	Unit	/ASB. /ACB.	/ASE. /ACE.
Plug connector for motor size		DR. 71 – 132	
Closure type of mating connector		Twin clip transverse closure	Single clip longitudinal closure
Basic connector system		Harting: HAN® EMC housing 10B Aluminum terminal box	
Motor-side connector view			
Number of contacts		10	
Grounding (PE)		Via two housing pins on insulator	
Connection to contacts		/AC.. = crimp contacts (HAN® 10E) AS..= cage clamps (HAN® 10ES)	
Contact type		Pin (bushing in mating connector)	
Maximum voltage (IEC)	V_{AC}	500	
Maximum voltage (CSA)	V_{AC}	600	
Maximum contact load	A_{AC}	16	
Degree of protection		Corresponding to motor degree of protection IP54, optional IP55, IP65	
Ambient temperature	°C	-40 to +40	
Certification		UL approval has been granted for the plug connectors. They are certified according to UL1977 in the product category ECBT2.	

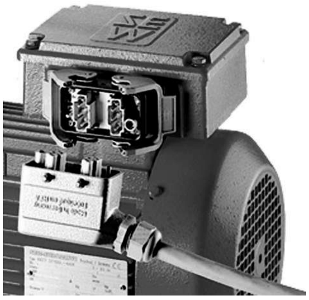
SEW-EURODRIVE provides details of the components and data for the plug connector in the order confirmation.

The mating connector is not included in the scope of delivery of SEW-EURODRIVE.

10.19.2 HAN® Modular

Type designation

/AM.., /AB.., /AD.., /AK.., or /IV



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Description

These mounted plug connectors are based on Harting systems. The following series are used:

- HAN® Modular 2 E modules: SEW-EURODRIVE designation: /AM..
- HAN® Modular 1 C and 1 E module: SEW designation: /AB..
- HAN® Modular 2 C and 1 E module: SEW designation: /AD..
- HAN® Modular 1 C and 1 E module: SEW designation: /AK..

The extensive possibilities for mounting a plug connector on the side of the terminal box are offered in the following variations:

- Single clip longitudinal closure (third character in SEW designation with "E")
- Twin clip transverse closure (third character in SEW designation with "B")

If a designation in the DT/DV modular motor system was used with an "X" as the third or fourth character, these versions are now specified with a /IV in the product type and catalog designation.

Due to the increasing use of AC motors on frequency inverters, the built-on housing is supplied in EMC design.

The built-on housing of the plug connector is not a separate component, but part of the terminal box.

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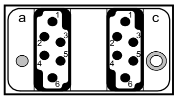
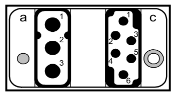
Notes on configuration

Depending on the module assembly, up to 12 contacts are used in the most diverse assignment configurations.

Type	Unit	/AMB. /AME.	/ABB. /ABE.
Plug connector for motor size		DR. 71 – 132	DR. 71 – 132 DR.160 – 225 1)
Closure type of mating connector		AMB: double locking latch AME: single locking latch	ABB: double locking latch ABE: single locking latch
Basic connector system		Harting: HAN® EMC housing 10B DR71 – 132: aluminum terminal box DR160 – 225: gray cast iron terminal box	
Motor-side connector view			
Number of contacts		2 × 6	1 × 3 + 1 × 6
Module type at positions a, b, and c		a: E module b: empty module c: E module	a: C module b: empty module c: E module
Grounding (PE)		Via two housing pins on articulated frame	
Connection to contacts		Crimp contacts (HAN® Modular)	
Contact type		Pin (bushing in mating connector)	
Maximum voltage (IEC)	V_{AC}	500	
Maximum voltage (CSA)	V_{AC}	600	
Maximum contact load	A_{AC}	12 × 16	3 × 36 6 × 16
Degree of protection		Corresponding to motor degree of protection IP54, optional IP55, IP65	
Certification		UL approval has been granted for the plug connectors. They are certified according to UL1977 in the product category ECBT2.	

1) Mechanically mountable up to size 225; the nominal current of the motor is decisive

SEW-EURODRIVE provides details of the components and data for the plug connector in the order confirmation documents.

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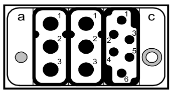
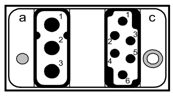
Depending on the module assembly, up to 12 contacts are used in the most diverse assignment configurations.

Type	Unit	/ADB2 /ADE2	/AKB. /AKE.
Plug connector for motor size		DR. 71 – 132 DR.160 – 225 [1]	DR.160 – 225[1]
Closure type of mating connector		ADB2: double locking latch ADE2: single locking latch	ADB: double locking latch ADE: single locking latch
Basic connector system		Harting: HAN® EMC housing 10B DR71 – 132: aluminum terminal box DR160 – 225: gray cast iron terminal box	
Motor-side connector view			
Number of contacts		2 × 3 + 1 × 6	1 × 3 + 1 × 6
Module type at positions a, b, and c		a: C module b: C module I c: E module	a: C module b: empty module c: E module
Grounding (PE)		Via two housing pins on articulated frame	
Connection to contacts		Crimp contacts (HAN® Modular)	C module: axial screw connection E module = crimp contacts (HAN® Modular)
Contact type		Pin (bushing in mating connector)	
Maximum voltage (IEC)	V_{AC}	500	
Maximum voltage (CSA)	V_{AC}	600	
Maximum contact load	A_{AC}	6 × 36 6 × 16	3 × 60 6 × 16
Degree of protection		Corresponding to motor degree of protection IP54, optional IP55, IP65	
Certification		UL approval has been granted for the plug connectors. They are certified according to UL1977 in the product category ECBT2.	

1) Mechanically mountable up to size 225; the nominal current of the motor is decisive.

SEW-EURODRIVE provides details of the components and data for the plug connector in the order confirmation documents.

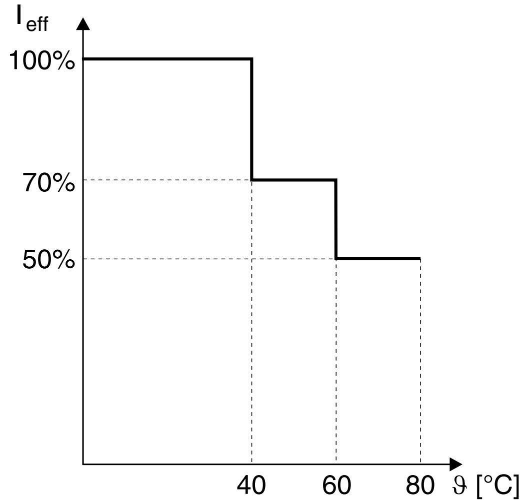
The mating connector is not included in the scope of delivery of SEW-EURODRIVE.

10.19.3 Contact rating at ambient temperatures over 40°C

Description

Reduced current values apply to temperatures higher than the 40°C specified in the tables. The following figure shows the permitted contact load depending on the ambient temperature.

The following figure shows the permitted contact load depending on the ambient temperature.



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Notes on configuration

The drive selection only supports a gradation of 20°C.

10.20 /KCC or /KC1 cage clamp

With these options, the traditional means of connecting to the bolts of the terminal board is replaced by a terminal strip with cage clamp connections.

10.20.1 6 or 10 /KCC terminal strips

Type designation

/KCC

Description

This option comprises an extension from 6 to 10 terminals, in each case with an additional 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

  or

- Using three jumpers for the delta connection

The four jumpers are included in the scope of delivery.

In a brakemotor, four additional terminal strips can be used as an option for connecting the brake.

Notes on configuration

The winding is always connected to the first six terminal strips.

Two alternatives exist for the connection of the optional brake:

- Separate connection in the terminal box via screw terminals for the brake voltage supply on the rectifier or the screw terminal when using the rectifiers in the control cabinet.
- Four additional terminal strips for the brake voltage supply and the optional feedback of the DC-side disconnection to the control cabinet.

When using the rectifiers in the control cabinet, only three of the four terminals are used for the connection.

Type	Unit	KCC
Cage clamp for motor size		DR. 71 – 132
Number of terminals		6 for motor 6 or 10 for brakemotor
Grounding (PE)		1 additional terminal
Connection to terminals		Cage clamp
Maximum core cross section		Rigid conductors: 4 mm² Flexible conductors: 4 mm² With conductor end sleeve: 2.5 mm²
Maximum voltage (IEC)	V_{AC}	720
Maximum voltage (CSA)	V_{AC}	600
Maximum contact load (IEC)	A_{AC}	28

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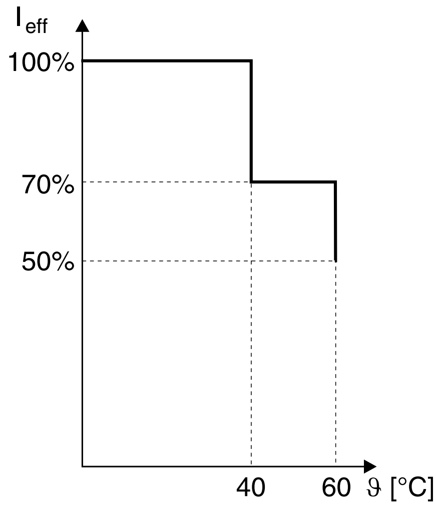
Type	Unit	KCC
Maximum contact load (CSA)	A_{AC}	20
Power range	kW	9.2
Degree of protection		Corresponding to motor degree of protection IP54, optional IP55, IP56, IP65, IP66
Ambient temperature	°C	-40 to +60

The auxiliary terminals – e.g., for thermal motor protection – are generally connected separately via screw terminals and not via the terminal strip.

10.20.2 /KCC contact rating at ambient temperatures over 40°C

Description

Reduced current values apply to temperatures higher than the 40°C specified in the tables. The following figure shows the permitted contact load depending on the ambient temperature.



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10.20.3 /KC1 compact wiring space

Type designation

/KC1

Description

The connection of the terminal box for the /KC1 option differs from that of the standard motor or brakemotor terminal box.

A non-modifiable terminal strip replaces the terminal board and, instead of a terminal box lower part and cover, a high cover with three threads for cable glands is screwed directly onto the terminal box shoulder on the stator. This helps to achieve the low height.

VDI guideline 3643 contains a profile for electrified monorail systems, the C1 profile. The motor size DR.71 complies with this profile.

The DR.80 motor also meets this guideline with the /KC1 option in terminal box positions R (0°), L (180°), and T (270°), for all cable entry directions (X, 1, 2, 3).

The /KC1 option is compatible with motors DR.71 – 132.

Drive selection

The terminal strip consists of the following:

- Three dual-chamber terminals for connecting the motor winding and the three incoming cables.
- Three single-chamber terminals for connecting the brake. The rectifier for the brake must be fitted externally.
- Two single-chamber terminals for connecting an auxiliary device – e.g., a /TF or a /TH, or the anti-condensation heating etc.
- A grounding terminal (PE).

The maximum cross section that can be connected is 2.5 mm^2 per terminal. There are no star or delta bridges.

The following three cable entries are integrated in the high cover of the KC1.

- M20 × 1.5
- M16 × 1.5
- M12 × 1.5

Type	Unit	KC1
Cage clamp for motor size		DR. 71 – 132 C1 profile with DR.71 – 80
Number of terminals		8 for motor/brakemotor
Grounding (PE)		1 additional terminal
Connection to terminals		Cage clamp
Maximum core cross section		Rigid conductors: 2.5 mm² Flexible conductors: 2.5 mm² With conductor end sleeve: 1.5 mm²
Maximum voltage (IEC)	V_{AC}	500
Maximum voltage (CSA)	V_{AC}	600

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Type	Unit	KC1
Maximum contact load (IEC)	A_{AC}	24
Maximum contact load (CSA)	A_{AC}	5
Degree of protection		Corresponding to motor degree of protection IP54, optional IP55, IP56, IP65, IP66
Ambient temperature	°C	-40 to +60

The motor with the /KC1 option is supplied with factory-fitted wiring. Unless specified otherwise by the customer, a star connection is provided for 2-, 4-, and 6-pole motors of the type DRS.., DRE.., and DRP.. with connection type R13.

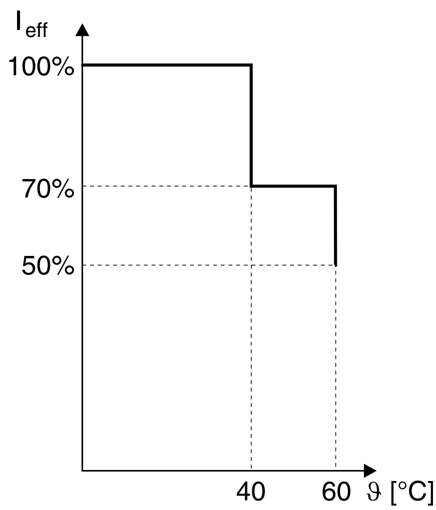
The customer can change this to a delta connection by altering the assignment of the three dual-chambers.

The terminal strip is approved by CSA (Canada) for a maximum of 5 amps.

10.20.4 /KC1 contact rating at ambient temperatures over 40°C

Description

Reduced current values apply to temperatures higher than the 40°C specified in the tables. The following figure shows the permitted contact load depending on the ambient temperature.



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10.21 Other industrial plug connectors

If the connection is to be established via other plug connectors, please supply SEW-EURODRIVE with the manufacturer and type of the desired plug connectors.

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10.22 Brake monitoring

10.22.1 Brake monitoring

Type designation

/DUB

Description

The DUB (Diagnostic Unit Brake) is a diagnostic unit used for reliable monitoring of the brake function and brake lining wear.

A microswitch serves as the core element of the /DUB diagnostic unit.

One microswitch is used for

- Function monitoring

  or

- Wear monitoring

Two microswitches are used for

- Function and wear monitoring

The /DUB option is available for brake BE2 on DR.90 up to BE122 on DR.315.

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Notes on configuration

The technical data of the microswitch is listed in the following table.

Technical data	Unit	value
Operating voltage	V_{AC}	Max. 250
	V_{AC} V_{DC}	24[1)]
Rated switching capacity	A_{AC}	6.0 (at 250 V)
	A_{AC} A_{DC}	0.1 (at 24 V)
Mechanical service life in number of cycles		50 million
Control element material		Stainless steel
Housing material		PA6T/X with fiberglass reinforcement
Snap switch mechanism		Self-reengaging, flexible tongue made of beryllium-copper with self-cleaning contacts
Tripping force	N	3.5
Differential movement	mm	0.1
Temperature range	°C	-40 to +80
Protection class		II
Can be mounted to		DR.90..BE2 – DR.315..BE122
Connection		Screw contacts in terminal box

1) When a voltage > 24 V DC is connected, the gold layer is destroyed, as a result of which operation with 24 V DC is no longer permitted.

- Note that for the function monitoring of the brake, no stop category is met in terms of the functional safety covered by standard EN 13849.
- The signal can be evaluated by a frequency inverter or higher-level controller.
- If the microswitch was operated with an AC voltage, operation with a 24 V DC voltage is then no longer permitted.

10.22.2 Function monitoring

Type designation

/DUB

Description

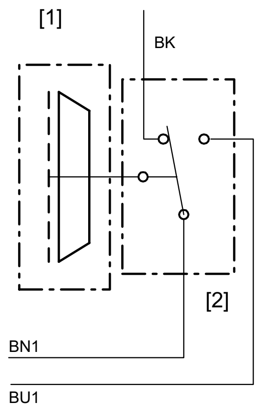
The function monitoring system signals whether the brake releases properly.

This is done via the NO function of the contact in the microswitch.

Drive selection

Block diagram:

Function monitoring



4040830219

[1] Brake

[2] MP321-1MS micro-switch

External vibration stress is not permitted since this can raise the occurrence of apparent error messages on the part of the microswitch.

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10.22.3 Wear monitoring

Type designation

/DUB

Description

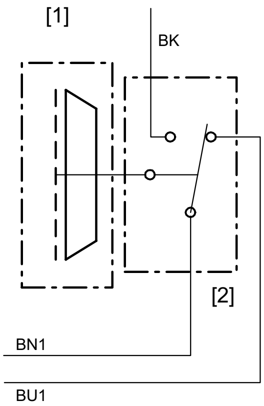
The wear monitoring system signals when the brake has reached a specified wear limit. However, the brake remains functional.

This is done via the NC function of the contact in the microswitch.

Drive selection

Block diagram:

Wear monitoring



4040831883

[1] Brake

[2] MP321-1MS microswitch

External vibration stress is not permitted since this can raise the occurrence of apparent error messages on the part of the microswitch.

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10.22.4 Function and wear monitoring

Type designation

/DUB

Description

Two microswitches are used in parallel.

- The function monitoring system signals whether the brake releases properly.

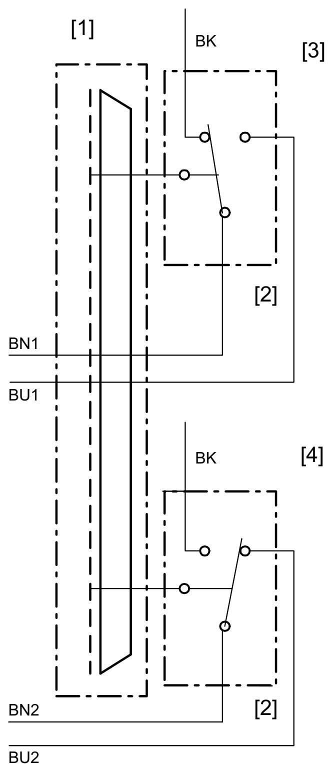
  This is done via the NO function of the contact in the first microswitch.
- The wear monitoring system signals when the brake has reached a specified wear limit. However, the brake remains functional.

  This is done via the NC function of the contact in the second microswitch.

Drive selection

Block diagram:

Function monitoring + wear monitoring



4040833547

[1] Brake	[3] Function monitoring
[2] MP321-1MS microswitch	[4] Wear monitoring

External vibration stress is not permitted since this can raise the occurrence of apparent error messages on the part of the microswitches.

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10.23 Vibration monitoring

10.23.1 SPM measuring nipple

Type designation

None

Description

The bores for accommodating the SPM vibration transducers are available as an option for the motor sizes DR.160 to 315.

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 greased for easy disassembly.

Usually, the vibration transducers are aligned to the terminal box. They can be supplied by SEW-EURODRIVE with the order. They are supplied loose with the drive.

Usually, the 24 mm nipple is used on the A-side, while the 78 mm nipple is used for the fan guard on the B-side.

Notes on configuration

The vibration transducer is not included in the scope of delivery of SEW-EURODRIVE.

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10.24 WPU smooth pole-change unit

Normal multi-speed motors cannot switch from high to low speed without jerks unless special measures are taken. To limit the regenerative braking torque which arises, the voltage is either reduced to a lower value at the moment of the changeover by chokes, a transformer or dropping resistors, or the changeover is only 2-phase. All specified measures involve additional installation effort and switchgear. A time relay, which is set empirically, causes the voltage to return to normal conditions.

The WPU smooth pole-change unit operates purely electronically.

10.24.1 Function

The changeover command blocks a phase of the line voltage by means of a triac, thereby reducing the shift-in torque to about one third. The third phase is switched back on with optimum current as soon as the synchronous speed of the low-speed winding is reached.

The following figure shows the WPU smooth pole-change unit.

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10.24.2 Advantages of WPU

- Load independent and wear-free
- No energy loss and thus high efficiency
- Unrestricted starting and nominal torque and unrestricted motor starting frequency
- Minimal wiring
- Suitable for any multi-speed standard motor

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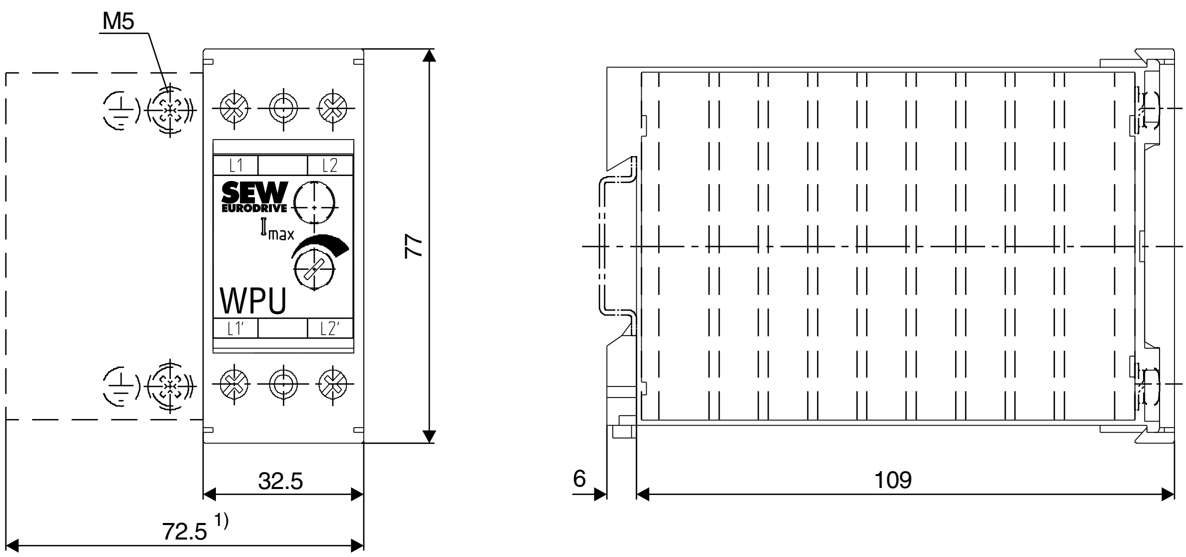
10.24.3 Technical data

Type	WPU 1001	WPU 1003	WPU 1010	WPU 2030
Part number	8257426	8257434	8257442	8257450
For multi-speed motors with nominal current I_N at low speeds in S1 continuous duty	0.2 – 1 A_{AC}	1 – 3 A_{AC}	3 – 10 A_{AC}	10 –30 A_{AC}
For multi-speed motors with nominal current I_N at low speeds in S3 intermittent duty 40/60% cdf	0.2 – 1 A_{AC}	1 – 5 A_{AC}	3 – 15 A_{AC}	10 – 50 A_{AC}
Rated supply voltage U_{line}	2 × 150 – 500 V_{AC}			
Line frequency f_{line}	50/60 Hz			
Nominal current in S1 continuous duty I_N	1 A_{AC}	3 A_{AC}	10 A_{AC}	30 A_{AC}
Ambient temperature ϑ_{amb}	-15 to +45°C			
Degree of protection	IP20			
Mass	0.3 kg	0.3 kg	0.6 kg	1.5 kg
Mechanical design	DIN rail housing with screw connections			Control cabinet back panel

10.24.4 Dimension sheets for WPU smooth pole-change unit

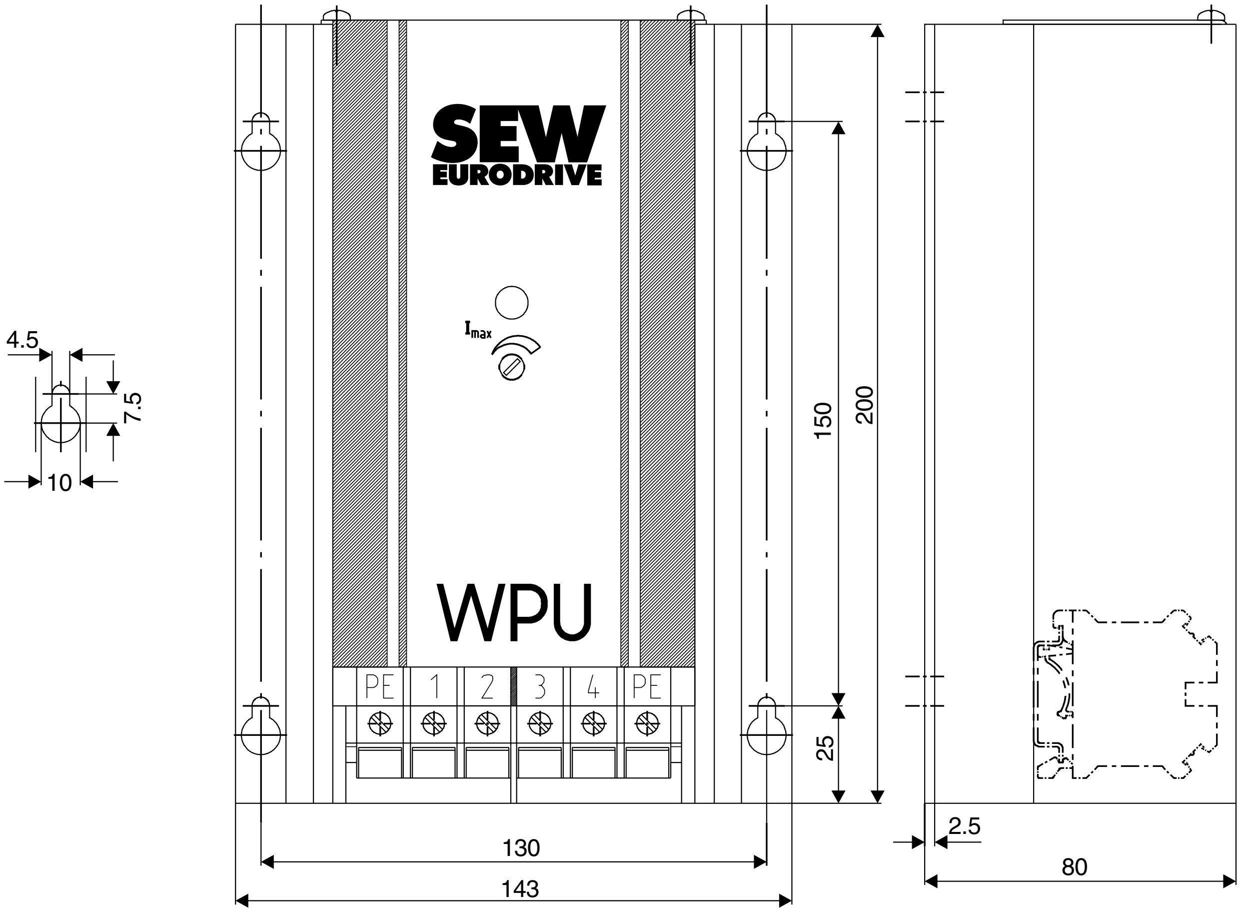
WPU 1001, 1003, 1010



3976853003

1) Heat sink only for WPU 1010

WPU 2030



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11 DR.. AC motors with decentralized technology

11.1 Product description – MOVI-SWITCH®

11.1.1 Type designation

/MSW

11.1.2 Description

MOVI-SWITCH® is the gearmotor with integrated switching and protection function.

The four-pole AC (brake) motor sizes DR.71 to DR.100 can be combined with all appropriate gear units of the modular concept as part of the MOVI-SWITCH® product range. Refer to the "Drive Systems for Decentralized Installation" catalog for detailed information about MOVI-SWITCH®.

11.1.3 Advantages of MOVI-SWITCH®

MOVI-SWITCH® offers the following advantages:

- Circuit breaker and protection functions are completely integrated, saving control cabinet space and cabling.
- Integrated mechatronic solution, robust and compact.
- AC motors and AC brakemotors have the same connection configuration,
- therefore simple installation.

11.1.4 MOVI-SWITCH® versions

Two MOVI-SWITCH® versions are available: one for operation with one direction of rotation (MSW-1E); one for operation with direction of rotation reversal (MSW-2S).

The line and control connections are the same for motors with or without brake.

MSW-1E

MOVI-SWITCH® MSW-1E is switched on and off without changing direction by means of a short circuit-proof star bridge switch. A thermal winding monitor (TF) is also integrated, which acts directly on the switch.

MSW-2S

The direction of rotation is reversed in MOVI-SWITCH® MSW-2S using a reversing relay combination with a long service life. Supply system monitoring, phase-sequence monitoring, brake control, circuit breaker, and protection functions are grouped together in the controller. The various operating states are indicated by the diagnostic LED.

The pin assignment for clockwise direction of rotation (CW) is compatible with that of MSW-1E. The integrated AS interface connection is compatible with MLK11A.

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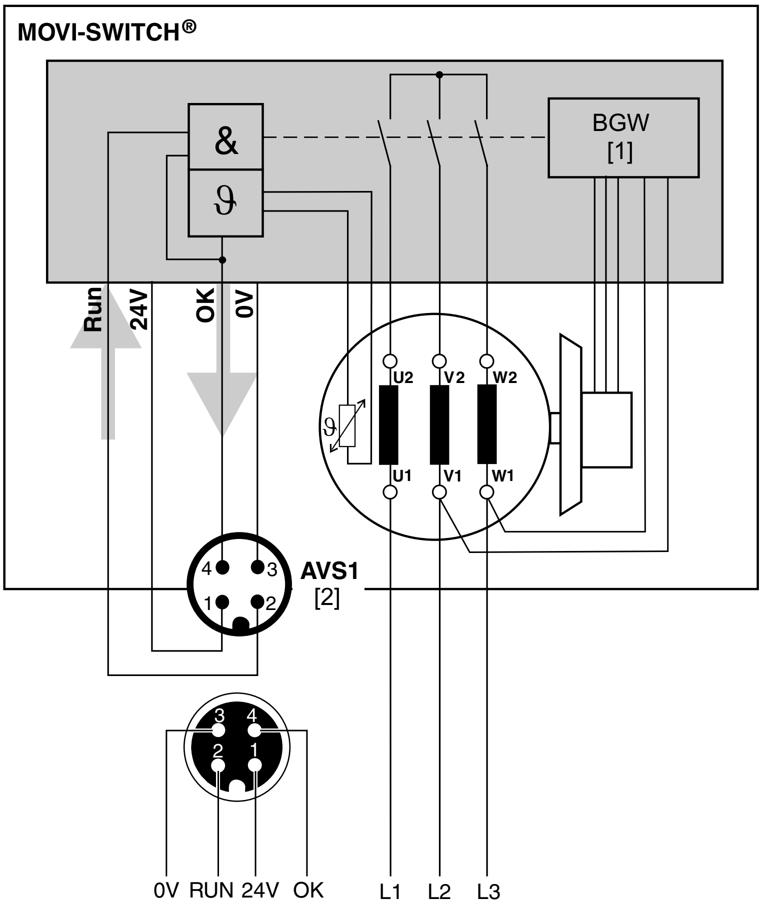
11.2 Project planning notes – MOVI-SWITCH®

11.2.1 Available combinations

MOVI-SWITCH® AC motors and brakemotors of sizes DR.71 to DR.100 can be combined with all suitable gear unit types, mounting positions, and designs in accordance with the selection tables for gearmotors.

11.2.2 Operating principle

The following figure illustrates how MOVI-SWITCH®-1E operates.



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[1] = Brake control

[2] = M12 plug connector (standard coding)

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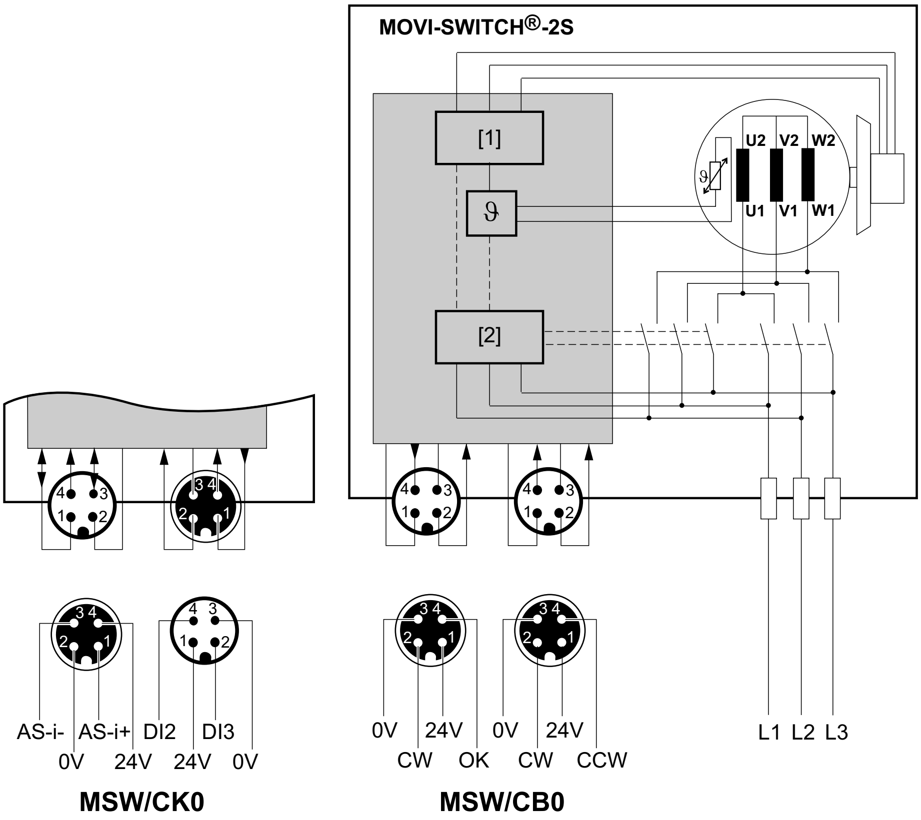
The following figure illustrates how MOVI-SWITCH®-2S operates.



4153305867

[1] Brake control

[2] Rotating field recognition

11.2.3 Voltage range

With MOVI-SWITCH®, motors can be switched within the following voltage range:

- 3 × 380 – 500 V, 50 / 60 Hz

11.2.4 MOVI-SWITCH® 1E drives in IP66

Properties

MOVI-SWITCH® 1E drives in enclosure IP66 are characterized by the following features:

- IP66 motor with condensation drain hole and corrosion protection
- IP66 connection box with cable outlet on one end
- Stainless steel screw plugs with seal on inside
- Stainless steel retaining screws in connection box cover
- Two metal cable glands (1 x M25 and 1 x M16, enclosed loose)
- Available with optional pressure compensation fitting (M16, enclosed loose)

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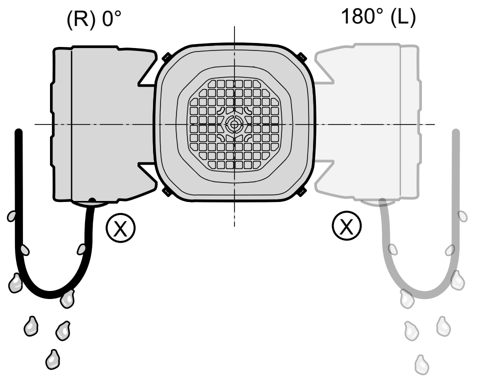
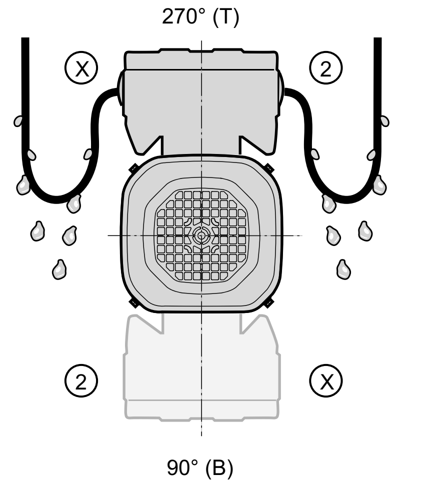
Available designs

MOVI-SWITCH® **without** pressure compensation	MOVI-SWITCH® **with** pressure compensation
 4153311627	 4153313291

Drives	**Type**	**Possible positions of connection box/cable entry**
MOVI-SWITCH® 1E without pressure compensation fitting	D../MSW/AVS1/IP66	0°/X 180°/X
MOVI-SWITCH® 1E with pressure compensation fitting	D../MSW/AVS1/IP66	90°/X 270°/X 90°/2 270°/2

11.2.5 MOVI-SWITCH® 2S drives in IP66

Properties

MOVI-SWITCH® 2S drives in enclosure IP66 are characterized by the following features:

- IP66 motor with condensation drain hole and corrosion protection
- IP66 connection box with cable outlet on one end (../RA2A)
- Wiring board with increased resistance to moisture condensation (coated)
- Stainless steel screw plugs with seal on inside
- Stainless steel retaining screws in MSW control unit
- Two metal cable glands (1 x M25 and 1 x M16, enclosed loose)
- Available with optional pressure compensation fitting (M16, enclosed loose)

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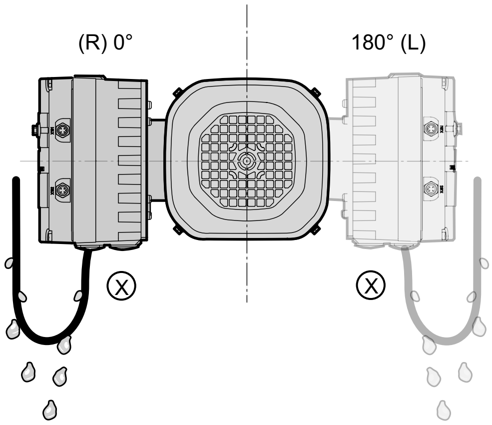
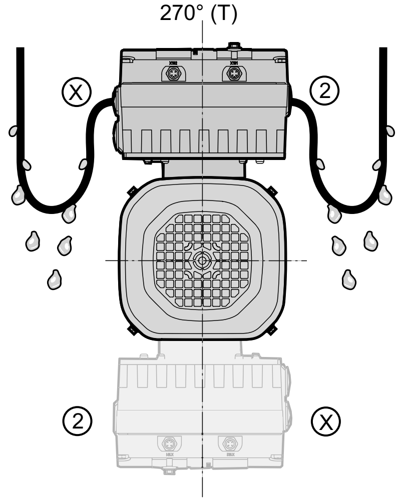
Available designs

MOVI-SWITCH® **without** pressure compensation	MOVI-SWITCH® **with** pressure compensation
 4153318027	 4153319691

Drives	Type	Possible positions of connection box/ cable entry
MOVI-SWITCH® 2S without pressure compensation fitting	D../MSW/C.. /RA2A – IP66	0°/X 180°/X
MOVI-SWITCH® 2S with pressure compensation fitting	D../MSW/C.. /RA2A – IP66	90°/X 270°/X 90°/2 270°/2

11.2.6 Important information for ordering

Note the following points when ordering AC (brake) motors or gearmotors with MOVI-SWITCH®:

- Voltage for winding in star connection only
- Only two brake voltages are possible:
  - Motor voltage / $\sqrt{3}$

    or
  - Motor voltage
- Position of the terminal box preferably 270°. Please consult SEW-EURODRIVE for other positions.

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11.2.7 MSW-1E

Connection technology

Overview

MOVI-SWITCH® 1E is supplied with AVS1 plug connectors for control signals unless specified otherwise in the order. The plug connectors listed in the following table are available as standard. For other types, please contact SEW-EURODRIVE.

Order designation	Function	Manufacturer designation
MSW../AVS1	Control signals	1 x M12 x 1 round plug connector
MSW../AVS1/ASA3	Control signals Power	1 x M12 x 1 round plug connector Harting Han® 10 ES pin insert (built-on housing with two clips)
MSW../ASAW	Connection to field distributor Z.3**W** or Z.6**W**	Harting Han® 10 ES pin insert (built-on housing with two clips)

Possible plug connector positions

The following positions are possible for ASA3 and AVS1 plug connectors:

Plug connectors	Possible positions
AVS1	X (standard)
	2
	3
ASA3 ASAW	X (standard)
	2
	3
AVS1/ASA3	ASA3 = X (standard) + AVS1 = X (standard)
	ASA3 = 2 + AVS1 = 2
	ASA3 = 3 + AVS1 = 3
	ASA3 = X (standard) + AVS1 = 2
	ASA3 = 2 + AVS1 = X (standard)

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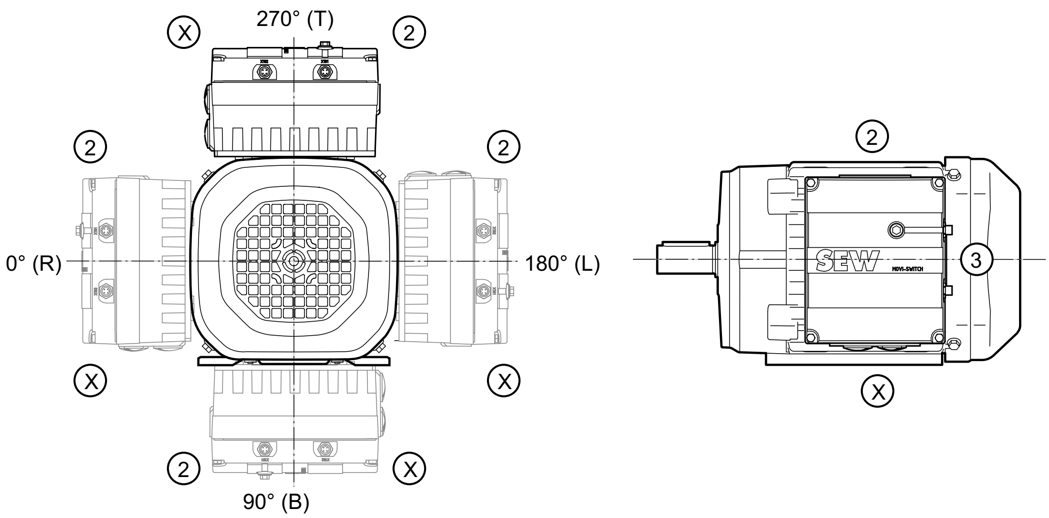

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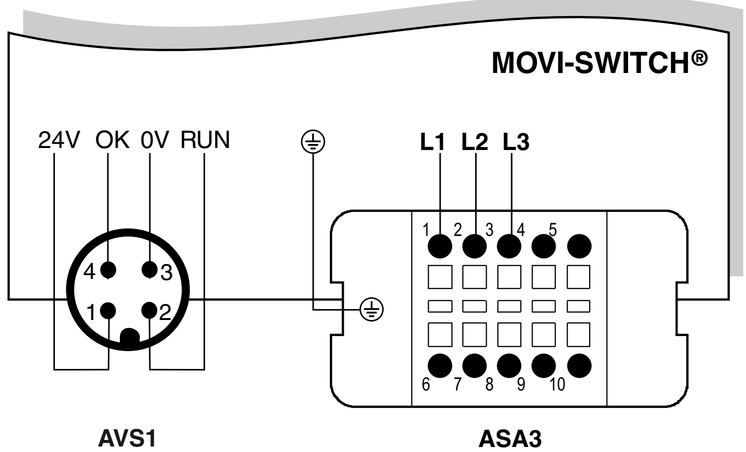
AVS1/ASA3 pin assignment

The following figure shows the assignment of the AVS1/ASA3 plug connector:



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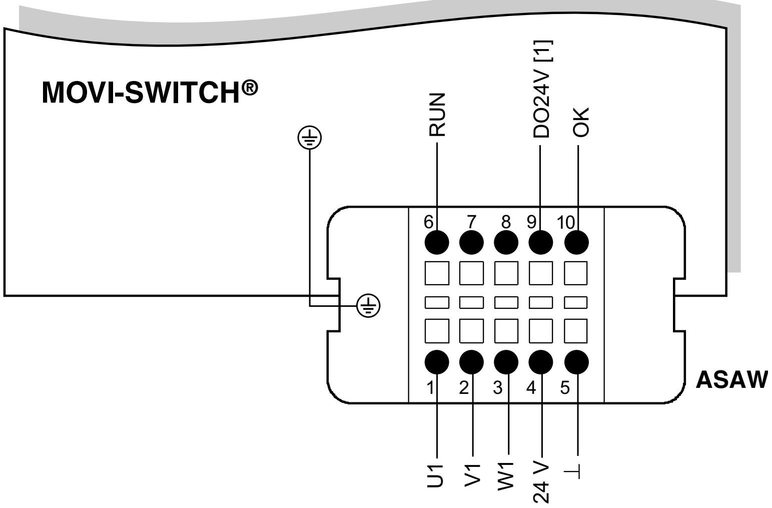
ASAW pin assignment

The following figure shows the assignment of the ASAW plug connector:



4153333515

[1] Plug connector monitoring possible with suitable connection wiring

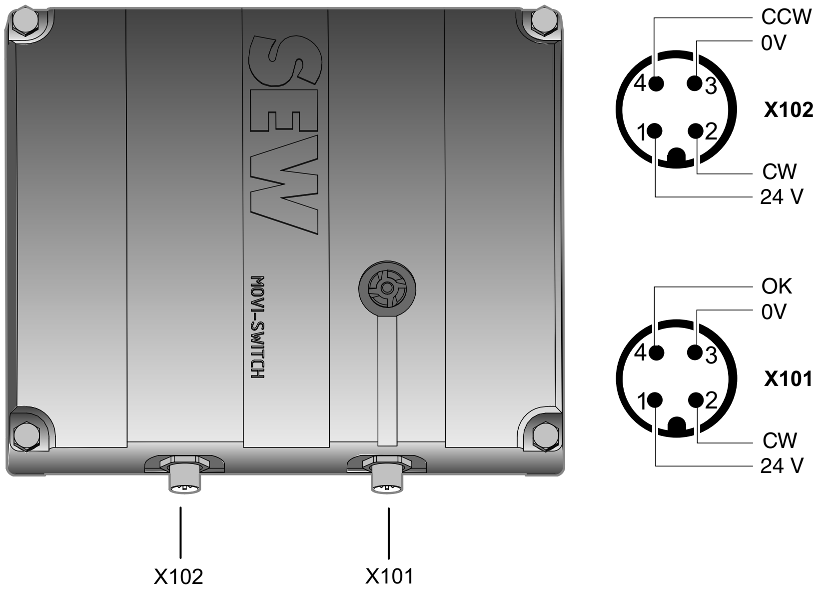
11.2.8 MSW-2S

Connection technology of CB0 version (binary control)

Standard version

As standard, MOVI-SWITCH® 2S is equipped with two plug connectors for connecting control signals and 24 V supply. The plug connectors are integrated in the control unit; see the following figure.

Order designation of the standard design: MSW/CB0/RA2A.



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Optional plug connectors

The following table shows the plug connectors in the connection box that are available as an option for MOVI-SWITCH® 2S (CB0 version). For other types, please contact SEW-EURODRIVE.

Order designation	Function	Manufacturer designation
MSW/.../ASA3	Power	Harting Han® 10 ES pin insert (built-on housing with two clips)
MSW/.../AND3	Power	Harting Han® Q8/0 pin insert (built-on housing with one clip)
MSW/.../ASAW	Connection to field distributor Z.3**W** or Z.6**W**	Harting Han® 10 ES pin insert (built-on housing with two clips)

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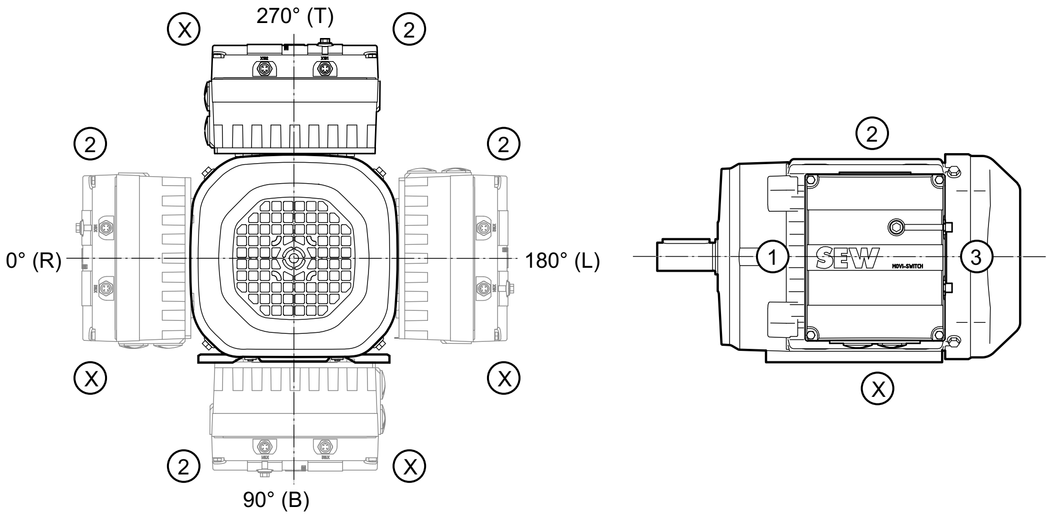
Possible plug connector positions

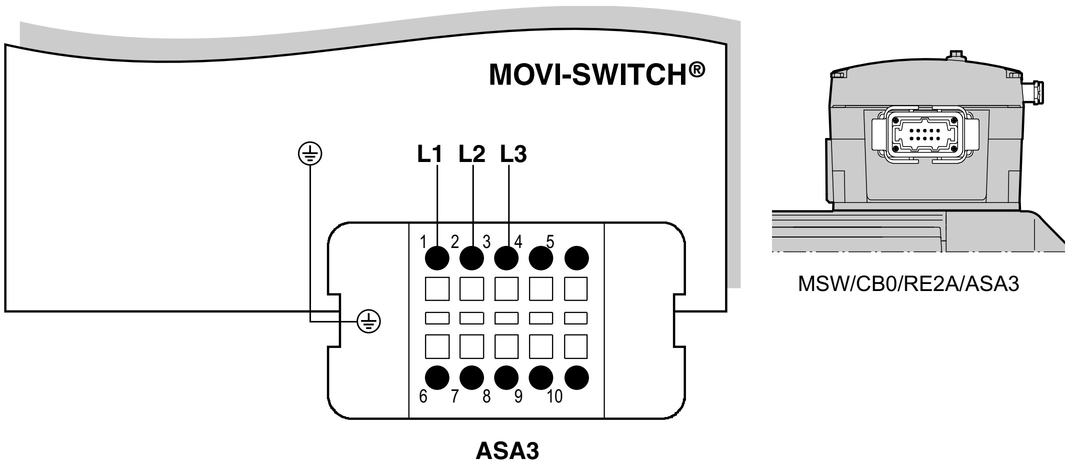
The positions shown in the following figure are possible for plug connectors. Some positions might not be possible for certain gear unit types and mounting positions; please contact SEW-EURODRIVE.



4153341963

ASA3 pin assignment

The following figure shows the assignment of the ASA3 plug connector:



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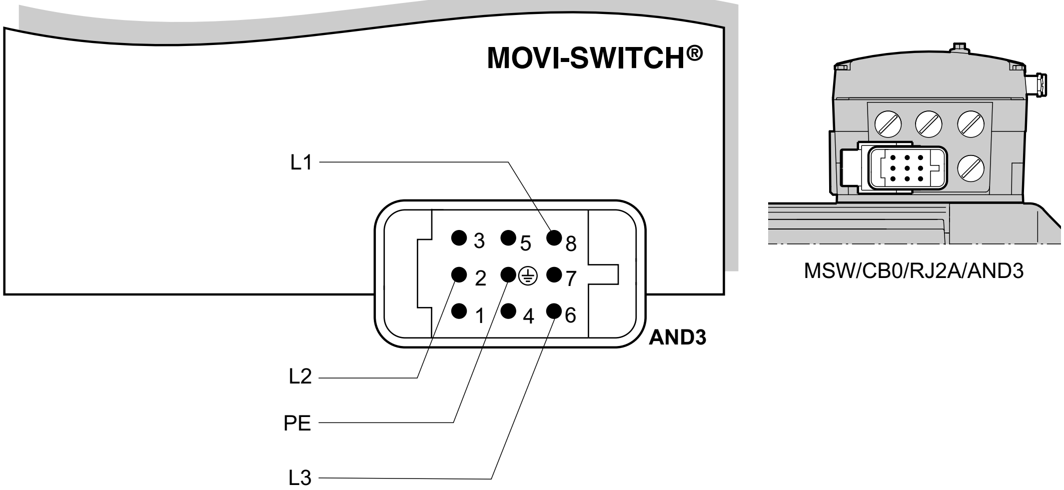
AND3 pin assignment

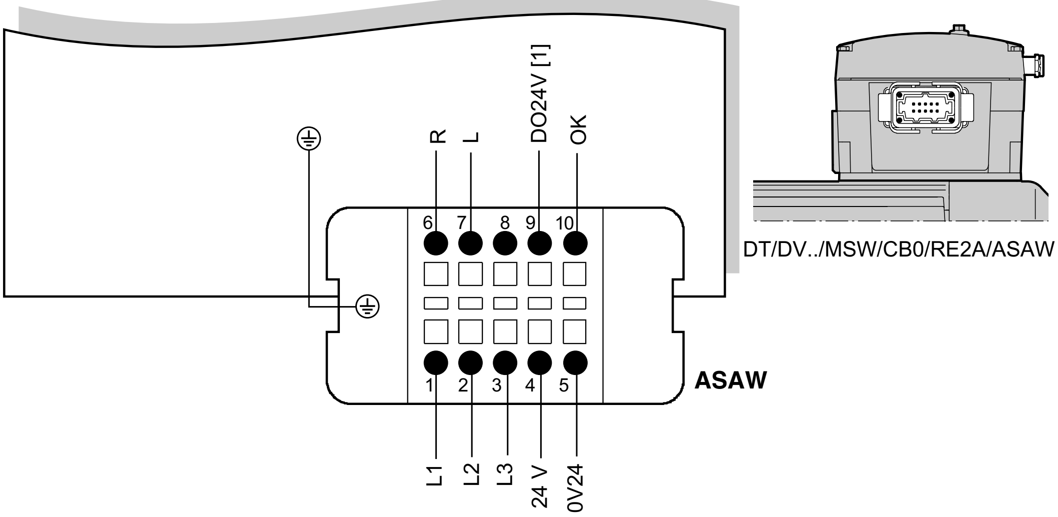
The following figure shows the assignment of the AND3 plug connector:



4153347339

ASAW pin assignment

The following figure shows the assignment of the ASAW plug connector:



4153350027

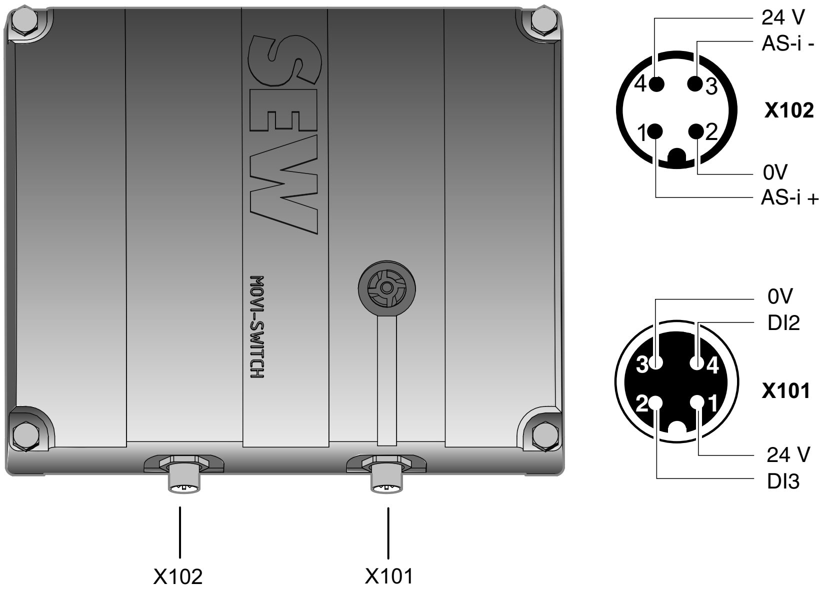
[1] Plug connector monitoring possible with suitable connection wiring

Connection technology of CK0 version (with integrated AS-Interface)

Standard version

MOVI-SWITCH® 2S is equipped with two 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.



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Optional plug connectors

The following table shows the plug connectors in the connection box that are available as an option for MOVI-SWITCH® 2S (CK0 version). For other types, please contact SEW-EURODRIVE.

Order designation	Function	Manufacturer designation
MSW/.../ASA3/AVS0	Power + AUX-PWR	Harting Han® 10 ES pin insert (built-on housing with two clips) + 1 x M12 x 1 round plug connector
MSW/.../AND3/AVS0	Power + AUX-PWR	Harting Han® Q8/0 pin insert (built-on housing with one clip) + 1 x M12 x 1 round plug connector

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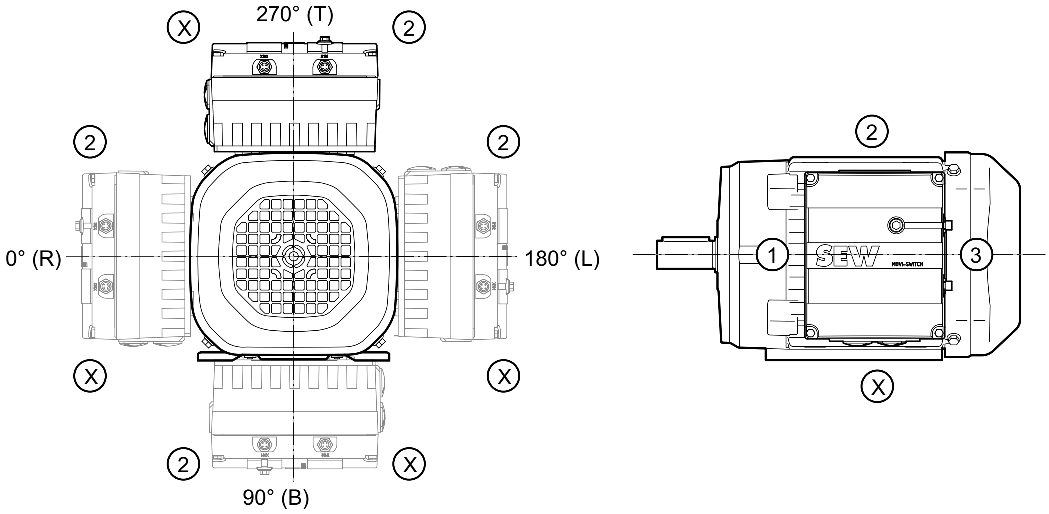
Possible plug connector positions

The positions shown in the following figure are possible for plug connectors. Some positions might not be possible for certain gear unit types and mounting positions (contact SEW-EURODRIVE)



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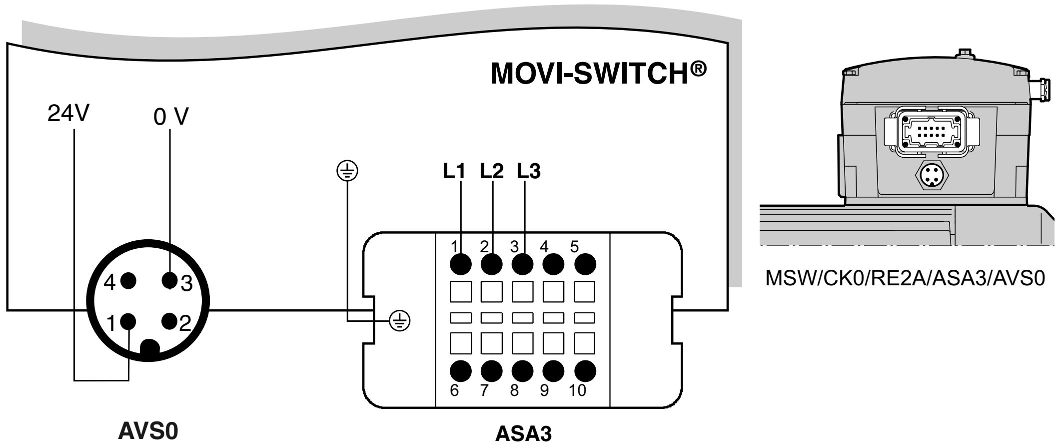
Pin assignments

AVS0/ASA3 pin assignment

The following figure shows the assignment of the AVS0/ASA3 plug connector:



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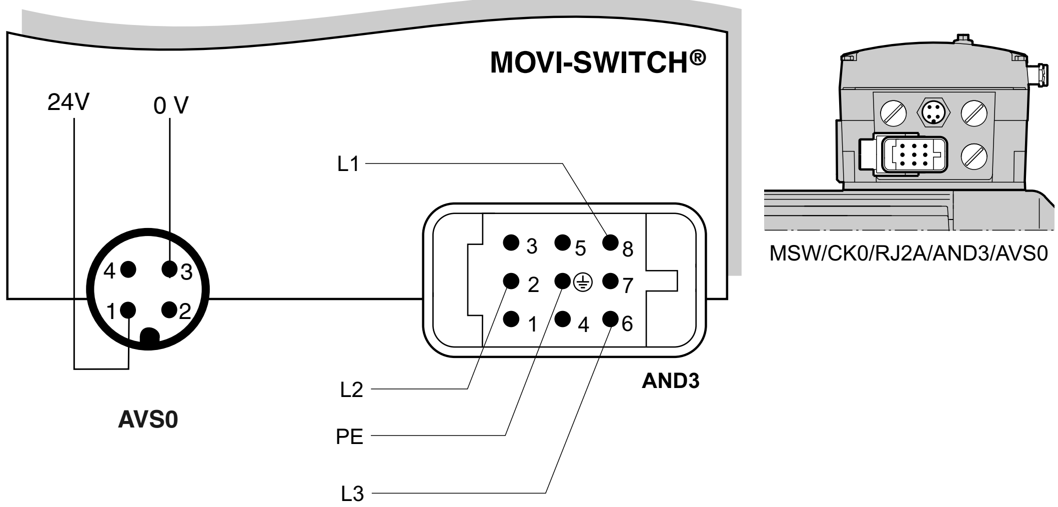
AVS0/AND3 pin assignment

The following figure shows the assignment of the AVS0/AND3 plug connector:



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11.3 Key to the data for energy-efficient motors with MOVI-SWITCH®

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
cosφ	Power factor
$\eta_{75\%}$	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	Mass of the motor
J_{Mot}	Mass moment of inertia of the motor
BE..	Brake used
Z_0 BG	Starting frequency for operation with BG brake controller
Z_0 BGE	Starting frequency for operation with BGE brake controller
M_B	Braking torque
m_B	Mass of the brake motor
J_{MOT_BE}	Mass moment of inertia of the brake motor

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11.4 Technical data – MOVI-SWITCH®-1E / 2S 2-pole

11.4.1 DRS..: 3000 rpm - S1 IE1

2-pole DRS../MSW motors

Motor type DRS../MSW	P_N kW	M_N Nm	n_N rpm	I_N 400 V A	I_N 380-420 V A	cosφ	IE	$\eta_{50\%}$ %	$\eta_{75\%}$ %	$\eta_{100\%}$ %	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DRS71M2	0.55	1.87	2810	1.37	1.42	0.79	IE1	70.7	73.5	72.9	4.9	2.9 2.1	2.3
DRS80S2	0.75	2.55	2800	1.73	1.78	0.84	IE1	71.3	74.6	74.4	4.6	2.5 2.3	2.5
DRS80M2	1.1	3.7	2840	2.35	2.4	0.88	IE1	80.2	77.7	76.5	6.0	2.7 2.5	2.8
DRS90M2	1.5	5.1	2830	3.1	3.2	0.89	IE1	83.3	80.0	78.3	5.9	2.7 2.6	2.7
DRS90L2	2.2	7.4	2820	4.45	4.6	0.89	IE1	84.9	82.8	80.5	5.8	2.9 2.5	2.6
DRS100M2	3	10.1	2840	5.8	6	0.91	IE1	86.9	84.6	82.5	6.4	3.1 2.8	2.8

2-pole DRS../MSW motors/brakemotors

Motor type DRS../MSW	P_N kW	M_N Nm	n_N rpm	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
DRS71M2	0.55	1.87	2810	9.1	7.21	BE05	2000 4500	3.5	12	8.51
DRS80S2	0.75	2.55	2800	12	15.3	BE05	1400 3300	5	14	16.8
DRS80M2	1.1	3.7	2840	14	21.7	BE1	1300 3000	7	17	23.2
DRS90M2	1.5	5.1	2830	18	35.7	BE1	1100 2700	10	21	37.3
DRS90L2	2.2	7.4	2820	21	43.9	BE2	900 2200	14	26	48.6
DRS100M2	3	10.1	2840	26	56.2	BE2	700 1800	20	31	61

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11.4.2 DRE..: 3000 rpm - S1 IE2

2-pole DRE../MSW motors

DRE../MSW motor type	P_N kW	M_N Nm	n_N rpm	I_N 400 V A	I_N 380-420 V A	cosφ	IE	$\eta_{50\%}$ %	$\eta_{75\%}$ %	$\eta_{100\%}$ %	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DRE80M2	0.75	2.5	2890	1.54	1.6	0.89	IE2	81.1	79.2	79.2	7.9	3.4 3.0	3.4
DRE90M2	1.1	3.65	2870	2.2	2.3	0.89	IE2	83.5	82.2	81.2	7.2	3.2 3.0	3.2
DRE90M2	1.5	5.1	2830	2.95	3.05	0.89	IE2	83.3	83.5	81.8	5.9	2.7 2.6	2.7
DRE100M2	2.2	7.3	2880	4.15	4.3	0.91	IE2	87.4	85.6	84.5	8.2	3.8 3.3	3.4
DRE100L2	3	10.1	2850	5.5	5.7	0.93	IE2	88.0	87.4	85.6	7.2	3.5 3.1	3.1

2-pole DRE../MSW motors/brakemotors

DRE../MSW motor type	P_N kW	M_N Nm	n_N rpm	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
DRE80M2	0.75	2.5	2890	14	21.7	BE05	1300 3200	5	17	23.2
DRE90M2	1.1	3.65	2870	18	35.7	BE1	1100 2700	10	21	37.3
DRE90M2	1.5	5.1	2830	18	35.7	BE1	1100 2700	10	21	37.3
DRE100M2	2.2	7.3	2880	26	56.2	BE2	700 1800	14	31	61
DRE100L2	3	10.1	2850	29	68.6	BE2	450 1000	20	34	73.3

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11.4.3 DRP..: 3000 rpm - S1 IE3

2-pole DRP../MSW motors

Motor type DRP../MSW	P_N kW	M_N Nm	n_N rpm	I_N 400 V A	I_N 380-420 V A	cosφ	IE	$\eta_{50\%}$ %	$\eta_{75\%}$ %	$\eta_{100\%}$ %	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DRP80M2	0.75	2.5	2890	1.46	1.52	0.89	IE3	81.1	83.2	83.2	7.9	3.4 3.0	3.4
DRP90M2	1.1	3.65	2870	2.1	2.2	0.89	IE3	83.5	84.7	83.7	7.2	3.2 3.0	3.2
DRP100M2	1.5	4.95	2890	2.65	2.85	0.93	IE3	87.4	87.9	87.1	8.7	3.8 3.3	3.5
DRP100M2	2.2	7.3	2880	4	4.15	0.91	IE3	87.4	87.8	86.7	8.2	3.8 3.3	3.4
DRP100LC2	3	9.8	2920	5.5	5.7	0.90	IE3	87.4	88.0	87.1	9.1	3.0 2.4	3.5

2-pole DRP../MSW motors/brakemotors

Motor type DRP	P_N kW	M_N Nm	n_N rpm	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
DRP80M2	0.75	2.5	2890	14	21.7	BE05	1300 3200	5	17	23.2
DRP90M2	1.1	3.65	2870	18	35.7	BE1	1100 2700	7	21	37.3
DRP100M2	1.5	4.95	2890	26	56.2	BE2	700 1800	14	31	61
DRP100M2	2.2	7.3	2880	26	56.2	BE2	700 1800	14	31	61
DRP100LC2	3	9.8	2920	31	90	BE2	300 700	20	36	94.7

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11.5 Technical data – MOVI-SWITCH®-1E / 2S 4-pole

11.5.1 DRS..: 1500 rpm - S1 IE1

4-pole DRS../MSW motors

Motor type DRS../MSW	P_N kW	M_N Nm	n_N rpm	I_N 400 V A	I_N 380-420 V A	cosφ	IE	$η_{50\%}$ %	$η_{75\%}$ %	$η_{100\%}$ %	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DRS71S4	0.37	2.55	1380	1.14	1.24	0.70	IE1	59.1	65.3	66.6	3.5	1.8 1.8	2.1
DRS71M4	0.55	3.85	1360	1.55	1.62	0.72	IE1	69.1	71.9	70.6	3.6	2.1 2.1	2.2
DRS80S4	0.75	5.1	1400	1.8	1.82	0.81	IE1	74.6	76.6	75.3	4.3	1.9 1.9	2.2
DRS80M4	1.1	7.4	1410	2.4	2.5	0.84	IE1	77.7	78.6	77.0	5.1	2.2 1.7	2.3
DRS90M4	1.5	10.3	1395	3.3	3.4	0.82	IE1	82.0	82.0	79.6	5.0	2.3 2.0	2.5
DRS90L4	2.2	15	1400	4.85	4.95	0.81	IE1	82.9	83.1	81.1	5.1	2.5 2.2	2.5
DRS100M4	3	20.5	1400	6.4	6.5	0.82	IE1	85.2	84.7	82.4	5.3	2.8 2.4	2.8

4-pole DRS../MSW motors/brakemotors

Motor type DRS../MSW DRS../MSW/ C.0	P_N kW	M_N Nm	n_N rpm	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
DRS71S4	0.37	2.55	1380	7.8	5.13	BE05	6000 9500	5	10	6.43
DRS71M4	0.55	3.85	1360	9.1	7.21	BE1	4100 11000	10	12	8.51
DRS80S4	0.75	5.1	1400	12	15.9	BE1	3500 9000	10	14	17.4
DRS80M4	1.1	7.4	1410	14	22.3	BE2	3500 9000	14	18	26.8
DRS90M4	1.5	10.3	1395	18	36.6	BE2	2900 7500	20	23	41.3
DRS90L4	2.2	15	1400	21	44.9	BE5	2300 5600	40	27	50.9
DRS100M4	3	20.5	1400	26	57.2	BE5	- 8500	40	32	63.2

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11.5.2 DRE..: 1500 rpm - S1 IE2

4-pole DRE../MSW motors

DRE../MSW motor type	P_N kW	M_N Nm	n_N rpm	I_N 400 V A	I_N 380-420 V A	cosφ	IE	$η_{50\%}$ %	$η_{75\%}$ %	$η_{100\%}$ %	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DRE80S4	0.37	2.45	1435	0.87	-	0.77	IE2	76.5	78.5	78.8	4.9	2.6 2.1	2.9
DRE80M4	0.55	3.65	1445	1.27	-	0.76	IE2	79.7	82.0	82.3	6.7	3.1 2.2	3.4
DRE80M4	0.75	5	1435	1.68	1.75	0.79	IE2	79.2	81.3	81.0	6.2	2.9 2.1	3.1
DRE90M4	1.1	7.4	1420	2.45	2.55	0.79	IE2	82.5	83.5	82.4	5.9	2.9 2.3	3.0
DRE90L4	1.5	10	1430	3.35	3.45	0.77	IE2	83.5	84.7	84.0	6.6	3.2 2.8	3.4
DRE100M4	2.2	14.7	1425	4.6	4.7	0.80	IE2	86.3	86.7	85.4	6.4	3.3 2.7	3.2
DRE100LC4	3	19.7	1455	6.2	6.3	0.81	IE2	86.3	87.1	86.3	7.5	2.7 2.4	3.3
DRE112M4	3	19.7	1455	6	6.2	0.83	IE2	87.7	87.4	86.5	7.3	2.4 2.0	3.0

4-pole DRE../MSW motors/brakemotors

Motor type DRS../MSW DRS../MSW/ C.0	P_N kW	M_N Nm	n_N rpm	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
DRE80S4	0.37	2.45	1435	12	15.9	BE1	3500 9000	10	14	17.4
DRE80M4	0.55	3.65	1445	14	22.3	BE1	3500 9000	10	17	23.8
DRE80M4	0.75	5	1435	14	22.3	BE1	3500 9000	10	17	23.8
DRE90M4	1.1	7.4	1420	18	36.6	BE2	3000 8000	14	23	41.3
DRE90L4	1.5	10	1430	21	44.9	BE2	3000 8000	20	26	49.6
DRE100M4	2.2	14.7	1425	26	57.2	BE5	- 8000	55	32	63.2
DRE100LC4	3	19.7	1455	31	91	BE5	- 3800	40	37	97
DRE112M4	3	19.7	1455	41	148	BE5	- 3100	40	48	152

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11.5.3 DRP..: 1500 rpm - S1 IE3

4-pole DRP../MSW motors

Motor type DRP../MSW	P_N kW	M_N Nm	n_N rpm	I_N 400 V A	I_N 380-420 V A	cosφ	IE	$\eta_{50\%}$ %	$\eta_{75\%}$ %	$\eta_{100\%}$ %	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DRP90M4	0.75	4.95	1450	1.81	1.86	0.72	IE3	79.8	82.7	83.3	7.3	3.7 3.1	3.9
DRP90L4	1.1	7.3	1440	2.4	2.5	0.78	IE3	84.8	86.0	85.3	6.8	3.2 2.7	3.4
DRP100M4	1.5	9.9	1440	3.2	3.3	0.79	IE3	86.4	87.2	86.6	7.4	3.6 3.1	3.7
DRP100L4	2.2	14.6	1440	4.75	4.85	0.77	IE3	86.4	87.5	87.1	7.7	4.2 3.2	3.7
DRP112M4	3	19.7	1455	6	6.2	0.82	IE3	88.2	88.7	88.0	7.3	2.4 2.0	3.0

4-pole DRP../MSW motors/brakemotors

Motor type DRP../MSW DRP../MSW/ C.0	P_N kW	M_N Nm	n_N rpm	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
DRP90M4	0.75	4.95	1450	18	36.6	BE1	2900 7500	10	21	38.2
DRP90L4	1.1	7.3	1440	21	44.9	BE2	2300 5600	14	26	49.6
DRP100M4	1.5	9.9	1440	26	57.2	BE2	- 8500	20	31	61.9
DRP100L4	2.2	14.6	1440	29	69.5	BE5	- 7600	28	35	75.5
DRP112M4	3	19.7	1455	41	148	BE5	- 3100	40	48	152

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11.6 Technical data – MOVI-SWITCH®-1E / 2S 6-pole

11.6.1 DRS..: 1000 rpm - S1 IE1

6-pole DRS../MSW motors

Motor type DRS../MSW	P_N kW	M_N Nm	n_N rpm	I_N 400 V A	I_N 380-420 V A	cosφ	IE	$η_{50\%}$ %	$η_{75\%}$ %	$η_{100\%}$ %	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DRS71S6	0.25	2.65	895	0.83	0.86	0.70	IE1	55.3	61.4	62.2	2.7	1.7 1.7	2.0
DRS71M6	0.37	3.9	905	1.13	1.16	0.71	IE1	61.9	66.4	66.5	3.1	1.9 1.9	2.0
DRS80S6	0.55	5.7	915	1.64	1.66	0.71	IE1	64.1	68.2	67.9	3.4	1.8 1.8	2.1
DRS80M6	0.75	7.8	915	2.15	2.15	0.71	IE1	68.3	71.6	70.7	3.6	2.0 1.9	2.2
DRS90L6	1.1	11.3	930	3.1	3.15	0.68	IE1	77.5	76.3	75.0	4.2	2.3 2.3	2.5
DRS100M6	1.5	15.5	925	4.25	4.25	0.68	IE1	76.0	77.3	75.7	4.2	2.7 2.7	2.7
DRS100LC6	2.2	22	955	5.5	5.6	0.71	IE1	80.1	80.8	80.0	5.1	2.2 2.2	2.7
DRS112M6	2.2	22	955	5.4	5.5	0.74	IE1	81.0	80.5	79.3	5.5	2.1 1.8	2.7
DRS112M6	3	30.5	945	7	7.2	0.76	IE1	84.6	83.0	81.0	5.1	1.9 1.6	2.5

6-pole DRS../MSW motors/brakemotors

Motor type DRS../MSW DRS../MSW/ C.0	P_N kW	M_N Nm	n_N rpm	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
DRS71S6	0.25	2.65	895	7.8	8.29	BE05	7000 16,000	5	10	9.59
DRS71M6	0.37	3.9	905	9.1	11.9	BE1	6600 15,000	10	12	13.2
DRS80S6	0.55	5.7	915	12	15.9	BE2	6000 14,000	20	15	20.4
DRS80M6	0.75	7.8	915	14	22.3	BE2	4300 10,000	20	18	26.8
DRS90L6	1.1	11.3	930	21	44.6	BE5	3500 8000	40	27	50.5
DRS100M6	1.5	15.5	925	26	56.8	BE5	- 7000	40	32	62.8
DRS100LC6	2.2	22	955	31	91	BE5	- 5000	55	37	97
DRS112M6	2.2	22	955	41	148	BE11	- 4000	80	56	158
DRS112M6	3	30.5	945	41	148	BE11	- 3600	80	56	158

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11.6.2 DRE..: 1000 rpm - S1 IE2

6-pole DRE../MSW motors

DRE../MSW motor type	P_N kW	M_N Nm	n_N rpm	I_N 400 V A	I_N 380-420 V A	cosφ	IE	$\eta_{50\%}$ %	$\eta_{75\%}$ %	$\eta_{100\%}$ %	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DRE71M6	0.25	2.6	910	0.73	-	0.73	IE2	64.8	70.0	68.8	3.4	2.0 2.0	2.1
DRE80S6	0.37	3.8	935	1.19	1.24	0.69	IE2	67.2	71.2	71.5	3.7	2.0 2.0	2.3
DRE80M6	0.55	5.6	935	1.58	-	0.69	IE2	70.5	74.0	74.0	4.4	2.2 2.2	2.4
DRE90L6	0.75	7.6	940	2.05	2.1	0.65	IE2	78.7	80.5	80.0	4.6	2.4 2.4	2.8
DRE100M6	1.1	11.2	940	3.1	3.15	0.64	IE2	77.2	79.4	78.7	4.7	3.0 2.9	3.1
DRE100L6	1.5	15.2	940	4	4.05	0.66	IE2	79.7	81.5	80.9	5.0	3.3 3.1	3.2
DRE112M6	2.2	22	955	5.2	5.3	0.74	IE2	83.5	84.2	83.0	5.5	2.1 1.8	2.7
DRE132S6	3	30	955	6.8	7	0.74	IE2	85.4	85.8	84.4	5.5	2.3 2.1	2.8

6-pole DRE../MSW motors/brakemotors

DRE../MSW motor type DRE../MSW/ C.0	P_N kW	M_N Nm	n_N rpm	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
DRE71M6	0.25	2.6	910	9.1	11.9	BE05	6600 15,000	5	12	13.2
DRE80S6	0.37	3.8	935	12	15.9	BE1	6000 14,000	10	14	17.4
DRE80M6	0.55	5.6	935	14	22.3	BE2	4300 10,000	14	18	26.8
DRE90L6	0.75	7.6	940	21	44.6	BE2	3500 8000	20	26	49.2
DRE100M6	1.1	11.2	940	26	56.8	BE5	- 7000	28	32	62.8
DRE100L6	1.5	15.2	940	29	69	BE5	- 6000	40	35	75
DRE112M6	2.2	22	955	41	148	BE5	- 4000	55	48	152
DRE132S6	3	30	955	46	190	BE11	- 3500	80	61	201

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11.6.3 DRP..: 1000 rpm - S1 IE3

6-pole motors DRP../MSW

Motor type DRP../MSW	P_N kW	M_N Nm	n_N rpm	I_N 400 V A	I_N 380-420 V A	cosφ	IE	$\eta_{50\%}$ %	$\eta_{75\%}$ %	$\eta_{100\%}$ %	I_A/I_N	M_A/M_N M_H/M_N	M_K/M_N
DRP90L6	0.75	7.6	940	2.05	2.1	0.65	IE3	78.7	80.5	80.0	4.6	2.4 2.4	2.8
DRP100L6	1.1	11.1	950	3.1	3.15	0.63	IE3	79.8	82.3	82.4	5.3	3.6 3.1	3.2
DRP112M6	1.5	14.8	965	3.5	3.6	0.70	IE3	84.5	86.1	85.8	6.2	2.4 1.7	2.7
DRP132S6	2.2	22	965	5.1	5.2	0.72	IE3	85.5	86.5	85.6	6.0	2.5 2.2	3.0
DRP132M6	3	29.5	970	7.1	7.2	0.70	IE3	86.5	87.7	87.3	6.6	2.9 2.7	3.4

6-pole motors/brakemotors DRP../MSW

Motor type DRP../MSW DRP../MSW/ C.0	P_N kW	M_N Nm	n_N rpm	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
DRP90L6	0.75	7.6	940	21	44.6	BE2	3500 8000	20	26	49.2
DRP100L6	1.1	11.1	950	29	69	BE5	- 6000	28	35	75
DRP112M6	1.5	14.8	965	41	148	BE5	- 4000	40	48	152
DRP132S6	2.2	22	965	46	190	BE5	- 3500	55	54	195
DRP132M6	3	29.5	970	60	251	BE11	- 3300	80	74	261

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11.7 Information about dimension sheets

Please refer to the following information regarding dimension sheets for 4-pole motors / brakemotors:

- The collective term IV (= industrial plug connectors) in the dimension sheets includes the plug connectors AC.., AS.., AM.. AB...
- Leave a clearance of at least half the fan guard diameter to provide unhindered air access.

11.7.1 Software support

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 variants 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 only depict the standard terminal box.

Dimensions not listed in the dimension sheets can be determined with the DRIVECAD software, available from Drivegate® on the SEW-EURODRIVE website.

- For registered DriveGate® users: https://portal.drivegate.biz/drivecad.
- For new users: www.sew-eurodrive.com → DriveGate® login.

11.7.2 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 in accordance with DIN 332, shape DR:

Ø	= 7 – 10 mm	→ M3	Ø	> 30 – 38 mm	→ M12
Ø	> 10 – 13 mm	→ M4	Ø	> 38 – 50 mm	→ M16
Ø	> 13 – 16 mm	→ M5	Ø	> 50 – 85 mm	→ M20
Ø	> 16 – 21 mm	→ M6	Ø	> 85 – 130 mm	→ M24
Ø	> 21 – 24 mm	→ M8	Ø	> 130 mm	→ M30
Ø	> 24 – 30 mm	→ M10			

Keys: according to DIN 6885 (domed type)

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Flanges

Centering shoulder tolerance:

Ø	≤ 230 mm (flange sizes A120 – A300)	→ ISO j6
Ø	> 230 mm (flange sizes A350 – A660)	→ ISO h6

Different flange dimensions are available for each AC (brake) motor size. The respective dimension drawings will show the flanges approved for each size.

Eyebolts, lifting eyes

Motors up to DR.100 are delivered without special transportation fixtures.

Motors ≥ DR.112 are equipped with removable lifting eye bolts.

11.7.3 Motor dimensions

Motor variants and options

The motor dimensions of the motor variants and options may change. Refer to the dimension drawings of the variants and options.

Special designs

The terminal box dimensions in special designs might vary from the standard.

Please note the information in the SEW-EURODRIVE order confirmation.

EN 50347

European standard EN 50347 became effective in August 2001. This standard adopts the dimension designations for three-phase AC motors for sizes 56 to 315M and flange sizes 65 to 740 from the IEC 72-1 standard.

The new dimension designations given in EN 50347 / IEC 72-1 are used for the dimensions in question in the dimension tables of the dimensions sheets.

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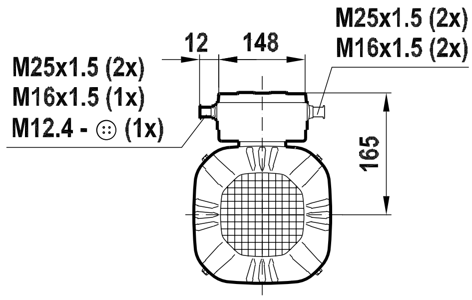
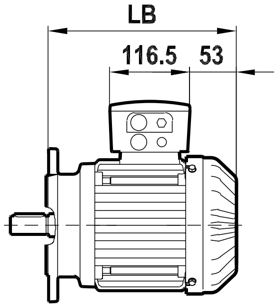
11.8 Dimension sheets for DR.. motors / brakemotors with MOVI-SWITCH®

MSW-1E

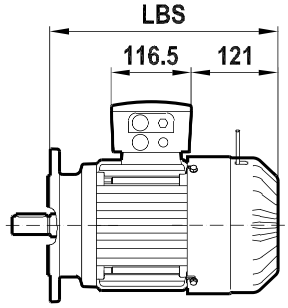
08 411 01 08
1 (1)

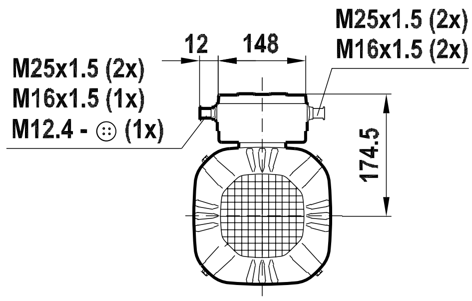


DR.71..

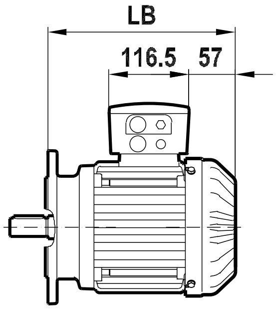


DR.71..BE

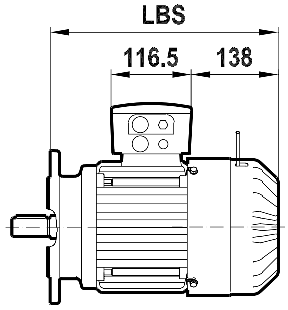


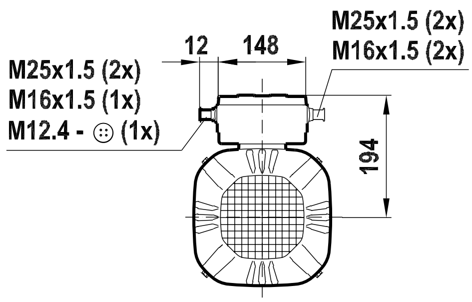


DR.80..

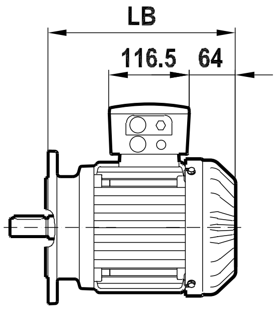


DR.80..BE

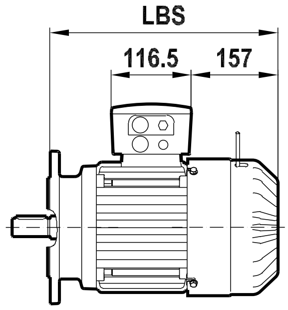


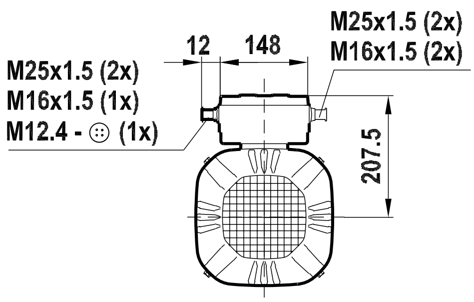


DR.90+100..

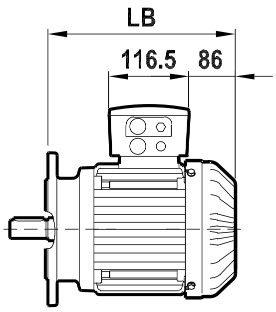


DR.90+100..BE

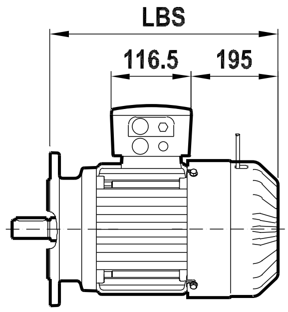




DR.112+132..



DR.112+132..BE



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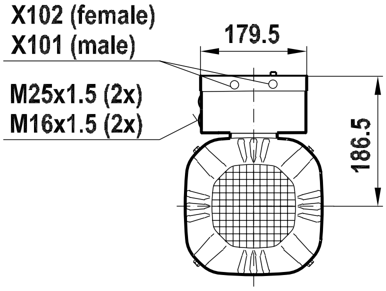
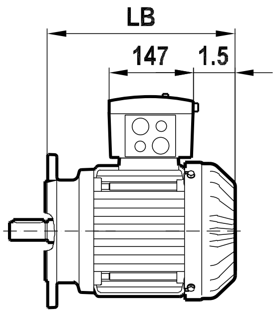
MSW-2S

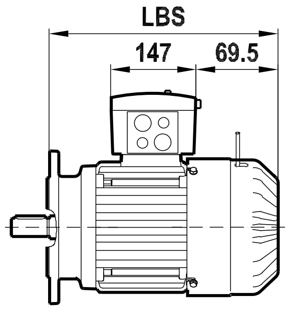
08 412 01 08
1 (1)

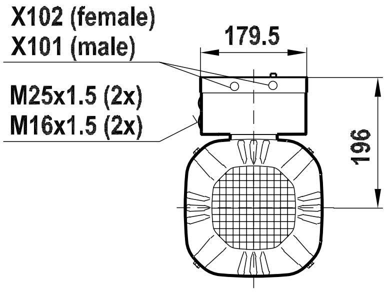


DR.71..

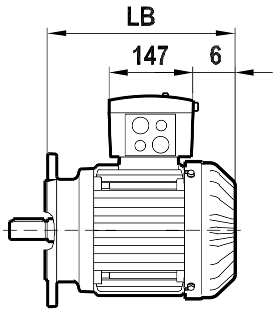


DR.71..BE

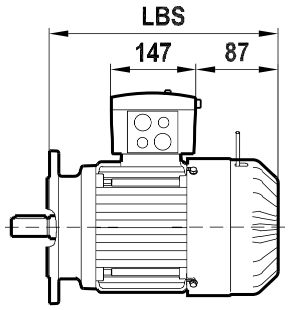


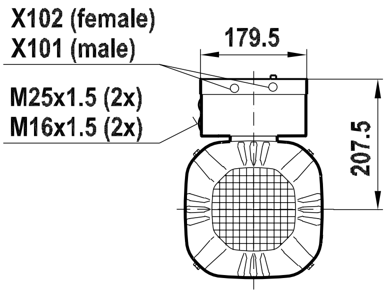


DR.80..

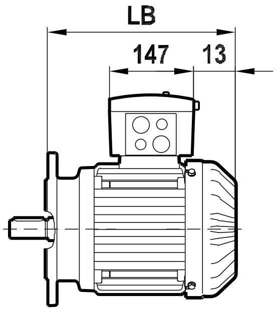


DR.80..BE

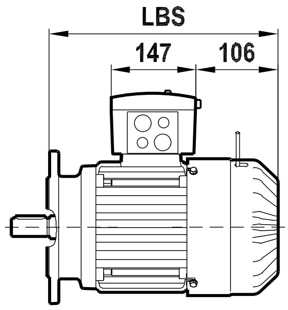


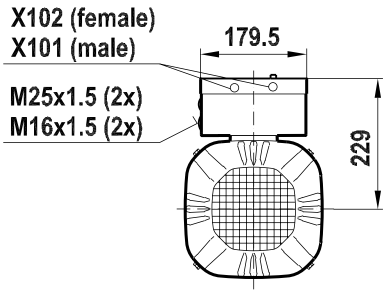


DR.90+100..

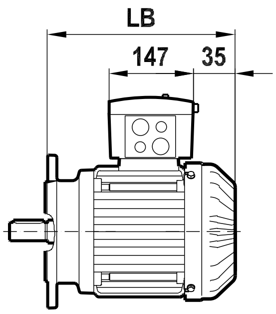


DR.90+100..BE

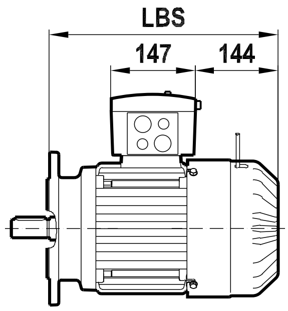




DR.112+132..



DR.112+132..BE



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11.9 Product description – MOVIMOT®

11.9.1 MOVIMOT® version D

Type designation

/MM03 – /MM40

Description

MOVIMOT®, the combination of the new AC (brake)motors DRS.., DRE.. and DRP.. and a new digital frequency inverter, is available in the power range 0.37 – 4.0 kW. Especially decentralized drive tasks can be solved easily and economically.

MOVIMOT® is the ideal solution for a variety of decentralized drive tasks.

The following functional description provides an overview of the most important features:

- Power range from 0.37 to 4 kW.
- Voltage range: 3 x 380 – 500 V.
- Frequency inverter with vector-oriented motor control.
- Application-specific parameter setting is possible.
- Pluggable parameter memory for data backup.
- Comprehensive protection and monitoring functions.
- Low-noise thanks to PWM switching frequency 16 kHz.
- Status LED for fast diagnostics.
- Diagnostic interface with plug connector as a standard feature.
- Diagnostics and manual operation using SEW MotionStudio.
- 4-quadrant operation as standard.
- Integrated brake management:
  - For motors with mechanical brake, the brake coil is used as braking resistor.
  - For motors without brake, MOVIMOT® is supplied with internal braking resistor as standard.
- Control takes place either via binary signals, via the serial interface RS-485 or optionally via AS-Interface or all common fieldbus interfaces (PROFIBUS, PROFIsafe, INTERBUS, DeviceNet, CANopen).
- MOVIMOT® can be supplied with UL approval (UL listed) on request.

Advantages of MOVIMOT®

MOVIMOT® offers the following advantages:

- Low total volume.
- 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.
- Optimum default settings of the parameters for the expected applications.
- Compliance with EMC standards EN 50 081 (interference suppression level A) and EN 50 082.

- Easy installation, startup and maintenance.
- Easy to service for retrofitting and replacement.

MOVIMOT® can be used to equip extensive systems in a modular manner or can be integrated into existing systems. MOVIMOT® is also the electronic replacement for pole-changing motors or mechanical variable speed drives.

MOVIMOT® is available as motor, brakemotor, gearmotor or geared brakemotor in many different standard versions and mounting positions.

MOVIMOT® options

/MO

MOVIMOT® can be supplemented by many different options.

/MO in the unit designation is used no matter whether one or several of the following options are used.

Designation	Description
BEM	Brake control
URM	Voltage relay
MLU13A	Internal DC 24 V voltage supply (380 – 500 V)
MNF11A	Internal line filter option (MM03 – MM15)
MLU11A MLU21A	DC 24 V voltage supply (380 – 500 V) DC 24 V voltage supply (200 – 240 V)
MLG11A MLG21A	Setpoint adjuster with DC 24 V voltage supply (380 – 500 V) Setpoint adjuster with DC 24 V voltage supply (200 – 240 V)
MFP...	Profibus interface
MFI...	InterBus interface
MFD...	DeviceNet interface
MFO...	CANopen interface

Please refer to the "Drive Systems for Decentralized Installation" manual and the "MOVIMOT® Geared Motors" catalog for detailed information and project planning instructions relating to the MOVIMOT® options.

11.9.2 Motor identification for MOVIMOT®

/MI

Each MOVIMOT® contains a motor identification module (DIM) for easy and fast startup. The DIM is included in the scope of delivery of the MOVIMOT® motor or MOVIMOT®gearmotor.

If a motor / brakemotor is ordered without MOVIMOT®, a DIM can be supplied for the motor according to its energy efficiency class. The DIM is attached in the standard terminal box of the motor or brakemotor. In the unit designation of the motor / brakemotor, the DIM is indicated by /MI.

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11.10 Project planning, technical data – MOVIMOT®

11.10.1 MOVIMOT®

/MM03 – /MM40

Note the following information when project planning for MOVIMOT®AC motors:

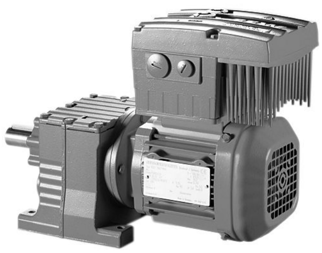
- The appropriate MOVIMOT® gearmotor is selected with regard to the speed, power, torque and spatial conditions of the application (see the selection tables in the "MOVIMOT® Gearmotors" catalog/price catalog).
- For detailed project planning information, technical data and information on MOVIMOT® communication via fieldbus interfaces or RS485, refer to the relevant publications for "Decentralized Installation" (MOVIMOT®, MOVI-SWITCH®, communication and supply interfaces).
- The options are selected depending on the type of control.
- MOVIMOT® can be used for hoist applications with restrictions only. Please contact SEW-EURODRIVE to inquire about suitable solutions with MOVITRAC®, MOVIFIT® or MOVIDRIVE®.

11.10.2 MOVIMOT® – Technical data

/MM03 – /MM40

For detailed information about MOVIMOT®, refer to the "MOVIMOT® Gearmotors" catalog.

MOVIMOT® gearmotor:



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- Available power range: 0.37 – 4.0 kW
- Supply voltages:
  - 3 x 380 – 500 V, 50 / 60 Hz
  - 3 x 200 – 240 V, 50 / 60 Hz (to 2.2 kW)
- Rated speeds: 1400, 1700 and 2900 rpm

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12 Prefabricated cables

12.1 Description

SEW-EURODRIVE offers pre-fabricated cables with plugs for straightforward and reliable motor connection.

Cable and contact are connected using the crimp technique. Cables are available by the meter.

Prefabricated cables are divided into:

- Power cables such as motor cables, brakemotor cables, extension cables
- Encoder cables and their extension cables.

12.1.1 Preselection of cables

Prefabricated cables were preselected by SEW-EURODRIVE according to the standard EN 60204. The routing types "fixed installation" and "cable carrier installation" were considered.

Using other standards for the machine construction can result in diverging cross sections.

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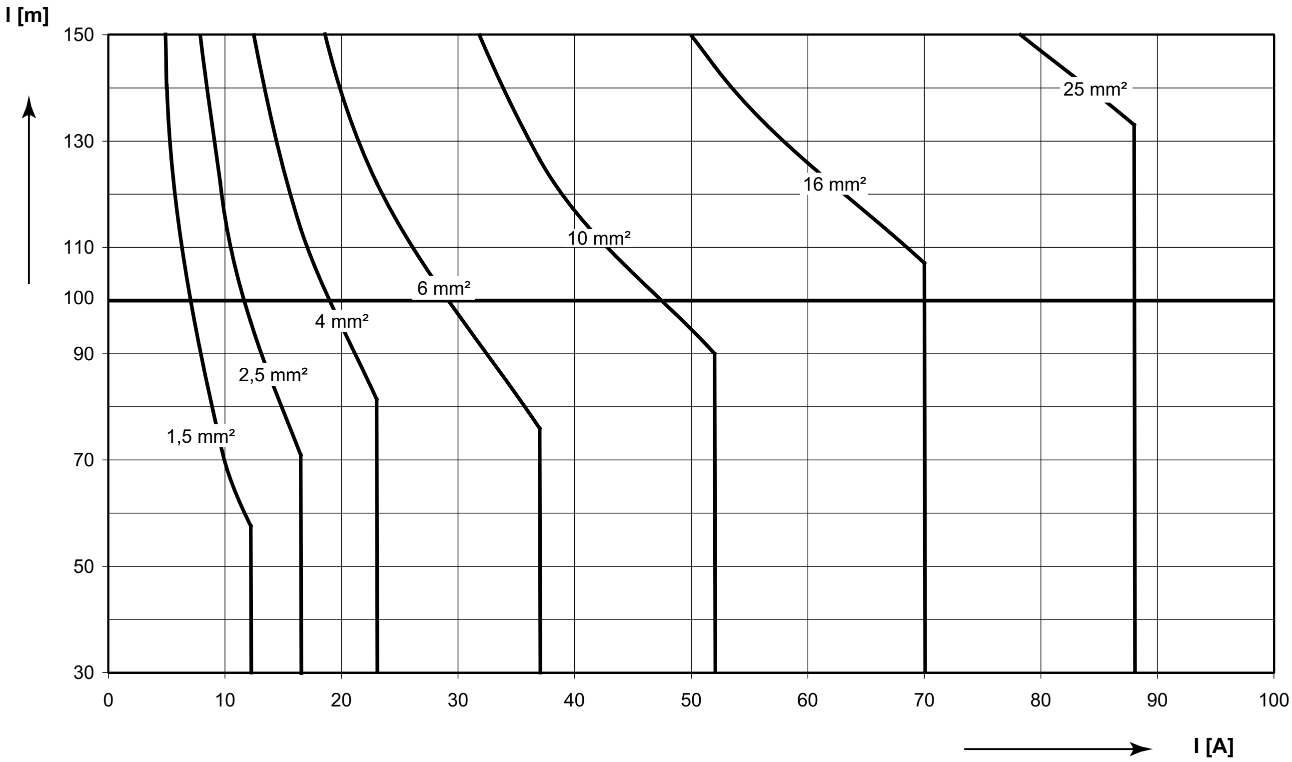
12.2 Project planning

12.2.1 Project planning for cable cross section

The following figure shows the minimum required cable cross section depending on 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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12.2.2 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	Triple-core, plastic-sheathed cable next to each other, horizontal
mm^2	**A**	**A**	**A**
1.5	13.1	15.2	16.1
2.5	17.4	21.0	22
4	23	28.0	30
6	30	36.0	37
10	40	50.0	52
16	54	66.0	70
25	70	84.0	88
35	86	104.0	114

This data comprises merely recommended values and is **no substitute for detailed project planning** of the cables, which is dependent on the specific application and takes into account 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.

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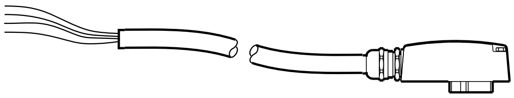
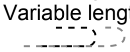
12.3 Overview of power cables for DR.. motors

12.3.1 Brakemotor cable with IS

Connection cable			Length/installation type	Specification
		Motor end		
			Set length, Variable length 	On the motor end, all 12 contacts of the integrated plug connector are used for connecting motor, brake, and motor protection. The cables are available with variable terminal link in star or delta connection. For wiring in the control cabinet and field distributors, the cores are fitted with ring-type cable lugs or conductor end sleeves. Detailed information: (→ 🗎 572)
Open (conductor end sleeve and ring cable lug)		IS		

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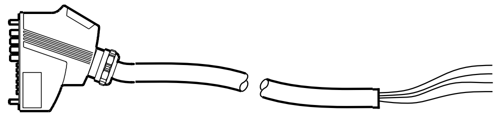
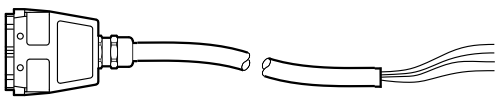
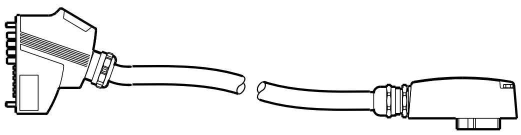
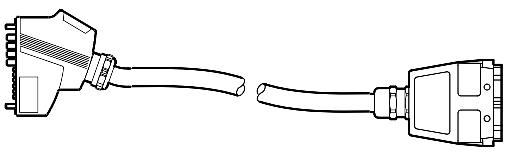
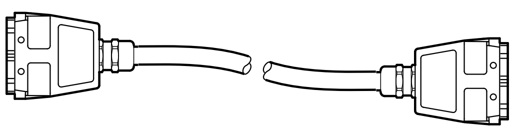
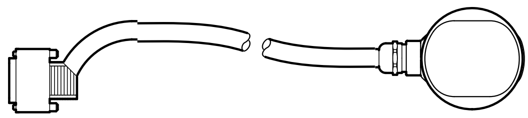
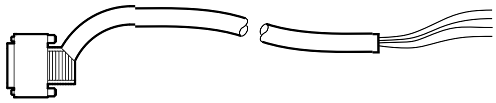
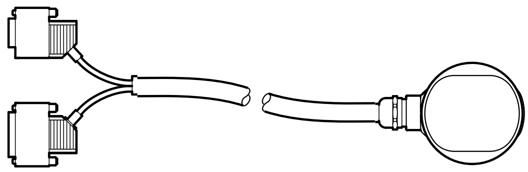
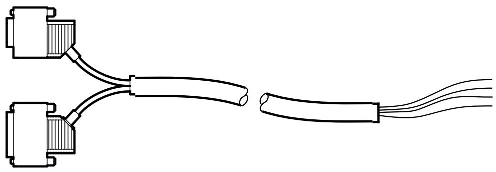
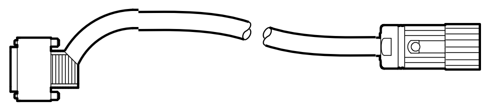
12.3.2 Brakemotor cable for decentralized MOVI-SWITCH®

Prefabricated cables for motor side

Connection cable			Length/installation type	Specification
		Motor end		
			Set length, Variable length	Detailed information: (→ 574)
PLUSCON VC		Open (conductor end sleeve and ring cable lug)		
			Set length, Variable length	Detailed information: (→ 575)
Han® 10E		Open (conductor end sleeve and ring cable lug)		
			Set length, Variable length	Detailed information: (→ 576)
PLUSCON VC		IS		
			Set length, Variable length	Detailed information: (→ 577)
PLUSCON VC		Han® 10E		
			Set length, Variable length	Detailed information: (→ 578)
Han® 10E		Han® 10E		

12.4 Overview of encoder cables for DR.. motors – MOVIDRIVE®

Connection cable			Length/installation type	Specification
		Motor end		
			Set length, Variable length	If the encoder on the motor is ordered and delivered without a connection cover, the prefabricated cable is fitted with a connection cover on the encoder end. Detailed information: (→ 🗎 579)
D-sub, (15-pin)		Connection cover		
			Set 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 scope of delivery of the encoder. Connection with MOVIDRIVE® A 15-pin plug is available that matches the interface on the inverter. Detailed information: (→ 🗎 580)
D-sub, (15-pin)		Open (conductor end sleeve and ring cable lug)		
			Set length, Variable length	If the encoder on the motor is ordered and delivered without a connection cover, the prefabricated cable is fitted with a connection cover on the encoder end. Detailed information: (→ 🗎 581)
D-sub (1 × 9-pole and 1 × 15-pole)		Connection cover		
			Set 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 scope of delivery of the encoder. Connection with MOVIDRIVE® A 9-pole or 15-pole plug is available to match the inverter in the interface. Detailed information: (→ 🗎 583)
D-sub (1 × 9-pole and 1 × 15-pole)		Open (conductor end sleeve and ring cable lug)		
			Set length, Variable length	Connection with MOVIDRIVE® A 15-pin plug is available that matches the interface on the inverter. Detailed information: (→ 🗎 584)
D-sub, (15-pin)		M23		

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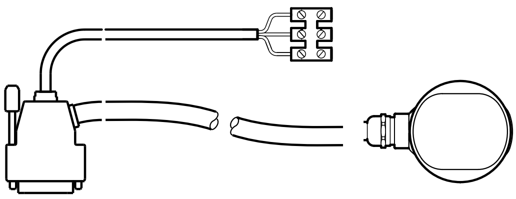
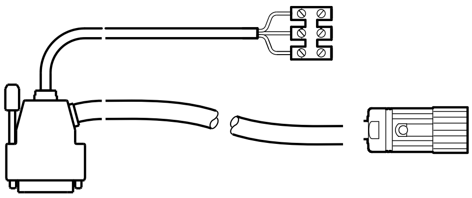
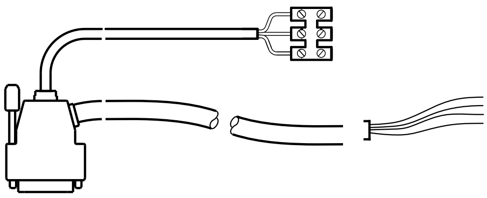
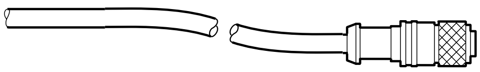
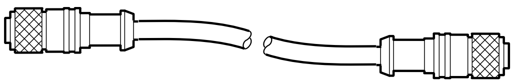
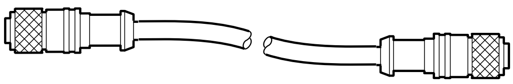
12.5 Overview of encoder cables for DR.. motors – MOVIAXIS®

Connection cable			Length/installation type	Specification
	Motor end			
			Set length, Variable length	If the encoder on the motor is ordered and delivered without a connection cover, the prefabricated cable is fitted with a connection cover on the encoder end. Connection with MOVIAXIS®: A 15-pin plug is available that matches the interface on the inverter. Detailed information: (→ 🗎 585)
D-sub, (15-pin)		Connection cover		
			Set 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. Detailed information: (→ 🗎 587)
D-sub, (15-pin)		M23		
			Set 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 scope of delivery of the encoder. 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. Detailed information: (→ 🗎 589)
D-sub, (15-pin)		Open (conductor end sleeve and ring cable lug)		

12.6 Overview of built-in encoder cable for DR.. motors

The used cable types for fixed and cable carrier installation are listed in chapter 'Cable specifications'.

Connection cable Motor end	Length/installation type	Specification
 M12	Set length, Variable length	4-pole, 8-pole. Cable is suitable for E17 encoder. Detailed information: (→ 🗎 591)
 M12 / M12	Set length, Variable length	4-pole, 8-pole. Cable is suitable for E17 encoder. Detailed information: (→ 🗎 593)
 M12 / M12	Set length, Variable length	8-pole. Cable can also be used for E17-FS encoders. Detailed information: (→ 🗎 593)

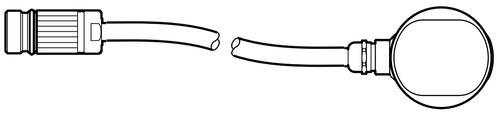
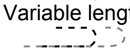
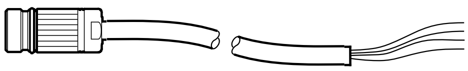
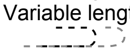
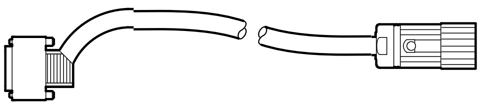
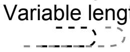
12

12.7 Overview of extensions for add-on encoder cables for DR.. motors

12.7.1 Intermediate sockets

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 used cable types for fixed and cable carrier installation are listed in chapter 'Cable specifications'.

Connection cable			Length / Installation type	Specification
	Motor end			
			Set length, Variable length 	Detailed information: (→ 🗎 595)
M23		Connection cover		
			Set 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 scope of delivery of the encoder. Detailed information: (→ 🗎 596)
M23		Open (conductor end sleeve and ring cable lug)		
			Set length, Variable length 	Connection with MOVIDRIVE® A 15-pin plug is available that matches the interface on the inverter. Detailed information: (→ 🗎 597)
D-sub, (15-pin)		M23		

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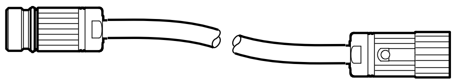
Extension

Connection cable			Length / Installation type	Specification
		Motor end		
			Set length, Variable length	Detailed information: (→ 598)
M23		M23		

12

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12.8 Power cable

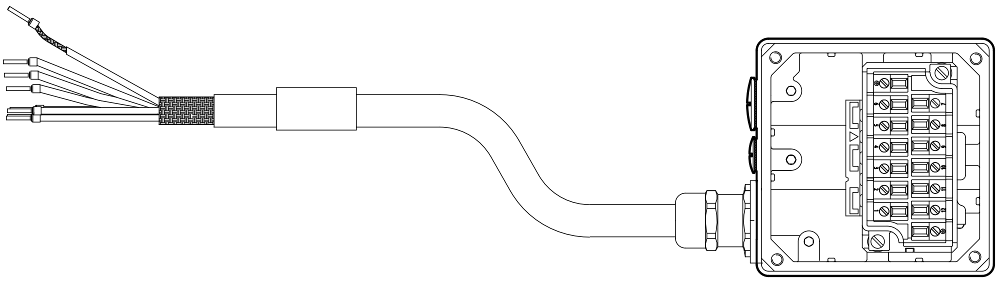
12.8.1 Brakemotor cable with IS

Brakemotor types

Motor type	Brake type	Connector
DR.71	BE05, BE1	/ISU
DR.80	BE05, BE1, BE2	
DR.90	BE1, BE2, BE5	
DR.100	BE2, BE5	
DR.112	BE5, BE11	
DR.132	BE5, BE11	

Cable drawing, wiring – ISU

IS brakemotor cable with motor protection, conductor end sleeves and ring-type cable lugs



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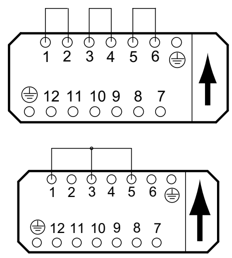
	Cable core color	Signal	Contact	
			1	Delta connection  Star connection
	Black (BK)	U1	2	
			3	
	Black (BK)	V1	4	
			5	
	Black (BK)	W1	6	
	Black (BK)		7	
			8	
	White (WH)		9	
	Red (RD)		10	
	Blue (BU)		11	
	Black (BK)		12	
	Green/yellow (GN/YE)		PE	

Part numbers

Star connection	Delta connection	Variable terminal link
08178127	08178178	Fixed installation

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12.8.2 Brakemotor cable for decentralized MOVI-SWITCH®

Brakemotor types

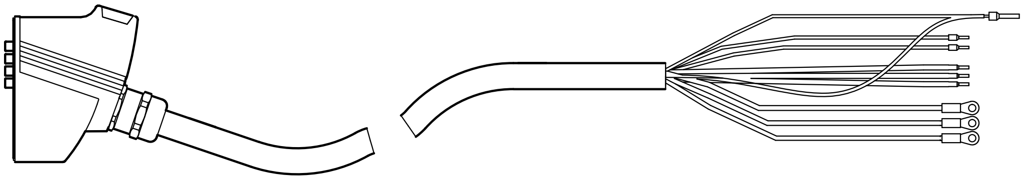
Motor type	Brake type	Connector
DR.71	BE05, BE1	/ISU /ASB4
DR.80	BE05, BE1, BE2	
DR.90	BE1, BE2, BE5	
DR.100	BE2, BE5	

MOVI-SWITCH®

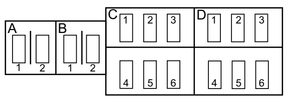
MOVI-SWITCH®	PLUSCON VC	Han® 10E
MSW-2S	.../APG4	.../ALA4

Cable drawing, wiring – PLUSCON VC

Brakemotor cable with motor protection; conductor end sleeves / ring-type cable lugs, PLUSCON VC



4154155531

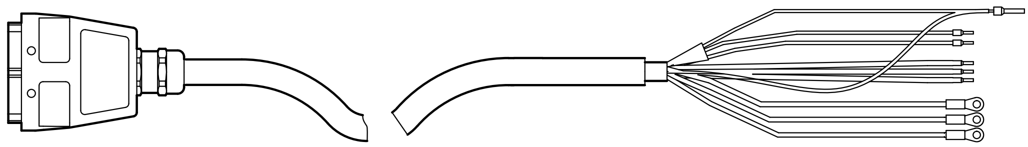
	Contact	Signal	Cable core color	Contact
 PLUSCON VC	A1	U1	Black (BK)	CL
	A2	V1	Black (BK)	CL
	B1	W1	Black (BK)	CL
	B2	PE	Green/yellow (GN/YE)	CES
	C1	Brake 15	Blue (BU)	CES
	C3	Brake 13	Red (RD)	CES
	C5	Brake 14	White (WH)	CES
	D2		Shielding	
	D3	24 V	Black (BK)	CES
	D6	TH/TF	Black (BK)	CES

Part numbers

	MOVI-SWITCH®
Motor DR.71 – DR.100	**PLUSCON VC**
Fixed installation	04178879

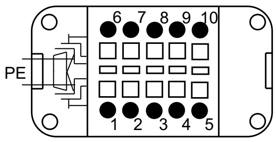
Cable drawing, wiring – Han® 10E

Brakemotor cable with motor protection; conductor end sleeves / ring-type cable lugs, HAN® 10E



4154157963

Conductor end sleeves / ring-type cable lugs, HAN® 10E:

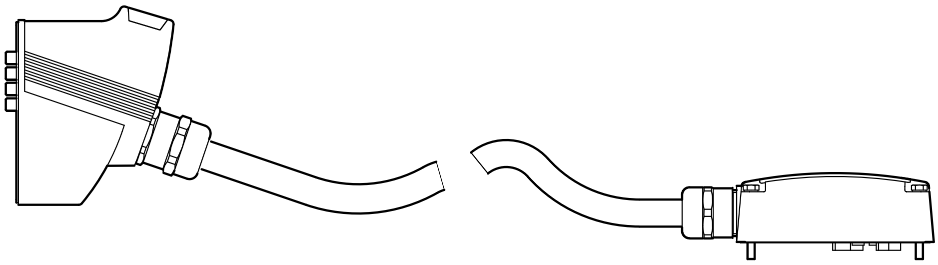
	Contact	Signal	Cable core color	Contact
	1	U1	Black (BK) \7	CL
	2	V1	Black (BK) \8	CL
	3	W1	Black (BK) \3	CL
	4	Brake 13	Black (BK) \5	CES
	5	Brake 15	Black (BK) \6	CES
	6	Brake 14	Black (BK) \4	CES
	7	nc		
	8	nc		
	9	24 V	Black (BK) \1	CES
	10	TH/TF	Black (BK) \2	CES
	PE		Shielding	
	PE		Green/yellow (GN/YE)	CES

Part numbers

	MOVI-SWITCH®
Motor DR.71 – DR.100	**Han® 10E**
Fixed installation	08178860

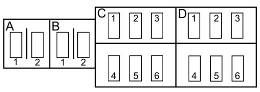
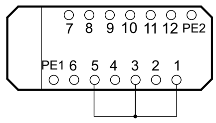
Cable drawing, wiring – ISU and PLUSCON VC

Brakemotor cable with motor protection; IS and PLUSCON VC



4154160395

IS and PLUSCON VC:

	Contact	Cable core color	Signal	Contact	
 PLUSCON VC	A1	Black (BK)	U1	2	
	A2	Black (BK)	V1	4	
	B1	Black (BK)	W1	6	
	B2	Green/yellow (GN/YE)	PE	PE1	
	C1	Blue (BU)	Brake 15	11	
	C3	Red (RD)	Brake 13	10	
	C5	White (WH)	Brake 14	9	
	C2		Variable terminal link	1	
	C4			3	
	C6			5	
	D2	Shielding		PI2	
	D3	Black (BK)	24 V	7	
	D6	Black (BK)	TH/TF	12	
		Shielding			

Part numbers

	MOVI-SWITCH®
Motor DR.71 – DR.100	**PLUSCON VC**
Fixed installation	05937558

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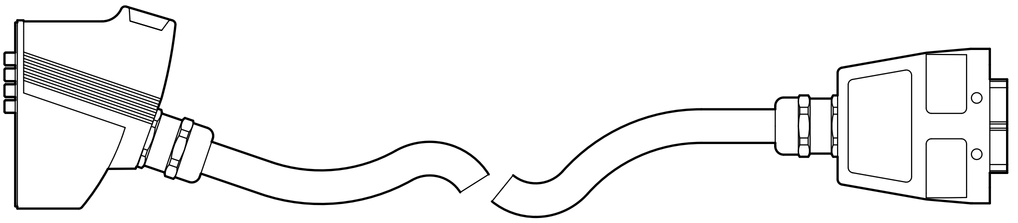
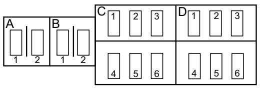
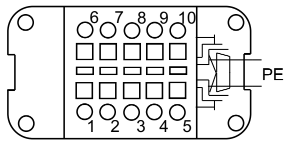
Cable drawing, wiring – Han® 10E and PLUSCON VC

Brakemotor cable with motor protection; HAN® 10E and PLUSCON VC



4154162827

	Contact	Cable core color	Signal	Contact	
 PLUSCON VC	A1	Black (BK) \7	U1	1	
	A2	Black (BK) \8	V1	2	
	B1	Black (BK) \3	W1	3	
	B2	Green/yellow (GN/YE)	PE	PE	
	C1	Black (BK) \6	Brake 15	5	
	C3	Black (BK) \5	Brake 13	4	
	C5	Black (BK) \4	Brake 14	6	
	D2	Shielding		PE	
	D3	Black (BK) \1	24 V	10	
	D6	Black (BK) \2	TH/TF	9	

HAN® 10E and PLUSCON VC

Part numbers

	MOVI-SWITCH®
Motor DR.71 – DR.100	**PLUSCON VC**
Fixed installation	08178895

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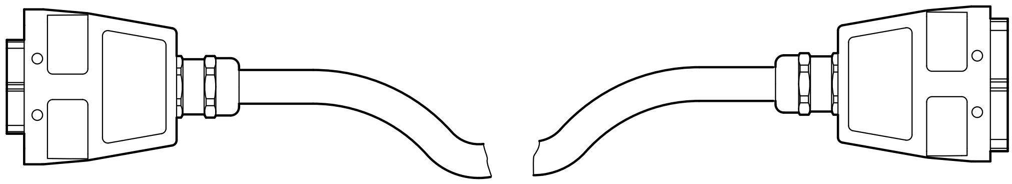
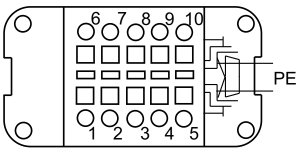
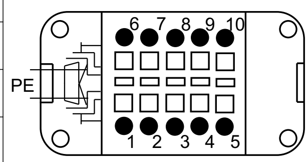
Cable drawing, wiring – Han® 10E and Han 10E

Brakemotor cable with motor protection; HAN® 10E and Han® 10E



4154165259

	Contact	Signal	Cable core color	Contact	
	1	U1	Black (BK) \7	1	
	2	V1	Black (BK) \8	2	
	3	W1	Black (BK) \3	3	
	4	Brake 13	Black (BK) \5	4	
	5	Brake 15	Black (BK) \6	5	
	6	Brake 14	Black (BK) \4	6	
	7	nc		7	
	8	nc		8	
	9	24 V	Black (BK) \1	9	
	10	TH/TF	Black (BK) \2	10	
	PE		Shielding	PE	
	PE		Green/yellow (GN/YE)	PE	

Part numbers

	MOVI-SWITCH®
Motor DR.71 – DR.100	**Han® 10E**
Fixed installation	08178887

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12.9 Add-on encoder cables for MOVIDRIVE®

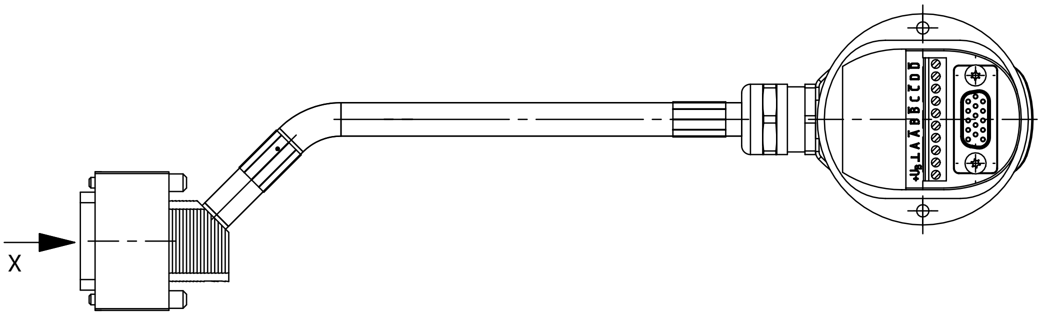
12.9.1 Encoder cable with connection cover and D-sub

Prefabricated cables for encoders

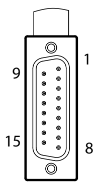
Encoder types	DR.71 – 132	DR.160 – 280
Sine encoder	ES7S	EG7S
TTL (V_B = DC 9 – 30 V)	ES7R	EG7R
RS485	AS7W	AG7W

Cable drawing, wiring – connection cover and D-sub

Encoder cable with connection cover with D-sub



4158198411

Connection MOVIDRIVE® B					Motor connection side
Plug connector view X	**Contact**	**Signal**	**Cable core color**	**Signal**	**Contact**
D-sub  15-pole	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	S	Black (BK)	Data+	S
	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

Cable type	Connection cover and D-sub
Fixed installation	13617621
cable carrier installation	13617648

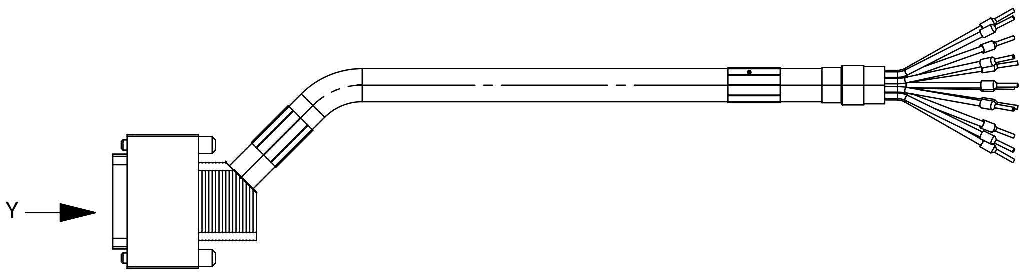
12.9.2 Encoder cable with conductor end sleeves and D-sub

Prefabricated cables for encoders

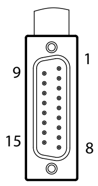
Encoder types	DR.71 – 132	DR.160 – 280
Sine encoder	ES7S	EG7S
TTL (V_B = DC 9 – 30 V)	ES7R	EG7R
RS485	AS7W	AG7W

Cable drawing, wiring – conductor end sleeve and D-sub

Conductor end sleeves with sub-D



4158303499

Connection MOVIDRIVE® B					Motor connection side
Plug connector view Y	**Contact**	**Signal**	**Cable core color**	**Signal**	**Contact**
D-sub  15-pole	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	S	Black (BK)	Data+	S
	12	$\overline{D}$	Violet (VT)	Data-	$\overline{D}$
	15	UB	Red/blue + gray (RD-BU + GY)	UB	+UB
	8	GND	Gray-pink+pink (GY-PK +PK)	GND	GND

Part numbers

Cable type	Conductor end sleeves and D-sub
Fixed installation	13622021
cable carrier installation	13622048

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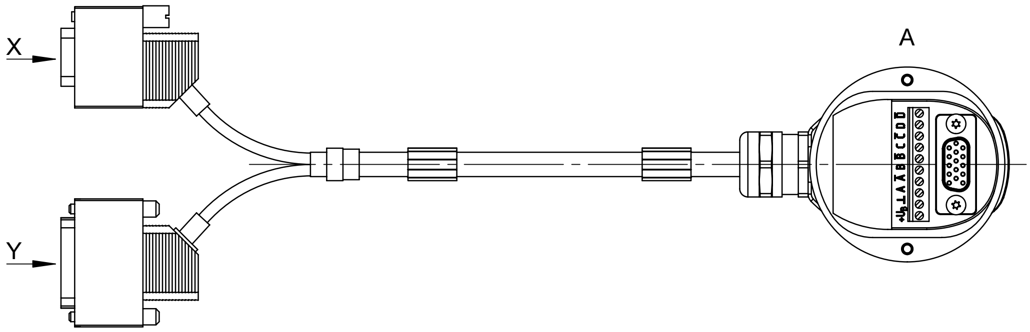
12.9.3 Encoder cable with connection cover and 2 D-sub

Prefabricated cables for encoders

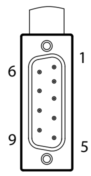
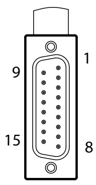
Encoder types	DR.71 – 132	DR.160 – 280	DR.315
M-SSI	AS7Y	AG7Y	AH7Y

Cable drawing, wiring – connection cover and 2 D-sub

Connection cover with 2 sub-D (1 × 9-pole and 1 × 15-pole)



9007203413047819

Connection MOVIDRIVE® B					Motor connection side
Plug connectors	Contact	Signal	Cable core color	Signal	Contact
D-sub View X  9-pole	3	C	Brown (BN)	C+	C
	8	$\overline{C}$	White (WH)	C-	$\overline{C}$
	1	S	Black (BK)	Data+	S
	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-pole	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-	$\overline{B}$

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Part numbers

Cable type	Connection cover or conductor end sleeve, 2 x D-sub
Fixed installation	13626299
cable carrier installation	13626302

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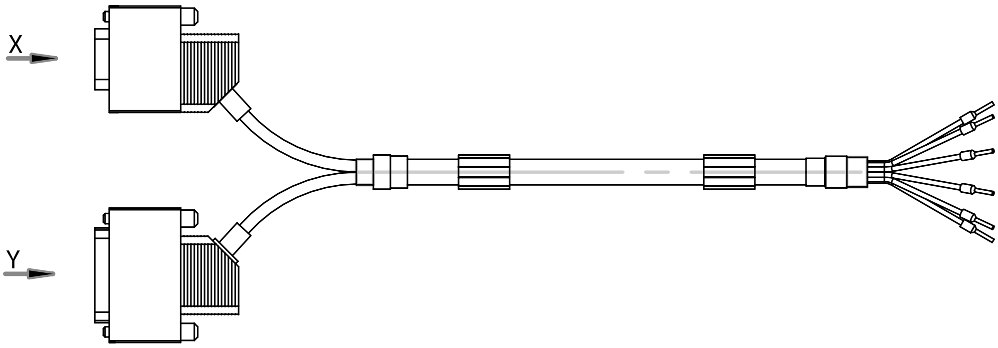
12.9.4 Encoder cable with conductor end sleeve and 2 D-sub

Prefabricated cables for encoders

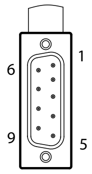
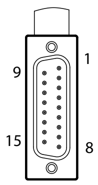
Encoder types	DR.71 – 132	DR.160 – 280	DR.315
M-SSI	AS7Y	AG7Y	AH7Y

Cable drawing, wiring – conductor end sleeve and 2 D-sub

Conductor end sleeves with 2 sub-D (1 × 9-pole and 1 × 15-pole)



4158310795

Connection MOVIDRIVE® B					Motor connection side
Plug connectors	**Contact**	**Signal**	**Cable core color**	**Signal**	**Contact**
Sub-D	1	Data+	Black (BK)	Data+	S
View X	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-pole	9	UB	Grey (GY)	UB	+UB
Sub-D	1	cos +	Red (RD)	cos +	A
View Y	9	cos-	Blue (BU)	cos-	$\overline{A}$
	2	sin+	Yellow (YE)	sin+	B
15-pole	10	sin-	Green (GN)	sin-	$\overline{B}$

Part numbers

Cable type	Connection cover or conductor end sleeve, 2 x D-sub
Fixed installation	13602640
cable carrier installation	13623265

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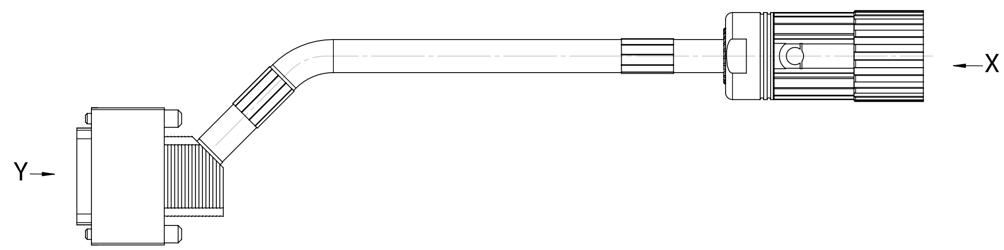
12.9.5 Encoder cable with M23 and D-sub

Prefabricated cables for encoders

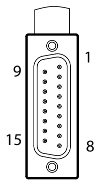
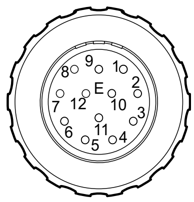
Encoder types	DR.315
Sine encoder	EH7S

Cable drawing, wiring – M23 and D-sub

M23 and D-sub



4158314507

Connection MOVIDRIVE® B					Motor connection side	
Plug connectors View Y	**Contact**	**Signal**	**Cable core color**	**Signal**	**Contact**	**Plug connectors View X**
D-sub  15-pole	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	S	-	Data+	-	
	12	$\overline{D}$	-	Data-	-	
	15	UB	Black+gray (BK+GY)	UB	12	
	8	GND	Pink+violet (PK+VT)	GND	10	

Part numbers

Cable type	M23, D-sub 15
Fixed installation	13602659
cable carrier installation	13623206

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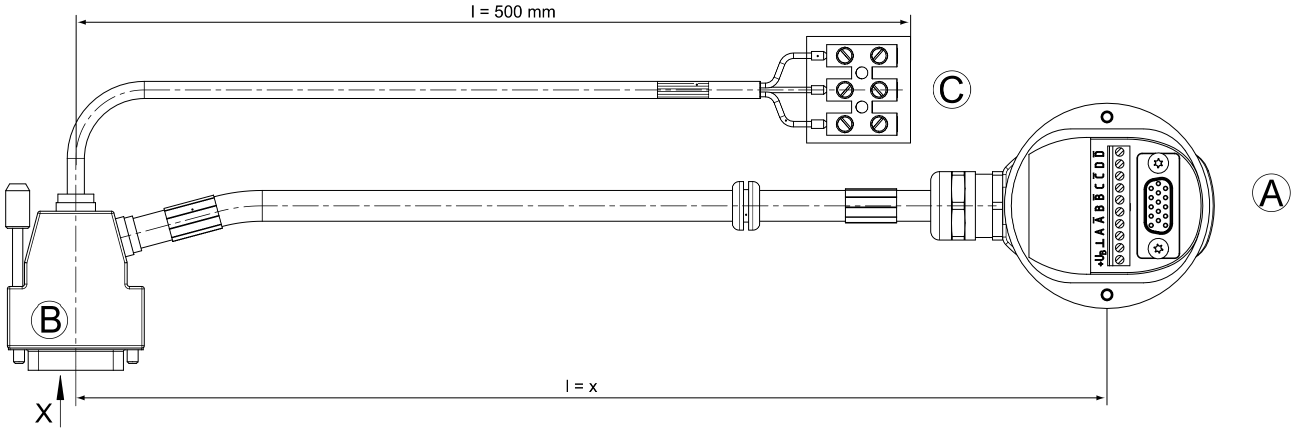
12.10 Add-on encoder cables for MOVIAXIS®

12.10.1 Encoder cable with connection cover and D-sub

Prefabricated cables for encoders

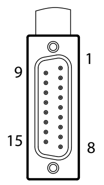
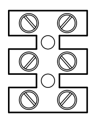
Encoder types
ES7S, EG7S, ES7R, EG7R, AS7W, AG7W

Cable drawing, wiring



27021600761130507

l = x: Length that can be ordered

MOVIAXIS®connection					Motor connection side	
Plug connectors View X	**Contact B**	**Signal**	**Cable core color**	**Signal**	**Contact A**	
D-sub  15-pole	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	S	Black (BK)	Data+	S	
	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

Cable type	Connection cover, D-sub 15
Fixed installation	13631632
cable carrier installation	13631640

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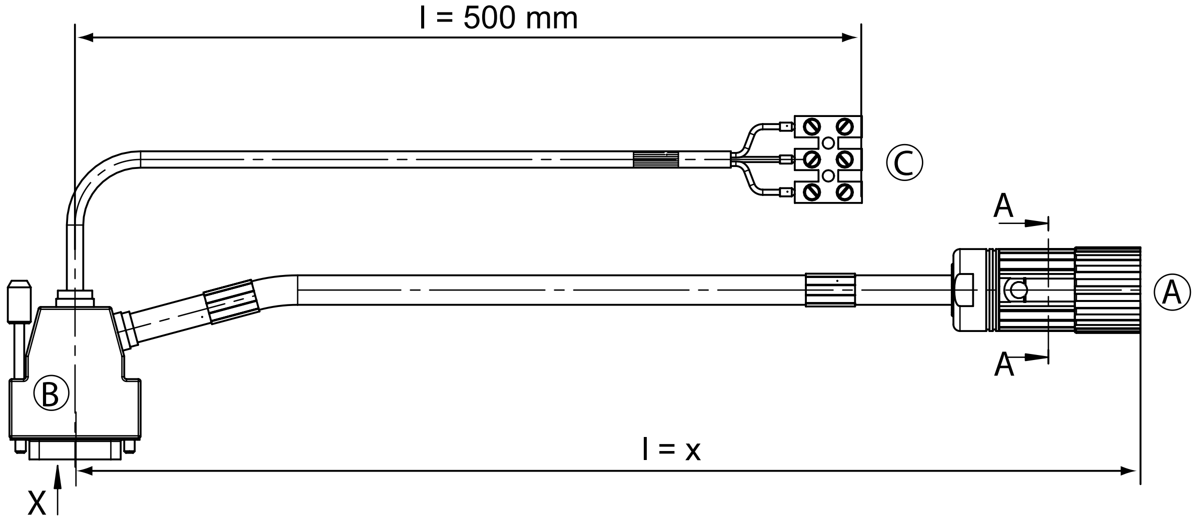
12.10.2 Encoder cable with M23 and D-sub

Prefabricated cables for encoders

Encoder types
ES7S, EG7S, ES7R, EG7R, AS7W, AG7W

Cable drawing, wiring



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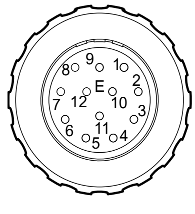
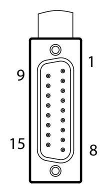
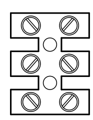
l = x: Length that can be ordered

MOVIAXIS®connection					Motor connection side	
Plug connectors View X	**Contact B**	**Signal**	**Cable core color**	**Signal**	**Contact A**	
	1	A	Red (RD)	A cos+	3	
	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	**ASTA 021 FR**
	3	C	Brown (BN)	C+	1	
D-sub	11	$\overline{C}$	White (WH)	C-	2	
	4	S	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	
15-pole	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

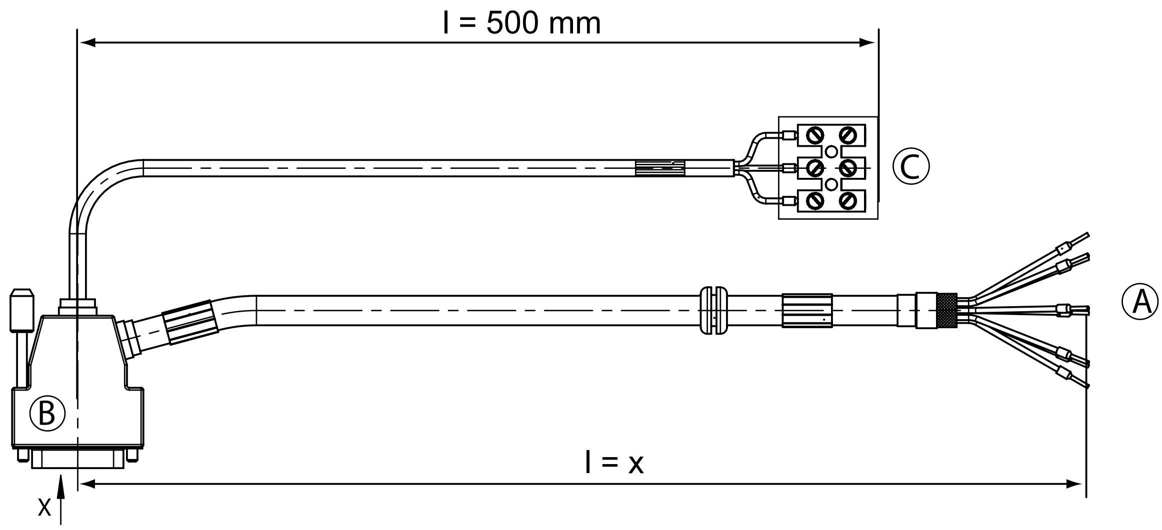
Cable type	M23, D-sub 15
Fixed installation	13631691
cable carrier installation	13631705

12.10.3 Encoder cable with conductor end sleeves and D-sub

Prefabricated cables for encoders

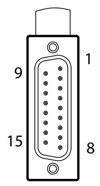
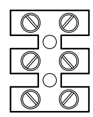
Encoder types
E.7., A.7.

Cable drawing, wiring



18014401506396555

l = x: Length that can be ordered

MOVIAXIS® connection					Motor connection side	
Plug connectors View X	Contact B	Signal	Cable core color	Signal	Contact A	
	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	
D-sub	11	$\overline{C}$	White (WH)	C-	$\overline{C}$	
	4	S	Black (BK)	Data+	S	
	12	$\overline{D}$	Violet (VT)	Data-	$\overline{D}$	
	15	UB	Gray (GY)	UB	+UB	
	15	UB	Red/blue (RD/BU)	UB	+UB	
15-pole	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

Cable type	Conductor end sleeves, D-sub 15
Fixed installation	13631659
cable carrier installation	13631667

12.11 Built-in encoder cable

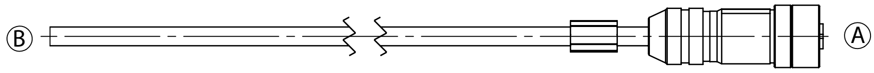
12.11.1 Encoder cable with an M12 connector

Prefabricated cables

Encoder types	DR.71 – 132
HTL	EI7C, EI76, EI72, EI71

Cable drawing, wiring

Encoder cable with one M12



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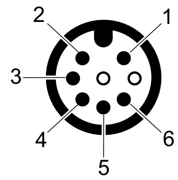
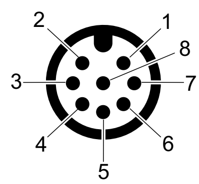
8-pole without TF

Inverter connection[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	
	n.c.	-	n.c.	7	
	n.c.	-	n.c.	8	
	UB	Gray (GY)	UB	1	
	GND	Pink (PK)	GND	2	

1) Assignment depends on the inverter used

8-pole with TF

Inverter connection[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	
	TS	Red (RD)	TS	7	
	TF-	Blue (BU)	TF-	8	
	UB	Gray (GY)	UB	1	
	GND	Pink (PK)	GND	2	

1) Assignment depends on the inverter used

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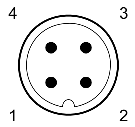
4-pole

Inverter connection[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 the inverter used

Part numbers

Cable type	Number of poles	Connection side inverter (B)	Connection side motor (A)	Part number
Fixed installation	4-pole	cut off	M12 connector, 4-pole, A-coded	18156746
	8-pole - with TF	Conductor end sleeve	M12 connector, 8-pole, A-coded	13623273
Cable carrier installation	8-pole - without TF	cut off		18156754
	8-pole - with TF	cut off		18156770
		Conductor end sleeves		13623281

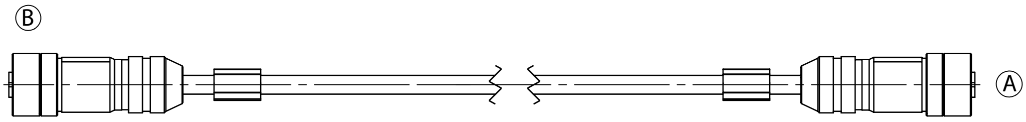
12.11.2 Encoder cable with two M12 connectors

Prefabricated cables

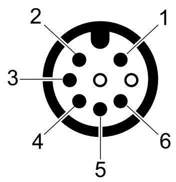
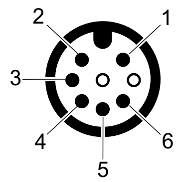
Encoder types	DR.71 – 132
HTL	EI7C, EI7C FS, EI76, EI72, EI71

Cable drawing, wiring

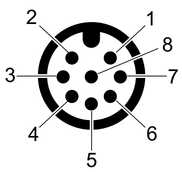
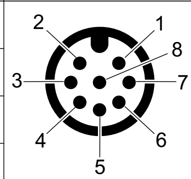
Encoder cable with two M12 connectors – 8- and 4-pole



8-pole without TF (EI7C FS)

Inverter 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	

8-pole

Inverter connection					Motor connection side	
	Contact B	Signal	Cable core col-or	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	TS	Red (RD)	TS	7	
	8	TF-	Blue (BU)	TF-	8	
	1	UB	Gray (GY)	UB	1	
	2	GND	Pink (PK)	GND	2	

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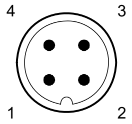
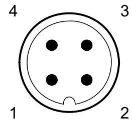
4-pole

Inverter 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	

Part numbers

Cable type	Number of poles	Part number
Fixed installation	8-pole	18156762
	4-pole	18156738

Safety-rated EI7C FS encoder

Cable type	Number of poles	Part number
Fixed installation	8-pole	18148670
Cable carrier installation		18158013

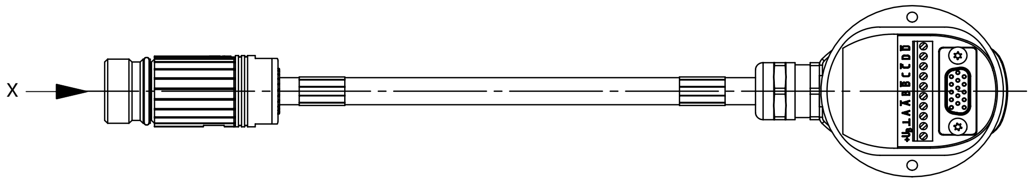
12.12 Extensions for add-on encoder cables

12.12.1 Encoder extension cable with connection cover and M23

Prefabricated cables for encoders

Encoder types	DR.71 – 132	DR.160 – 280
Sine encoder	ES7S	EG7S
TTL (V_B = DC 9 – 30 V)	ES7R	EG7R
RS485	AS7W	AG7W

Cable drawing, wiring



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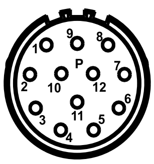
Inverter connection					Motor connection side
Plug connectors View X	**Contact**	**Signal**	**Cable core color**	**Signal**	**Contact**
AKUA 020  *9007204073939083*	3	A cos+	Red (RD)	A cos+	A
	4	$\overline{A}$ cos-	Blue (BU)	$\overline{A}$ cos-	$\overline{A}$
	5	B sin+	Yellow (YE)	B sin+	B
	6	$\overline{B}$ 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+	S
	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

Cable type	Connection cover, M23
Fixed installation	13621963

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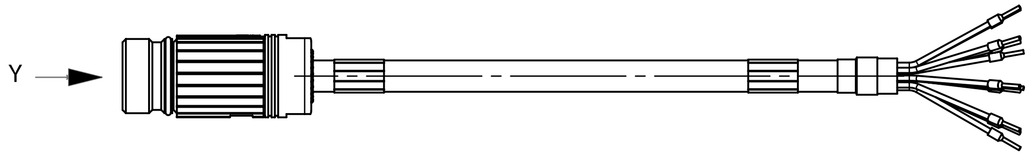
12.12.2 Encoder extension cable with conductor end sleeves and M23

Prefabricated cables for encoders

Encoder types	DR.71 – 132	DR.160 – 280
Sine encoder	ES7S	EG7S
TTL (V_B = DC 9 – 30 V)	ES7R	EG7R
RS485	AS7W	AG7W

Cable drawing, wiring



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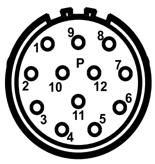
Inverter connection					Motor connection side
Plug connectors View Y	Contact	Signal	Cable core color	Signal	Contact
AKUA 020  *9007204073939083*	3	A cos+	Red (RD)	A cos+	A
	4	$\overline{A}$ cos-	Blue (BU)	$\overline{A}$ cos-	$\overline{A}$
	5	B sin+	Yellow (YE)	B sin+	B
	6	$\overline{B}$ sin-	Green (GN)	$\overline{B}$ sin-	$\overline{B}$
	1	C+	Brown (BN)	C+	C
	2	C-	White (WH)	C-	$\overline{C}$
	8	Data+	Black (BK)	Data+	S
	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

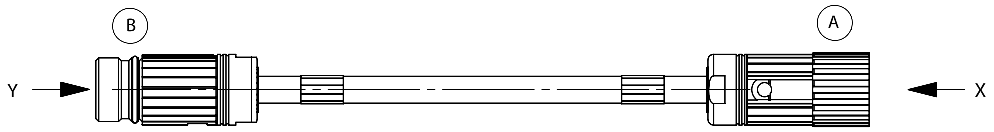
Cable type	Conductor end sleeves, M23
Fixed installation	13623184

12.12.3 Encoder extension cable with two M23

Prefabricated cables for encoders

Encoder types	DR.71 – 132	DR.160 – 280
Sine encoder	ES7S	EG7S
TTL (V_B = DC 9 – 30 V)	ES7R	EG7R
RS485	AS7W	AG7W

Cable drawing, wiring



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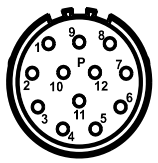
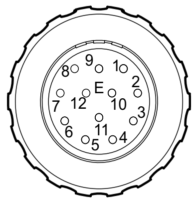
Motor connection side					Inverter connection	
Plug connectors View Y	Contact	Signal	Cable core color	Signal	Contact	Plug connectors View X
AKUA 020  *9007204073939083*	3	A cos+	Red (RD)	A cos+	3	**ASTA 021FR** 
	4	$\overline{A}$ cos-	Blue (BU)	$\overline{A}$ cos-	4	
	5	B sin+	Yellow (YE)	B sin+	5	
	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

Cable type	M23 – M23
Fixed installation	13623192
Cable carrier installation	13621971

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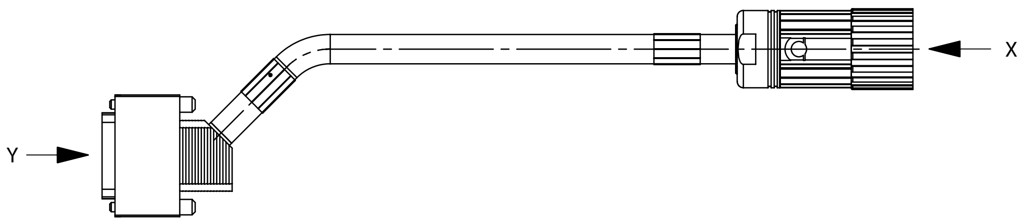
12.12.4 Encoder extension cable with M23 and D-sub

Prefabricated cables for encoders

Encoder types	DR.71 – 132	DR.160 – 280
Sine encoder	ES7S	EG7S
TTL (V_B = DC 9 – 30 V)	ES7R	EG7R
RS485	AS7W	AG7W

Cable drawing, wiring



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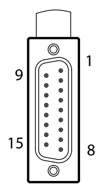
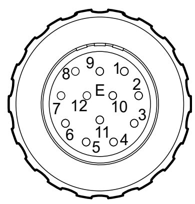
Motor connection side					Inverter connection	
Plug connectors View Y	Contact	Signal	Cable core color	Signal	Contact	Plug connectors View X
	1	A cos+	Red (RD)	A cos+	3	ASTA 021FR 
	9	$\overline{A}$ cos-	Blue (BU)	$\overline{A}$ cos-	4	
	2	B sin+	Yellow (YE)	B sin+	5	
	10	$\overline{B}$ sin-	Green (GN)	$\overline{B}$ 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

Cable type	M23 – D-sub
Fixed installation	13621998

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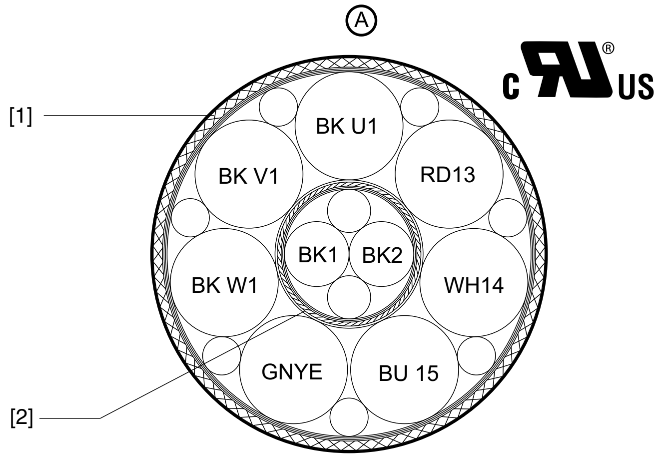
12.13 Cable specifications of the power cables

12.13.1 Cable type A

Mechanical design



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Cable type A: Connection between Z.7 or Z.8 field distributors and AC motors

Connection between MOVIMOT® or MOVI-SWITCH® 2S with AC motors

(for mounting close to the motor)

[1] Overall shield

[2] Shield

- SEW works standard W3251 (817 953 0)
- Supply cores: 7 x 1.5 mm^2
- Control core pair: 2 x 0.75 mm^2
- Insulation: TPE-U (polyurethane)
- Conductor: Bare E-Cu strand, extra fine wires with individual wire ≤ 0.1 mm
- Shield:Tinned E-Cu wire.
- Overall diameter: 13.2 – 15.9 mm
- Color of outer cable sheath: Schwarz

Electrical properties

- Conductor resistance for 1.5 mm^2 (20 °C): max. 13 Ω/km
- Conductor resistance for 0.75 mm^2 (20 °C): max. 26 Ω/km
- Operating voltage for conductor 1.5 mm^2: max. 750 V (c UL US600 V)
- Operating voltage for conductor 0.75 mm^2: max. 350 V (c UL US600 V)
- Insulation resistance at 20 °C:min. 20 MΩ x km

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Mechanical properties

- Suitable for cable carriers
  - Bending cycles > 2.5 million
  - Travel speed ≤ 3 m/s
- Bending radius in the cable track: 10 x diameter
- Bending radius for fixed routing: 5 x diameter
- Torsional strength (e.g. rotary table applications)
  - Torsion ±180° for a cable length of > 1 m
  - Torsional cycles > 100.000

INFORMATION

You will have to check the mechanical marginal conditions if you encounter reversed bending and high torsional load for a length of < 3 m. Please contact SEW-EURODRIVE in such cases

Thermal properties

- Processing and operation: -30 °C to +90 °C (cULus: -30 °C to +80 °C)
- Transport and storage: -40 °C to +90 °C (cULus: -30 °C to +80 °C)
- Flame-retardant according to UL1581 Vertical Wiring Flame Test (VW1)
- Flame-retardant according to CSA C22.2 Vertical Wiring Flame Test

Chemical properties

- Oil-resistant according to VDE 0472 part 803 method B
- General fuel resistance (such as diesel, gasoline) according to DIN ISO 6722 parts 1 and 2
- General resistance to acids, alkalis, cleaning agents
- General resistance against dusts (e.g. bauxite, magnesite)
- Insulation and cable jacket material is halogen free according to VDE 0472 part 815 as well as silicone free
- Within the specified temperature range, free from substances interfering with wetting agents

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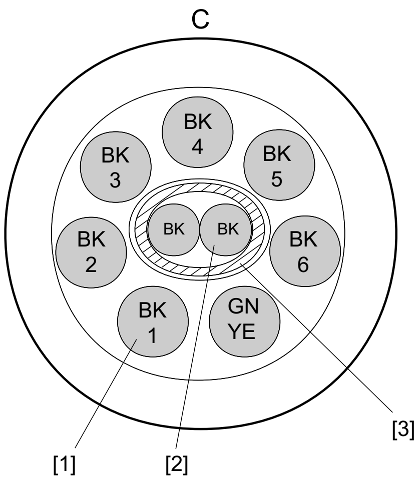
12.13.2 Cable type C

Mechanical design



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Cable type C connection between MOVI-SWITCH® 2S with AC motor

(for mounting close to the motor with option P2.A)

[1] Conductors 2.5 mm ^{2}

[2] Conductors 0.75 mm ^{2}

[3] Shield

- SEW works standard W3251 (015 207 2)
- Supply cores: 7 x 2.5 mm^2
- Control cores: 2 x 0.75 mm^2
- Insulation: PVC / Special PVC
- Conductor: Fine wires to VDE class 5, copper strand conductor
- Shield: Braided tinned copper shield
- Overall diameter: 15.2 mm

Electrical properties

- Conductor resistance for 2.5 mm^2: 8.5 Ω/km
- Conductor resistance for 0.75 mm^2: 26 Ω/km
- Operating voltage for 2.5 mm^2 cores: 600 V/1000 V
- Operating voltage for conductors 0.75 mm$^{2:}$ AC 48 V
- Insulation resistance: 20 MΩ x km

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Mechanical properties

- Bending radius in the cable track: 20 x diameter
- Bending radius for fixed routing: 6 x diameter

Thermal properties

- Processing and operation
  – Flexible routing: -5 °C to +70 °C
  – Fixed routing: -30 °C to +80 °C
- Transport and storage: -30 °C to +80 °C

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12.14 Cable specification of encoder cables

12.14.1 Fixed installation

Accessory designation		ES7S / EG7S / ES7R / EG7R / ES7C / EG7C / AS7W / AG7W / AH7Y / AS7Y / AG7Y	EH7S / AH7Y	EI7C[1)]
Cable cross sections		**6 x 2 x 0.25 mm²**	**5 x 2 x 0.25 mm²**	
Manufacturer		**HELUKABEL**		
Manufacturer designation		LI9YCY		
Operating voltage V_0 / V AC	V	230 / 350		
Temperature range	°C	Fixed installation -40 to +80		
Max. temperature	°C	+ 80		
Min. bending radius	mm	43	36.5	73
Outside diameter D	mm	8.6 ± 0.2	7.3 ± 0.2	
Core identification		DIN 47 100		
Sheath color		Green, similar to RAL 6018		
Approval(s)		DESINA / VDE / UL/CSA / CE		
Capacitance core/shielding	nF/km	110		
Capacitance core/core	nF/km	70		
Halogen-free		no		
Silicone-free		Yes		
CFC-free		Yes		
Inner insulation (core)		PP		
Outer insulation (sheath)		PVC		
Flame-inhibiting/self-extinguishing		No		flame retardant according to VDE0472, Part 802, Test type B, according to IEC 60332-1
Conductor material		Cu blank		
Shielding		Braided tinned Cu		
Weight (cable)	kg/km	107	78	83

1) EI7C encoders require a maximum of 8 conductors, additional conductors potentially for temperature sensors

12

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12.14.2 cable carrier installation

Accessory designation		**ES7S / EG7S / ES7R / EG7R / ES7C / EG7C / AS7W / AG7W / AH7Y / AS7Y / AG7Y**	**EH7S / AH7Y / EI7C**	**EI7C[1)]**
Cable cross sections		**6 x 2 x 0.25 mm²**	**5 x 2 x 0.25 mm²**	**4 x 2 x 0.25 mm²**
Manufacturer		**Nexans**		**HELUKABEL**
Manufacturer's designation		SSL18YC11Y 6 x 2 x 0.25 SSL18YC11Y 5 x 2 x 0.25		Top encoder 503, 74419
Operating voltage V_0 / V AC	V	300		
Temperature range	°C	-20 to +60		-20 to +80
Max. temperature	°C	+90 (+194) (on conductor)	+60	+80
Min. bending radius	mm	100	96	63
Outside diameter D	mm	9.8 ± 0.2	9.6± 0.2	8.4 ± 0.2
Maximum acceleration	m/s^2	20		50
Max. velocity	m/min	200		300
Core identification		DIN 47100		
Sheath color		Green similar to RAL 6018		
Approval(s)		DESINA / VDE /	DESINA / VDE / UL / CE	DESINA / VDE / UL/CSA / CE
Capacitance core/shielding	nF/km	100	85	110
Capacitance core/core	nF/km	58		70
Halogen-free		Yes		
Silicone-free		Yes		
CFC-free		Yes		
Inner insulation (core)		PP		
Outer insulation (sheath)		PUR		
Flame-inhibiting/self-extinguishing		yes		
Conductor material		E-Cu blank		
Shielding		Braided tinned Cu		
Weight	kg/km	130	114	89
Min. bending cycles		≥ 5 million		

1) EI7C encoders require a maximum of 8 conductors, additional conductors potentially for temperature sensors

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13 AC motors DT56, DR63

13.1 Technical data DT56, DR63

13.1.1 3000 rpm - S1

Motor type	P_N M_N	n_N	I_N 380-415 V (400 V)	cosφ	I_A/I_N	M_A/M_N M_H/M_N	J_{Mot} 2)	 3)	Z_0 BG[4] BGE[5]	M_{Bmax}	m[1]	
	kW Nm	rpm	A				10^{-4} kgm²		1/h	Nm	kg	
DR63S2	0.18 0.63	2720	12:46 AM (0.45)	0.88	4.2	2.4 2.2	3.6	4.8	5000 -	1.6	6.2	8.0
DR63M2	0.25 0.9	2660	0.66 (0.65)	0.86	3.5	2.2 1.9	3.6	4.8	4500 -	2.4	6.2	8.0
DR63L2	0.37 1.3	2650	1.0 (0.92)	0.87	3.5	2.1 1.9	4.4	5.6	4000 -	3.2	6.7	8.5

1) applies to flange motor
2) without brake
3) with brake
4) operation with BG brake control
5) operation with BGE brake control

13.1.2 1500 rpm - S1

Motor type	P_N M_N	n_N	I_N 380-415 V (400 V)	cosφ	I_A/I_N	M_A/M_N M_H/M_N	J_{Mot} 2)	 3)	Z_0 BG[4] BGE[5]	M_{Bmax}	m[1] 2)	 3)
	kW Nm	rpm	A				10^{-4} kgm²		1/h	Nm	kg	
DT56M4	0.09 0.66	1300	0.31 (0.29)	0.68	2.6	2.1 1.8	1.1	1.2	10000 -	0.8	Only in combination with helical gear units R07, RF07, R07F or SPIROPLAN® gear units W10, WF10, WA10, WAF10	
DT56L4	0.12 0.88	1300	0.46 (0.42)	0.68	2.6	2.2 1.9	1.1	1.2	10000 -	1.2		
DR63S4	0.12 0.83	1380	0.39 (0.39)	0.69	3.3	2.4 2.2	3.6	4.8	10000 -	2.4	6.1	7.6
DR63M4	0.18 1.3	1320	0.55 (0.55)	0.78	2.9	1.8 1.7	3.6	4.8	10000 -	3.2	6.1	7.6
DR63L4	0.25 1.8	1300	0.73 (0.68)	0.81	2.8	1.8 1.7	4.4	5.6	10000 -	3.2	6.7	8.2

1) applies to flange motor
2) without brake
3) with brake
4) operation with BG brake control
5) operation with BGE brake control

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13.1.3 1000 rpm - S1

Motor type	P_N	M_N	n_N	I_N 380-415 V (400 V)	cosφ	I_A/I_N	M_A/M_N M_H/M_N	J_{Mot}		Z_0	M_{Bmax}	m[1)]	
								2)	3)	BG[4)] BGE[5)]			
	kW	Nm	rpm	A				10^{-4} kgm²		1/h	Nm	kg	
DR63S6	0.09	0.95	900	0.42 (0.38)	0.64	2.2	1.8 1.6	5.4	6.6	20000 -	2.5	6.0	7.5
DR63M6	0.12	1.2	900	0.62 (0.58)	0.65	2.1	1.8 1.7	5.4	6.6	20000 -	3.2	6.0	7.5
DR63L6	0.18	2	870	0.81 (0.78)	0.70	2.2	1.6 1.5	6.8	8.0	20000 -	3.2	6.6	8.1

1) applies to flange motor
2) without brake
3) with brake
4) operation with BG brake control
5) operation with BGE brake control

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13.2 General notes on the product description

13.2.1 Noise

The noise levels of all motors from SEW-EURODRIVE are well within the maximum permitted noise levels set forth in IEC/EN 60034-9.

13.2.2 Painting

The motors from SEW-EURODRIVE are painted with "blue/gray" / RAL 7031 machine paint according to DIN 1843 as standard. Special coatings are available on request.

13.2.3 Surface and anti-corrosion protection

If required, all motors from SEW-EURODRIVE can also be supplied with special surface protection for applications in extremely humid and chemically aggressive environments.

13.2.4 Air admission and accessibility

The motors/brakemotors must be mounted on the driven machine in such a way that sufficient space, both axially and radially, is left for unimpeded air admission and for maintenance of the brake. Please also refer to the notes in the motor dimension sheets.

13.2.5 Brakemotors

On request, the motors can be supplied with an integrated mechanical brake. The SEW-EURODRIVE brake is an electromagnetic disk brake with a DC coil that releases electrically and brakes using spring force. Due to its operating principle, the brake is applied if the power fails. It meets the basic safety requirements. The brake can also be released mechanically if equipped with manual brake release. For this purpose, the brake is supplied with either a hand lever with automatic reset or an adjustable set screw. The brake is controlled with a brake control that is either installed in the motor wiring space or the control cabinet.

A characteristic feature of the brakes is their very short design. The brake endshield is a part of both the motor and the brake. The integrated construction of the SEW-EURODRIVE brakemotor permits particularly compact and sturdy solutions.

13.2.6 International markets

On request, SEW-EURODRIVE supplies UL-registered motors or CSA certified motors with connection conditions according to CSA and NEMA standard.

For the Japanese market, SEW-EURODRIVE offers motors conforming to JIS standard. Please contact SEW-EURODRIVE if required.

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13.3 Special markets

13.3.1 CSA/NEMA/UL-R

SEW-EURODRIVE offers the NEMA MG1 version or the CSA/UL-R option for drives delivered to North America. These versions have the following characteristic features:

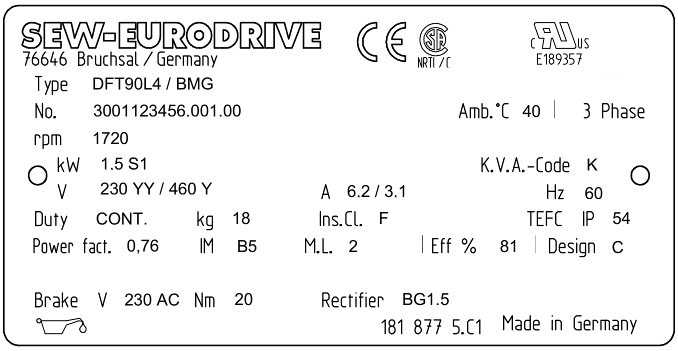
- Terminal designation T1, T2, etc. in addition to U1, V1, etc.
- The terminal boxes are part of the motor housing.
- Cable entry in the terminal box compliant with ANSI/ASME B1.20.1.-1983 with NPT threads (conical inch threads). The following table shows the number of cable entries and NPT sizes for the respective motor sizes.

Motor size	Number and type of threads
DT56	1 × 1/2" NPT + 1 × 3/8"' NPT (with adapter)
DR63	2 × 1/2" NPT (with adapter)

The NPT openings are sealed with plugs for transportation and storage.

- For AC motors/AC brakemotors modified nameplate with the following information: TEFC, K.V.A. code and design. With CSA/UL-R option also CSA and UR mark (UL registration no. E189357).

Exemplary representation of a nameplate:



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13.3.2 JIS/JEC

The drives can be built according to JIS for delivery to Japan. SEW-EURODRIVE supplies special motor terminal boxes on request. These terminal boxes have cable entries with the PF threads (straight inch thread) customary in Japan.

13.3.3 V.I.K.

The German association of the Energy and Power Generation Industry V.I.K. has published for its members a recommendation for the implementation of technical requirements for AC asynchronous motors.

The drives from SEW-EURODRIVE can be supplied in compliance with these requirements. In this case, please contact SEW-EURODRIVE.

13.3.4 CCC

After joining the World Trade Organization (WTO), the People's Republic of China issued a certification system – CCC "China Compulsory Certification" – for products. CCC became effective on 1 May 2002 and replaced the marks "Great Wall" (CCEE China Commission for Conformity of Electric Equipment) for domestic products and

"CCIB" (China Commodity Inspection Bureau) for imported products. The Chinese government introduced the CCC certification in order to improve the safety of household appliances. The certification requirement became effective on August 1, 2003 for many products in household applications.

As a result, machines and systems of our customers with permanently installed motors and gearmotors are usually not subject to this mandatory certification. The only known exceptions are welding machines. Therefore, for the mechanical and plant engineering sector, CCC certification will only be relevant for individually exported products, such as spare parts.

This certification also affects SEW-EURORDRIVE products. The drive solutions from SEW-EURODRIVE obtained the necessary certification on July 29, 2003.

13.4 Corrosion and surface protection

See chapter "Corrosion and surface protection" (→ 🗎 57).

13.5 Type designation for AC motors and options

13.5.1 Standard AC motor in the series

DR.., DT..	Attached motor for gear units
DFR..	Flange-mounted design

13.5.2 Motor options

/BR, /BMG	Brake (reduced noise)
../HF	.. with lock-type manual brake release
../HR	.. with automatic manual brake release
/RS	Backstop
/TF	Thermistor (PTC resistor)
/TH	Thermostat (bimetallic switch)
/U	non-ventilated
/C	Protection canopy for fan guard

13.5.3 Plug connector options on DR63 AC motor

/IS	Integrated plug connector
/AMD..	Han® modular 10B plug connector on terminal box with single locking latch
/AME..	Han® modular 10B plug connector on terminal box, single locking latch and EMC housing
/ASD..	Han® 10ES plug connector on terminal box, single locking latch
/ASE..	Han® 10ES plug connector on terminal box, single locking latch and EMC housing

13.5.4 Encoder options on DR63 AC motor

/EH1S	Encoder with hollow shaft, sin/cos signals
/EH1T	Encoder with hollow shaft, TTL (RS422) signals
/EH1R	Encoder with hollow shaft, TTL (RS422) signals, U_B = 9 – 26 V
EH1C	Encoder with hollow shaft, HTL signals

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SEW EURODRIVE

13.6 Important order information

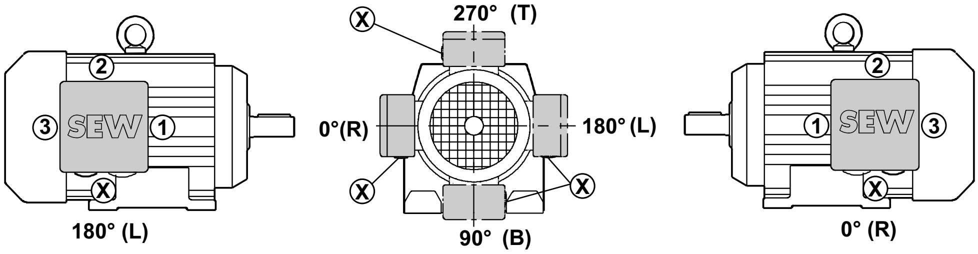
13.6.1 Position of motor terminal box and cable entry

To date, the position of the motor terminal box has been specified as 0°, 90°, 180° or 270° as viewed onto the fan guard = B-side. A change in the product standard EN 60034 specifies that the following designations must be used for terminal box positions for foot-mounted motors in the future:

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

This new designation applies to foot-mounted motors without a gear unit in mounting position B3 (= M1). The previous designation is retained for gearmotors. The following figure shows both designations. Where the mounting position of the motor changes, R, B, L and T are rotated accordingly. In motor mounting position B8 (= M3), T is at the bottom.

The position of the cable entry can be selected as well. Available positions are "X" (= standard position), "1", "2" or "3".



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Unless indicated otherwise, terminal box type 0° (R) with cable entry "X" will be supplied. We recommend selecting cable entry "2" with mounting position M3.

INFORMATION

When the **terminal box is in the 90° (B)** position, check to see if the gearmotor needs to be supported.

Only cable entries **"X"** and **"2"** are possible with **DT56 and DR63** motors. **Exception: Cable entry "3"** is also possible for DR63 **with IS plug connector**.

Terminal box position	0° (R)	90° (B)	180° (L)	270° (T)
Possible cable entries	"X", "3"	"X", "1", "3"	"1", "2"	"X", "1", "3"

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13.7 Mounting position designations of motors

See chapter "Mounting Positions" (→ 🗎 144).

13.8 Available motor options

13.8.1 Overview

The following motor options are available in various combinations:

- BMG02, BR03 (→ 🗎 641) disk brakes
- IS integrated plug connector (→ 🗎 621)
- AS.., AC.., AM.., AB.. (→ 🗎 623) plug connectors
- Encoders and prefabricated cables for encoder connection (→ 🗎 627)
- Protection canopy C (→ 🗎 633)

13.9 Standards and regulations

13.9.1 Conformance to standards

AC motors and AC brakemotors from SEW-EURODRIVE conform to the relevant standards and regulations, in particular:

- IEC 60034-1, EN 60034-1

Rotating electrical machinery, rating and performance.

- EN 60529

IP degrees of protection provided by electrical equipment housing.

- IEC 60072

Dimensions and performance of rotating electrical machinery.

- EN 50262

Metric threads of cable glands.

- EN 50347

Standardized dimensions and power ranges.

13.9.2 Rated data

See section "Rated data" (→ 🗎 17).

13.9.3 Tolerances

See section "Tolerances" (→ 🗎 18).

13.10 Electrical characteristics

13.10.1 Inverter-compatible

AC (brake) motors can be operated on inverters, for example SEW-EURODRIVE MOVIDRIVE®, MOVITRAC® and MOVIMOT®, thanks to the high quality of insulation (including phase separator) with which they are equipped as standard.

13.10.2 Frequency

SEW-EURODRIVE AC motors are designed for a 50 Hz or 60 Hz line frequency on request. By default, the technical data for AC motors refers to a 50 Hz line frequency.

13.10.3 Motor voltage

AC motors are available for nominal voltages from 220 – 690 V. Pole-changing motors of size 63 only from 220 – 500 V.

The standard version for motor sizes 250/280 is AC 380 – 415/660 – 690 V, 50 Hz. The star or delta jumpers are mounted on the terminal board.

For 50 Hz power supply

The **standards voltages** are:

Motors	Motor size	
	DT56	DR63
	Motor voltage	
Single-speed	-	230/400 V_{AC}△ /⅄ 290/500 V_{AC}△ /⅄
	Brake voltage	
Standard voltages	24 V_{DC} / 230 V_{AC} / 400 V_{AC}	

Motors and brakes for AC 230/400 V and motors for AC 690 V may also be operated on supply systems with a nominal voltage of AC 220/380 V or AC 660 V respectively. In this case, the voltage-dependent data will change slightly.

Standard connections 50 Hz motors

Number of poles	Synchronous speed n_{syn} at 50 Hz in rpm	Connection
2	3000	⅄ / Δ
4	1500	⅄ ; ⅄ / Δ
6	1000	⅄ / Δ

50 Hz motor on 60 Hz supply system

The rated data of motors designed for 50 Hz supply systems is slightly different when the motors are operated on 60 Hz supply systems:

Motor voltage at 50 Hz	Motor connection	U in V at 60 Hz	Modified rated data			
			n_N	P_N	M_N	M_A/M_N
230/400 V_{AC} Δ/⅄	Δ	230	+20%	0%	-17%	-17%

Motor voltage at 50 Hz	Motor connection	U in V at 60 Hz	Modified rated data			
			n_N	P_N	M_N	M_A/M_N
230/400 V_{AC} Δ/⅄	⅄	460	+20%	+20%	0%	0%
400/690 V_{AC} Δ/⅄	Δ					

For 60 Hz power supply

The **standard voltages** are indicated in **bold**:

Motors	Motor size	
	56	63
	Motor voltage	
Single-speed	-	**266/460V**$_{AC}$ Δ/⅄ 220/380 V_{AC} Δ/⅄ 330/575 V_{AC} Δ/⅄
	Brake voltage	
Standard voltages	24 V_{DC} / 230 V_{AC} / 266 V_{AC} / 460 V_{AC}	

Standard connections 60 Hz motors

Number of poles	Synchronous speed n_{syn} at 60 Hz in rpm	Connection
2	3600	Δ/⅄ ; ⅄⅄/⅄
4	1800	
6	1200	

60 Hz motor on 50 Hz supply system

The rated data of motors designed for 50 Hz supply systems is slightly different when the motors are operated on 60 Hz supply systems.

Example: NEMA C-motor, designed for the USA, operation on a 50 Hz supply system:

Motor voltage at 60 Hz (USA)	Motor connection	U in V at 50 Hz	Modified rated data			
			n_N	P_N	M_N	M_A/M_N
230/460 V_{AC}⅄⅄ / ⅄	⅄	400	-17%	-17%	0%	0%

13.10.4 Motors for the USA and Canada

Motors for the USA and Canada are designed according to NEMA or CSA regulations. NEMA or CSA single speed motors are registered by Underwriters Laboratories (UL). The following voltage assignments (60 Hz) are customary in the USA and Canada:

	Nominal voltage of the supply power	Nominal voltage of the motor
USA	208 V	200 V
	240 V	230 V
	480 V	460 V

	Nominal voltage of the supply power	Nominal voltage of the motor
Canada	600 V	575 V

The motor voltage may deviate up to ±10% from the nominal voltage. This deviation largely corresponds to the tolerance B.

In the USA, it is normal for AC 230/460 V / 60 Hz motors to be used.

13.11 Circuit breaker and protective equipment

See chapter "General project planning notes" (→ 🗎 77).

13.11.1 Safe switching of inductances

Note the following information for the switching of inductances:

- Switching of low-speed motor windings.

If the cable is routed incorrectly, switching of low-speed motor windings can generate voltage peaks. Voltage peaks can damage windings and contacts. Install varistors in the incoming cable to avoid such problems.

- Switching of brake coils.

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

Brake control systems from SEW-EURODRIVE are equipped with varistors as standard. Use contactors with contacts in utilization category AC3 or better to EN 60947-4-1 for switching of brake coils.

- Suppressor circuit on the switching devices.

According to EN 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 switching operations, SEW-EURODRIVE recommends installing suppressor circuits on the switching devices.

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13.12 Thermal characteristics

13.12.1 Thermal classes according to IEC 60034-1 (EN 60034-1)

- The single-speed AC motors DT56 and DR63 are designed in thermal class 130 (B) as standard. Thermal classes 155 (F) or 180 (H) are available on request.

The table below lists the overtemperatures to IEC 60034-1 (EN 60034-1).

Thermal classes		Limit overtemperature in K
New	Old	
130	B	80 K
155	F	105 K
180	H	125 K

13.12.2 Power reduction

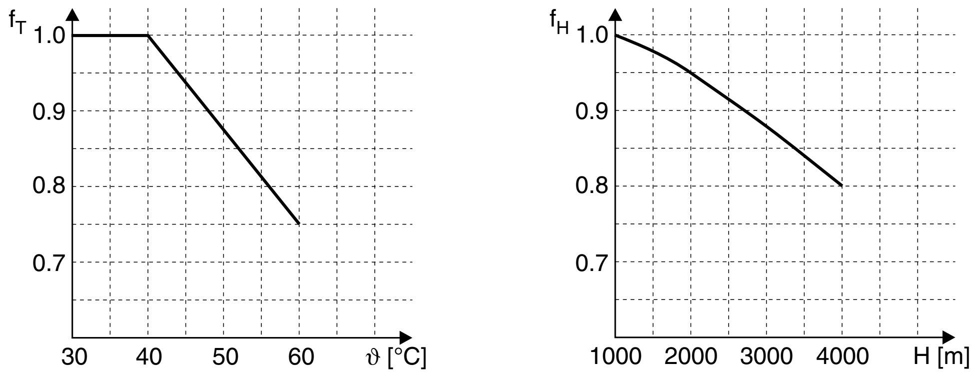
The rated power P_N of an AC motor or the thermally permitted torque M_N of an asynchronous servomotor is dependent on the ambient temperature and the installation altitude. The rated power or rated torque stated on the nameplate applies to an ambient temperature of 40°C and a maximum installation altitude of 1000 m above sea level. The rated power or rated torque must be reduced according to the following formula in the case of higher ambient temperatures or installation altitudes:

$$\mathbf{P_{Nred} = P_N \cdot f_T \cdot f_H}$$

$$\mathbf{M_{Nred} = M_N \cdot f_T \cdot f_H}$$

AC motors

Refer to the following diagrams for factors f_T and f_H for AC motors:



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ϑ = ambient temperature

H = installation altitude above sea level

13.12.3 Operating modes

See section "Operating modes" (→ 🗎 131).

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13.13 Starting frequency

See chapter "Starting frequency" (→ 🗎 137).

13.13.1 Permitted work done by the brake

If you are using a brakemotor, you must check whether the brake is approved for use with the required starting frequency Z.

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13.14 Mechanical characteristics

See chapter "Mechanical characteristics" (→ 🗎 139).

13.15 Overhung loads and axial forces

The following table lists the permitted overhung loads (top value) and axial forces (bottom value) of DR63 AC motors:

Mounting position	Speed in rpm Number of poles	Permitted overhung load F_R in N Permitted axial load F_A in N; $F_{A\_tensile} = F_{A\_pressure}$
Flange-mounted motor	1000 6	600 150
	1500 4	500 110
	3000 2	400 70

13.15.1 Overhung load conversion for off-center force application

The permitted overhung loads must be calculated using the following formulae in the event of force application not in the center of the shaft end. The smaller of the two values F_{xL} (according to bearing service life) and F_{xW} (according to shaft strength) is the permitted value for the overhung load at point x.

All overhung load diagrams are based on a bearing service life of 20,000 hours. A detailed bearing service life calculation is available on request. Note that the calculations apply to M_N.

F_{xL} based on bearing service life

$$F_{xL} = F_R \cdot \frac{a}{b + x} \; [N]$$

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F_{xw} based on shaft strength

$$F_{xW} = \frac{c}{f + x} \text{ [N]}$$

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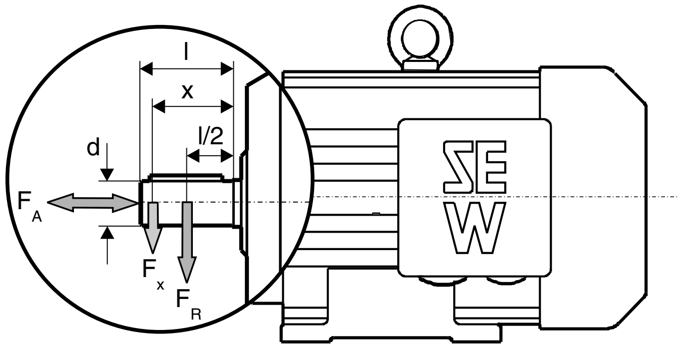
F_R = Permitted overhung load (x = l/2) in N

x = Distance from the shaft shoulder to the force application point in mm

a, b, f = Motor constants for overhung load conversion in mm

c = Motor constant for overhung load conversion in Nmm



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Motor constants for overhung load conversion

Motor type	a	b	c			f	d	l
	mm	mm	2-pole Nmm	4-pole Nmm	6-pole Nmm	mm	mm	mm
63	161	146	$11.2 \cdot 10^3$	$16.8 \cdot 10^3$	$19 \cdot 10^3$	13	14	30

2nd motor shaft end

Contact SEW-EURODRIVE regarding the permitted load for the 2nd motor shaft end.

Motor bearings used

The following table shows which bearings are used in SEW-EURODRIVE AC (brake)motors:

Motor type	A-side bearing			B-side bearing	
	Flange-mounted motor	Gearmotor	Foot-mounted motor	Without brake	With brake
56	-	6302-Z	-	6001-2RS-J	
63	6203-2Z-J	6303-2Z-J	-	6202-2Z-J	6202-2RS-J-C3

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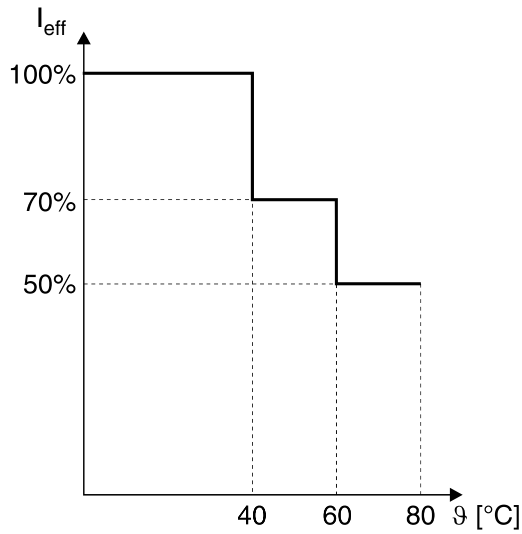
13.16 Project planning, technical data – plug connectors

13.16.1 Contact rating depending on the temperature

The "Technical data" tables for plug connectors lists electrical current values for the maximum permitted contact load (= max. contact load) of the plug connectors. These current values are valid for ambient temperatures of up to max. 40 °C. Higher ambient temperatures apply for reduced current values. The following graph shows the permitted contact load as a function of the ambient temperature.



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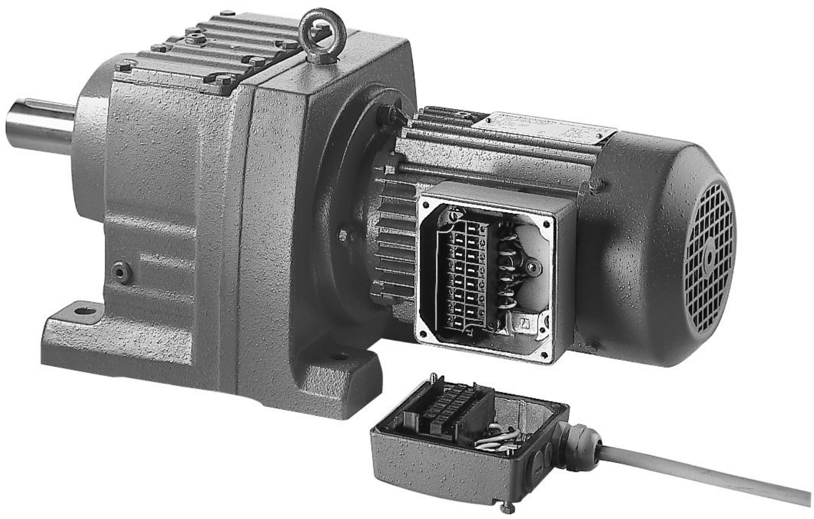
I_{eff} = Current value of the maximum permitted contact load, 100% = value as listed in the "Technical Data", from (→ 🗎 624)

ϑ = Ambient temperature

13.16.2 IS integrated plug connector

AC gearmotor with integrated IS plug connector



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The AC (brake)motors of the DR63 series can be supplied on request with the integrated 12-pole IS plug connector instead of the standard terminal box. The upper section of the IS plug connector (mating connector) is included in the scope of delivery. The IS plug connector is particularly compact and offers the following connection options:

- Motor, single-speed or two-pole multi-speed
- Brakes
- Temperature monitoring (TF or TH)

As with the terminal box, the cable entry for the IS integrated plug connector can also be from four different directions offset at 90°.

INFORMATION

IS requires a clearance of 30 mm for removing the connector.

For DR63 brakemotors with IS size 1 only: Only brake control systems BG1.2, BG2.4, BSR and BUR can be accommodated in the IS. Other brake control systems must be installed in the control cabinet.

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13.16.3 Plug connectors AS.., AC.., AM.., AB..

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The plug connector systems AS.., AC.., AM.., AB.. are based on plug connector systems from Harting.

- AS.., AC.. → Han® 10ES / 10E
- AM.., AB.. → Han® Modular

The plug connectors are located at the side of the terminal box. They are locked either using two clamps or one clamp on the terminal box.

UL approval has been granted for the plug connectors.

The mating connector (sleeve housing) with socket contacts is not included in the scope of delivery.

AS.., AC..

The ten contacts of the AS.. and AC.. plug connector systems connect the motor winding (6 contacts), the brake (2 contacts) and the thermal motor protection (2 contacts). You can connect both motors with single speed and 2-pole multi-speed motors.

Types AS.. and AC.. differ as follows:

- AS = Cage clamps
- AC = Crimp contacts and shortened contacts for thermal motor protection

INFORMATION

Applies to AS.1 and AC.1

With brakemotors, it is only possible to select the version with brake control in the terminal box. In this case, the disconnection in the DC circuit has to take place electronically using BSR or BUR.

The ASD.. and ASE.. types with single clip longitudinal closure correspond to the DESINA regulation issued by the Association of German Machine Tool Manufacturers (VDW).

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AM.., AB..

Plug connectors AM.. and AB.. can be used for connecting both single-speed motors and two-speed pole-changing motors.

With brakemotors, the brake control system can be located either in the terminal box or in the control cabinet. All versions of the brake control system are possible.

13.16.4 Prefabricated cable

SEW-EURODRIVE provides a prefabricated cable for connecting the field distributor and the AC (brake) motor with option APG4. The cable is prefabricated in half-meter steps up to a maximum length of five meters. The cable can be ordered from SEW-EURODRIVE. Specify the required length (max. 5 m).

13.16.5 IS integrated plug connector

Technical data

IS size		1
For motors		DR63
Number of contacts		12 + 2 × PE
Contact connection		Screw connection
Contact type		Blade/bushing
Max. voltage/(CSA)	V_{AC}	690 / (600)
Max. contact rating	A_{eff}	16
Degree of protection		Corresponding to motor degree of protection (IP54, IP55, optionally IP56, IP65, IP66)
Ambient temperature	°C	-40 to +40

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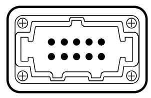
13.16.6 Installed plug connectors AS.., AM..

Technical data AS..

Plug connectors		ASD..
For motors		DR63
Locking of mating connector		Single clamp
Connector viewed from motor end		
Basic connector system		[1]
Number of contacts		10
Max. contact rating	A_{eff}	10 × 16
PE connection		2 contacts on insulator
Max. voltage/(CSA)	V_{AC}	500/(600)
Contact connection		AC = crimp contacts (Han® 10E) AS.= cage clamps (HAN® 10ES)
Contact type		Pin/(socket = customer end)
Degree of protection		Corresponding to motor degree of protection (IP54, IP55, optionally IP65)
Ambient temperature	°C	-40 to +40

1) Harting, aluminum standard housing (painted) Han® 10E/10ES

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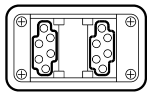
Technical data AM..

Plug connectors		AMD..
For motors		DR63
Locking of mating connector		Single clamp
Connector viewed from motor end		
Basic connector system		1)
Number of contacts		2 × 6
Module type 2)		2 × E-module
Max. contact rating	A_{eff}	12 × 16
PE connection		2 contacts on articulated frame
Max. voltage/(CSA)	V_{AC}	500/(600)
Contact connection		Crimp contacts
Contact type		Pin/(socket = customer end)
Degree of protection		Corresponding to motor degree of protection (IP54, IP55, optionally IP65)
Ambient temperature	°C	-40 to +40

1) Harting, standard aluminum housing (painted) Han Modular® 10B

2) The module type depends on the current. C-module for more than 16 A, E-module for less than or equal to 16 A.

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13.17 Project planning, technical data – encoders

13.17.1 Speed sensors

Various types of speed sensor are available for installation on DR63 AC motors as standard depending on the application and motor size.

Overview of encoders

Designation	Motor	Encoder type	Shaft	Specification	Supply	Signal
EH1T	DR63	Encoder	Hollow shaft	1024 pulses/ revolution	5 V_{DC} controlled	TTL/RS422
EH1S					9 V_{DC} – 26 V_{DC}	1 V_{SS} sin/cos
EH1R						TTL/RS422
EH1C						HTL

Encoder connection

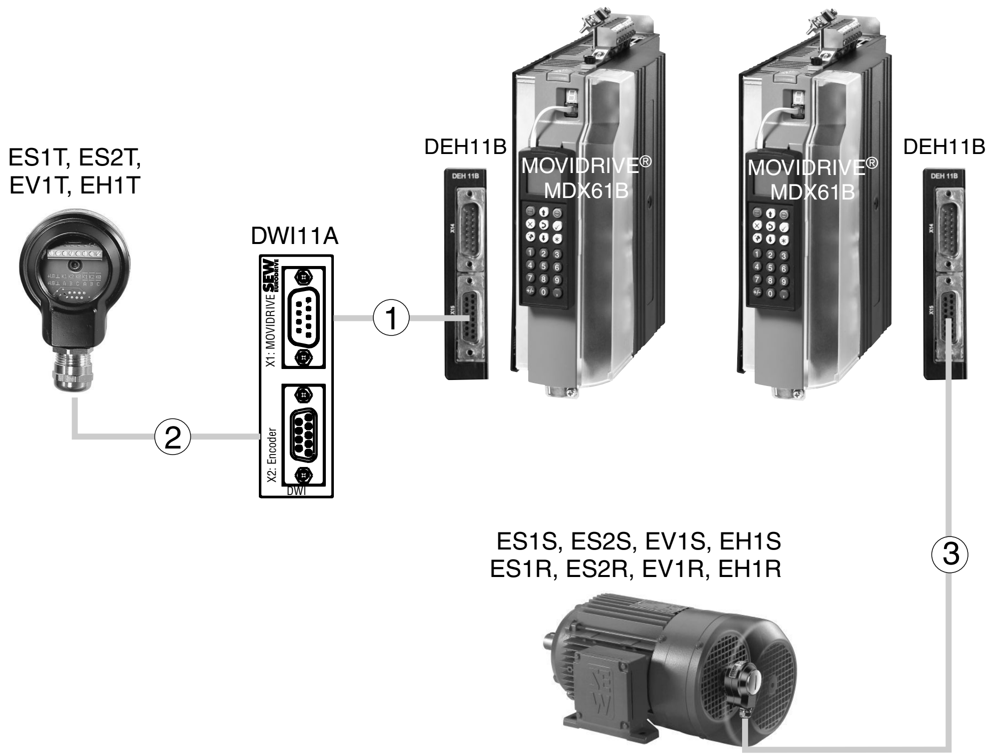
When connecting the encoders to the inverters, always follow the operating instructions for the relevant inverter and the wiring diagrams supplied with the encoders.

- The maximum cable length (inverter– encoder) is 100 m with a cable capacitance:
  - < 83 nF/km (conductor/conductor) according to DIN VDE 0472 part 504
  - < 110 nF/km (conductor/shield)
- Core cross section: 0.20 – 0.5 mm^2
- Use shielded cable with twisted pair conductors and apply shield over large area on both ends:
  - To the encoder in the cable gland or in the encoder plug
  - To the inverter on the electronics shield clamp and/or to the housing of the D-sub connector
- Install the encoder cables separately from the power cables, maintaining a distance of at least 200 mm.
- Encoder with cable gland: Observe the permitted diameter of the encoder cable to ensure that the cable gland functions correctly.

13.17.2 Prefabricated cables for encoder connection

SEW-EURODRIVE offers prefabricated cables for simple and reliable connection of encoder systems. It is necessary to differentiate between cables used for fixed installation or for use in cable carriers. The cables are prefabricated in 1 m steps for the required length.

Prefabricated cables for encoder connection and encoders:



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Prefabricated cables for encoder connection:

Part number	8179573
Installation	Fixed installation
For encoders with 5 V voltage supply	EH1T
Cable cross section	4×2×0.25 mm² (AWG23) + 1×0.25 mm² (AWG23)
Conductor colors	A: yellow (YE) A: green (GN) B: red (RD) B: blue (BU) C: pink (PK) C: gray (GY) UB: white (WH) ⊥: brown (BN) Sensor cable: violet (VT)
Manufacturer and type Lapp Helukabel	 Unitronic Li2YCY (TP) Paar-Tronic-CY
For inverters	MOVIDRIVE® MDX61B with DEH11B option
Connection on the DWI11A on the inverter	 with 9-pin D-sub socket with 15-pin D-sub connector

②

Prefabricated cables for incremental TTL rotary encoders with 5 V voltage supply:

Part number	**1988298**	**198828X**
Installation	Fixed installation	Cable carrier installation
For encoders	EH1T via DWI11A and cable 817 957 3	
Cable cross section	4×2×0.25 mm² (AWG23) + 1×0.25 mm² (AWG23)	
Conductor colors	A: yellow (YE) A: green (GN) B: red (RD) B: blue (BU) C: pink (PK) C: gray (GY) UB: white (WH) ⊥: brown (BN) Sensor cable: violet (VT)	
Manufacturer and type Lapp Helukabel	 Unitronic Li2YCY (TP) Paar-Tronic-CY	 Unitronic LiYCY Super-Paar-Tronic-C-PUR
For inverters	MOVIDRIVE® MDX61B with DEH11B option	
Connection to encoder/motor	 with conductor end sleeves Connect the violet conductor (VT) with the encoder at UB with 9-pin D-sub connector	

3

Prefabricated cables for incremental TTL sensors and sin/cos rotary encoders with 24 V voltage supply:

Part number	**13324594**	**13324586**
Installation	Fixed installation	Cable carrier installation
For encoders	EH1S, EH1R	
Cable cross section	4×2×0.25 mm² (AWG23) + 1×0.25 mm² (AWG23)	
Conductor colors	A: yellow (YE) A: green (GN) B: red (RD) B: blue (BU) C: pink (PK) C: gray (GY) UB: white (WH) ⊥: brown (BN) Sensor cable: violet (VT)	
Manufacturer and type Lapp Helukabel	 Unitronic Li2YCY (TP) Paar-Tronic-CY	 Unitronic LiYCY Super-Paar-Tronic-C-PUR
For inverters	MOVIDRIVE® MDX61B with DEH11B option	
Connection to encoder/motor	with conductor end sleeves Cut off the violet conductor (VT) of the cable at the encoder end, with 15-pin D-sub connector	

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13.17.3 Incremental rotary encoders

Hollow shaft encoder

Incremental encoder with 1024 pulses/revolution:

Hollow shaft encoders for DR63 AC motors		EH1T	EH1S[1)]	EH1R
Supply voltage	U_B	5 V_{DC} ±5%	9 V_{DC} – 26 V_{DC}	
Max. current consumption	I_{in}	180 mA	160 mA	180 mA
Output amplitude per track	U_{high} U_{low}	≥ 2.5 V_{DC} ≤ 0.5 V_{DC}	1 V_{SS}	≥ 2.5 V_{DC} ≤ 0.5 V_{DC}
Signal output		TTL/RS-422	Sin/cos	TTL/RS-422
Output current per track	I_{out}	20 mA	40 mA	20 mA
Max. pulse frequency	f_{max}	120 kHz		
Pulses (sine cycles) per A, B Revolution C		 1024 1		
Pulse duty factor		1 : 1 ±20%		
Phase angle A : B		90° ±20%		
Vibration resistance (10 Hz – 2000 Hz)		≤ 100 m/s² (EN 60068-2-6)		
Shock resistance		≤ 1000 m/s² (EN 60068-2-27)		
Ambient temperature ϑ_U		-30°C to +60°C (EN 60721-3-3, class 3K3)		
Degree of protection		IP66 (EN 60529)		
Connection		Terminal box on encoder		

1) recommended encoder for operation with MOVIDRIVE®

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13.18 Project planning, technical data – protection canopy C

13.18.1 Protection canopy C

Liquids and/or solid foreign objects can penetrate the air outlet openings of motors in a vertical mounting position with their input shaft pointing downwards. SEW-EURODRIVE offers the motor option "protection canopy C" for this purpose.

Explosion-proof AC motors and AC brakemotors in a vertical mounting position with their output shaft pointing downwards must always be ordered with protection canopy C. The same applies to motors in a vertical mounting position installed outdoors.

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13.19 Project planning for AC motors with inverters

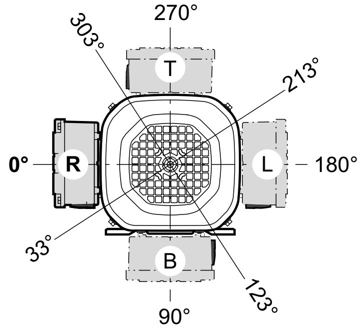
Information can be found in the chapter "Drive selection – controlled motor" (→ 🗎 179).

14 Dimension sheets – DT56, DR63

14.1 Information about the dimension sheets

Observe the following notes regarding dimension sheets for 4-pole AC (brake) motors:

- 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°.



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14.1.1 Motor dimensions

Motor variants and options

The motor dimensions can differ depending on the motor variants and options. Refer to the dimension drawings of the motor variants and options.

Special designs

In the case of special designs, or for specific variants and options that are connected in the terminal box, the terminal box dimensions can deviate from the standard.

Observe the notes in the order confirmation from SEW-EURODRIVE.

EN 50347, IEC 72-1

European standard EN 50347 became effective in August 2001. This standard adopts the dimension designations for three-phase AC motors for sizes 56 to 315M and flange sizes 65 to 740 from the IEC 72-1 standard.

The new dimension designations given in EN 50347/IEC 72-1 are used for the dimensions in question in the dimension tables of the dimensions sheets.

14.2 Dimension sheets for DT56, DR63 motors/brakemotors

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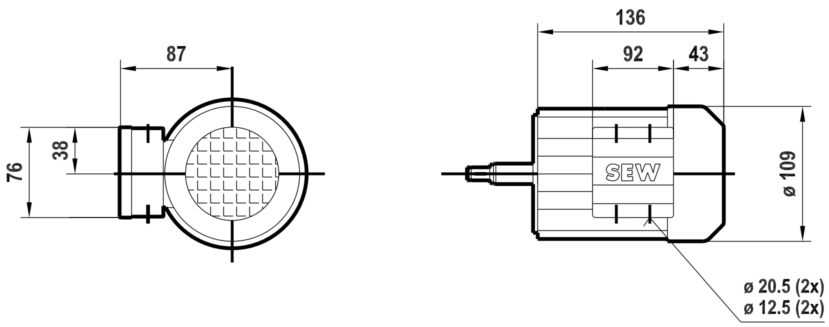
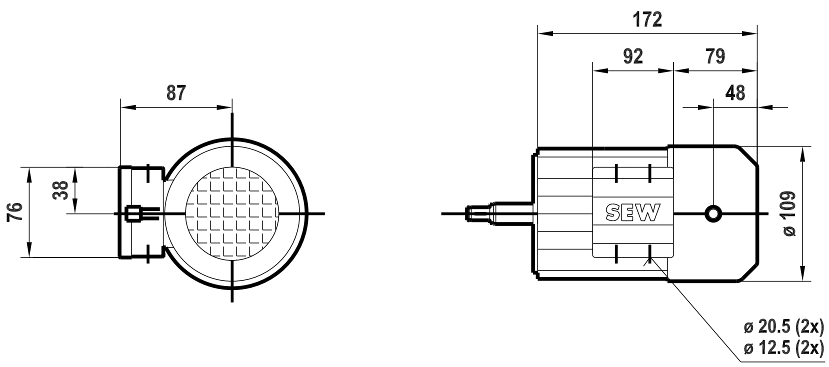
DT56



DT56 / B



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DFR63

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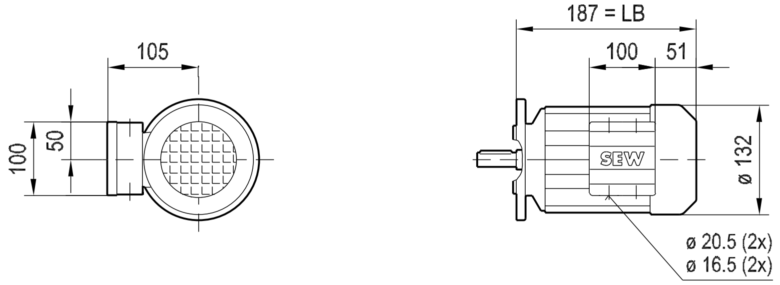

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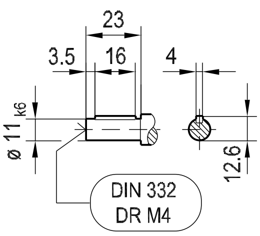
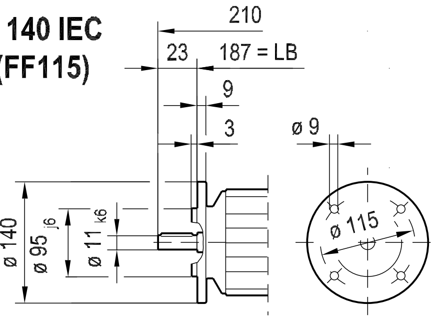
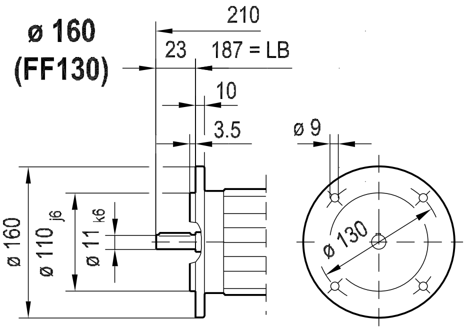


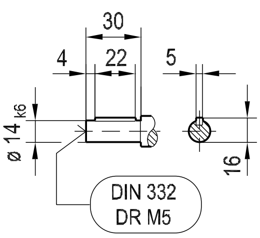
ø 140 IEC (FF115)



ø 160 (FF130)



ø 14 k6



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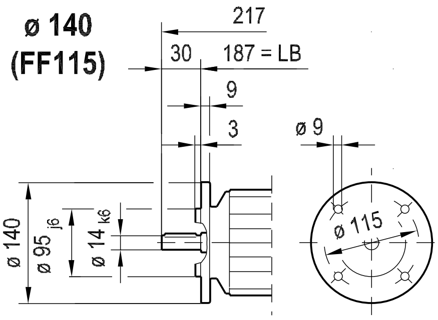

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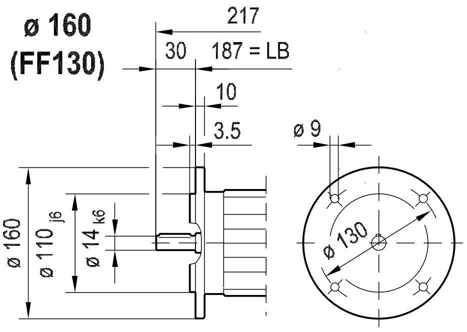

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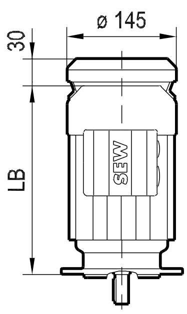

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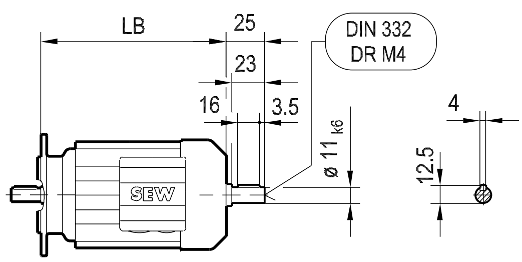

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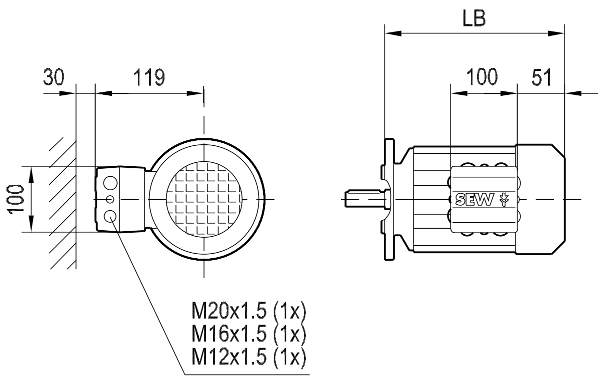
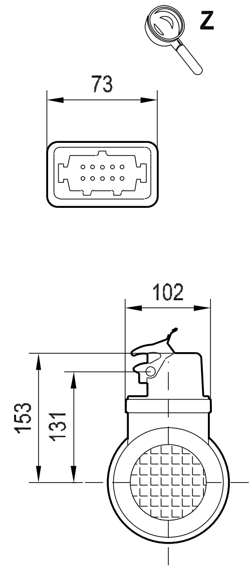
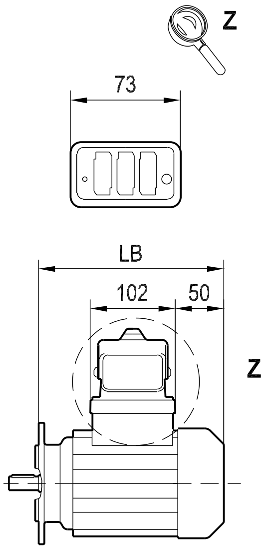


/ ASD.



/ AMD.



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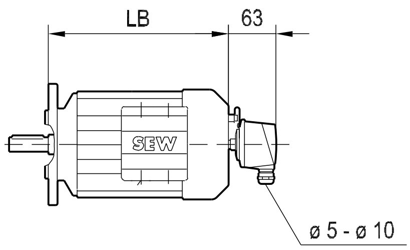

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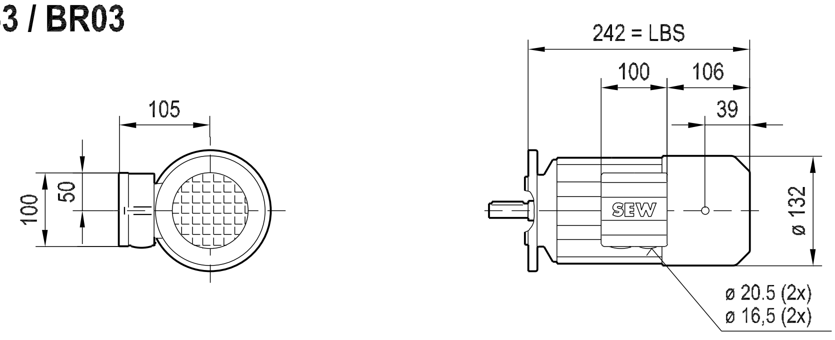

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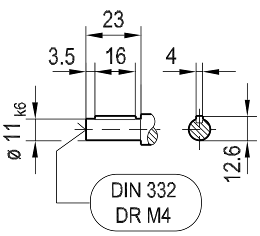

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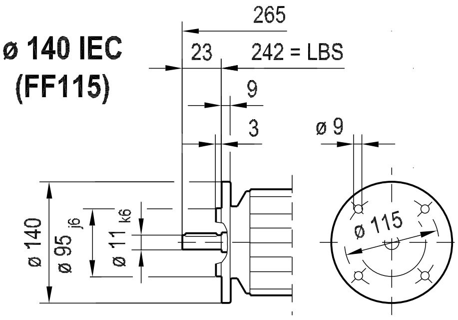
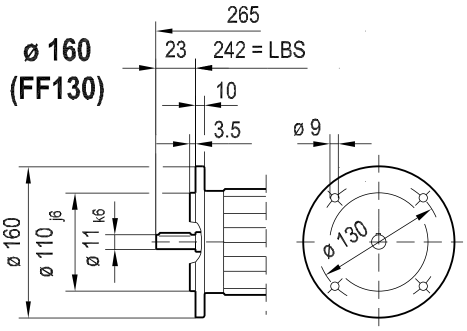
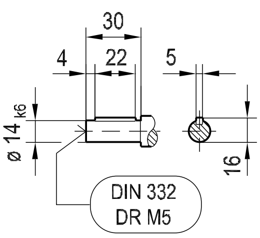


ø 160 (FF130)



ø 14 k6



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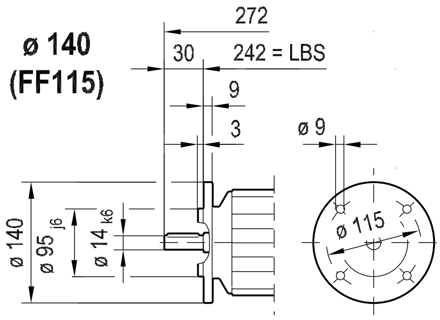

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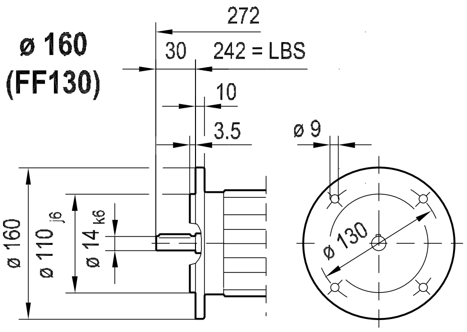

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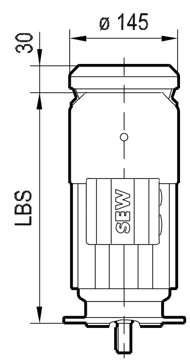

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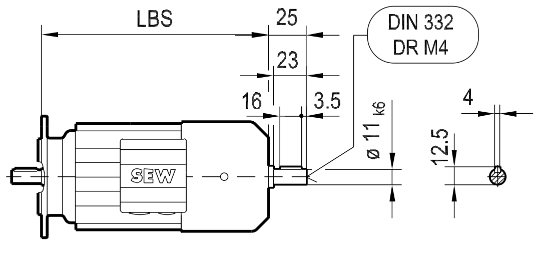

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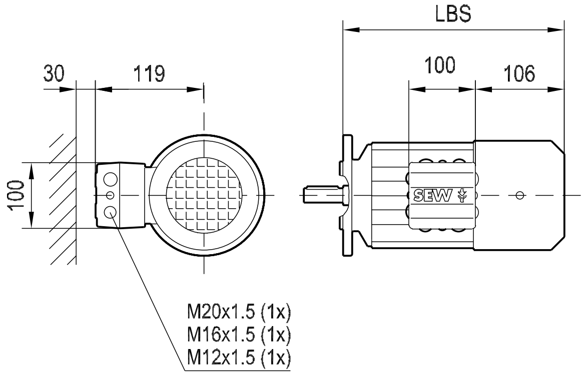

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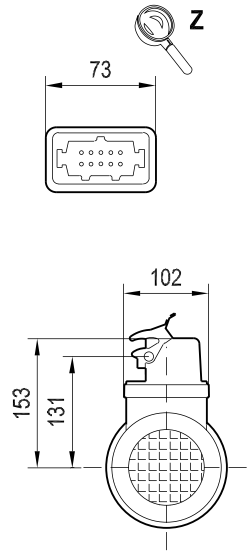

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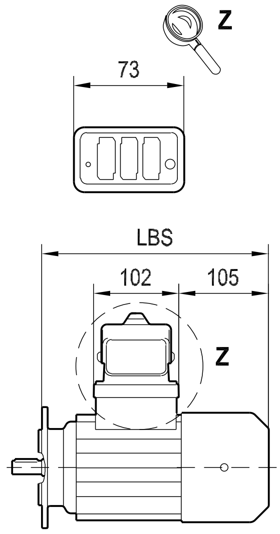

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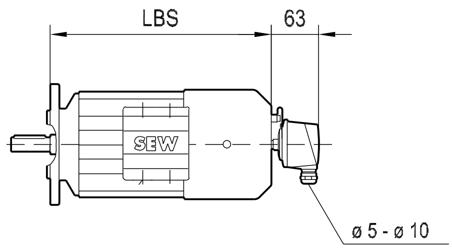

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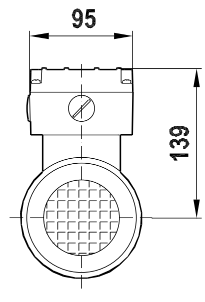
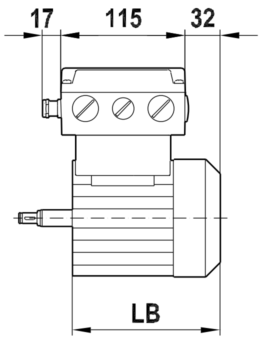
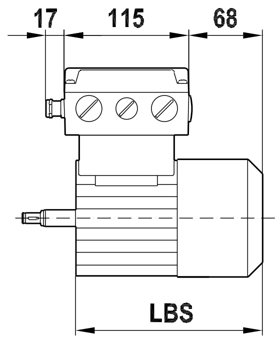
DT56..

DT56..B

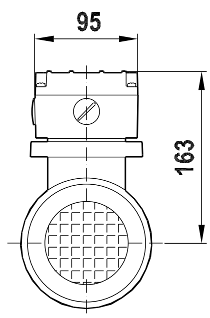


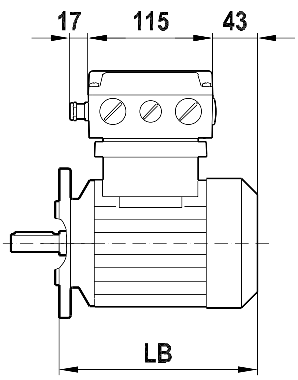


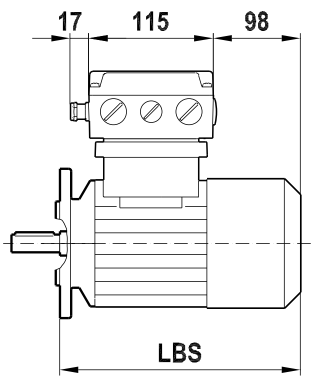


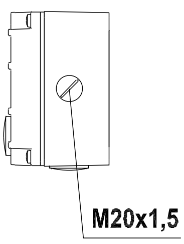
DR63..

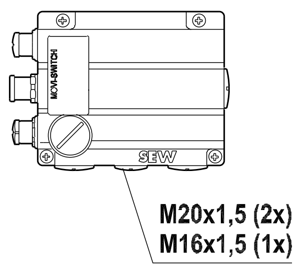
DR63..BR03











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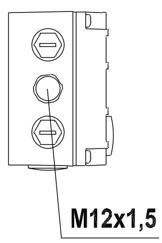

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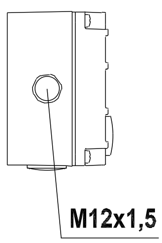

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15 Brakes – DT56, DR63

15.1 General

On request, SEW-EURODRIVE motors and gearmotors can be supplied with an integrated mechanical brake. The brake is a DC electromagnetic disk brake that is released electrically and applied with spring force. The brake is applied in case of a power failure. It meets the basic safety requirements.

The brake can also be released mechanically if equipped with manual brake release. Two options are available for manual brake release:

1. With automatic manual brake release (..HR), a hand lever is supplied.
2. With lock-type manual brake release (..HF), a set screw is supplied.

The brake is controlled with a brake control that is either installed in the motor wiring space or the control cabinet.

A main advantage of brakes from SEW-EURODRIVE is their very short design. The brake endshield is a part of both the motor and the brake. The integrated construction of the brakemotor permits particularly compact and sturdy solutions.

15.1.1 Quick response times

A characteristic feature of the brake is the patented two-coil system. This system comprises the accelerator coil BS and the coil section TS. The special SEW-EURODRIVE brake control system ensures that, when the brake is released, the accelerator coil is switched on first with a high current inrush, after which the coil section is switched on. The result is a particularly short response time when releasing the brake. The brake disk moves clear very swiftly and the motor starts up with hardly any brake friction.

This principle of the two coil system also reduces self-induction so that the brake is applied more rapidly. The result is a reduced braking distance. The brake can be switched off in the DC and AC circuit to achieve particularly short response times when applying the brake, for example in hoists.

15.1.2 Emergency stop features

In lifting applications, the limits of the permitted maximum braking work (including for emergency switching off) may not be exceeded. In other applications, such as in travel drives with reduced braking torques, significantly higher values are permitted, depending on the specific case. Please consult SEW-EURODRIVE if you require values for increased emergency stop braking work.

15.1.3 Brake control

Various brake controls are available for controlling disk brakes with a DC coil, depending on the requirements and the operating conditions. All brake controls are fitted as standard with varistors to protect against overvoltage. For detailed information on brakes from SEW-EURODRIVE, see the publication "Drive Engineering - Practical Implementation, SEW Disk Brakes".

The brake controls are installed either directly in the wiring space on the motor or in the control cabinet. For motors of thermal class 180 (H), the control system must be installed in the control cabinet.

15.2 Principles of the SEW brake

15.2.1 Basic design

The SEW brake is an electromagnetic disk brake with a DC coil that releases electrically and brakes using spring force. The system meets all fundamental safety requirements: the brake is applied automatically if the power fails.

The principal parts of the brake system are the brake coil itself [8] (accelerator coil + coil section = holding coil), comprising the brake coil body [9] with an encapsulated winding and a tap, the moving pressure plate [6], the brake springs [7], the brake disk [1] and the brake endshield [2].

A characteristic feature of SEW brakes is their very short design: the brake endshield is a part of both the motor and the brake. The integrated design of the SEW brakemotor makes for particularly compact and sturdy solutions.

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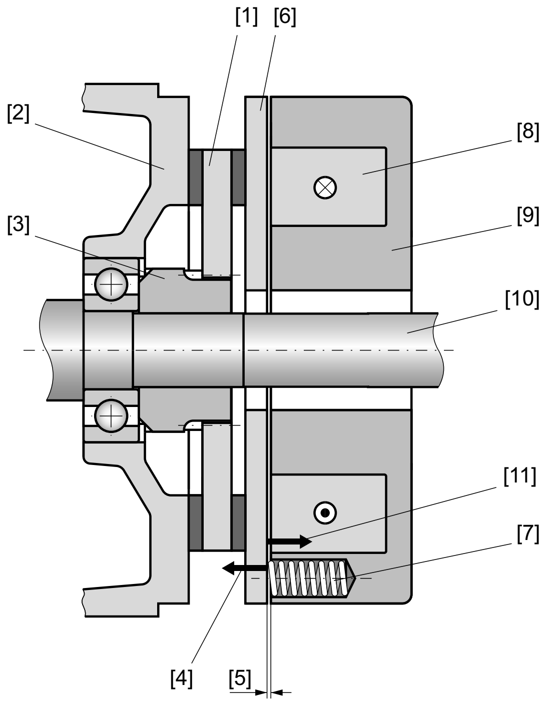
15.2.2 Basic function

In contrast to other disk brakes with a DC coil, SEW brakes operate with a two coil system. The pressure plate is forced against the brake disk by the brake springs when the electromagnet is de-energized. The motor is slowed down. The number and type of the 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 coil body. The brake disk moves clear and the rotor can turn.



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[1] Brake disk	[7] Brake spring
[2] Brake endshield	[8] Brake coil
[3] Driver	[9] Coil body
[4] Spring force	[10] Motor shaft
[5] Working air gap	[11] Electromagnetic force
[6] Pressure plate	

Particularly short response times at switch-on

See section "Fast response times" (→ 🗎 642).

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15.3 Details of the SEW brake system

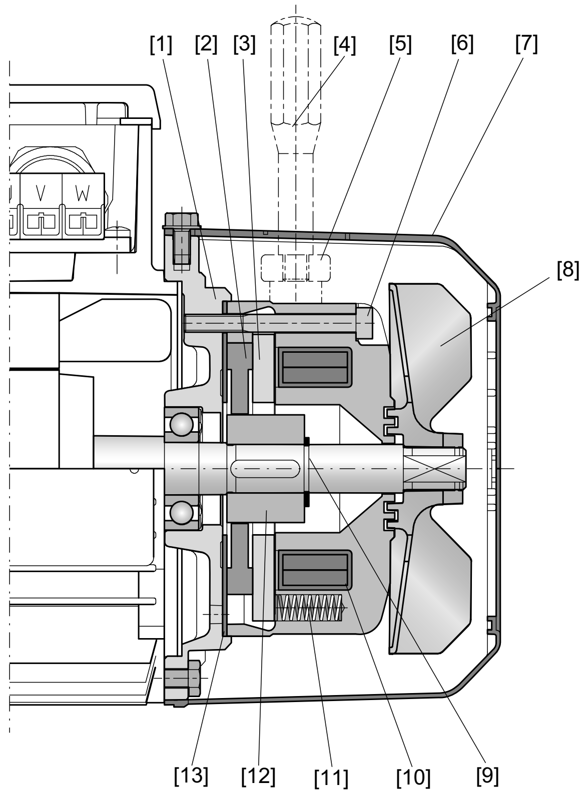
15.3.1 BMG02 brake

The BMG02 brake is used in AC brakemotors of size DT56.

The BMG02 brake is only available as a complete spare part.

Main features of the brake:

- Brake coil with tap
- Preassembled unit
- Movable pressure plate
- Plug connector (contact box) for simple electrical bonding
- The number of brake springs determines the braking torque



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[1]	Brake endshield	[6]	Retaining screw	[11]	Brake spring
[2]	Brake disk (complete)	[7]	Fan guard	[12]	Driver
[3]	Pressure plate	[8]	Fan	[13]	Friction plate
[4]	Hand lever	[9]	Retaining ring		
[5]	Releasing lever	[10]	Brake coil		

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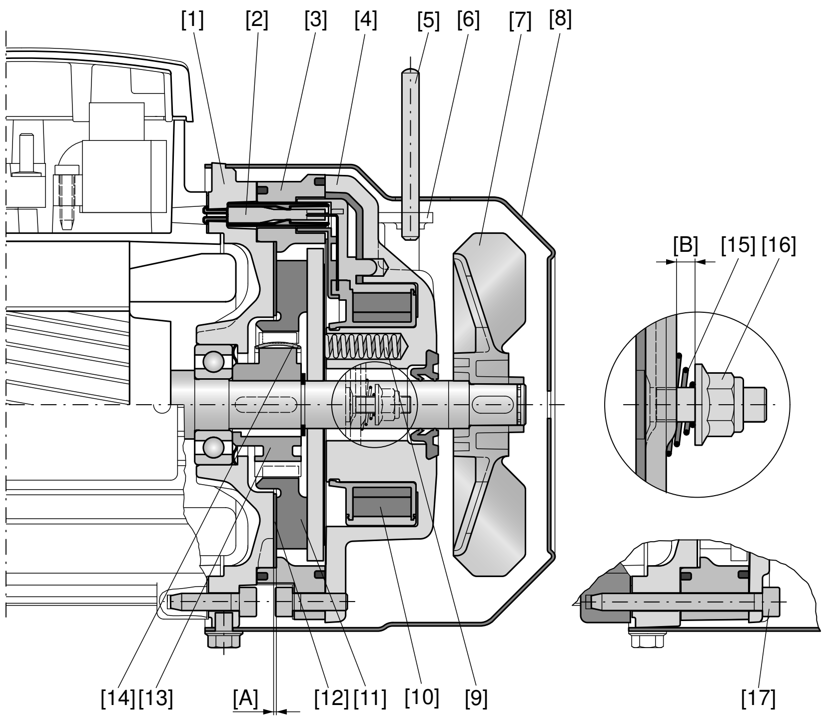
15.3.2 BR03 brake

The BR03 brake is used in AC brakemotors of size DR63. The BR brake can be installed mechanically or electrically and is then ready for operation. The BR03 brake is only available as a complete spare part. The guide ring [3] allows for a very compact design.

Main features of the brake:

- Brake coil with tap
- Movable pressure plate
- Plug connector (contact box) for simple electrical bonding
- The number of brake springs determines the braking torque



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[1]	Brake endshield	[8]	Fan guard	[15]	Conical spring
[2]	Contact box	[9]	Brake spring	[16]	Hex nut
[3]	Guide ring	[10]	Brake coil	[17]	Retaining screws
[4]	Magnet body	[11]	Brake disk	[A]	Working air gap
[5]	Hand lever	[12]	Friction plate	[B]	Floating clearance of manual brake release
[6]	Releasing lever	[13]	Driver		
[7]	Fan	[14]	Clip		

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15.4 Brake control

Various brake control systems are available for controlling disk brakes with a DC coil, depending on the requirements and the operating conditions. All brake controls are fitted as standard with varistors to protect against overvoltage.

The brake controls are installed either directly in the wiring space on the motor or in the control cabinet. For motors of thermal class 180 (H), the control system must be installed in the control cabinet.

15.4.1 Brake control in the wiring space

The supply voltage for brakes with an AC connection is either supplied separately or taken from the supply system of the motor in the wiring space. Only motors with a fixed speed can be supplied from the motor supply voltage. With multi-speed motors and for operation with a frequency inverter, the supply voltage for the brake must be supplied separately.

Furthermore, bear in mind that if the brake is powered by the motor supply voltage, the brake response is delayed by the residual voltage of the motor. The brake application time t_2I for cut-off in the AC circuit, specified in the brake's technical data, applies to a separate supply only.

15.4.2 Motor wiring space

The following table lists the technical data of brake control systems for installation in the motor wiring space and the assignments with regard to motor size and connection technology. The different housings have different colors (= color code) to make them easier to distinguish.

Type	Function	Voltage	Holding current I_{Hmax} in A	Type	Part number	Color code
BG	One-way rectifier	90 – 500 V AC	1.2	BG 1.2	8269920	Black
		24 – 500 V AC	2.4	BG 2.4	8270198	Brown
BSR	One-way rectifier + current relay for cut-off in the DC circuit	90 – 500 V AC	1.0	BG1.2 + SR 11	8269920 + 8267618	
		42 – 87 V AC	1.0	BG2.4 + SR 11	8270198 + 8267618	
BUR	One-way rectifier + voltage relay for cut-off in the DC circuit	90 – 150 V AC	1.0	BG 1.2 + UR 11	8269920 + 8267588	
		42 – 87 V AC	1.0	BG 2.4 + UR 11	8270198 + 8267588	
		150 – 500 V AC	1.0	BG 1.2 + UR 15	8269920 + 8267596	

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15.4.3 Control cabinet

The following table lists the technical data of brake control systems for installation in the control cabinet and the assignments with regard to motor size and connection technology. The different housings have different colors (= color code) to make them easier to distinguish.

Type	Function	Voltage	Holding current I_{Hmax} in A	Type	Part number	Color code
BMS	One-way rectifier as BG	150 – 500 V AC	1.5	BMS 1.5	8258023	Black
		42 – 150 V AC	3.0	BMS 3	8258031	Brown
BME	One-way rectifier with electronic switching as BGE	150 – 500 V AC	1.5	BME 1.5	8257221	Red
		42 – 150 V AC	3.0	BME 3	825723X	Blue
BMH	One-way rectifier with electronic switching and heating function	150 – 500 V AC	1.5	BMH 1.5	825818X	Green
		42 – 150 V AC	3	BMH 3	8258198	Yellow
BMP	One-way rectifier with electronic switching, integrated voltage relay for cut-off in the DC circuit	150 – 500 V AC	1.5	BMP 1.5	8256853	White
		42 – 150 V AC	3.0	BMP 3	8265666	Light blue
BMK	One-way rectifier with electronic switching, 24 V DC control input and cut-off in the DC circuit	150 – 500 V AC	1.5	BMK 1.5	8264635	Water blue
		42 – 150 V AC	3.0	BMK 3	8265674	Bright red
BMV	Brake control unit with electronic switching, 24 V DC control input and rapid cut-off	24 V DC	5.0	BMV	13000063	White

15.5 AC brakemotors DR../DT...BR/BMG

The BR03 brake is only used for size DR63, while the BMG brake is used for size DT56.

SEW brakemotors are characterized by the fact that the brake is integrated in the motor, resulting in a very short, compact design.

Various brake control systems for installation in the terminal box, with plug connection or in the control cabinet mean that the optimum solution can be found for all applications and conditions.

The standard type is supplied unless particular requirements are stipulated.

15.5.1 Standard brake control

A standard brakemotor is a brakemotor supplied with a terminal box and, with one exception, with built-in brake control systems. The standard type is delivered ready for connection.

The motor connection voltage and the brake voltage are usually specified by the customer. If the customer does not supply the relevant information, the phase voltage is selected automatically for single-speed motors and the mains voltage for pole-changing motors. The table below lists the standard AC brakemotors.

Motor type	AC connection	24 V DC connection
DT56..BMG	BG	Without control unit[1]
DR63..BR		

1) The overvoltage protection must be implemented by the customer, for example using varistors.

Either cut-off in the AC circuit or cut-off in both the DC and AC circuits is possible with standard versions for AC connection.

The brake voltage can either be supplied separately (particularly with multi-speed motors) or taken directly from the motor terminal board (with single-speed motors).

The response times t_2I for cut-off in the AC circuit apply to the separate supply voltage. With the terminal board connection, switching the motor off with remanent energization leads to a further delay before the brake is applied.

The specified brake controls have powerful overvoltage protection for the brake coil and switch contact.

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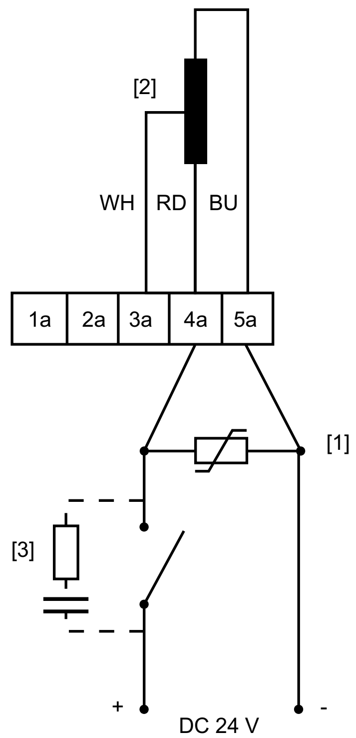
No brake control is supplied with the standard version for 24 V DC voltage supply of DT56..BMG and DR63..BR motors. The customer must install suitable overvoltage protection.



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[1] Varistor

[2] Brake coil

WH = White

RD = Red

BU = Blue

Example: Varistor for protecting the brake coil

Varistor type	Manufacturer
SIOV-S10 K300	EPCOS
10M 250 VB	Conradty

15.5.2 Brakemotors for special requirements

The SEW modular concept for brakemotors permits a wide variety of versions using electronic and mechanical options. The options include special voltages, mechanical manual brake release, special degrees of protection, plug connections and special brake control systems (see the "Gearmotor" catalog).

High starting frequency

Brakemotors often demand a high starting frequency and significant external mass moments of inertia.

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In addition to the basic thermal suitability of the motor, the brake needs to have a response time t_1 short enough to ensure that it is already released when the motor starts. At the same time, the acceleration required for the mass moment of inertia also has to be taken into account. Without the usual startup phase when the brake is still applied, the temperature and wear balance of the SEW brake permits a high starting frequency.

High stopping accuracy

Positioning systems require high stopping accuracy.

Due to their mechanical principle, the degree of wear on the linings and on-site physical peripheral conditions, brakemotors are subject to an empirically determined braking distance variation of ± 12%. The shorter the response times, the smaller the absolute value of the variation.

Cut-off in the DC and AC circuits makes it possible to shorten the brake application time t_2II considerably, see chapter "Technical data" (→ 🗎 654).

Cut-off in the DC and AC circuits with mechanical contact:

We already referred to the possibility of achieving this solution by conventional means with an extra contact in the section "Standard brake control" (→ 🗎 648).

Cut-off in the DC and AC circuits with electronic relay in the terminal box:

The BSR and BUR brake control systems offer sophisticated options involving an electronic, wear-free contact with minimum wiring. Both control systems are made up of BG and either the SR current relay or UR voltage relay.

BSR is only suitable for single-speed motors. BUR can be installed universally if it has a separate power supply.

When ordering the brakemotor, it is sufficient to specify BSR and BUR in conjunction with the motor or brake voltage. The SEW order processing system assigns a suitable relay.

Relay retrofitting options suited to the motor and voltage are provided in the chapter "Brake control" (→ 🗎 646). The electronic relays can switch up to 1 A braking current and thereby limit the selection to BSR and BUR.

Principle and selection of the BSR brake control

The BSR brake control system combines the BGE control unit with an electrical current relay. With BSR, the BGE or BG is supplied with voltage directly from the terminal board of a single-speed motor, which means that it does not need a special incoming cable.

When the motor is disconnected, the motor current is interrupted practically instantaneously and is used for cut-off in the DC circuit of the brake coil via the SR current relay. This feature results in particularly fast brake application despite the remanence voltage at the motor terminal board and in the brake control system.

The brake voltage is defined automatically on the basis of the motor phase voltage without further customer data (e.g. motor 230 V/400 V, brake 230 V). As an option, the brake coil can also be configured for the line-to-line voltage (e.g. motor 400 V, brake 400 V).

The following table takes the braking current and the motor current into account for the assignment of the SR relay.

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Motor	BSR (BGE + SR..) for motor voltage (V AC)																			
	40 - 58	59 - 66	67 - 73	74 - 82	83 - 92	93 -104	105 - 116	117 - 131	132 - 147	148 - 164	165 - 185	186 - 207	208 - 233	234 - 261	262 - 293	294 - 329	330 - 369	370 - 414	415 - 464	465 - 522	523 - 690
DR63..BR	Not possible	SR11	SR11	SR11	SR11	SR11	SR11	SR11	SR11	SR11	SR11	SR11	SR11	SR11	SR11	SR11	SR11	SR11	SR11	SR11	SR11

SR11 SR15 SR19 Not possible

INFORMATION

Motor sizes 250/280 are offered without BSR.

Principle and selection of the BUR brake control system

The BUR brake control system combines the BGE (BG) control unit with an electronic voltage relay. In this case, the BGE (or BG) control unit has a separate voltage supply because there is no constant voltage at the motor terminal board (pole-changing motors, motor with frequency inverters) and because the remanence voltage of the motor (single-speed motor) would cause a delay in the brake application time. With cut-off in the AC circuit, the UR voltage relay triggers cut-off in the DC circuit of the brake coil almost instantaneously and the brake is applied very quickly.

The brake voltage is defined automatically on the basis of the motor phase voltage without further customer data. Optionally, other brake voltages can be defined in accordance with the following table.

Motor	BUR (BGE + UR..) for brake control (AC V)																			
	40 - 58	59 - 66	67 - 73	74 - 82	83 - 92	93 -104	105 - 116	117 - 131	132 - 147	148 - 164	165 - 185	186 - 207	208 - 233	234 - 261	262 - 293	294 - 329	330 - 369	370 - 414	415 - 464	465 - 522	523 - 690
DR63..BR	Not possible	UR11	UR11	UR11	UR11	UR11	UR11	UR11	UR11	UR15	UR15	UR15	UR15	UR15	UR15	UR15	UR15	UR15	UR15	UR15	Not possible

UR11 UR15 Not possible

Increased ambient temperature or restricted ventilation

In addition to the basic considerations, increased ambient temperature, insufficient supply of cooling air and/or thermal class H are valid reasons for installing the brake control system in the control cabinet.

Only brake controls with electronic switching are used in order to ensure reliable switching at higher winding temperatures in the brake.

Use of BGE, BME or BSG is stipulated instead of BG, BMS or 24 V DC direct connection for the special case of "electrical brake release when motor is at standstill" for motor sizes 71 - 100.

Special brakemotor designs for increased thermal loading have to be equipped with brake control systems in the control cabinet.

Low and fluctuating ambient temperatures

Brakemotors for low and fluctuating ambient temperatures, e.g. for use outdoors, are exposed to the dangers of condensation and icing. Functional limitations due to corrosion and ice can be counteracted 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 SEW brake 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 gives rise to heating in the coil system, increasing the temperature by approximately 25 K in relation to the ambient temperature.

The heating function (via K16 in the sample circuits) must be ended before the brake starts its normal switching function again.

BMH is available for all motor sizes and is only mounted in the control cabinet.

Brake control system in the control cabinet

The SEW brake controls are also available for control cabinet installation. The following aspects favor control cabinet installation of brake controls:

- Unfavorable ambient conditions at the motor (e.g. motor with thermal class H, high ambient temperature > 40°C, low ambient temperatures etc.)
- Connections with cut-off in the DC circuit by means of a switch contact are less complicated to install in the control cabinet
- Easier access to the brake control for service purposes

When the brake control system is installed in the control cabinet, three cables must always be routed between the brake coil and the control system. An auxiliary terminal strip with five terminals is available for connection in the terminal box.

The table below gives an overview of all brake control systems available for control cabinet installation. With the exception of BSG, all units are delivered with housings for top hat rail mounting.

Brakemotor type	Brake control system in the control cabinet	
	for AC connection	for 24 V DC connection
DR63..BR03	BMS, BME, BMH, BMP, BMK	BSG BMV

Multi-motor operation of brakemotors

Brakes must be switched at the same time in multi-motor operation. The brakes must also be applied together when a fault occurs in one brake.

Simultaneous switching can be achieved by connecting multiple brakes to one brake control in parallel.

When several brakes are connected in parallel to the same brake rectifier, the total of all the operating currents must not exceed the nominal current of the brake control system.

INFORMATION

If a fault occurs in one brake, all brakes must be cut-off in the AC circuit.

15.6 AC brakemotors DR../DT...BM(G) with frequency inverter

Important: The voltage supply for the brake must always be routed separately. It cannot be taken from the terminal board of the motor due to the variable motor connection voltage.

Under normal circumstances in the frequency inverter mode of the motor, the mechanical brake only has the characteristics of a holding brake for holding a position that has been reached and of a security brake for an emergency (emergency switching off). Consequently, its size is determined by a defined number of emergency stop braking operations of the drive at full load from maximum speed.

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The brake command is always issued to the frequency inverter simultaneously with the stop command without any delay. It is beneficial and recommended for this command to be generated by the frequency inverter itself. Internal interlocks in the frequency inverter ensure that the precise moment is selected. This allows the load to be safely taken over by the mechanical brake, thereby avoiding, for example, any sag during hoist operation.

The table below gives an overview of all brake controls possible in conjunction with frequency inverter supply to the motor.

Brakemotor type	Terminal box installation	Control cabinet installation
DR63..BR	BG, BUR	BMS, BME, BMP, BMH
	Without control unit	BSG, BMV

15.7 Block diagrams

For block diagrams and a key, refer to the chapter "Brake control block diagrams" (→ 🗎 399).

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15.8 Technical data

15.8.1 Technical data BR/BMG brake for AC motors DT.., DR..

The following table lists the technical data of the brakes. The type and number of brake springs determines the level of the braking torque. Maximum braking torque $M_{B\ max}$ is installed as standard, unless specified otherwise in the order. Other brake spring combinations can produce the reduced braking torque values $M_{B\ red}$.

Brakes Type	For motor size	$M_{B\ max}$ Nm	Reduced braking torques $M_{B\ red}$ Nm							W 10^6J	t_1 10^{-3}/s	t_2 t_2II 10^{-3}/s	t_2I 10^{-3}/s	P_B W
BMG02	DT56	1.2	0.8							15	28	10	100	25
BR03	DR63	3.2	2.4	1.6	0.8					200	25	3	30	26

$M_{B\ max}$ = Maximum braking torque

$M_{B\ red}$ = Reduced braking torque

W = Braking work until maintenance

t_1 = Response time

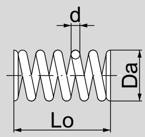
t_2I = Brake application time for cut-off in the AC circuit

t_2II = Brake application time for cut-off in the DC and AC circuit

P_B = Braking power

The response and application times are guide values in relation to the maximum braking torque.

15.8.2 Table for setting different braking torques for type BMG / BR03



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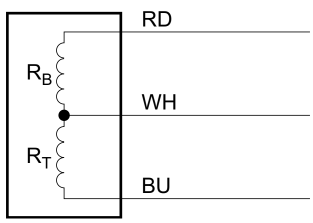
Brakes	Mounting on motor	Braking torque Nm	Number and type of brake springs Normal	Red	Part (order) no. and brake spring dimensions Normal Lo	Da	d	w	Part no.	Lo	Da	d	w	Brake spring part no.
BR03	DR63	3.2	6	-	32	7	0.9	13.5	01858157	32	7	0.65	13.5	01858734
		2.4	4	2										
		1.6	3	2										
		0.8	-	5										

15.8.3 Brake coil resistance

BMG02/BR03

Brakes		BMG02		BR03	
Max. braking torque in Nm		1.2		3.2	
Coil power in W		25		26	
Voltage U_N		BS	TS	BS	TS
V AC	V DC	R_B	R_T	R_B	R_T
	24	8.46	24.2	6.0	18.0
24 (23–26)	10			0.95	2.8
42 (40–45)	18			3.0	8.9
60 (57–63)	24			6.0	18.0
110 (99–110)	44			19.0	56.5
120 (111–123)	48			23.9	71.2
133 (124–138)	54			30.1	89.6
208 (194–217)	85			75.6	225
230 (218–243)	96	121	345	95.2	283
254 (244–273)	110			120	357
290 (274–306)	125			151	449
318 (307–343)	140			190	565
360 (344–379)	150			239	712
400 (380–431)	170	374	1070	301	896
460 (432–484)	190			379	1128
500 (485–542)	217	576	1650		



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BS = Accelerator coil
TS = Coil section
R_B = Accelerator coil resistance at 20°C in Ω
R_T = Coil section resistance at 20°C in Ω
U_N = Nominal voltage (nominal voltage range)
RD = Red
WH = White
BU = Blue

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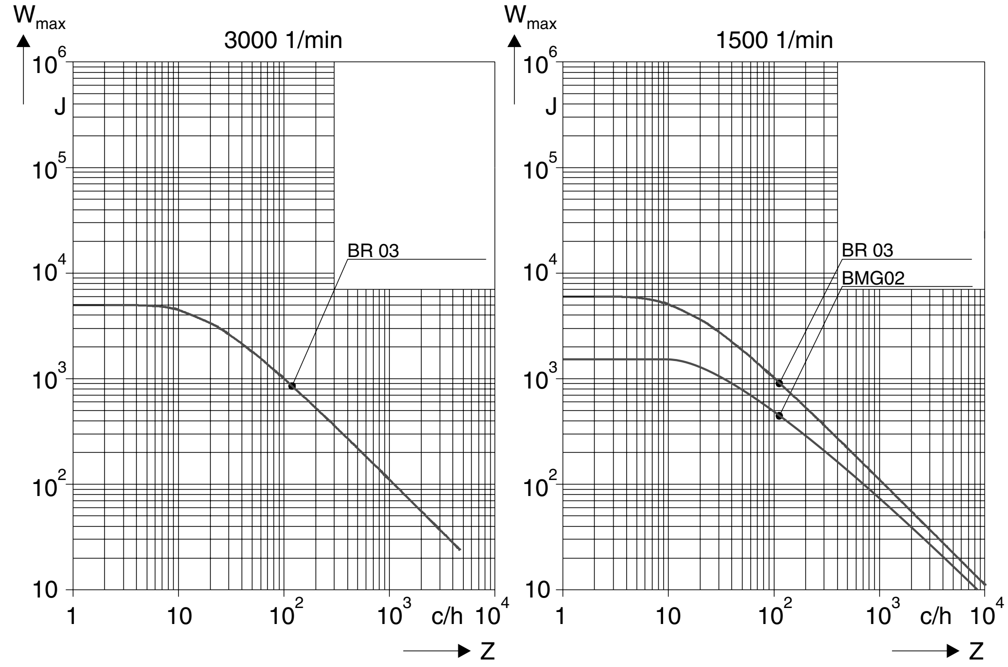
15.8.4 Permitted work done by the BM and BR brakes for AC motors

If you are using a brakemotor, you must check whether the brake is approved for use with the required starting frequency Z. The following diagrams show the approved work done W_{max} per cycle for the various brakes and rated speeds. The values are given with reference to the required starting frequency Z in cycles/hour (1/h).

Example: The rated speed is 1500 rpm and the brake BM 32 is used. At 200 cycles per hour, the permitted work done per cycle is 9,000 J.



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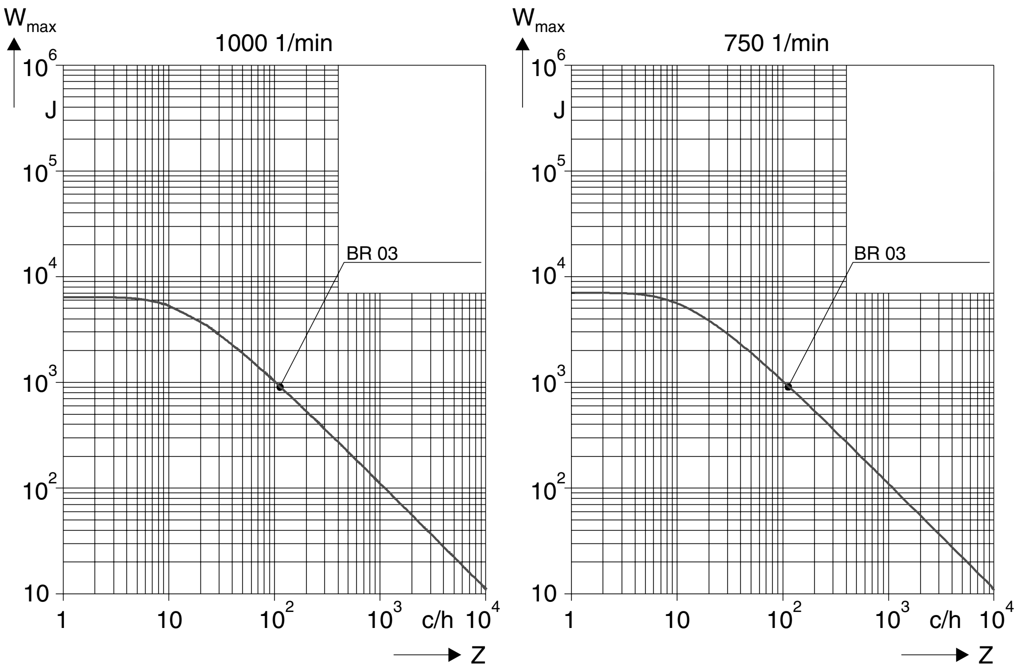

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15.9 Project planning notes

The size of the brakemotor and its electrical connection must be selected carefully to ensure the longest possible service life.

The following aspects must be taken into account:

- Selection of the brake and braking torque in accordance with the project planning data (motor selection)
- Determining the brake voltage
- Selection of the brake control and connection type
- Dimensioning and routing of the cable
- Selecting the braking contactor
- Design specifications
- Motor protection switch if necessary to protect the brake coil

15.9.1 Motor overload circuit breaker

Motor protection switches (e.g. ABB type M25-TM) are suitable as protection against short circuits for the brake rectifier and thermal protection for the brake coil.

Select or set the motor protection switch to 1.1 x $I_{\text{Brake holding current}}$ (r.m.s. value). Holding currents are detailed in chapter 12.5.

Motor protection switches are suitable for all brake rectifiers in the control cabinet (important: except for the BMH heating function) and in the terminal box with separate voltage supply.

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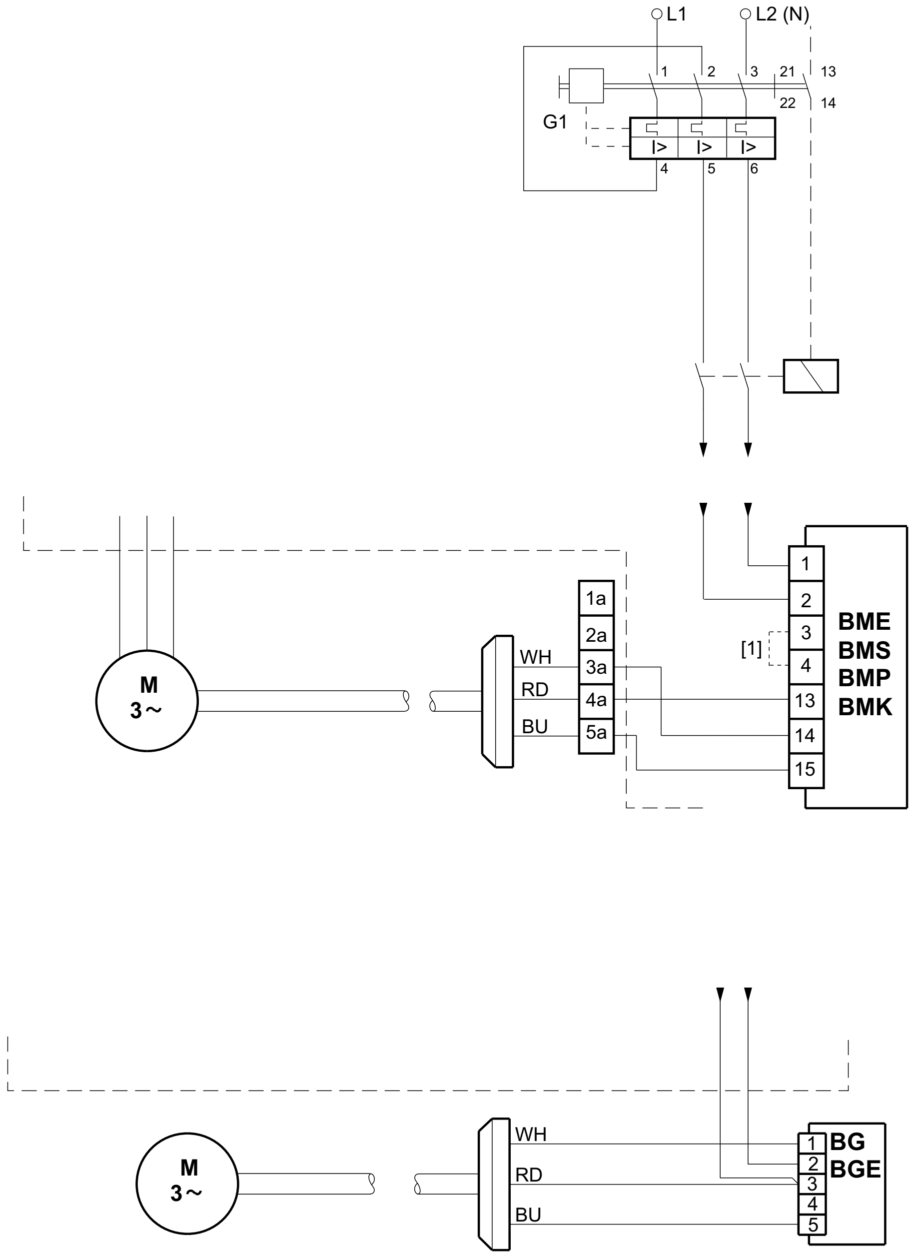
Advantage: Motor protection switches prevent the brake coil from being destroyed when a fault occurs in the brake rectifier or when the brake coil is connected incorrectly (keeps costs resulting from repairs and downtimes low).



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[1] Customers are responsible for connecting terminals 3 and 4.

15.9.2 Selection of the brake and braking torque in accordance with the project planning data (motor selection)

The mechanical components, brake type, and braking torque are determined when the driving motor is selected. The drive type or application areas and the standards that have to be taken into account are used for the brake selection.

Selection criteria:

- AC motor with one speed/pole-changing motor
- Speed-controlled AC motor with frequency inverter
- Servomotor
- Number of braking operations during service or number of emergency braking operations
- Working brake or holding brake
- Level of braking torque ("soft braking"/"hard braking")
- Lifting application
- Minimum/maximum deceleration

Values determined/calculated during motor selection:

Basic specification	Link/supplement/comment
Motor type	Brake type/brake control system
Braking torque [1]	Brake springs
Brake application time	Connection type of brake control (important for electrical design, 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**	Adjustment time (important for service)

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 the dimensioning of the brakemotor and calculating the braking data, refer to the documentation Drive Engineering - Practical Implementation "Project Planning for Drives".

15.9.3 Determining the brake voltage

The brake voltage should always be selected on the basis of the available AC supply voltage or motor operating voltage. This means the user is always guaranteed the most cost-effective installation for lower braking currents.

In the case of multi-voltage versions for which the line voltage has not been defined when the motor is purchased, the lower voltage must be selected in each case in order to achieve feasible connection conditions when the brake control is installed in the terminal box.

Low potentials are often unavoidable for reasons of safety. However, they demand a considerably greater investment in cables, switchgear, transformers as well as rectifiers and overvoltage protection (e.g. for direct 24 V DC supply) than for connection to the supply voltage.

With the exception of BG and BMS, the maximum current flowing when the brake is released is 8.5 times the holding current. The voltage at the brake coil must not drop below 90% of the nominal voltage.

15.9.4 Selecting and routing the cable

a) Selecting the cable

Select the cross section of the brake cable according to the currents in your application. Observe the inrush current of the brake when selecting the cross section. When taking the voltage drop into account due to the inrush current, the value must not drop below 90% of the nominal voltage. The data sheets for the brakes (see the "Technical Data" chapter) provide information on the possible connection voltages and the resulting operating currents.

Refer to the table below for a quick source of information for the dimensioning of the cable cross sections with regard to the acceleration currents for cable lengths ≤ 50 m.

Brake type	Minimum cable cross section of the brake cables in mm² (AWG) for cable lengths ≤ 50 meters and brake voltage (AC V)							
	42	48	56 24 V DC	110	125–153	175–200	230	254–500
BR03	1.5 (16)							

Values in brackets = AWG (American Wire Gauge)

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.

b) Routing information:

Brake cables must always be routed separately from other power cables with phased currents unless they are shielded.

Provide for a suitable equipotential bonding between drive and control cabinet.

In particular, power cables with phased currents include:

- Output cables from frequency inverters and servo inverters, soft-start units and brake units
- Incoming cables to braking resistors

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15.9.5 Selecting the braking contactor

In view of the high current loading and the DC voltage to be switched at inductive load, the switchgear for the brake voltage and cut-off in the DC circuit either has to be a special DC contactor or an adapted AC contactor with contacts in utilization category AC 3 to EN 60947-4-1.

It is simple to select the braking contactor for line operation:

- For the standard voltages 230 V AC or 400 V AC, a power contactor with a rated power of 2.2 kW or 4 kW for AC-3 operation is selected.
- The contactor is configured for DC-3 operation with 24 V DC.

When the applications require cut-off in the DC and AC circuits for the brake, it is a good idea to install SEW switchgear to perform this task.

Control cabinet installation

Brake rectifiers (BMP, BMV and BMK), which perform the cut-off in the DC circuit internally, have been specially designed for this purpose.

Terminal box installation

The current and voltage relays (SR1x and UR1x), mounted directly on the motor, perform the same task.

Advantages compared to switch contacts:

- Special contactors with four AC-3 contacts are not required.
- 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 operate without any wear at all.
- Customers do not have to perform any additional wiring. 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.
- Two additional conductors between the motor and control cabinet are no longer required.
- No additional interference emission from contact bounce when the brake is cut-off in the DC circuit.

Semi-conductor relay

Semi-conductor relays with RC protection circuits are not suitable for switching brake rectifiers (with the exception of BG and BMS).

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15.9.6 Important design information

a) EMC (electromagnetic compatibility)

SEW AC brakemotors comply with the relevant EMC generic standards when operated in accordance with their designated use in continuous duty connected to mains power.

Additional instructions in the frequency inverter documentation must also be taken into account for operation with frequency inverters.

The EMC instructions in the servo inverter documentation must also be taken into account for the operation of SEW servomotors with a brake.

The instructions on laying cables (→ 🗎 660) must always be adhered to.

b) Connection type

The electrical design team and, in particular the installation and startup personnel, must be given detailed information on the connection type and the intended brake function.

Maintaining certain brake application times may 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 passed on clearly and unambiguously to the people undertaking the work.

The brake application times t_2I specified in the data summary for cut-off (→ 🗎 654) in the AC circuit only apply if there is a separate voltage supply. The times are longer if the brake is connected to the terminal board of the motor.

BG and BGE are always supplied wired up for cut-off in the AC circuit in the terminal box. The blue wire on the brake coil must be moved from terminal 5 of the rectifier to terminal 4 for cut-off in the AC and DC circuits. An additional switch contact (or SR/UR) must also be connected between terminals 4 and 5.

c) Maintenance intervals

The time to maintenance is determined on the basis of the expected brake wear. This value is important for setting up the maintenance schedule for the machine to be used by the customer’s service personnel (machine documentation).

d) Measuring principles

The following points must be observed during service measurements on the brakes:

The values for DC voltage specified in the data sheets only apply if brakes are supplied with DC voltage from an external source without an SEW brake control.

Due to the fact that the freewheeling arm only extends over the coil section, the DC voltage that can be measured during operation with the SEW brake control system is 10 to 20% lower than the normal one-way rectification when the freewheeling arm extends over the entire coil.

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16 Address Directory

Germany			
Headquarters Production plant Sales	**Bruchsal**	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Strasse 42 76646 Bruchsal, Germany P.O. box address Postfach 3023 • D-76642 Bruchsal, Germany	Tel. +49 7251 75-0 Fax +49 7251 75-1970 http://www.seweurodrive.com sew@sew-eurodrive.de
Production Plant / Industrial Gear Units	**Bruchsal**	SEW-EURODRIVE GmbH & Co KG Christian-Pähr-Str.10 76646 Bruchsal, Germany	Tel. +49 7251 75-0 Fax +49 7251 75-2970
Production plant	**Graben**	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Strasse 1 76676 Graben-Neudorf, Germany P.O. box address Postfach 1220 • 76671 Graben-Neudorf, Germany	Tel. +49 7251 75-0 Fax +49 7251 75-2970
	Östringen	SEW-EURODRIVE GmbH & Co KG, Oestringen Plant Franz-Gurk-Strasse 2 76684 Oestringen, Germany	Tel. +49 7253 9254-0 Fax +49 7253 9254-90 oestringen@sew-eurodrive.de
Service Competence Centers	**Mechanical/ Mechatronic Components**	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Strasse 1 76676 Graben-Neudorf, Germany	Tel. +49 7251 75-1710 Fax +49 7251 75-1711 sc-mitte@sew-eurodrive.de
	Electronics	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Strasse 42 76646 Bruchsal, Germany	Tel. +49 7251 75-1780 Fax +49 7251 75-1769 sc-elektronik@sew-eurodrive.de
Drive Technology Center	**North**	SEW-EURODRIVE GmbH & Co KG Alte Ricklinger Strasse 40-42 30823 Garbsen (near Hanover)	Tel. +49 5137 8798-30 Fax +49 5137 8798-55 sc-nord@sew-eurodrive.de
	East	SEW-EURODRIVE GmbH & Co KG Daenkritzer Weg 1 08393 Meerane (near Zwickau)	Tel. +49 3764 7606-0 Fax +49 3764 7606-30 sc-ost@sew-eurodrive.de
	South	SEW-EURODRIVE GmbH & Co KG Domagkstrasse 5 85551 Kirchheim (near Munich)	Tel. +49 89 909552-10 Fax +49 89 909552-50 sc-sued@sew-eurodrive.de
	West	SEW-EURODRIVE GmbH & Co KG Siemensstrasse 1 40764 Langenfeld (near Düsseldorf)	Tel. +49 2173 8507-30 Fax +49 2173 8507-55 sc-west@sew-eurodrive.de
	Drive Service Hotline/24-hour availability		+49 800 SEWHELP +49 800 7394357
Technical offices	**Augsburg**	SEW-EURODRIVE GmbH & Co KG August-Wessels-Strasse 27 86156 Augsburg, Germany	Tel. +49 821 22779-10 Fax +49 821 22779-50 tb-augsburg@sew-eurodrive.de
	Berlin	SEW-EURODRIVE GmbH & Co KG Lilienthalstrasse 3a 12529 Schoenefeld, Germany	Tel. +49 306331131-30 Fax +49 306331131-36 tb-berlin@sew-eurodrive.de
	Lake Constance	SEW-EURODRIVE GmbH & Co KG Dornierstraße 4 88677 Markdorf, Germany	Tel. +49 7544 96590-90 Fax +49 7544 96590-99 tb-bodensee@sew-eurodrive.de
	Bremen	SEW-EURODRIVE GmbH & Co KG Bornstr.19 ... 22 28195 Bremen, Germany	Tel. +49 421 33918-10 Fax +49 421 33918-22 tb-bremen@sew-eurodrive.de
	Dortmund	SEW-EURODRIVE GmbH & Co KG Hildastraße 8 44145 Dortmund, Germany	Tel. +49 231 229028-10 Fax +49 231 229028-20 tb-dortmund@sew-eurodrive.de
	Dresden	SEW-EURODRIVE GmbH & Co KG Hauptstrasse 32 01445 Radebeul, Germany	Tel. +49 351 26338-0 Fax +49 351 26338-38 tb-dresden@sew-eurodrive.de
	Erfurt	SEW-EURODRIVE GmbH & Co KG Dubliner Strasse 12 99091 Erfurt, Germany	Tel. +49 361 21709-70 Fax +49 361 21709-79 tb-erfurt@sew-eurodrive.de
	Guestrow	SEW-EURODRIVE GmbH & Co KG Glasewitzer Chaussee 33 B 18273 Guestrow, Germany P.O. box address Postfach 1216 • 18262 Güstrow, Germany	Tel. +49 3843 8557-80 Fax +49 3843 8557-88 tb-guestrow@sew-eurodrive.de

Germany			
	Hamburg	SEW-EURODRIVE GmbH & Co KG Bramfelder Strasse 119 22305 Hamburg, Germany	Tel. +49 40 298109-60 Fax +49 40 298109-70 tb-hamburg@sew-eurodrive.de
	Hanover/Garbsen	SEW-EURODRIVE GmbH & Co KG Alte Ricklinger Str.40-42 30823 Garbsen, Germany P.O. box address Postfach 1104 53 • 30804 Garbsen, Germany	Tel. +49 5137 8798-10 Fax +49 5137 8798-50 tb-hannover@sew-eurodrive.de
	Heilbronn	SEW-EURODRIVE GmbH & Co KG Zeppelinstrasse 7 74357 Boennigheim, Germany	Tel. +49 7143 8738-0 Fax +49 7143 8738-25 tb-heilbronn@sew-eurodrive.de
	Herford	SEW-EURODRIVE GmbH & Co KG Göbenstraße 3 – 7 32052 Herford	Tel. +49 5221 9141-0 Fax +49 5221 9141-20 tb-herford@sew-eurodrive.de
	Karlsruhe	SEW-EURODRIVE GmbH & Co KG Ettlinger Weg 2 76467 Bietigheim, Germany P.O. box address Postfach 43 • 76463 Bietigheim, Germany	Tel. +49 7245 9190-10 Fax +49 7245 9190-20 tb-karlsruhe@sew-eurodrive.de
	Kassel	SEW-EURODRIVE GmbH & Co KG Lange Strasse 14 34253 Lohfelden, Germany	Tel. +49 561 95144-80 Fax +49 561 95144-90 tb-kassel@sew-eurodrive.de
	Koblenz	SEW-EURODRIVE GmbH & Co KG Bahnstrasse 17a 56743 Mendig, Germany	Tel. +49 2652 9713-30 Fax +49 2652 9713-40 tb-koblenz@sew-eurodrive.de
	Lahr	SEWEURODRIVE GmbH & Co KG Europastrasse 3/1 77933 Lahr/Schwarzwald, Germany	Tel. +49 7821 90999-60 Fax +49 7821 90999-79 tb-lahr@sew-eurodrive.de
	Langenfeld	SEW-EURODRIVE GmbH & Co KG Siemensstrasse 1 40764 Langenfeld, Germany	Tel. +49 2173 8507-10 Fax +49 2173 8507-50 tb-langenfeld@sew-eurodrive.de
	Magdeburg	SEW-EURODRIVE GmbH & Co KG Breiteweg 53 39179 Barleben, Germany	Tel. +49 39203 7577-1 Fax +49 39203 7577-9 tb-magdeburg@sew-eurodrive.de
	Mannheim	SEW-EURODRIVE GmbH & Co KG Besselstrasse 26 68219 Mannheim, Germany	Tel. +49 621 71683-10 Fax +49 621 71683-22 tb-mannheim@sew-eurodrive.de
	Munich	SEW-EURODRIVE GmbH & Co KG Domagkstrasse 5 85551 Kirchheim, Germany	Tel. +49 89 90955-110 Fax +49 89 90955-150 tb-muenchen@sew-eurodrive.de
	Muenster	SEW-EURODRIVE GmbH & Co KG Hafenplatz 4 48155 Muenster, Germany	Tel. +49 251 41475-11 Fax +49 251 41475-50 tb-muenster@sew-eurodrive.de
	Nuremberg	SEW-EURODRIVE GmbH & Co KG Plattenaeckerweg 6 90455 Nuremberg, Germany	Tel. +49 911 98884-50 Fax +49 911 98884-60 tb-nuernberg@sew-eurodrive.de
	Regensburg	SEW-EURODRIVE GmbH & Co KG Im Gewerbepark A15 93059 Regensburg, Germany	Tel. +49 941 46668-68 Fax +49 941 46668-66 tb-regensburg@sew-eurodrive.de
	Rhine-Main	SEW-EURODRIVE GmbH & Co KG Niederstedter Weg 5 61348 Bad Homburg, Germany	Tel. +49 6172 9617-0 Fax +49 6172 9617-50 tb-rheinmain@sew-eurodrive.de
	Stuttgart	SEW-EURODRIVE GmbH & Co KG Friedrich-List-Strasse 46 70771 Leinfelden-Echterdingen, Germany	Tel. +49 711 16072-0 Fax +49 711 16072-72 tb-stuttgart@sew-eurodrive.de
	Ulm	SEWEURODRIVE GmbH & Co KG Dieselstrasse 14 89160 Dornstadt, Germany	Tel. +49 7348 9885-0 Fax +49 7348 9885-90 tb-ulm@sew-eurodrive.de
	Drive Center Wuerzburg	SEW-EURODRIVE GmbH & Co KG Nuernbergerstrasse 118 97076 Wuerzburg-Lengfeld, Germany	Tel. +49 931 27886-60 Fax +49 931 27886-66 tb-wuerzburg@sew-eurodrive.de
	Zwickau / Meer-ane	SEW-EURODRIVE GmbH & Co KG Dänkritzer Weg 1 08393 Meerane, Germany	Tel. +49 3764 7606-0 Fax +49 3764 7606-20 tb-zwickau@sew-eurodrive.de

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France			
Production plant **Sales** **Service**	**Haguenau**	SEW-USOCOME 48-54 route de Soufflenheim B. P. 20185 67506 Haguenau Cedex, France	Tel. +33 3 88 73 67 00 Fax +33 3 88 73 66 00 http://www.usocome.com sew@usocome.com
Production plant	**Forbach**	SEW-USOCOME Zone industrielle Technopôle Forbach Sud B. P. 30269 57604 Forbach Cedex, France	Tel. +33 3 87 29 38 00
Assembly plant **Sales** **Service**	**Bordeaux**	SEW-USOCOME Parc d'activités de Magellan 62 avenue de Magellan - B. P. 182 33607 Pessac Cedex, France	Tel. +33 5 57 26 39 00 Fax +33 5 57 26 39 09
	Lyon	SEW-USOCOME Parc d'affaires Roosevelt Rue Jacques Tati 69120 Vaulx en Velin, France	Tel. +33 4 72 15 37 00 Fax +33 4 72 15 37 15
	Nantes	SEW-USOCOME Parc d’activités de la forêt 4 rue des Fontenelles 44140 Le Bignon, France	Tel. +33 2 40 78 42 00 Fax +33 2 40 78 42 20
	Paris	SEW-USOCOME Zone industrielle 2 rue Denis Papin 77390 Verneuil I'Etang, France	Tel. +33 1 64 42 40 80 Fax +33 1 64 42 40 88
Technical offices	**Alsace**	SEW-USOCOME 1 rue Auguste Gasser 68360 Soultz, France	Tel. +33 3 89 74 51 62 Fax +33 3 89 76 58 71
	Aquitaine/Charente	SEW-USOCOME Parc d'activités de Magellan 62 avenue de Magellan - B.P.182 33607 Pessac Cedex, France	Tel. +33 5 57 26 39 08 Fax +33 5 57 26 39 09
	Auvergne/Limousin	SEW-USOCOME Farges 19600 Chasteaux, France	Tel. +33 5 55 20 12 10 Fax +33 5 55 20 12 11
	Lower Normandy	SEW-USOCOME 5 rue de la Limare 14250 Brouay, France	Tel. +33 2 31 37 92 86 Fax +33 2 31 74 68 15
	Burgundy	SEW-USOCOME 10 rue de la poste 71350 Saint Loup Géanges, France	Tel. +33 3 85 49 92 18 Fax +33 3 85 49 92 19
	Brittany	SEW-USOCOME Parc d’activités de la forêt 4 rue des Fontenelles 44140 Le Bignon, France	Tel. +33 2 40 78 42 04 Fax +33 2 40 78 42 20
	Centre/Poitou	SEW-USOCOME Parc d’activités de la forêt 4 rue des Fontenelles 44140 Le Bignon, France	Tel. +33 2 40 78 42 11 Fax +33 2 40 78 42 20
	Champagne-Ardenne	SEW-USOCOME 25 bis rue Victor Hugo Appartement 7 10120 Saint André les Vergers, France	Tel. +33 3 25 79 63 24 Fax +33 3 25 79 63 25
	Franche-Comté	SEW-USOCOME 24 avenue Charles Boby 70000 Quincey, France	Tel. +33 3 81 60 20 47 Fax +33 3 81 87 75 93
	Île-de-France East/Aisne	SEW-USOCOME 20 rue Félix Faure 02100 Saint Quentin, France	Tel. +33 3 23 62 81 24 Fax +33 3 23 62 81 44
	Île-de-France North/Picardy	SEW-USOCOME 25bis rue Kléber 92300 Levallois Perret, France	Tel. +33 1 41 05 92 74 Fax +33 1 41 05 92 75
	Île-de-France South	SEW-USOCOME 6 chemin des bergers Lieu-dit Marchais 91410 Roinville sous Dourdan, France	Tel. +33 1 60 81 10 56 Fax +33 1 60 81 10 57

France			
	Lothringen/Northern Alsace	SEW-USOCOME 1 rue de la forêt 54250 Champigneulles, France	Tel. +33 3 83 96 28 04 Fax +33 3 83 96 28 07
	Midi-Pyrénées/ Roussillon	SEW-USOCOME 179 route de Grazac 31190 Caujac, France	Tel. +33 5 61 08 15 85 Fax +33 5 61 08 16 44
	Nord-Pas-de-Calais	SEW-USOCOME 209, route d'Hesdigneul 62360 Hesdin l'Abbé, France	Tel. +33 3 21 10 86 86 Fax +33 3 21 10 86 87
	Paris/Île-de-France West	SEW-USOCOME 42 avenue Jean Jaurès 78580 Maule, France	Tel. +33 1 30 90 89 86 Fax +33 1 30 90 93 15
	Pays de la Loire	SEW-USOCOME Parc d'activités de la forêt 4 rue des Fontenelles 44140 Le Bignon, France	Tel. +33 2 40 78 42 03 Fax +33 2 40 78 42 20
	Provence-Alpes-Côte d'Azur	SEW-USOCOME Le Clos Montolivet 9 impasse Bounin – Bât. A 13012 Marseille, France	Tel. +33 4 91 18 00 11 Fax +33 4 91 18 00 12
	Rhône-Alpes East	SEW-USOCOME Montée de la Garenne 26750 Génissieux, France	Tel. +33 4 75 05 65 95 Fax +33 4 75 05 65 96
	Rhône-Alpes North	SEW-USOCOME Parc d'affaires Roosevelt Rue Jacques Tati 69120 Vaulx en Velin, France	Tel. +33 4 72 15 37 03 Fax +33 4 72 15 37 15
	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

Algeria			
Sales	**Algiers**	REDUCOM Sarl 16, rue des Frères Zaghnoune Bellevue 16200 El Harrach Alger	Tel. +213 21 8214-91 Fax +213 21 8222-84 info@reducom-dz.com http://www.reducom-dz.com

Argentina			
Assembly plant **Sales**	**Buenos Aires**	SEW EURODRIVE ARGENTINA S.A. Ruta Panamericana Km 37.5, Lote 35 (B1619IEA) Centro Industrial Garín Prov. de Buenos Aires	Tel. +54 3327 4572-84 Fax +54 3327 4572-21 sewar@sew-eurodrive.com.ar http://www.sew-eurodrive.com.ar
	Córdoba	SEW EURODRIVE ARGENTINA S.A. Ruta Nacional 19, Manzana 97, Lote 5 (X5125) Malvinas Argentinas Prov. de Córdoba	Tel. +54 351-490-0010 sewcor@sew-eurodrive.com.ar http://www.sew-eurodrive.com.ar
	Santa Fe	SEW EURODRIVE ARGENTINA S.A. Ruta Prov. 21 Km 7, Lote 41 Parque Industrial Alvear (2126) Gral. Alvear Prov. de Santa Fe	Tel. +54 341-317-7277 sewsfe@sew-eurodrive.com.ar http://www.sew-eurodrive.com.ar
Service	**Mendoza**	SEW EURODRIVE ARGENTINA S.A.	Tel. +54 261-430-0060 sewmen@sew-eurodrive.com.ar http://www.sew-eurodrive.com.ar
Technical offices	**Tucumán**	SEW EURODRIVE ARGENTINA S.A. Balcarce 609 (T4000IAM) S.M. de Tucumán Prov. de Tucumán	Tel. +54 381-400-4569 sewtuc@sew-eurodrive.com.ar http://www.sew-eurodrive.com.ar
	Bahía Blanca	SEW EURODRIVE ARGENTINA S.A. O'Higgins 95, 1er Piso A (B8000IVA) Bahía Blanca Prov. de Buenos Aires	Tel. +54 291-451-7345 sewbb@sew-eurodrive.com.ar http://www.sew-eurodrive.com.ar
	Comahue	SEW EURODRIVE ARGENTINA S.A. Puerto Rico 1885 (R8324IOE) Cipolletti Prov. de Río Negro	Tel. +54 299-478-1290 sewcomahue@sew-eurodrive.com.ar http://www.sew-eurodrive.com.ar

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Argentina			
Mining	**Mendoza**	SEW EURODRIVE ARGENTINA S.A.	Tel. +54 261-430-0060 mineria@sew-eurodrive.com.ar http://www.sew-eurodrive.com.ar
Australia			
Assembly plants **Sales** **Service**	**Melbourne**	SEW-EURODRIVE PTY. LTD. 27 Beverage Drive Tullamarine, Victoria 3043, Australia	Tel. +61 3 9933-1000 Fax +61 3 9933-1003 http://www.sew-eurodrive.com.au enquires@sew-eurodrive.com.au
	Sydney	SEW-EURODRIVE PTY. LTD. 9, Sleigh Place, Wetherill Park New South Wales, 2164, Australia	Tel. +61 2 9725-9900 Fax +61 2 9725-9905 enquires@sew-eurodrive.com.au
Sales **Service**	**Adelaide**	SEW-EURODRIVE PTY. LTD. 9C Park Way Mawson Lakes, SA 5095, Australia	Tel. +61 8 8161 4000 Fax +61 8 8161 4002 enquires@sew-eurodrive.com.au
	Brisbane	SEW-EURODRIVE PTY.LTD. 1 /34 Collinsvale St Rocklea, Queensland, 4106, Australia	Tel. +61 7 3276 5100 Fax +61 7 3276 5102 enquires@sew-eurodrive.com.au
	Perth	SEW-EURODRIVE PTY. LTD. 10 Colin Jamieson Drive Welshpool, WA 6106, Australia	Tel. +61 8 9251-4900 Fax +61 8 9251-4903 enquires@sew-eurodrive.com.au
Sales	**Townsville**	SEW-EURODRIVE PTY. LTD. 12 Leyland Street Garbutt, QLD 4814, Australia	Tel. +61 7 4779 4333 Fax +61 7 4779 5333 enquires@sew-eurodrive.com.au
Austria			
Assembly plant **Sales** **Service**	**Vienna**	SEW-EURODRIVE Ges.m.b.H. Richard-Strauss-Strasse 24 1230 Wien, Austria	Tel. +43 1 617 55 00-0 Fax +43 1 617 55 00-30 http://www.sew-eurodrive.at sew@sew-eurodrive.at
Technical offices	**Linz**	SEW-EURODRIVE Ges.m.b.H. Reuchlinstr. 6/3 4020 Linz, Austria	Tel. +43 732 655 109-0 Fax +43 732 655 109-20 tb-linz@sew-eurodrive.at
	Graz	SEW-EURODRIVE Ges.m.b.H. Grabenstraße 231 8045 Graz, Austria	Tel. +43 316 685 756-0 Fax +43 316 685 755 tb-graz@sew-eurodrive.at
	Dornbirn	SEW-EURODRIVE Ges.m.b.H. Lustenauerstraße 27/1 6850 Dornbirn, Austria	Tel. +43 5572 3725 99-0 Fax +43 5572 3725 99-20 tb-dornbirn@sew-eurodrive.at
Bangladesh			
Sales	**Bangladesh**	SEW-EURODRIVE INDIA PRIVATE LIMITED 345 DIT Road East Rampura Dhaka-1219, Bangladesh	Mobile +88 01729 097309 salesdhaka@seweurodrivebangla-desh.com
Belarus			
Sales	**Minsk**	SEW-EURODRIVE BY RybalkoStr. 26 220033 Minsk, Belarus	Tel. +375 17 298 47 56 / 298 47 58 Fax +375 17 298 47 54 http://www.sew.by sales@sew.by
Belgium			
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.be info@sew-eurodrive.be
Service Competence Centers	**Industrial gear units**	**SEW-EURODRIVE n.v./s.a.** Rue de Parc Industriel, 31 6900 Marche-en-Famenne, Belgium	Tel. +32 84 219-878 Fax +32 84 219-879 http://www.sew-eurodrive.be service-wallonie@sew-eurodrive.be
Brazil			
Production plant **Sales** **Service**	**São Paulo**	SEW-EURODRIVE Brasil Ltda. Avenida Amâncio Gaiolli, 152 - Rodovia Presi-dente Dutra Km 208 Guarulhos - 07251-250 - SP, Brazil SAT - SEW ATENDE - 0800 7700496	Tel. +55 11 2489-9133 Fax +55 11 2480-3328 http://www.sew-eurodrive.com.br sew@sew.com.br

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Brazil			
Assembly plants **Sales** **Service**	**Rio Claro**	SEW-EURODRIVE Brasil Ltda. Rodovia Washington Luiz, Km 172 Condomínio Industrial Conpark Caixa Postal: 327 13501-600 – Rio Claro / SP	Tel. +55 19 3522-3100 Fax +55 19 3524-6653 montadora.rc@sew.com.br
	Joinville	SEW-EURODRIVE Brasil Ltda. Rua Dona Francisca, 12.346 – Pirabeiraba 89239-270 – Joinville / SC	Tel. +55 47 3027-6886 Fax +55 47 3027-6888 filial.sc@sew.com.br
	Indaiatuba	SEW-EURODRIVE Brasil Ltda. Estrada Municipal Jose Rubim, 205 Rodovia Santos Dumont Km 49 13347-510 – Indaiatuba / SP	Tel. +55 19 3835-8000 sew@sew.com.br

Bulgaria			
Sales	**Sofia**	BEVER-DRIVE GmbH Bogdanovetz Str.1 1606 Sofia, Bulgaria	Tel. +359 2 9151160 Fax +359 2 9151166 bever@bever.bg

Cameroon			
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 Development Area Shenyang, 110141, China	Tel. +86 24 25382538 Fax +86 24 25382580 shenyang@sew-eurodrive.cn

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China			
	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
	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 Hot-line/24-hour avail-ability	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

Great Britain			
	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 Ta- luk, 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@seweurodrivebangla- desh.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

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India			
	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
	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

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India			
	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
	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@seweurodriveindia.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

Italy			
	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
	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

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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
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

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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
	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

Russia			
	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
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

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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
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

Sweden			
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 Imhof 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 Huttwill, BE, Switzerland	Tel. +41 62 962 54 55 Fax +41 62 962 54 56
	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 Swit- zerland	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

Thailand			
	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
	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

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USA			
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
		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

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17 Order and inquiry form

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 ⌀ : ________ mm
☐ Hollow shaft with key ☐ TorqLOC® Flange ⌀ : ________ 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

☐ 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
☐ Encoders: ______________
☐ 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:** ______________

SEW-EURODRIVE GmbH & Co KG / P.O. Box 30 23 / D-76642 Bruchsal / Tel. +49 7251 75-0 / Fax +49 7251 75-1970
www.sew-eurodrive.com / sew@sew-eurodrive.com

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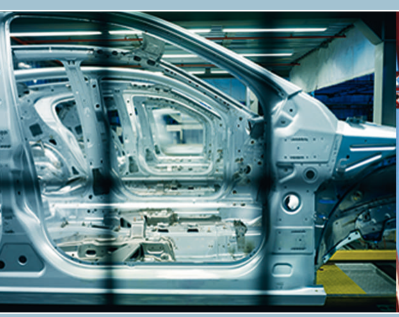

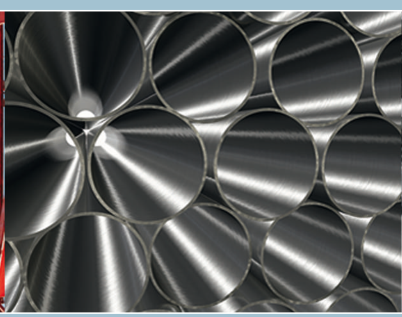


SEW-EURODRIVE
Driving the world

SEW-EURODRIVE GmbH & Co KG
P.O. Box 3023
76642 BRUCHSAL
GERMANY
Phone +49 7251 75-0
Fax +49 7251-1970
sew@sew-eurodrive.com
→ www.sew-eurodrive.com