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<br>• P002 - 102 series planetary gear units<br>• P.MC.., P.X.. series helical and bevel-helical planetary gear units<br>• Application solutions with connections<br>– Swing base<br>– Gearmotor<br>– Motor<br>– Coupling<br>– Brake<br>– Lubrication system<br>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<br>• Parallel-shaft helical gear units / parallel-shaft helical gearmotors<br>• Helical-bevel gear units / helical-bevel gearmotors<br>• Helical-worm gear units and gearmotors<br>• SPIROPLAN® right-angle gearmotors<br>• Drives for electrified monorail systems<br>• Geared torque motors<br>• Pole-changing gearmotors<br>• Variable-speed gear units / variable-speed gearmotors<br>• Aseptic gearmotors<br>• Explosion-proof gear units / gearmotors<br>• Explosion-proof variable-speed gear units / variable-speed gearmotors | • Asynchronous AC motors / AC brakemotors<br>• Pole-changing AC motors / AC brakemotors<br>• Energy-efficient motors<br>• Explosion-proof AC motors / AC brakemotors<br>• Torque motors<br>• Single-phase motors / single-phase brakemotors<br>• Asynchronous linear motors | • MOVITRAC® frequency inverters<br>• MOVI4R-U® frequency inverters<br>• MOVIDRIVE® drive inverters<br>• 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<br>• Low backlash helical-bevel servo gear units / helical-bevel gearmotors<br>• R, F, K, S, W gear units / gearmotors<br>• Explosion-proof servo gear units / servo gearmotors | • Asynchronous servomotors / servo brakemotors<br>• Synchronous servomotors<br>• Explosion-proof servomotors / servo brakemotors<br>• Synchronous linear motors | • MOVIDRIVE® servo drive inverters<br>• MOVIAXIS® multi-axis servo inverters<br>• 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<br>– DBC – Direct Binary Communication<br>– DAC – Direct AS-Interface Communication<br>– DSC – Direct SBus Communication<br>– SNI – Single Line Network Installation<br>• MOVIMOT® gearmotors with integrated frequency inverter<br>• MOVIMOT® motors / brakemotors with integrated frequency inverter<br>• MOVI-SWITCH® gearmotors with integrated switching and protection function<br>• MOVI-SWITCH® motors / brakemotors with integrated switching and protection function<br>• Explosion-proof MOVIMOT® and MOVI-SWITCH® gearmotors | • Fieldbus interfaces<br>• Field distributors for decentralized installation<br>• MOVIFIT® product line<br>– MOVIFIT® FDC for controlling MOVIGEAR® and DRC.. drive units<br>– MOVIFIT® MC for controlling MOVIMOT® drives<br>– MOVIFIT® SC with integrated electronic motor switch<br>– MOVIFIT® FC with integrated frequency inverter<br>• MOVIPRO® product line<br>– MOVIPRO® SDC decentralized drive and positioning control | • MOVITRANS® system<br>– Stationary components for energy supply<br>– Mobile components for energy consumption<br>– 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

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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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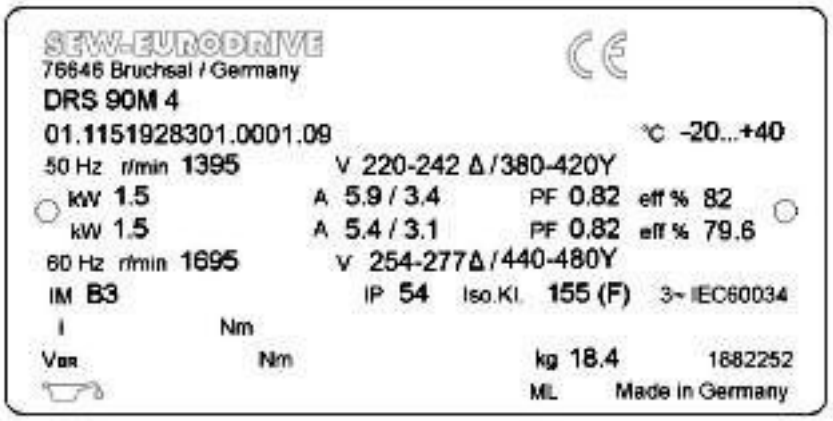
Example of a nameplate:




*9007203221173771*

### 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 | -0.15 × (1-η) |
| $P_N > 150$ kW | -0.1 × (1-η) |
| Power factor cosφ | $-\frac{1 - \cos\varphi}{6}$ |
| Slip $P_N < 1$ kW | ±30% |
| $P_N \geq 1$ kW | ±20% |
| Starting current | +20% |
| Tightening torque | -15% to +25% |
| Breakdown torque | -10% |
| Mass moment of inertia | ±10% |

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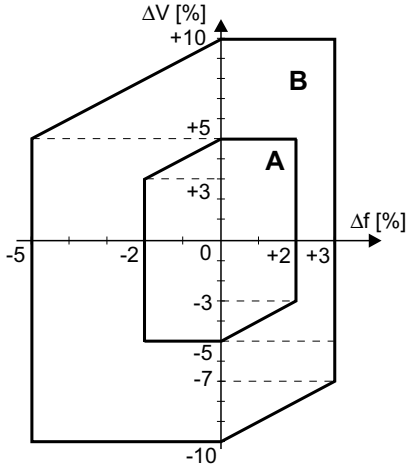
### Tolerance A, tolerance B

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.




*3966438155*

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:<br>- Standard no.<br>- Starting current ratio<br>- Wiring diagram(s)<br>- Direction(s) of rotation<br>- 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:<br>Permitted temperature range<br>Design letter | <br>Ambient: -20 °C to 40 °C<br>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 |

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

### 2.4.3 Efficiency regulations

| Country | Law/Standard/ Regulation | Description | Mark |
|---|---|---|---|
| Australia | MEPS 2006<br>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<br>Reg 640/2009<br>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 |

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## 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:

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<br>from 0.75 kW | to 0.55 kW<br>to 225 kW | CE |
| 6-pole DRE.. motors | from 0.25 kW<br>from 0.75 kW | to 0.55 kW<br>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:

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– 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:

*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:

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

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- 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<br>from 2p: 0.37 kW | to 4p: 18.5 kW<br>to 2p: 20 kW | UR |
| 8/4-pole DRS.. motors | from 8p: 0.10 kW<br>from 4p: 0.18 kW | to 8p: 18 kW<br>to 4p: 34 kW | UR |
| 8/2-pole DRS.. motors (S1/100%) | from 8p: 0.044 kW<br>from 2p: 0.20 kW | to 8p: 1.1 kW<br>to 2p: 4.6 kW | UR |
| 8/2-pole DRS.. motors (S3/40/60%) | from 8p: 0.06 kW<br>from 2p: 0.25 kW | to 8p: 1.1 kW<br>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.

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<br>from 2p: 0.37 kW | to 4p: 18.5 kW<br>to 2p: 20 kW | CSA |
| 8/4-pole DRS.. motors | from 8p: 0.10 kW<br>from 4p: 0.18 kW | to 8p: 18 kW<br>to 4p: 34 kW | CSA |
| 8/2-pole DRS.. motors (S1/100%) | from 8p: 0.044 kW<br>from 2p: 0.20 kW | to 8p: 1.1 kW<br>to 2p: 4.6 kW | CSA |
| 8/2-pole DRS.. motors (S3/40/60%) | from 8p: 0.06 kW<br>from 2p: 0.25 kW | to 8p: 1.1 kW<br>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:

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### 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 |

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| Motors | Lowest power rating | Highest power rating | Mark |
|---|---|---|---|
| 4-pole EDRE.. motors | from 0.75 kW | to 45 kW | CSA Energy Verified<br>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.

### 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<br>from 2p: 0.37 kW | to 4p: 0.88 kW<br>to 2p: 1.3 kW | CCC |
| 8/4-pole DRS.. motors[1)] | from 8p: 0.10 kW<br>from 4p: 0.18 kW | to 8p: 0.44 kW<br>to 4p: 0.88 kW | CCC |
| 8/2-pole DRS.. motors (S1/100%) | from 8p: 0.044 kW<br>from 2p: 0.20 kW | to 8p: 0.50 kW<br>to 2p: 2.1 kW | CCC |
| 8/2-pole DRS.. motors[1)] (S3/40/60%) | from 8p: 0.06 kW<br>from 2p: 0.25 kW | to 8p: 0.45 kW<br>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<br>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.

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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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).

### 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:

EAC

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.

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## 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 (△/⅄) 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 (△/⅄) | 254 – 277 V/440 – 480 V (△/⅄) |
| Voltage block 2 | 175 – 190 V/304 – 330 V (△/⅄) | 200 – 230 V/346 – 380 V (△/⅄) |
| Voltage block 3 | 380 – 420 V/660 – 725 V (△/⅄) | 440 – 480 V/ ----- (△/⅄) |

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 (△/⅄) | 266/460 (△/⅄) |
| Voltage block 2 | 380 – 420 V/660 – 725 V (△/⅄) | 460 V/ ----- (△/⅄) |

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<br>*5112749195* | UR mark for USA |
| C US<br>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.

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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 |

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### 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<br>Code letter for classifying short-circuit apparent power |
| 2 | | ML | From UL/UR certification:<br>Mounting Location = number of certified SEW-EURODRIVE assembly plant |
| 3 | | S.F. | From NEMA MG1 Ch. 12.51<br>Permitted overload factor of motor (values 1.0, 1.1 or 1.15) |
| 4 | | TEFC | From NEMA MG1 Ch. 1.26<br>Identification of type of protection:<br>TEFC = totally enclosed, fan-cooled |
| 5 | USA<br>(Canada) | Design | From NEMA MG1 Ch. 12.35 - 12.40 or from IEC 60034-12:<br>Code letter for classifying speed/torque characteristics<br>NEMA MG1: A, B or C<br>IEC 60034: N or H |
| 6 | Canada | "…+40 °C" | From CSA C22:<br>The temperature range of the motor must always be indicated |
| 7 | China | | From GB 18613:2012<br>Numerical value of motor efficiency |
| 8 | | CCC | From GB 12350:2009<br>CCC mark upon delivery not built into a system or machine |

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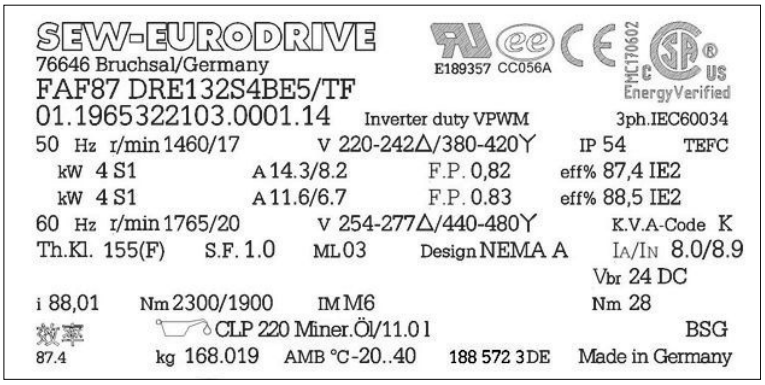
| No. | Country | Designation | Information required |
|---|---|---|---|
| 9 | Brazil | $I_a/I_n$ | From ABNT:<br>Starting current-to-nominal current ratio |
| 10 | | (CCW)<br>(CW) | From ABNT:<br>Direction of motor shaft rotation looking from motor output shaft<br>CCW: Counterclockwise<br>CW: Clockwise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

Example of the nameplate of a global motor:

**Main nameplate**

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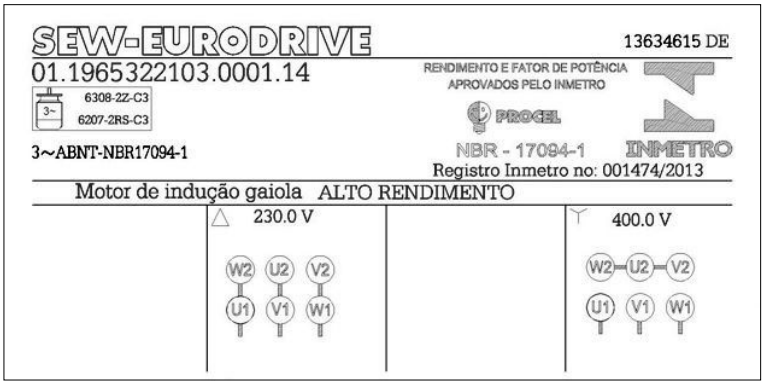
**ABNT nameplate**

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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

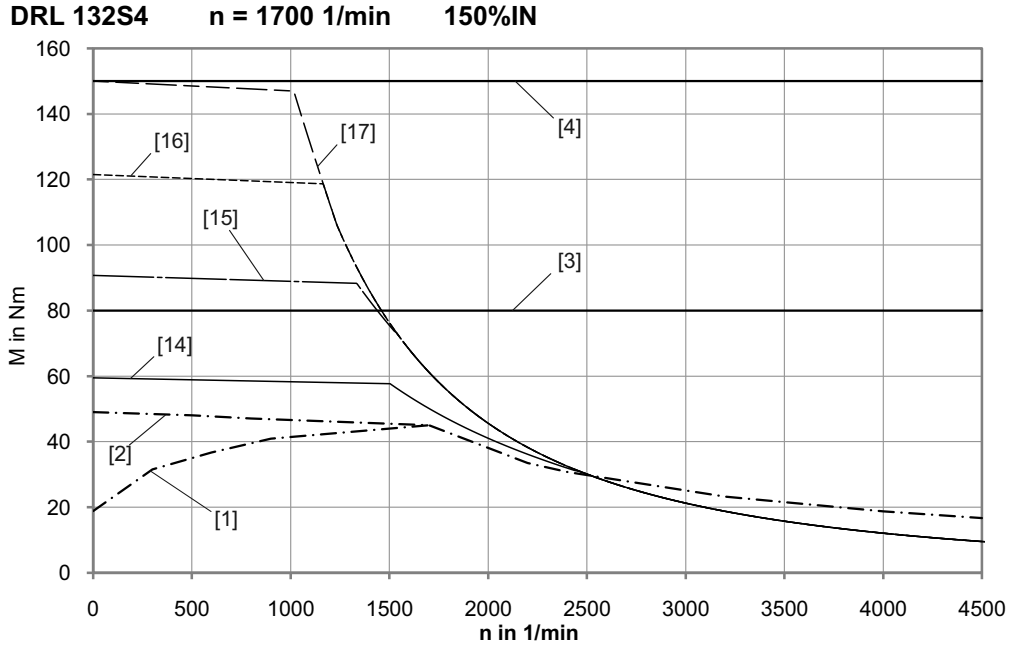
In inverter operation, field weakening begins at the rated speed.

### 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.

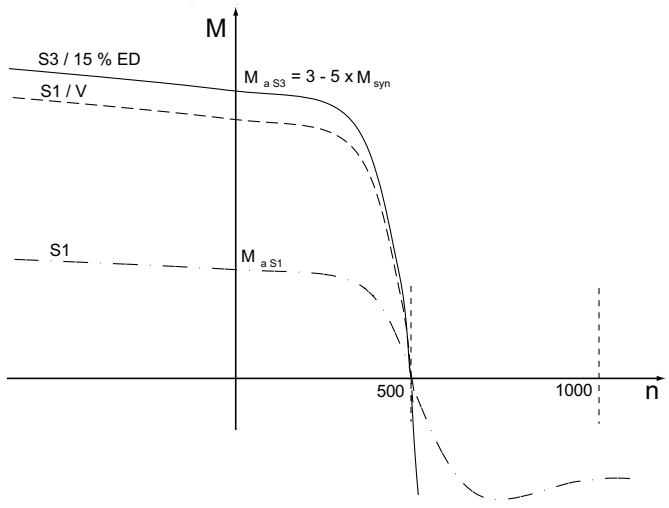
### 2.8.2 Properties of DRM.. motors: Operating mode

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:


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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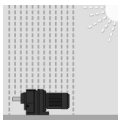
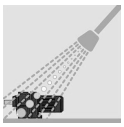
### 2.10.3 SP surface protection

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.<br>Similar to corrosivity category[2] :<br>• C1 (negligible) | • Machines and systems in the automotive industry<br>• Transport systems in logistics<br>• 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.<br>According to corrosivity category[2]:<br>• C2 (low) | • Systems in saw mills<br>• Hall gates<br>• Agitators and mixers |
| SP2 |  | Suited for environments with high humidity or moderate atmospheric contamination, such as outdoor applications subject to direct weathering.<br>According to corrosivity category[2]:<br>• C3 (moderate) | • Applications in amusement parks<br>• Aerial tramways and chair-lifts<br>• Applications in gravel plants<br>• 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.<br>According to corrosivity category[2]:<br>• C4 (high) | • Sewage treatment plants<br>• Port cranes<br>• 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.<br>According to corrosivity category[2]:<br>• C5-1 (very high) | • Drives in malting plants<br>• Wet areas in the beverage industry<br>• 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.

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### 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 | $M_{N\text{-}50Hz\text{-}8pole}$ Nm | $n_{N\text{-}8pole}$ rpm | $M_{N\text{-}50Hz\text{-}4pole}$ Nm | $n_{N\text{-}4pole}$ 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 | $M_{N\text{-}50Hz\text{-}8pole}$ Nm | $n_{N\text{-}8pole}$ rpm | $M_{N\text{-}50Hz\text{-}2pole}$ Nm | $n_{N\text{-}2pole}$ rpm |
|---|---|---|---|---|---|
| DRS71S8/2 | 0.06/0.25 | 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 | $10^{-4}$ kgm² |
| 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 | DR.71-132 | DR.160-180 | DR.200-225 | DR.280-315 |
|---|---|---|---|---|---|
| | Material | | | | |
| 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:<br>71 / 80 / 90 / 100 / 112 / 132 / 160 / 180 / 200 / 225 / 250 / 280 / 315 |
| K – L, MC, LC | Lengths:<br>K= very short / S = short / M = medium / L = long<br>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<br>Also available in a functionally safe design |
| /EI76, /EI72, | Built-in encoder with HTL interface and 6/2/1 period(s) |

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| 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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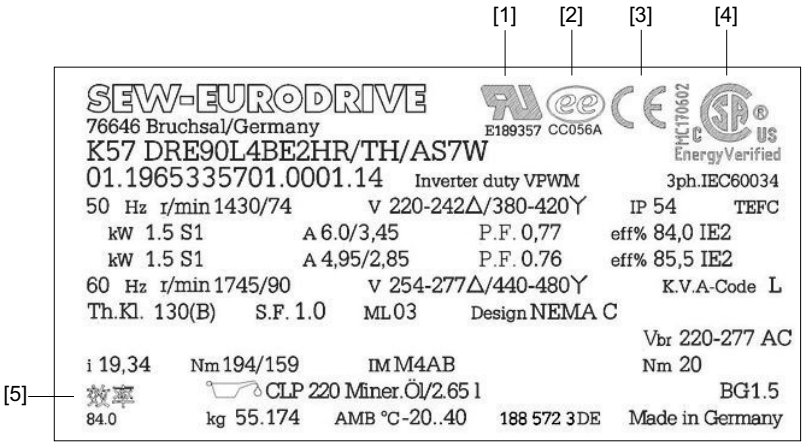
## 4.6 Example of a nameplate for the global motor

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.

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## 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:

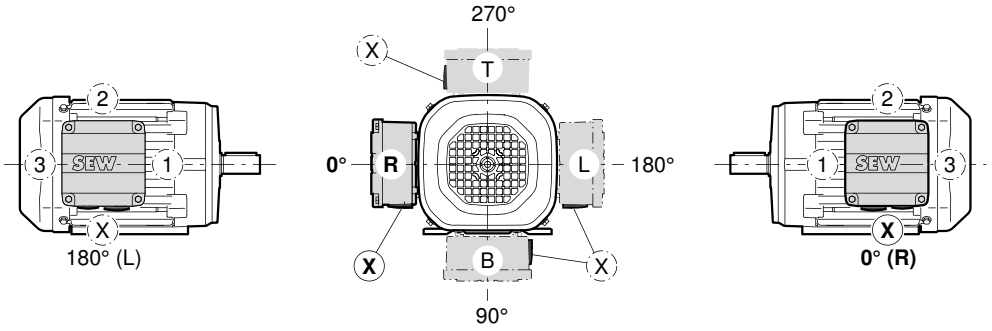
- As viewed onto the output shaft = A-side
- Designation as R (right), B (bottom), L (left) and T (top)

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.

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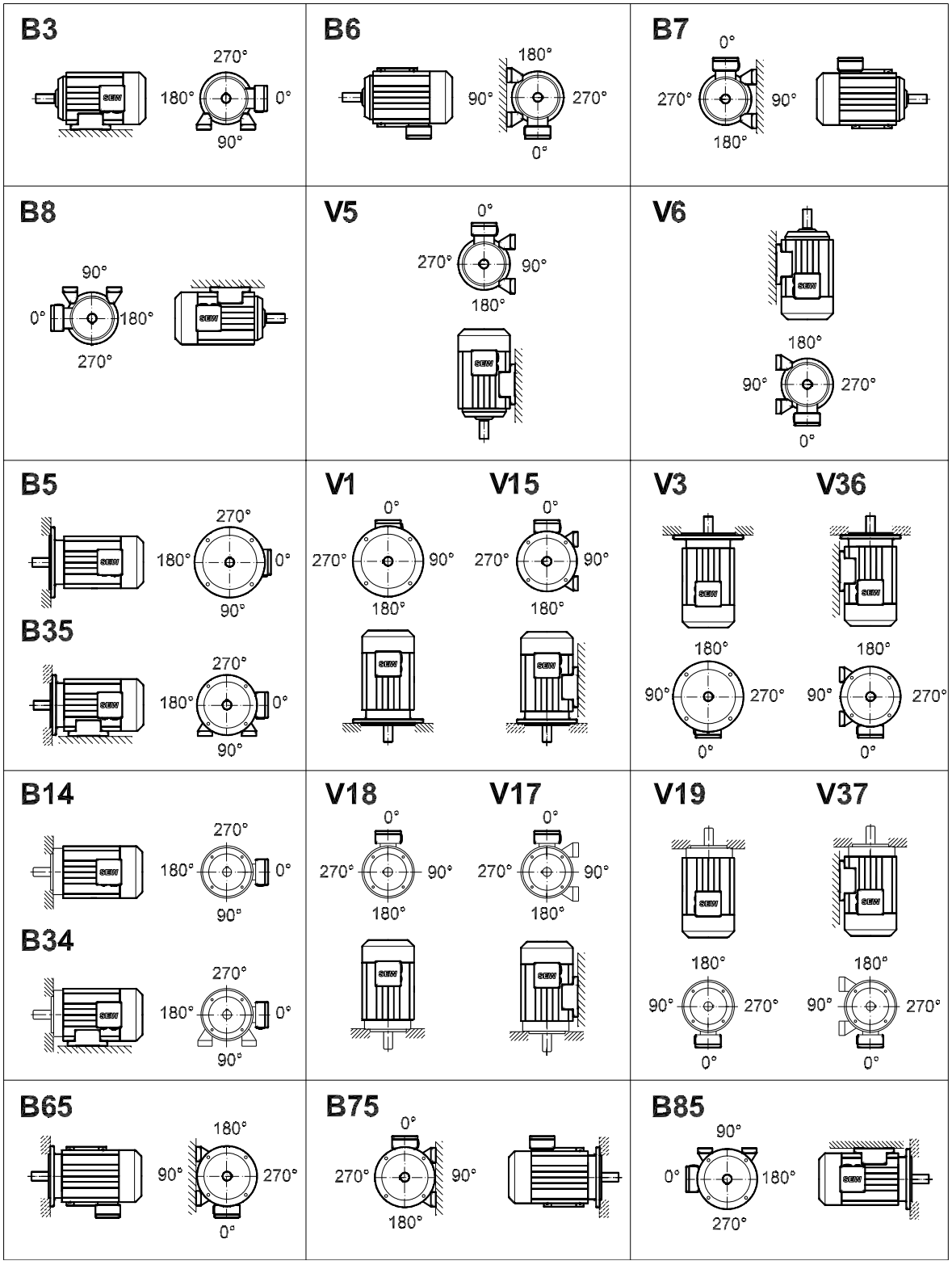
## INFORMATION

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

### 4.7.2 Mounting positions for AC motors

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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 | $\eta_{50\%}$ % | $\eta_{75\%}$ % | $\eta_{100\%}$ % | $I_A/I_N$ | $M_A/M_N$ | $M_H/M_N$ | $M_K/M_N$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DRS71M2 | 0.55 | 1.87<br>1.53 | 2810<br>3425 | 1.37<br>1.35 | 0.79<br>0.79 | IE1 | 70.7<br>73.2 | 73.5<br>76.3 | 72.9<br>75.5 | 4.9<br>5.8 | 2.9<br>3.4 | 2.1<br>2.1 | 2.3<br>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<br>1.53 | 2810<br>3425 | 9.1 | 7.21 | BE05 | 2000<br>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 | $\eta_{50\%}$ % | $\eta_{75\%}$ % | $\eta_{100\%}$ % | $I_A/I_N$ | $M_A/M_N$ | $M_H/M_N$ | $M_K/M_N$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DRE80M2 | 0.75 | 2.5<br>2.05 | 2890<br>3505 | 1.54<br>1.3 | 0.89<br>0.89 | IE2 | 81.1<br>81.6 | 79.2<br>81.0 | 79.2<br>80.0 | 7.9<br>9.7 | 3.4<br>4.0 | 3.0<br>3.3 | 3.4<br>4.1 |
| DRE90M2 | 1.1 | 3.65<br>3 | 2870<br>3485 | 2.2<br>1.9 | 0.89<br>0.89 | IE2 | 83.5<br>84.4 | 82.2<br>83.8 | 81.2<br>82.5 | 7.2<br>8.8 | 3.2<br>3.7 | 3.0<br>3.4 | 3.2<br>3.9 |
| DRE90L2 | 1.5 | 5<br>4.15 | 2840<br>3460 | 2.75<br>2.5 | 0.93<br>0.93 | IE2 | 84.7<br>86.3 | 84.0<br>86.1 | 81.7<br>84.0 | 6.3<br>7.9 | 2.9<br>3.4 | 2.5<br>2.8 | 2.6<br>3.1 |
| DRE100M2 | 2.2 | 7.3<br>6 | 2880<br>3495 | 4.15<br>3.65 | 0.91<br>0.91 | IE2 | 87.4<br>87.8 | 85.6<br>86.8 | 84.5<br>85.5 | 8.2<br>10.0 | 3.8<br>4.5 | 3.3<br>3.5 | 3.4<br>4.0 |
| DRE100L2 | 3 | 10.1<br>8.2 | 2850<br>3475 | 5.5<br>4.8 | 0.93<br>0.93 | IE2 | 88.0<br>88.9 | 87.4<br>88.8 | 85.6<br>87.5 | 7.2<br>9.3 | 3.5<br>4.4 | 3.1<br>3.9 | 3.1<br>4.0 |
| DRE112M2 | 4 | 13.2<br>10.9 | 2900<br>3510 | 7.5<br>6.6 | 0.89<br>0.89 | IE2 | 87.7<br>88.3 | 87.6<br>88.2 | 86.5<br>87.5 | 6.3<br>7.4 | 2.3<br>2.6 | 2.1<br>2.3 | 2.8<br>3.3 |
| DRE132M2 | 5.5 | 17.9<br>14.8 | 2935<br>3540 | 9.8<br>8.8 | 0.90<br>0.90 | IE2 | 90.2<br>89.5 | 90.7<br>89.2 | 90.1<br>88.5 | 8.7<br>9.1 | 2.9<br>3.1 | 2.5<br>2.5 | 3.5<br>3.9 |
| DRE132MC2 | 7.5 | 24.5<br>20 | 2940<br>3555 | 13.7<br>12.2 | 0.89<br>0.89 | IE2 | 90.2<br>88.5 | 90.1<br>90.3 | 88.9<br>89.5 | 7.6<br>8.7 | 2.2<br>2.5 | 1.9<br>2.1 | 2.9<br>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<br>2.05 | 2890<br>3505 | 14.3 | 21.7 | BE05 | 1300<br>3200 | 5 | 17.1 | 23.2 |
| DRE90M2 | 1.1 | 3.65<br>3 | 2870<br>3485 | 18.4 | 35.7 | BE1 | 1100<br>2700 | 10 | 21.3 | 37.3 |
| DRE90L2 | 1.5 | 5<br>4.15 | 2840<br>3460 | 21.4 | 43.9 | BE2 | 900<br>2200 | 14 | 26 | 48.6 |
| DRE100M2 | 2.2 | 7.3<br>6 | 2880<br>3495 | 26 | 56.2 | BE2 | 700<br>1800 | 14 | 30.6 | 61 |
| DRE100L2 | 3 | 10.1<br>8.2 | 2850<br>3475 | 29 | 68.6 | BE2 | 450<br>1000 | 20 | 33.6 | 73.3 |
| DRE112M2 | 4 | 13.2<br>10.9 | 2900<br>3510 | 41.3 | 114 | BE5 | -<br>600 | 28 | 48.5 | 119 |
| DRE132M2 | 5.5 | 17.9<br>14.8 | 2935<br>3540 | 60 | 193 | BE5 | -<br>500 | 55 | 67.2 | 198 |
| DRE132MC2 | 7.5 | 24.5<br>20 | 2940<br>3555 | 63 | 239 | BE11 | -<br>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<br>1.01 | 1380<br>1700 | 0.64<br>0.45 | 0.70<br>0.69 | IE1 | 59.1<br>66.5 | 65.3<br>67.7 | 66.6<br>68.0 | 3.5<br>4.2 | 1.8<br>1.9 | 1.8<br>1.9 | 2.1<br>2.5 |
| DRS71S4 | 0.25 | 1.72<br>1.4 | 1390<br>1700 | 0.67<br>0.62 | 0.75<br>0.69 | IE1 | 68.6<br>70.0 | 72.6<br>74.3 | 72.6<br>74.0 | 4.1<br>4.2 | 1.9<br>1.9 | 1.9<br>1.9 | 2.3<br>2.5 |
| DRS71S4 | 0.37 | 2.55<br>2.1 | 1380<br>1700 | 1.14<br>1.06 | 0.70<br>0.65 | - | 59.1<br>66.5 | 65.3<br>67.7 | 66.6<br>68.0 | 3.5<br>4.4 | 1.8<br>2.1 | 1.8<br>2.1 | 2.1<br>2.8 |
| DRS71M4 | 0.55 | 3.85<br>3.1 | 1360<br>1700 | 1.55<br>1.31 | 0.72<br>0.68 | IE1 | 69.1<br>72.8 | 71.9<br>76.1 | 70.6<br>74.0 | 3.6<br>4.5 | 2.1<br>2.4 | 2.1<br>2.3 | 2.2<br>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<br>1.01 | 1380<br>1700 | 7.8 | 5.13 | BE05 | 6000<br>9500 | 5 | 10.2 | 6.43 |
| DRS71S4 | 0.25 | 1.72<br>1.4 | 1390<br>1700 | 7.8 | 5.13 | BE05 | 6000<br>9500 | 5 | 10.2 | 6.43 |
| DRS71S4 | 0.37 | 2.55<br>2.1 | 1380<br>1700 | 7.8 | 5.13 | BE05 | 6000<br>9500 | 5 | 10.2 | 6.43 |
| DRS71M4 | 0.55 | 3.85<br>3.1 | 1360<br>1700 | 9.1 | 7.21 | BE1 | 4100<br>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<br>2.05 | 1435<br>1740 | 0.87<br>0.79 | 0.77<br>0.73 | IE2 | 76.5<br>78.2 | 78.5<br>80.2 | 78.8<br>80.0 | 4.9<br>6.9 | 2.6<br>3.0 | 2.1<br>2.4 | 2.9<br>3.7 |
| DRE80M4 | 0.55 | 3.65<br>3 | 1445<br>1755 | 1.27<br>1.15 | 0.76<br>0.73 | IE2 | 79.7<br>80.1 | 82.0<br>82.2 | 82.3<br>82.5 | 6.7<br>8.1 | 3.1<br>3.7 | 2.2<br>2.6 | 3.4<br>4.2 |
| DRE80M4 | 0.75 | 5<br>4.1 | 1435<br>1745 | 1.68<br>1.52 | 0.79<br>0.76 | IE2 | 79.2<br>79.6 | 81.3<br>82.9 | 81.0<br>82.5 | 6.2<br>7.6 | 2.9<br>3.3 | 2.1<br>2.3 | 3.1<br>3.9 |
| DRE90M4 | 1.1 | 7.4<br>6.1 | 1420<br>1735 | 2.45<br>2.1 | 0.79<br>0.77 | IE2 | 82.5<br>82.2 | 83.5<br>84.5 | 82.4<br>84.0 | 5.9<br>7.3 | 2.9<br>3.2 | 2.3<br>2.6 | 3.0<br>3.4 |
| DRE90L4 | 1.5 | 10<br>8.2 | 1430<br>1745 | 3.35<br>2.85 | 0.77<br>0.76 | IE2 | 83.5<br>83.6 | 84.7<br>85.8 | 84.0<br>85.5 | 6.6<br>7.9 | 3.2<br>3.7 | 2.8<br>3.3 | 3.4<br>4.0 |
| DRE100L4 | 2.2 | 14.6<br>12 | 1440<br>1750 | 4.7<br>4.2 | 0.77<br>0.75 | IE2 | 85.8<br>85.8 | 87.5<br>87.9 | 87.1<br>87.5 | 7.7<br>8.9 | 4.2<br>4.8 | 3.2<br>3.3 | 3.7<br>4.9 |
| DRE100LC4 | 3 | 19.7<br>16.3 | 1455<br>1760 | 6.2<br>5.3 | 0.81<br>0.80 | IE2 | 86.3<br>86.9 | 87.1<br>88.5 | 86.3<br>87.5 | 7.5<br>9.4 | 2.7<br>3.2 | 2.4<br>2.7 | 3.3<br>4.0 |
| DRE112M4 | 3 | 19.7<br>16.3 | 1455<br>1760 | 6<br>5.1 | 0.83<br>0.82 | IE2 | 87.7<br>87.0 | 87.4<br>88.4 | 86.5<br>87.5 | 7.3<br>8.8 | 2.4<br>2.7 | 2.0<br>1.7 | 3.0<br>3.5 |
| DRE132S4 | 4 | 26<br>21.5 | 1460<br>1765 | 8<br>6.7 | 0.82<br>0.83 | IE2 | 87.6<br>88.0 | 88.2<br>89.4 | 87.4<br>88.5 | 8.0<br>8.9 | 2.7<br>2.7 | 2.4<br>2.2 | 3.2<br>3.7 |
| DRE132M4 | 5.5 | 36<br>30 | 1455<br>1760 | 10.5<br>9 | 0.85<br>0.85 | IE2 | 89.8<br>90.1 | 89.6<br>90.8 | 88.5<br>89.5 | 7.7<br>8.8 | 2.6<br>2.5 | 1.9<br>1.7 | 3.1<br>3.0 |
| DRE132MC4 | 7.5 | 48.5<br>40.5 | 1470<br>1775 | 14.8<br>13.8 | 0.82<br>0.76 | IE2 | 88.9<br>87.3 | 89.5<br>89.5 | 89.0<br>89.5 | 8.2<br>8.7 | 2.2<br>2.1 | 1.8<br>1.6 | 3.2<br>3.2 |
| DRE160S4 | 7.5 | 49<br>40.5 | 1465<br>1770 | 14.7<br>12.6 | 0.82<br>0.83 | IE2 | 90.3<br>90.0 | 90.3<br>91.0 | 89.3<br>90.2 | 6.5<br>7.6 | 2.4<br>2.8 | 1.8<br>2.0 | 2.5<br>2.9 |
| DRE160M4 | 9.2 | 60<br>49.5 | 1470<br>1775 | 18.3<br>15.7 | 0.80<br>0.80 | IE2 | 90.4<br>90.4 | 90.7<br>91.6 | 90.0<br>91.0 | 7.7<br>8.4 | 2.9<br>3.3 | 2.2<br>2.4 | 3.0<br>3.2 |
| DRE160MC4 | 11 | 71<br>59 | 1475<br>1780 | 21.5<br>18.3 | 0.81<br>0.82 | IE2 | 90.3<br>90.9 | 90.6<br>92.0 | 90.2<br>91.7 | 7.7<br>8.6 | 2.6<br>3.2 | 1.9<br>2.2 | 2.8<br>3.3 |
| DRE180S4 | 11 | 71<br>59 | 1470<br>1775 | 21<br>18.1 | 0.83<br>0.83 | IE2 | 89.5<br>89.7 | 90.4<br>91.4 | 90.2<br>91.0 | 7.2<br>8.0 | 2.6<br>3.1 | 2.2<br>2.4 | 2.9<br>3.3 |
| DRE180M4 | 15 | 97<br>81 | 1470<br>1775 | 28<br>24 | 0.85<br>0.85 | IE2 | 90.9<br>89.5 | 91.5<br>91.5 | 91.0<br>91.7 | 7.1<br>7.8 | 2.4<br>2.8 | 2.0<br>2.1 | 3.0<br>3.3 |

| 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<br>100 | 1470<br>1775 | 34<br>29.5 | 0.85<br>0.85 | IE2 | 91.4<br>91.5 | 92.0<br>92.7 | 91.7<br>92.4 | 7.1<br>8.1 | 2.5<br>2.9 | 2.1<br>2.2 | 3.0<br>3.4 |
| DRE180LC4 | 22 | 142<br>118 | 1480<br>1780 | 42<br>35.5 | 0.82<br>0.84 | IE2 | 91.7<br>91.7 | 92.2<br>92.8 | 91.8<br>92.4 | 7.1<br>8.0 | 2.3<br>2.6 | 1.9<br>2.0 | 2.8<br>3.2 |
| DRE200L4 | 30 | 194<br>161 | 1475<br>1780 | 57<br>48.5 | 0.82<br>0.83 | IE2 | 92.6<br>92.2 | 92.9<br>93.3 | 92.4<br>93.0 | 6.3<br>7.4 | 2.1<br>2.6 | 1.9<br>2.1 | 2.6<br>2.9 |
| DRE225S4 | 37 | 240<br>198 | 1477<br>1780 | 70<br>60 | 0.82<br>0.83 | IE2 | 93.0<br>92.4 | 93.4<br>93.4 | 93.0<br>93.0 | 7.0<br>7.9 | 2.5<br>3.2 | 2.0<br>2.4 | 3.0<br>3.2 |
| DRE225M4 | 45 | 290<br>240 | 1478<br>1780 | 84<br>73 | 0.83<br>0.83 | IE2 | 93.5<br>92.9 | 93.7<br>93.8 | 93.3<br>93.6 | 7.3<br>8.0 | 2.5<br>3.3 | 2.1<br>2.3 | 2.9<br>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<br>2.05 | 1435<br>1740 | 11.5 | 15.9 | BE1 | 3500<br>9000 | 10 | 14.5 | 17.4 |
| DRE80M4 | 0.55 | 3.65<br>3 | 1445<br>1755 | 14.3 | 22.3 | BE1 | 3500<br>9000 | 10 | 17.3 | 23.8 |
| DRE80M4 | 0.75 | 5<br>4.1 | 1435<br>1745 | 14.3 | 22.3 | BE1 | 3500<br>9000 | 10 | 17.3 | 23.8 |
| DRE90M4 | 1.1 | 7.4<br>6.1 | 1420<br>1735 | 18.4 | 36.6 | BE2 | 3000<br>8000 | 14 | 23 | 41.3 |
| DRE90L4 | 1.5 | 10<br>8.2 | 1430<br>1745 | 21.4 | 44.9 | BE2 | 3000<br>8000 | 20 | 26 | 49.6 |
| DRE100L4 | 2.2 | 14.6<br>12 | 1440<br>1750 | 29 | 69.5 | BE5 | -<br>7600 | 28 | 34.9 | 75.5 |
| DRE100LC4 | 3 | 19.7<br>16.3 | 1455<br>1760 | 31.2 | 91 | BE5 | -<br>3800 | 40 | 37.1 | 97 |
| DRE112M4 | 3 | 19.7<br>16.3 | 1455<br>1760 | 41.3 | 148 | BE5 | -<br>3100 | 40 | 48.5 | 152 |
| DRE132S4 | 4 | 26<br>21.5 | 1460<br>1765 | 46.3 | 191 | BE5 | -<br>2800 | 55 | 53.5 | 196 |
| DRE132M4 | 5.5 | 36<br>30 | 1455<br>1760 | 60 | 258 | BE11 | -<br>2000 | 80 | 74.5 | 269 |
| DRE132MC4 | 7.5 | 48.5<br>40.5 | 1470<br>1775 | 63 | 347 | BE11 | -<br>1500 | 110 | 77.5 | 357 |
| DRE160S4 | 7.5 | 49<br>40.5 | 1465<br>1770 | 79.5 | 366 | BE11 | -<br>1100 | 110 | 98.2 | 388 |
| DRE160M4 | 9.2 | 60<br>49.5 | 1470<br>1775 | 88.5 | 442 | BE20 | -<br>1000 | 150 | 115.2 | 493 |
| DRE160MC4 | 11 | 71<br>59 | 1475<br>1780 | 93.5 | 600 | BE20 | -<br>900 | 150 | 120.2 | 651 |
| DRE180S4 | 11 | 71<br>59 | 1470<br>1775 | 121.9 | 909 | BE20 | -<br>900 | 150 | 153.9 | 969 |
| DRE180M4 | 15 | 97<br>81 | 1470<br>1775 | 138.3 | 1130 | BE20 | -<br>800 | 200 | 170.3 | 1190 |
| DRE180L4 | 18.5 | 120<br>100 | 1470<br>1775 | 152.1 | 1310 | BE30 | -<br>590 | 300 | 192.1 | 1450 |
| DRE180LC4 | 22 | 142<br>118 | 1480<br>1780 | 161.1 | 1700 | BE30 | -<br>520 | 300 | 201.1 | 1830 |
| DRE200L4 | 30 | 194<br>161 | 1475<br>1780 | 258 | 2390 | BE32 | -<br>550 | 400 | 313 | 2620 |
| DRE225S4 | 37 | 240<br>198 | 1477<br>1780 | 294.5 | 2970 | BE32 | -<br>320 | 500 | 349.5 | 3200 |
| DRE225M4 | 45 | 290<br>240 | 1478<br>1780 | 315.5 | 3470 | BE32 | -<br>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<br>2.1 | 910<br>1130 | 0.73<br>0.65 | 0.73<br>0.67 | IE2 | 64.8<br>66.0 | 70.0<br>71.0 | 68.8<br>72.0 | 3.4<br>4.0 | 2.0<br>1.9 | 2.0<br>1.9 | 2.1<br>2.1 |
| DRE80S6 | 0.37 | 3.8<br>3.1 | 935<br>1145 | 1.19<br>1.01 | 0.69<br>0.63 | IE2 | 67.2<br>69.0 | 71.2<br>73.0 | 71.5<br>74.0 | 3.7<br>4.5 | 2.0<br>2.4 | 2.0<br>2.3 | 2.3<br>2.8 |
| DRE80M6 | 0.55 | 5.6<br>4.6 | 935<br>1145 | 1.58<br>1.51 | 0.69<br>0.64 | IE2 | 70.5<br>73.0 | 74.0<br>76.5 | 74.0<br>77.0 | 4.4<br>4.8 | 2.2<br>2.5 | 2.2<br>2.5 | 2.4<br>3.0 |
| DRE90L6 | 0.75 | 7.6<br>6.3 | 940<br>1145 | 2.05<br>1.85 | 0.65<br>0.64 | IE2 | 78.7<br>80.5 | 80.5<br>82.5 | 80.0<br>81.5 | 4.6<br>5.1 | 2.4<br>2.4 | 2.4<br>2.4 | 2.8<br>2.9 |
| DRE100LC6 | 1.1 | 10.8<br>9 | 970<br>1170 | 2.8<br>2.6 | 0.68<br>0.64 | IE2 | 78.5<br>82.0 | 79.4<br>85.4 | 78.7<br>85.5 | 5.9<br>6.7 | 2.3<br>2.7 | 2.2<br>2.4 | 3.2<br>3.7 |
| DRE112M6 | 1.5 | 14.8<br>12.2 | 970<br>1170 | 3.5<br>3.7 | 0.72<br>0.69 | IE2 | 80.6<br>85.4 | 81.5<br>87.1 | 80.9<br>86.5 | 5.4<br>5.9 | 1.9<br>2.0 | 1.6<br>1.8 | 2.7<br>3.0 |
| DRE132M6 | 2.2 | 21.5<br>18 | 970<br>1170 | 5.2<br>4.7 | 0.70<br>0.69 | IE2 | 83.2<br>86.0 | 84.2<br>88.0 | 83.0<br>87.5 | 5.9<br>6.8 | 2.4<br>2.6 | 2.1<br>2.3 | 3.2<br>3.9 |
| DRE132M6 | 3 | 29.5<br>24.5 | 970<br>1170 | 7.3<br>6.6 | 0.67<br>0.68 | IE2 | 84.9<br>87.2 | 85.8<br>88.5 | 84.4<br>87.5 | 6.1<br>6.9 | 2.5<br>2.8 | 2.2<br>2.4 | 3.4<br>4.0 |
| DRE132M6 | 4 | 40<br>33 | 960<br>1165 | 9.5<br>8.5 | 0.71<br>0.72 | IE2 | 85.3<br>87.2 | 86.2<br>88.3 | 85.4<br>87.5 | 6.1<br>5.9 | 2.8<br>2.2 | 2.6<br>2.0 | 3.2<br>3.2 |
| DRE160M6 | 5.5 | 54<br>45 | 965<br>1170 | 12.6<br>10.5 | 0.72<br>0.72 | IE2 | 86.4<br>88.3 | 87.4<br>89.8 | 86.8<br>89.5 | 5.8<br>6.2 | 2.3<br>2.2 | 2.0<br>1.9 | 2.8<br>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<br>2.1 | 910<br>1130 | 9.1 | 11.9 | BE05 | 6600<br>15000 | 5 | 11.5 | 13.2 |
| DRE80S6 | 0.37 | 3.8<br>3.1 | 935<br>1145 | 11.5 | 15.9 | BE1 | 6000<br>14000 | 10 | 14.5 | 17.4 |
| DRE80M6 | 0.55 | 5.6<br>4.6 | 935<br>1145 | 14.3 | 22.3 | BE2 | 4300<br>10000 | 14 | 18 | 26.8 |
| DRE90L6 | 0.75 | 7.6<br>6.3 | 940<br>1145 | 21.4 | 44.6 | BE2 | 3500<br>8000 | 20 | 26 | 49.2 |
| DRE100LC6 | 1.1 | 10.8<br>9 | 970<br>1170 | 31.2 | 91 | BE5 | -<br>5000 | 40 | 37.1 | 97 |
| DRE112M6 | 1.5 | 14.8<br>12.2 | 970<br>1170 | 41.3 | 148 | BE5 | -<br>4000 | 55 | 48.5 | 152 |
| DRE132M6 | 2.2 | 21.5<br>18 | 970<br>1170 | 60 | 251 | BE11 | -<br>3300 | 80 | 74.5 | 261 |
| DRE132M6 | 3 | 29.5<br>24.5 | 970<br>1170 | 60 | 251 | BE11 | -<br>3300 | 80 | 74.5 | 261 |
| DRE132M6 | 4 | 40<br>33 | 960<br>1165 | 60 | 251 | BE11 | -<br>3300 | 80 | 74.5 | 261 |
| DRE160M6 | 5.5 | 54<br>45 | 965<br>1170 | 88.5 | 634 | BE11 | -<br>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<br>2.2 | - |
| DR63M2 | 0.25 | 0.9 | 2660 | 0.65 | 0.66 | 0.86 | - | - | - | - | 3.5 | 2.2<br>1.9 | - |
| DR63L2 | 0.37 | 1.3 | 2650 | 0.92 | 1.0 | 0.87 | - | - | - | - | 3.5 | 2.1<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>- | 1.6 | 8.0 | 4.8 |
| DR63M2 | 0.25 | 0.9 | 2660 | 6.2 | 3.6 | BR03 | 4500<br>- | 2.4 | 8.0 | 4.8 |
| DR63L2 | 0.37 | 1.3 | 2650 | 6.7 | 4.4 | BR03 | 4000<br>- | 3.2 | 8.5 | 5.6 |
| DRS71S2 | 0.37 | 1.31 | 2700 | 7.8 | 5.13 | BE05 | 2450<br>4150 | 5 | 10 | 6.43 |
| DRS71M2 | 0.55 | 1.87 | 2810 | 9.1 | 7.21 | BE05 | 2000<br>4500 | 3.5 | 12 | 8.51 |
| DRS80S2 | 0.75 | 2.55 | 2800 | 12 | 15.3 | BE05 | 1400<br>3300 | 5 | 14 | 16.8 |
| DRS80M2 | 1.1 | 3.7 | 2840 | 14 | 21.7 | BE1 | 1300<br>3000 | 7 | 17 | 23.2 |
| DRS90M2 | 1.5 | 5.1 | 2830 | 18 | 35.7 | BE1 | 1100<br>2700 | 10 | 21 | 37.3 |
| DRS90L2 | 2.2 | 7.4 | 2820 | 21 | 43.9 | BE2 | 900<br>2200 | 14 | 26 | 48.6 |
| DRS100M2 | 3 | 10.1 | 2840 | 26 | 56.2 | BE2 | 700<br>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 |

### 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 | $\eta_{50\%}$ % | $\eta_{75\%}$ % | $\eta_{100\%}$ % | $I_A/I_N$ | $M_A/M_N$<br>$M_H/M_N$ | $M_K/M_N$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DRP80M2 | 0.75 | 2.5 | 2890 | 1.46 | 1.52 | 0.89 | IE3 | 81.1 | 83.2 | 83.2 | 7.9 | 3.4<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>3200 | 5 | 17 | 23.2 |
| DRP90M2 | 1.1 | 3.65 | 2870 | 18 | 35.7 | BE1 | 1100<br>2700 | 7 | 21 | 37.3 |
| DRP100M2 | 1.5 | 4.95 | 2890 | 26 | 56.2 | BE2 | 700<br>1800 | 14 | 31 | 61 |
| DRP100M2 | 2.2 | 7.3 | 2880 | 26 | 56.2 | BE2 | 700<br>1800 | 14 | 31 | 61 |
| DRP100LC2 | 3 | 9.8 | 2920 | 31 | 90 | BE2 | 300<br>700 | 20 | 36 | 94.7 |
| DRP112M2 | 3 | 9.8 | 2920 | 41 | 114 | BE5 | -<br>600 | 20 | 48 | 119 |
| DRP132S2 | 4 | 13.1 | 2910 | 46 | 147 | BE5 | -<br>500 | 28 | 54 | 151 |
| DRP132M2 | 5.5 | 17.9 | 2935 | 60 | 193 | BE5 | -<br>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<br>1.8 | - |
| DT56L4 | 0.12 | 0.88 | 1300 | 0.42 | 0.46 | 0.68 | - | - | - | - | 2.6 | 2.2<br>1.9 | - |
| DR63S4 | 0.12 | 0.83 | 1380 | 0.39 | 0.39 | 0.69 | - | - | - | - | 3.3 | 2.4<br>2.2 | - |
| DR63M4 | 0.18 | 1.3 | 1320 | 0.55 | 0.55 | 0.78 | - | - | - | - | 2.9 | 1.8<br>1.7 | - |
| DR63L4 | 0.25 | 1.8 | 1300 | 0.68 | 0.73 | 0.81 | - | - | - | - | 2.8 | 1.8<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>2.0 | 2.6 |
| DRS160M4 | 11 | 72 | 1460 | 22 | 22.5 | 0.81 | IE1 | 89.2 | 89.1 | 88.0 | 6.8 | 2.7<br>2.3 | 2.8 |
| DRS160MC4 | 15 | 97 | 1470 | 30 | 31 | 0.80 | IE1 | 90.3 | 90.2 | 89.1 | 6.3 | 2.1<br>1.7 | 2.4 |
| DRS180S4 | 15 | 98 | 1460 | 29 | 29.5 | 0.83 | IE1 | 90.0 | 90.3 | 89.5 | 6.2 | 2.3<br>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<br>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<br>2.0 | 2.8 |
| DRS180LC4 | 30 | 195 | 1470 | 57 | 59 | 0.84 | IE1 | 92.2 | 92.0 | 90.9 | 5.6 | 1.8<br>1.5 | 2.2 |
| DRS200L4 | 30 | 194 | 1475 | 57 | 59 | 0.82 | IE1 | 91.6 | 91.9 | 91.3 | 6.4 | 2.1<br>1.9 | 2.6 |
| DRS225S4 | 37 | 240 | 1475 | 70 | 72 | 0.82 | IE1 | 92.2 | 92.0 | 91.6 | 7.1 | 2.4<br>1.9 | 3.0 |

| 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<br>2.2 | 2.9 |
| DRS225MC4 | 55 | 355 | 1480 | 106 | 108 | 0.81 | IE1 | 92.4 | 92.8 | 92.4 | 6.8 | 2.4<br>1.8 | 2.4 |
| DRS250M4 | 55 | 355 | 1479 | 105 | 108 | 0.82 | IE1 | 92.1 | 92.5 | 92.7 | 6.9 | 3.0<br>2.1 | 2.6 |
| DRS280S4 | 75 | 485 | 1480 | 140 | 144 | 0.83 | IE1 | 92.3 | 93.0 | 93.4 | 7.8 | 3.0<br>2.1 | 2.6 |
| DRS280M4 | 90 | 580 | 1478 | 170 | 172 | 0.82 | IE1 | 93.2 | 93.7 | 93.6 | 7.0 | 3.4<br>2.3 | 2.8 |
| DRS315K4 | 110 | 710 | 1482 | 200 | 210 | 0.84 | IE1 | 93.7 | 94.2 | 94.0 | 6.1 | 2.2<br>1.7 | 2.5 |
| DRS315S4 | 132 | 850 | 1484 | 230 | 240 | 0.86 | IE1 | 93.4 | 94.2 | 94.2 | 6.5 | 2.4<br>1.9 | 2.7 |
| DRS315M4 | 160 | 1030 | 1483 | 280 | 290 | 0.87 | IE1 | 94.6 | 94.8 | 94.6 | 6.9 | 2.1<br>1.7 | 2.3 |
| DRS315L4 | 200 | 1290 | 1481 | 350 | 375 | 0.88 | IE1 | 94.7 | 94.9 | 94.6 | 6.4 | 2.1<br>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<br>- | 0.8 | -[1] | 1.2 |
| DT56L4 | 0.12 | 0.88 | 1300 | -[1] | 1.1 | BMG02 | 10000<br>- | 1.2 | -[1] | 1.2 |
| DR63S4 | 0.12 | 0.83 | 1380 | 6.1 | 3.6 | BR03 | 10000<br>- | 2.4 | 7.6 | 4.8 |
| DR63M4 | 0.18 | 1.3 | 1320 | 6.1 | 3.6 | BR03 | 10000<br>- | 3.2 | 7.6 | 4.8 |
| DR63L4 | 0.25 | 1.8 | 1300 | 6.7 | 4.4 | BR03 | 10000<br>- | 3.2 | 8.2 | 5.6 |
| DRS71S4 | 0.18 | 1.25 | 1380 | 7.8 | 5.13 | BE05 | 6000<br>9500 | 5 | 10 | 6.43 |
| DRS71S4 | 0.25 | 1.72 | 1390 | 7.8 | 5.13 | BE05 | 6000<br>9500 | 5 | 10 | 6.43 |
| DRS71S4 | 0.37 | 2.55 | 1380 | 7.8 | 5.13 | BE05 | 6000<br>9500 | 5 | 10 | 6.43 |
| DRS71M4 | 0.55 | 3.85 | 1360 | 9.1 | 7.21 | BE1 | 4100<br>11000 | 10 | 12 | 8.51 |
| DRS80S4 | 0.75 | 5.1 | 1400 | 12 | 15.9 | BE1 | 3500<br>9000 | 10 | 14 | 17.4 |
| DRS80M4 | 1.1 | 7.4 | 1410 | 14 | 22.3 | BE2 | 3500<br>9000 | 14 | 18 | 26.8 |
| DRS90M4 | 1.5 | 10.3 | 1395 | 18 | 36.6 | BE2 | 2900<br>7500 | 20 | 23 | 41.3 |
| DRS90L4 | 2.2 | 15 | 1400 | 21 | 44.9 | BE5 | 2300<br>5600 | 40 | 27 | 50.9 |
| DRS100M4 | 3 | 20.5 | 1400 | 26 | 57.2 | BE5 | -<br>8500 | 40 | 32 | 63.2 |
| DRS100LC4 | 4 | 26.5 | 1440 | 31 | 91 | BE5 | -<br>3800 | 55 | 37 | 97 |
| DRS112M4 | 4 | 26.5 | 1435 | 41 | 152 | BE5 | -<br>3100 | 55 | 48 | 157 |
| DRS132S4 | 5.5 | 36.5 | 1445 | 44 | 196 | BE11 | -<br>2800 | 80 | 59 | 206 |
| DRS132M4 | 7.5 | 49.5 | 1445 | 60 | 258 | BE11 | -<br>2000 | 110 | 74 | 269 |

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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 |
|---|---|---|---|---|---|---|---|---|---|---|
| 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 |

| 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 | $\eta_{50\%}$ % | $\eta_{75\%}$ % | $\eta_{100\%}$ % | $I_A/I_N$ | $M_A/M_N$ $M_H/M_N$ | $M_K/M_N$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DRE112M4 | 3 | 19.7 | 1455 | 6 | 6.2 | 0.83 | IE2 | 87.7 | 87.4 | 86.5 | 7.3 | 2.4<br>2.0 | 3.0 |
| DRE132S4 | 4 | 26 | 1460 | 8 | 8.2 | 0.82 | IE2 | 87.6 | 88.2 | 87.4 | 8.0 | 2.7<br>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<br>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<br>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<br>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<br>2.2 | 3.0 |
| DRE160MC4 | 11 | 71 | 1475 | 21.5 | 22 | 0.81 | IE2 | 90.3 | 90.6 | 90.2 | 7.7 | 2.6<br>1.9 | 2.8 |
| DRE180S4 | 11 | 71 | 1470 | 21 | 21.5 | 0.83 | IE2 | 89.5 | 90.4 | 90.2 | 7.2 | 2.6<br>2.2 | 2.9 |
| DRE180M4 | 15 | 97 | 1470 | 28 | 29 | 0.85 | IE2 | 90.9 | 91.5 | 91.0 | 7.1 | 2.4<br>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<br>2.1 | 3.0 |
| DRE180LC4 | 22 | 142 | 1480 | 42 | 43 | 0.82 | IE2 | 91.7 | 92.2 | 91.8 | 7.1 | 2.3<br>1.9 | 2.8 |
| DRE200L4 | 30 | 194 | 1475 | 57 | 59 | 0.82 | IE2 | 92.6 | 92.9 | 92.4 | 6.3 | 2.1<br>1.9 | 2.6 |
| DRE225S4 | 37 | 240 | 1477 | 70 | 72 | 0.82 | IE2 | 93.0 | 93.4 | 93.0 | 7.0 | 2.5<br>2.0 | 3.0 |
| DRE225M4 | 45 | 290 | 1478 | 84 | 86 | 0.83 | IE2 | 93.5 | 93.7 | 93.3 | 7.3 | 2.5<br>2.1 | 2.9 |
| DRE250M4 | 55 | 355 | 1479 | 104 | 107 | 0.82 | IE2 | 93.0 | 93.8 | 93.6 | 6.9 | 3.0<br>2.1 | 2.6 |
| DRE280S4 | 75 | 485 | 1480 | 138 | 143 | 0.83 | IE2 | 93.3 | 94.1 | 94.4 | 7.8 | 3.0<br>2.1 | 2.6 |
| DRE280M4 | 90 | 580 | 1478 | 170 | 172 | 0.82 | IE2 | 93.7 | 94.5 | 94.4 | 7.0 | 3.4<br>2.3 | 2.8 |
| DRE315K4 | 110 | 710 | 1483 | 196 | 205 | 0.85 | IE2 | 94.4 | 94.9 | 94.7 | 6.0 | 2.3<br>1.8 | 2.6 |
| DRE315S4 | 132 | 850 | 1483 | 230 | 235 | 0.87 | IE2 | 94.3 | 95.0 | 95.0 | 6.6 | 2.4<br>2.0 | 2.7 |
| DRE315M4 | 160 | 1030 | 1484 | 275 | 285 | 0.88 | IE2 | 95.3 | 95.5 | 95.3 | 6.8 | 2.2<br>1.8 | 2.4 |
| DRE315L4 | 200 | 1290 | 1482 | 345 | 360 | 0.89 | IE2 | 95.4 | 95.7 | 95.3 | 6.3 | 2.2<br>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<br>9000 | 10 | 14 | 17.4 |
| DRE80M4 | 0.55 | 3.65 | 1445 | 14 | 22.3 | BE1 | 3500<br>9000 | 10 | 17 | 23.8 |
| DRE80M4 | 0.75 | 5 | 1435 | 14 | 22.3 | BE1 | 3500<br>9000 | 10 | 17 | 23.8 |
| DRE90M4 | 1.1 | 7.4 | 1420 | 18 | 36.6 | BE2 | 3000<br>8000 | 14 | 23 | 41.3 |
| DRE90L4 | 1.5 | 10 | 1430 | 21 | 44.9 | BE2 | 3000<br>8000 | 20 | 26 | 49.6 |
| DRE100M4 | 2.2 | 14.7 | 1425 | 26 | 57.2 | BE5 | -<br>8000 | 55 | 32 | 63.2 |

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| 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 |

| 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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>2.0 | 3.2 |
| DRP180LC4 | 18.5 | 119 | 1480 | 35 | 36 | 0.82 | IE3 | 92.7 | 93.4 | 93.2 | 8.0 | 2.6<br>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<br>2.2 | 3.0 |
| DRP200L4 | 22 | 142 | 1482 | 41 | 42.5 | 0.83 | IE3 | 92.7 | 93.5 | 93.4 | 7.9 | 2.7<br>2.3 | 3.0 |
| DRP225S4 | 30 | 194 | 1480 | 55 | 57 | 0.85 | IE3 | 94.0 | 94.3 | 93.9 | 7.4 | 2.6<br>2.2 | 2.8 |
| DRP225M4 | 37 | 240 | 1482 | 69 | 71 | 0.83 | IE3 | 93.5 | 94.1 | 94.0 | 8.4 | 2.9<br>2.6 | 3.2 |
| DRP250M4 | 45 | 290 | 1482 | 85 | 88 | 0.81 | IE3 | 93.6 | 93.7 | 94.3 | 7.6 | 3.2<br>2.1 | 3.2 |
| DRP280S4 | 55 | 355 | 1482 | 100 | 103 | 0.84 | IE3 | 94.8 | 95.2 | 95.1 | 8.0 | 3.1<br>2.1 | 2.6 |
| DRP280M4 | 75 | 485 | 1479 | 138 | 142 | 0.83 | IE3 | 95.2 | 95.4 | 95.0 | 7.2 | 3.2<br>2.1 | 2.6 |
| DRP315K4 | 90 | 580 | 1484 | 159 | 169 | 0.86 | IE3 | 0.0 | 95.1 | 95.2 | 6.7 | 2.4<br>1.9 | 2.7 |
| DRP315S4 | 110 | 710 | 1486 | 192 | 200 | 0.87 | IE3 | 0.0 | 95.6 | 95.5 | 7.1 | 2.3<br>1.8 | 2.5 |
| DRP315M4 | 132 | 850 | 1488 | 230 | 240 | 0.87 | IE3 | 94.7 | 95.6 | 95.6 | 8.1 | 2.5<br>2.0 | 2.8 |
| DRP315L4 | 160 | 1030 | 1488 | 275 | 280 | 0.88 | IE3 | 95.5 | 96.0 | 96.1 | 8.0 | 2.8<br>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<br>7500 | 10 | 21 | 38.2 |
| DRP90L4 | 1.1 | 7.3 | 1440 | 21 | 44.9 | BE2 | 2300<br>5600 | 14 | 26 | 49.6 |
| DRP100M4 | 1.5 | 9.9 | 1440 | 26 | 57.2 | BE2 | -<br>8500 | 20 | 31 | 61.9 |
| DRP100L4 | 2.2 | 14.6 | 1440 | 29 | 69.5 | BE5 | -<br>7600 | 28 | 35 | 75.5 |
| DRP112M4 | 3 | 19.7 | 1455 | 41 | 148 | BE5 | -<br>3100 | 40 | 48 | 152 |
| DRP132M4 | 4 | 26 | 1465 | 60 | 258 | BE5 | -<br>2000 | 55 | 67 | 263 |
| DRP132MC4 | 5.5 | 35.5 | 1475 | 63 | 347 | BE11 | -<br>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.. | $P_N$ | $M_N$ | $n_N$ | $I_N$ 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 | | | % | % | % | | | |
| DR63S6 | 0.09 | 0.95 | 900 | 0.38 | 0.42 | 0.64 | - | - | - | - | 2.2 | 1.8<br>1.6 | - |
| DR63M6 | 0.12 | 1.2 | 900 | 0.58 | 0.62 | 0.65 | - | - | - | - | 2.1 | 1.8<br>1.7 | - |
| DR63L6 | 0.18 | 2 | 870 | 0.78 | 0.81 | 0.70 | - | - | - | - | 2.2 | 1.6<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>1.9 | 2.5 |

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

| Motor type DRS.. | $P_N$ | $M_N$ | $n_N$ | m | $J_{Mot}$ | BE.. | $Z_0$ BG BGE | $M_B$ | $m_B$ | $J_{Mot_BE}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| | kW | Nm | rpm | kg | $10^{-4}$ kgm² | | 1/h | Nm | kg | $10^{-4}$ kgm² |
| DR63S6 | 0.09 | 0.95 | 900 | 6.0 | 5.4 | BR03 | 20,000<br>- | 2.5 | 7.5 | 6.6 |
| DR63M6 | 0.12 | 1.2 | 900 | 6.0 | 5.4 | BR03 | 20,000<br>- | 3.2 | 7.5 | 6.6 |
| DR63L6 | 0.18 | 2 | 870 | 6.6 | 6.8 | BR03 | 20,000<br>- | 3.2 | 8.1 | 8.0 |
| DRS71S6 | 0.25 | 2.65 | 895 | 7.8 | 8.29 | BE05 | 7000<br>16,000 | 5 | 10 | 9.59 |
| DRS71M6 | 0.37 | 3.9 | 905 | 9.1 | 11.9 | BE1 | 6600<br>15000 | 10 | 12 | 13.2 |
| DRS80S6 | 0.55 | 5.7 | 915 | 12 | 15.9 | BE2 | 6000<br>14000 | 20 | 15 | 20.4 |
| DRS80M6 | 0.75 | 7.8 | 915 | 14 | 22.3 | BE2 | 4300<br>10000 | 20 | 18 | 26.8 |
| DRS90L6 | 1.1 | 11.3 | 930 | 21 | 44.6 | BE5 | 3500<br>8000 | 40 | 27 | 50.5 |
| DRS100M6 | 1.5 | 15.5 | 925 | 26 | 56.8 | BE5 | -<br>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 | $\eta_{50\%}$ % | $\eta_{75\%}$ % | $\eta_{100\%}$ % | $I_A/I_N$ | $M_A/M_N$ | $M_H/M_N$ | $M_K/M_N$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DRS80S2 | 0.75 | 2.55<br>2.1 | 2800<br>3440 | 1.73<br>1.5 | 0.84<br>0.81 | IE1 | 71.3<br>74.4 | 74.6<br>77.9 | 74.4<br>77.0 | 4.6<br>5.9 | 2.5<br>2.9 | 2.3<br>2.7 | 2.5<br>2.9 |
| DRS80M2 | 1.1 | 3.7<br>3 | 2840<br>3475 | 2.35<br>1.93 | 0.88<br>0.87 | IE1 | 80.2<br>82.0 | 77.7<br>82.5 | 76.5<br>81.5 | 6.0<br>7.7 | 2.7<br>3.3 | 2.5<br>2.9 | 2.8<br>3.3 |
| DRS90M2 | 1.5 | 5.1<br>4.15 | 2830<br>3470 | 3.1<br>2.65 | 0.89<br>0.85 | IE1 | 83.3<br>85.0 | 80.0<br>84.4 | 78.3<br>82.5 | 5.9<br>7.9 | 2.7<br>3.2 | 2.6<br>3.0 | 2.7<br>3.4 |
| DRS90L2 | 2.2 | 7.4<br>6.1 | 2820<br>3450 | 4.45<br>3.75 | 0.89<br>0.89 | IE1 | 84.9<br>86.0 | 82.8<br>85.8 | 80.5<br>84.0 | 5.8<br>7.5 | 2.9<br>3.4 | 2.5<br>2.8 | 2.6<br>3.1 |
| DRS100M2 | 3 | 10.1<br>8.3 | 2840<br>3465 | 5.8<br>5 | 0.91<br>0.91 | IE1 | 86.9<br>88.3 | 84.6<br>87.5 | 82.5<br>85.5 | 6.4<br>8.3 | 3.1<br>3.7 | 2.8<br>3.2 | 2.8<br>3.3 |
| DRS100LC2 | 4 | 13.2<br>10.9 | 2900<br>3520 | 7.8<br>6.7 | 0.88<br>0.87 | IE1 | 86.9<br>88.2 | 85.6<br>87.6 | 84.2<br>86.5 | 7.7<br>9.5 | 2.7<br>3.2 | 2.1<br>2.4 | 3.0<br>3.6 |
| DRS112M2 | 4 | 13.2<br>10.9 | 2900<br>3510 | 7.6<br>6.6 | 0.89<br>0.89 | IE1 | 87.7<br>88.6 | 85.4<br>88.2 | 84.3<br>87.5 | 6.3<br>7.4 | 2.3<br>2.6 | 2.1<br>2.3 | 2.8<br>3.3 |
| DRS132S2 | 5.5 | 18.2<br>15 | 2890<br>3500 | 10.2<br>9 | 0.91<br>0.91 | IE1 | 89.2<br>89.8 | 87.0<br>88.7 | 85.5<br>87.5 | 6.5<br>7.2 | 2.3<br>2.4 | 2.1<br>2.1 | 2.8<br>3.1 |
| DRS132M2 | 7.5 | 24.5<br>20.5 | 2910<br>3520 | 13.7<br>12.1 | 0.91<br>0.90 | IE1 | 90.0<br>90.7 | 87.8<br>90.1 | 86.5<br>88.5 | 7.3<br>8.5 | 2.5<br>2.7 | 2.3<br>2.3 | 3.1<br>3.5 |
| DRS132M2 | 9.2 | 30.5<br>25 | 2900<br>3505 | 16.9<br>14.4 | 0.89<br>0.90 | IE1 | 90.2<br>91.1 | 88.8<br>89.6 | 87.2<br>87.5 | 6.9<br>7.3 | 2.5<br>2.5 | 2.3<br>2.2 | 3.0<br>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<br>2.1 | 2800<br>3440 | 11.5 | 15.3 | BE05 | 1400<br>3300 | 5 | 14.3 | 16.8 |
| DRS 80M 2 | 1.1 | 3.7<br>3 | 2840<br>3475 | 14.3 | 21.7 | BE1 | 1300<br>3000 | 7 | 17.3 | 23.2 |
| DRS 90M 2 | 1.5 | 5.1<br>4.15 | 2830<br>3470 | 18.4 | 35.7 | BE1 | 1100<br>2700 | 10 | 21.3 | 37.3 |
| DRS 90L 2 | 2.2 | 7.4<br>6.1 | 2820<br>3450 | 21.4 | 43.9 | BE2 | 900<br>2200 | 14 | 26 | 48.6 |
| DRS 100M 2 | 3 | 10.1<br>8.3 | 2840<br>3465 | 26 | 56.2 | BE2 | 700<br>1800 | 20 | 30.6 | 61 |
| DRS 100LC 2 | 4 | 13.2<br>10.9 | 2900<br>3520 | 31.2 | 90 | BE5 | -<br>700 | 28 | 37.1 | 96 |
| DRS 112M 2 | 4 | 13.2<br>10.9 | 2900<br>3510 | 41.3 | 114 | BE5 | -<br>600 | 28 | 48.5 | 119 |
| DRS 132S 2 | 5.5 | 18.2<br>15 | 2890<br>3500 | 44.2 | 147 | BE5 | -<br>500 | 40 | 51.4 | 151 |
| DRS 132M 2 | 7.5 | 24.5<br>20.5 | 2910<br>3520 | 60 | 193 | BE5 | -<br>500 | 55 | 67.2 | 198 |
| DRS 132M 2 | 9.2 | 30.5<br>25 | 2900<br>3505 | 60 | 193 | BE5 | -<br>500 | 55 | 67.2 | 198 |

## 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<br>3.05 | 1400<br>1720 | 1.32<br>1.18 | 0.81<br>0.77 | IE1 | 74.6<br>75.7 | 76.6<br>77.8 | 75.3<br>78.5 | 4.3<br>5.3 | 1.9<br>2.4 | 1.9<br>2.4 | 2.2<br>2.5 |
| DRS80S4 | 0.75 | 5.1<br>4.15 | 1400<br>1720 | 1.8<br>1.75 | 0.81<br>0.77 | IE1 | 74.6<br>75.7 | 76.6<br>77.8 | 75.3<br>78.5 | 4.3<br>5.3 | 1.9<br>2.4 | 1.9<br>2.4 | 2.2<br>2.5 |
| DRS80M4 | 1.1 | 7.4<br>6.1 | 1410<br>1725 | 2.4<br>2.2 | 0.84<br>0.79 | IE1 | 77.7<br>80.2 | 78.6<br>80.4 | 77.0<br>80.0 | 5.1<br>6.4 | 2.2<br>2.9 | 1.7<br>2.0 | 2.3<br>3.1 |
| DRS90M4 | 1.5 | 10.3<br>8.3 | 1395<br>1720 | 3.3<br>2.85 | 0.82<br>0.76 | IE1 | 82.0<br>84.0 | 82.0<br>84.1 | 79.6<br>82.5 | 5.0<br>6.3 | 2.3<br>3.2 | 2.0<br>2.6 | 2.5<br>3.3 |
| DRS90L4 | 2.2 | 15<br>12.2 | 1400<br>1720 | 4.85<br>4.15 | 0.81<br>0.78 | IE1 | 82.9<br>85.1 | 83.1<br>85.4 | 81.1<br>84.0 | 5.1<br>6.4 | 2.5<br>3.0 | 2.2<br>2.7 | 2.5<br>3.2 |
| DRS100M4 | 3 | 20.5<br>16.7 | 1400<br>1720 | 6.4<br>5.5 | 0.82<br>0.79 | IE1 | 85.2<br>86.3 | 84.7<br>86.1 | 82.4<br>84.0 | 5.3<br>7.0 | 2.8<br>3.5 | 2.4<br>2.6 | 2.8<br>3.6 |
| DRS100LC4 | 4 | 26.5<br>22 | 1440<br>1750 | 8.9<br>7.1 | 0.78<br>0.77 | IE1 | 83.2<br>86.9 | 84.3<br>87.6 | 83.2<br>86.5 | 6.5<br>7.2 | 2.5<br>3.9 | 2.3<br>3.1 | 3.1<br>3.9 |
| DRS112M4 | 4 | 26.5<br>22 | 1435<br>1750 | 8.1<br>6.8 | 0.84<br>0.82 | IE1 | 86.1<br>89.3 | 85.6<br>88.7 | 83.8<br>86.5 | 6.0<br>7.0 | 2.0<br>2.2 | 1.7<br>1.8 | 2.5<br>2.8 |
| DRS132S4 | 5.5 | 36.5<br>30 | 1445<br>1750 | 11.1<br>9.4 | 0.82<br>0.81 | IE1 | 86.4<br>89.3 | 86.7<br>89.4 | 85.7<br>88.5 | 6.7<br>7.8 | 2.4<br>2.8 | 2.1<br>2.3 | 2.8<br>3.3 |
| DRS132M4 | 7.5 | 49.5<br>41 | 1445<br>1750 | 14.4<br>13.1 | 0.85<br>0.85 | IE1 | 90.0<br>90.3 | 89.1<br>89.4 | 87.1<br>87.5 | 6.6<br>7.8 | 2.4<br>2.6 | 1.9<br>2.1 | 2.7<br>3.2 |
| DRS132MC4 | 9.2 | 60<br>49.5 | 1465<br>1770 | 18.6<br>17.2 | 0.81<br>0.77 | IE1 | 87.9<br>88.3 | 88.5<br>89.0 | 87.6<br>88.5 | 7.2<br>9.1 | 2.1<br>2.4 | 1.6<br>1.8 | 2.9<br>3.7 |
| DRS160S4 | 9.2 | 60<br>49.5 | 1460<br>1770 | 18.9<br>15.9 | 0.79<br>0.79 | IE1 | 87.9<br>89.2 | 89.0<br>90.1 | 88.0<br>88.5 | 6.4<br>7.4 | 2.5<br>2.8 | 2.0<br>2.0 | 2.6<br>2.9 |
| DRS160M4 | 11 | 72<br>59 | 1460<br>1770 | 22<br>18.8 | 0.81<br>0.79 | IE1 | 89.2<br>89.9 | 89.1<br>90.2 | 88.0<br>89.5 | 6.8<br>8.0 | 2.7<br>3.2 | 2.3<br>2.4 | 2.8<br>3.1 |
| DRS160MC4 | 15 | 97<br>81 | 1470<br>1770 | 30<br>27 | 0.80<br>0.80 | IE1 | 90.3<br>90.5 | 90.2<br>90.7 | 89.1<br>90.2 | 6.3<br>7.6 | 2.1<br>2.6 | 1.7<br>1.9 | 2.4<br>2.8 |
| DRS180S4 | 15 | 98<br>81 | 1460<br>1765 | 29<br>25.5 | 0.83<br>0.82 | IE1 | 90.0<br>89.9 | 90.3<br>91.0 | 89.5<br>90.2 | 6.2<br>7.0 | 2.3<br>2.8 | 2.0<br>2.2 | 2.6<br>3.0 |
| DRS180M4 | 18.5 | 121<br>100 | 1465<br>1775 | 34.5<br>31.5 | 0.85<br>0.85 | IE1 | 90.6<br>90.2 | 90.8<br>91.2 | 90.0<br>91.0 | 6.5<br>7.5 | 2.2<br>2.6 | 1.8<br>2.0 | 2.7<br>3.1 |
| DRS180L4 | 22 | 143<br>119 | 1465<br>1770 | 41.5<br>37.5 | 0.84<br>0.84 | IE1 | 90.9<br>90.3 | 91.2<br>91.2 | 90.5<br>91.0 | 6.9<br>7.9 | 2.4<br>2.8 | 2.0<br>2.1 | 2.8<br>3.3 |
| DRS180LC4 | 30 | 195<br>162 | 1470<br>1770 | 57<br>51 | 0.84<br>0.84 | IE1 | 92.2<br>91.8 | 92.0<br>92.5 | 90.9<br>91.7 | 5.6<br>6.4 | 1.8<br>2.0 | 1.5<br>1.6 | 2.2<br>2.4 |
| DRS200L4 | 30 | 194<br>161 | 1475<br>1775 | 57<br>52 | 0.82<br>0.82 | IE1 | 91.6<br>91.7 | 91.9<br>92.6 | 91.3<br>92.4 | 6.4<br>7.4 | 2.1<br>2.6 | 1.9<br>2.1 | 2.6<br>2.9 |
| DRS225S4 | 37 | 240<br>198 | 1475<br>1780 | 70<br>61 | 0.82<br>0.82 | IE1 | 92.2<br>92.1 | 92.0<br>93.1 | 91.6<br>92.4 | 7.1<br>7.6 | 2.4<br>3.0 | 1.9<br>2.2 | 3.0<br>3.0 |
| DRS225M4 | 45 | 290<br>240 | 1480<br>1780 | 84<br>72 | 0.83<br>0.81 | IE1 | 92.8<br>92.9 | 92.7<br>93.8 | 92.3<br>93.0 | 7.4<br>8.0 | 2.5<br>3.4 | 2.2<br>2.3 | 2.9<br>3.1 |
| DRS225MC4 | 55 | 355<br>295 | 1480<br>1780 | 106<br>88 | 0.81<br>0.83 | IE1 | 92.4<br>92.8 | 92.8<br>93.7 | 92.4<br>93.0 | 6.8<br>7.1 | 2.4<br>2.6 | 1.8<br>1.8 | 2.4<br>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<br>3.05 | 1400<br>1720 | 11.5 | 15.9 | BE1 | 3500<br>9000 | 10 | 14.5 | 17.4 |
| DRS80S4 | 0.75 | 5.1<br>4.15 | 1400<br>1720 | 11.5 | 15.9 | BE1 | 3500<br>9000 | 10 | 14.5 | 17.4 |
| DRS80M4 | 1.1 | 7.4<br>6.1 | 1410<br>1725 | 14.3 | 22.3 | BE2 | 3500<br>9000 | 14 | 18 | 26.8 |
| DRS90M4 | 1.5 | 10.3<br>8.3 | 1395<br>1720 | 18.4 | 36.6 | BE2 | 2900<br>7500 | 20 | 23 | 41.3 |
| DRS90L4 | 2.2 | 15<br>12.2 | 1400<br>1720 | 21.4 | 44.9 | BE5 | 2300<br>5600 | 40 | 27.3 | 50.9 |
| DRS100M4 | 3 | 20.5<br>16.7 | 1400<br>1720 | 26 | 57.2 | BE5 | -<br>8500 | 40 | 31.9 | 63.2 |
| DRS100LC4 | 4 | 26.5<br>22 | 1440<br>1750 | 31.2 | 91 | BE5 | -<br>3800 | 55 | 37.1 | 97 |
| DRS112M4 | 4 | 26.5<br>22 | 1435<br>1750 | 41.3 | 152 | BE5 | -<br>3100 | 55 | 48.5 | 157 |
| DRS132S4 | 5.5 | 36.5<br>30 | 1445<br>1750 | 44.2 | 196 | BE11 | -<br>2800 | 80 | 58.7 | 206 |
| DRS132M4 | 7.5 | 49.5<br>41 | 1445<br>1750 | 60 | 258 | BE11 | -<br>2000 | 110 | 74.5 | 269 |
| DRS132MC4 | 9.2 | 60<br>49.5 | 1465<br>1770 | 63 | 347 | BE11 | -<br>1500 | 110 | 77.5 | 357 |
| DRS160S4 | 9.2 | 60<br>49.5 | 1460<br>1770 | 79.5 | 366 | BE20 | -<br>1100 | 150 | 106.2 | 417 |
| DRS160M4 | 11 | 72<br>59 | 1460<br>1770 | 91.5 | 442 | BE20 | -<br>1000 | 150 | 118.2 | 493 |
| DRS160MC4 | 15 | 97<br>81 | 1470<br>1770 | 93.5 | 609 | BE20 | -<br>900 | 200 | 120.2 | 661 |
| DRS180S4 | 15 | 98<br>81 | 1460<br>1765 | 121.9 | 909 | BE20 | -<br>900 | 200 | 153.9 | 969 |
| DRS180M4 | 18.5 | 121<br>100 | 1465<br>1775 | 141.1 | 1130 | BE30 | -<br>800 | 300 | 181.1 | 1260 |
| DRS180L4 | 22 | 143<br>119 | 1465<br>1770 | 152.1 | 1310 | BE30 | -<br>590 | 300 | 192.1 | 1450 |
| DRS180LC4 | 30 | 195<br>162 | 1470<br>1770 | 161.1 | 1700 | BE32 | -<br>520 | 400 | 206.1 | 1930 |
| DRS200L4 | 30 | 194<br>161 | 1475<br>1775 | 258 | 2390 | BE32 | -<br>550 | 400 | 313 | 2620 |
| DRS225S4 | 37 | 240<br>198 | 1475<br>1780 | 294.5 | 2970 | BE32 | -<br>320 | 500 | 349.5 | 3200 |
| DRS225M4 | 45 | 290<br>240 | 1480<br>1780 | 315.5 | 3470 | BE32 | -<br>270 | 600 | 370.5 | 3700 |
| DRS225MC4 | 55 | 355<br>295 | 1480<br>1780 | 329 | 4390 | BE32 | -<br>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<br>0.37 | 1.71<br>1.3 | 1400<br>2720 | 1.05<br>1 | 0.71<br>0.88 | 37.9<br>52.5 | 45.9<br>59.3 | 48.6<br>60.7 | 3.0<br>3.5 | 1.5<br>1.5 | 1.4<br>1.3 | 1.9<br>1.6 |
| DRS 71M 4/2 | 0.4<br>0.63 | 2.75<br>2.25 | 1380<br>2660 | 1.24<br>1.66 | 0.75<br>0.90 | 56.1<br>68.8 | 62.3<br>68.0 | 62.3<br>61.2 | 3.0<br>3.5 | 1.6<br>1.4 | 1.4<br>1.2 | 1.8<br>1.4 |
| DRS 80M 4/2 | 0.55<br>0.88 | 3.6<br>2.95 | 1455<br>2860 | 1.43<br>1.91 | 0.71<br>0.86 | 71.8<br>74.4 | 76.7<br>77.4 | 78.1<br>77.4 | 6.3<br>5.6 | 2.8<br>2.3 | 2.5<br>1.9 | 3.5<br>2.6 |
| DRS 90M 4/2 | 0.88<br>1.3 | 5.9<br>4.45 | 1430<br>2780 | 2.4<br>3 | 0.75<br>0.86 | 0.0<br>0.0 | 70.0<br>73.0 | 71.0<br>73.0 | 5.7<br>5.4 | 2.5<br>1.9 | 2.5<br>1.8 | 3.0<br>2.1 |
| DRS 90M 4/2 | 1.2<br>1.8 | 8<br>6.2 | 1440<br>2780 | 3.15<br>4.1 | 0.74<br>0.86 | 68.8<br>72.1 | 73.6<br>75.0 | 75.0<br>75.0 | 5.1<br>4.6 | 2.4<br>2.0 | 2.4<br>2.0 | 2.8<br>2.2 |
| DRS 100M 4/2 | 1.5<br>2.2 | 10<br>7.4 | 1430<br>2840 | 3.35<br>4.3 | 0.80<br>0.93 | 81.0<br>80.5 | 82.1<br>80.5 | 81.1<br>79.2 | 6.4<br>6.4 | 2.7<br>2.2 | 2.5<br>1.8 | 3.2<br>2.7 |
| DRS 100L 4/2 | 2.5<br>3 | 17.1<br>10.1 | 1400<br>2840 | 5.5<br>5.8 | 0.84<br>0.93 | 83.2<br>82.4 | 80.9<br>81.6 | 78.4<br>79.7 | 5.0<br>6.7 | 2.2<br>2.5 | 1.9<br>2.0 | 2.3<br>2.3 |
| DRS 132S 4/2 | 3.3<br>4 | 21.5<br>13.1 | 1450<br>2915 | 9<br>7.5 | 0.65<br>0.90 | 77.9<br>85.2 | 80.8<br>86.4 | 81.0<br>85.8 | 4.5<br>7.3 | 1.8<br>2.2 | 1.8<br>1.9 | 2.6<br>2.8 |
| DRS 132M 4/2 | 4.4<br>5.5 | 29<br>17.9 | 1455<br>2930 | 11.3<br>9.9 | 0.67<br>0.91 | 80.9<br>87.6 | 83.3<br>88.4 | 83.3<br>87.6 | 4.9<br>7.9 | 1.9<br>2.2 | 1.8<br>1.9 | 2.7<br>2.9 |
| DRS 160S 4/2 | 6<br>7.5 | 39<br>24.5 | 1470<br>2950 | 12<br>17 | 0.80<br>0.75 | 89.3<br>81.5 | 89.7<br>83.9 | 88.9<br>84.2 | 7.0<br>6.8 | 2.5<br>2.7 | 1.8<br>1.5 | 2.6<br>3.0 |
| DRS 160M 4/2 | 8.8<br>11 | 57<br>35.5 | 1465<br>2940 | 17.5<br>25 | 0.82<br>0.76 | 89.6<br>82.3 | 89.2<br>83.8 | 87.7<br>83.2 | 6.3<br>6.3 | 2.2<br>2.3 | 1.7<br>1.5 | 2.5<br>2.8 |
| DRS 180L 4/2 | 13<br>15 | 84<br>48.5 | 1475<br>2960 | 23.5<br>31.5 | 0.87<br>0.78 | 92.1<br>84.2 | 92.7<br>87.1 | 92.4<br>88.0 | 8.0<br>8.2 | 2.6<br>3.0 | 1.8<br>1.6 | 3.1<br>3.6 |
| DRS 180L 4/2 | 18.5<br>20 | 120<br>65 | 1470<br>2960 | 34.5<br>45.5 | 0.84<br>0.72 | 92.0<br>84.8 | 92.0<br>87.2 | 91.2<br>87.7 | 7.0<br>7.6 | 2.4<br>2.9 | 1.7<br>1.5 | 2.8<br>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<br>0.37 | 1.71<br>1.3 | 1400<br>2720 | 7.8 | 5.13 | BE05 | 4800<br>2000 | 7500<br>2700 | 3.5 | 10 | 6.43 |
| DRS 71M 4/2 | 0.4<br>0.63 | 2.75<br>2.25 | 1380<br>2660 | 9.1 | 7.21 | BE05 | 3000<br>1700 | 5400<br>2200 | 5 | 12 | 8.51 |
| DRS 80M 4/2 | 0.55<br>0.88 | 3.6<br>2.95 | 1455<br>2860 | 14 | 22.3 | BE1 | 1100<br>800 | 2200<br>1900 | 7 | 17 | 23.8 |
| DRS 90M 4/2 | 0.88<br>1.3 | 5.9<br>4.45 | 1430<br>2780 | 18 | 36.6 | BE2 | 1900<br>850 | 3850<br>1300 | 20 | 23 | 41.3 |
| DRS 90M 4/2 | 1.2<br>1.8 | 8<br>6.2 | 1440<br>2780 | 18 | 36.6 | BE2 | 1900<br>850 | 3850<br>1300 | 20 | 23 | 41.3 |
| DRS 100M 4/2 | 1.5<br>2.2 | 10<br>7.4 | 1430<br>2840 | 26 | 57.2 | BE2 | 920<br>550 | 3280<br>820 | 20 | 31 | 61.9 |
| DRS 100L 4/2 | 2.5<br>3 | 17.1<br>10.1 | 1400<br>2840 | 29 | 69.5 | BE5 | -<br>- | 2250<br>920 | 28 | 35 | 75.5 |
| DRS 132S 4/2 | 3.3<br>4 | 21.5<br>13.1 | 1450<br>2915 | 44 | 147 | BE5 | -<br>- | 1200<br>450 | 55 | 51 | 151 |
| DRS 132M 4/2 | 4.4<br>5.5 | 29<br>17.9 | 1455<br>2930 | 60 | 193 | BE11 | -<br>- | 670<br>350 | 80 | 74 | 204 |
| DRS 160S 4/2 | 6<br>7.5 | 39<br>24.5 | 1470<br>2950 | 80 | 366 | BE11 | -<br>- | 900<br>280 | 80 | 98 | 388 |
| DRS 160M 4/2 | 8.8<br>11 | 57<br>35.5 | 1465<br>2940 | 92 | 442 | BE20 | -<br>- | 750<br>190 | 110 | 120 | 493 |
| DRS 180L 4/2 | 13<br>15 | 84<br>48.5 | 1475<br>2960 | 150 | 1300 | BE20 | -<br>- | 750<br>140 | 200 | 185 | 1360 |
| DRS 180L 4/2 | 18.5<br>20 | 120<br>65 | 1470<br>2960 | 150 | 1300 | BE30 | -<br>- | 750<br>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<br>0.25 | 0.84<br>0.83 | 685<br>2870 | 0.48<br>0.98 | 0.62<br>0.65 | 0.0<br>0.0 | 0.0<br>0.0 | 29.1<br>57.2 | 1.7<br>3.4 | 1.6<br>2.0 | 1.5<br>1.5 | 1.7<br>2.2 |
| DRS 71M 8/2 | 0.08<br>0.37 | 1.12<br>1.24 | 685<br>2855 | 0.61<br>0.98 | 0.58<br>0.81 | 0.0<br>0.0 | 0.0<br>0.0 | 32.7<br>66.6 | 1.7<br>4.2 | 1.7<br>1.9 | 1.6<br>1.4 | 1.7<br>1.9 |
| DRS 71M 8/2 | 0.1<br>0.4 | 1.43<br>1.34 | 670<br>2840 | 0.66<br>1.04 | 0.66<br>0.83 | 0.0<br>0.0 | 0.0<br>0.0 | 33.6<br>66.6 | 1.5<br>4.0 | 1.3<br>1.8 | 1.3<br>1.3 | 1.3<br>1.8 |
| DRS 71M 8/2 | 0.11<br>0.44 | 1.56<br>1.47 | 675<br>2860 | 0.82<br>1.34 | 0.60<br>0.74 | 0.0<br>0.0 | 0.0<br>0.0 | 32.5<br>63.1 | 1.5<br>3.4 | 1.5<br>2.0 | 1.4<br>1.5 | 1.5<br>2.0 |
| DRS 80S 8/2 | 0.15<br>0.6 | 2.15<br>2.1 | 670<br>2710 | 0.95<br>1.9 | 0.65<br>0.80 | 0.0<br>0.0 | 0.0<br>0.0 | 35.9<br>58.6 | 1.8<br>3.0 | 1.5<br>2.0 | 1.6<br>1.7 | 1.8<br>1.8 |
| DRS 80M 8/2 | 0.22<br>0.9 | 3.1<br>3.1 | 680<br>2780 | 1.15<br>2.4 | 0.60<br>0.80 | 32.1<br>64.2 | 39.8<br>68.5 | 43.3<br>68.7 | 2.0<br>4.0 | 1.7<br>2.6 | 1.7<br>2.4 | 1.9<br>2.5 |
| DRS 90M 8/2 | 0.3<br>1.3 | 4.05<br>4.3 | 710<br>2880 | 1.41<br>3.3 | 0.55<br>0.80 | 0.0<br>0.0 | 0.0<br>0.0 | 56.1<br>71.0 | 2.5<br>4.6 | 1.4<br>1.9 | 1.4<br>1.7 | 1.9<br>2.3 |
| DRS 90L 8/2 | 0.45<br>1.8 | 6<br>5.9 | 720<br>2905 | 2.5<br>4.7 | 0.52<br>0.74 | 0.0<br>0.0 | 0.0<br>0.0 | 55.0<br>74.5 | 2.3<br>5.6 | 1.4<br>2.5 | 1.4<br>2.1 | 2.0<br>2.6 |
| DRS 100M 8/2 | 0.6<br>2.4 | 8.1<br>7.9 | 710<br>2890 | 3.1<br>5.4 | 0.57<br>0.82 | 0.0<br>0.0 | 0.0<br>0.0 | 49.8<br>79.2 | 2.3<br>6.2 | 1.4<br>2.6 | 1.4<br>2.2 | 1.9<br>2.7 |
| DRS 112M 8/2 | 0.8<br>3 | 10.8<br>10.4 | 710<br>2750 | 4.2<br>6.7 | 0.53<br>0.87 | 0.0<br>0.0 | 0.0<br>0.0 | 53.4<br>75.7 | 2.5<br>4.6 | 1.4<br>2.7 | 0.9<br>2.2 | 1.6<br>2.4 |
| DRS 132M 8/2 | 1.1<br>4.6 | 14.8<br>15.7 | 710<br>2800 | 4.6<br>8.5 | 0.53<br>0.92 | 0.0<br>0.0 | 0.0<br>0.0 | 65.9<br>80.5 | 3.0<br>6.7 | 1.5<br>3.1 | 1.5<br>2.0 | 2.1<br>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<br>0.25 | 0.84<br>0.83 | 685<br>2870 | 7.8 | 5.13 | BE05 | 15000<br>6000 | 20000<br>9000 | 1.8 | 10 | 6.43 |
| DRS 71M 8/2 | 0.08<br>0.37 | 1.12<br>1.24 | 685<br>2855 | 9.1 | 7.21 | BE05 | 14000<br>6000 | 18000<br>8000 | 3.5 | 12 | 8.51 |
| DRS 71M 8/2 | 0.1<br>0.4 | 1.43<br>1.34 | 670<br>2840 | 9.1 | 7.21 | BE05 | 14000<br>6000 | 18000<br>8000 | 3.5 | 12 | 8.51 |
| DRS 71M 8/2 | 0.11<br>0.44 | 1.56<br>1.47 | 675<br>2860 | 9.1 | 7.21 | BE05 | 14000<br>6000 | 18000<br>8000 | 3.5 | 12 | 8.51 |
| DRS 80S 8/2 | 0.15<br>0.6 | 2.15<br>2.1 | 670<br>2710 | 12 | 15.9 | BE05 | 8000<br>3800 | 14000<br>5000 | 5 | 14 | 17.4 |
| DRS 80M 8/2 | 0.22<br>0.9 | 3.1<br>3.1 | 680<br>2780 | 14 | 22.3 | BE1 | 8000<br>3000 | 14000<br>4000 | 7 | 17 | 23.8 |
| DRS 90M 8/2 | 0.3<br>1.3 | 4.05<br>4.3 | 710<br>2880 | 18 | 36.6 | BE1 | 7000<br>2300 | 11000<br>3500 | 10 | 21 | 38.2 |
| DRS 90L 8/2 | 0.45<br>1.8 | 6<br>5.9 | 720<br>2905 | 21 | 44.9 | BE2 | 5000<br>1700 | 10000<br>3300 | 14 | 26 | 49.6 |
| DRS 100M 8/2 | 0.6<br>2.4 | 8.1<br>7.9 | 710<br>2890 | 26 | 57.2 | BE2 | 4000<br>1700 | 9000<br>2600 | 20 | 31 | 61.9 |
| DRS 112M 8/2 | 0.8<br>3 | 10.8<br>10.4 | 710<br>2750 | 41 | 152 | BE5 | -<br>- | 7000<br>1500 | 28 | 48 | 157 |
| DRS 132M 8/2 | 1.1<br>4.6 | 14.8<br>15.7 | 710<br>2800 | 60 | 258 | BE5 | -<br>- | 5000<br>1000 | 40 | 67 | 263 |

## 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<br>0.18 | 1.39<br>1.23 | 685<br>1400 | 0.485<br>0.52 | 0.62<br>0.79 | 38.8<br>57.0 | 47.1<br>63.6 | 51.0<br>64.7 | 2.2<br>3.3 | 1.7<br>1.5 | 1.7<br>1.4 | 2.0<br>1.9 |
| DRS 71M 8/4 | 0.16<br>0.3 | 2.25<br>2.05 | 685<br>1400 | 0.71<br>0.79 | 0.62<br>0.83 | 42.5<br>60.9 | 50.6<br>65.6 | 54.0<br>65.6 | 2.4<br>3.5 | 1.7<br>1.5 | 1.7<br>1.4 | 2.0<br>1.9 |
| DRS 80M 8/4 | 0.22<br>0.4 | 2.95<br>2.65 | 710<br>1440 | 0.98<br>0.96 | 0.56<br>0.81 | 44.9<br>71.6 | 53.2<br>74.9 | 57.4<br>74.7 | 3.0<br>4.9 | 1.8<br>1.7 | 1.8<br>1.4 | 2.4<br>2.2 |
| DRS 90M 8/4 | 0.3<br>0.6 | 4.05<br>4 | 710<br>1440 | 1.44<br>1.42 | 0.51<br>0.79 | 47.8<br>75.8 | 55.6<br>78.0 | 59.4<br>77.3 | 2.9<br>5.1 | 2.1<br>1.9 | 2.1<br>1.7 | 2.5<br>2.4 |
| DRS 90L 8/4 | 0.44<br>0.88 | 6<br>5.9 | 700<br>1425 | 1.9<br>1.98 | 0.54<br>0.83 | 52.2<br>78.0 | 59.2<br>79.1 | 61.2<br>76.9 | 2.9<br>4.7 | 1.8<br>1.7 | 1.7<br>1.6 | 2.2<br>2.1 |
| DRS 100M 8/4 | 0.66<br>1.3 | 9.1<br>8.7 | 690<br>1420 | 2.65<br>2.9 | 0.57<br>0.84 | 57.2<br>79.7 | 62.7<br>79.7 | 63.9<br>77.2 | 2.8<br>4.5 | 1.7<br>1.8 | 1.7<br>1.6 | 2.0<br>2.0 |
| DRS 100L 8/4 | 0.9<br>1.8 | 12.5<br>12.2 | 690<br>1410 | 3.5<br>4 | 0.58<br>0.85 | 57.7<br>80.5 | 63.0<br>79.7 | 63.9<br>76.5 | 2.8<br>4.5 | 1.7<br>1.7 | 1.7<br>1.6 | 2.0<br>1.9 |
| DRS 112M 8/4 | 1.2<br>2.2 | 17<br>15.1 | 675<br>1390 | 4.2<br>4.6 | 0.58<br>0.87 | 69.3<br>83.5 | 72.1<br>82.6 | 71.0<br>79.7 | 2.9<br>4.8 | 1.9<br>2.2 | 1.9<br>1.9 | 2.1<br>2.2 |
| DRS 132S 8/4 | 1.6<br>3.3 | 22.5<br>23 | 680<br>1385 | 5.8<br>6.8 | 0.55<br>0.87 | 70.5<br>84.2 | 72.4<br>82.1 | 72.2<br>79.9 | 2.9<br>4.7 | 2.0<br>2.1 | 2.0<br>1.9 | 2.3<br>2.1 |
| DRS 132M 8/4 | 2.1<br>4.2 | 29.5<br>29 | 680<br>1390 | 7<br>8.6 | 0.59<br>0.87 | 73.4<br>85.5 | 75.4<br>83.7 | 74.2<br>80.2 | 3.3<br>5.0 | 1.9<br>2.1 | 1.9<br>1.9 | 2.2<br>2.2 |
| DRS 160S 8/4 | 2.7<br>5.5 | 35.5<br>35.5 | 725<br>1470 | 9.2<br>11 | 0.54<br>0.84 | 0.0<br>0.0 | 0.0<br>0.0 | 78.9<br>85.6 | 4.0<br>6.3 | 2.1<br>1.9 | 1.9<br>1.4 | 2.3<br>2.2 |
| DRS 160M 8/4 | 3.8<br>7.5 | 49.5<br>48.5 | 730<br>1470 | 12.9<br>15 | 0.54<br>0.84 | 0.0<br>0.0 | 0.0<br>0.0 | 78.4<br>85.6 | 3.9<br>6.2 | 2.0<br>1.9 | 1.9<br>1.4 | 2.3<br>2.2 |
| DRS 180S 8/4 | 5.5<br>10 | 72<br>65 | 730<br>1465 | 17.4<br>18.7 | 0.55<br>0.87 | 79.7<br>89.9 | 82.5<br>89.9 | 83.1<br>88.9 | 4.0<br>6.0 | 2.2<br>1.9 | 2.0<br>1.4 | 2.6<br>2.3 |
| DRS 180L 8/4 | 7.5<br>15 | 97<br>97 | 735<br>1470 | 22.5<br>27.5 | 0.55<br>0.87 | 0.0<br>0.0 | 0.0<br>0.0 | 86.3<br>89.9 | 4.4<br>6.0 | 2.4<br>1.9 | 2.1<br>1.4 | 2.7<br>2.3 |
| DRS 200L 8/4 | 11<br>22 | 143<br>142 | 735<br>1475 | 35.5<br>41.5 | 0.52<br>0.85 | 0.0<br>0.0 | 0.0<br>0.0 | 85.3<br>89.9 | 4.0<br>5.9 | 2.4<br>1.8 | 2.0<br>1.4 | 2.5<br>2.0 |
| DRS 225S 8/4 | 14<br>28 | 182<br>181 | 735<br>1475 | 45<br>52 | 0.52<br>0.85 | 0.0<br>0.0 | 0.0<br>0.0 | 86.2<br>90.8 | 4.1<br>6.2 | 2.5<br>1.9 | 2.2<br>1.5 | 2.6<br>2.0 |
| DRS 225M 8/4 | 18<br>34 | 230<br>220 | 740<br>1475 | 57<br>63 | 0.53<br>0.86 | 0.0<br>0.0 | 0.0<br>0.0 | 86.4<br>91.1 | 4.0<br>6.3 | 2.4<br>2.0 | 2.0<br>1.5 | 2.5<br>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 | $J_{Mot}$ $10^{-4}$ 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 8/4 | 0.1<br>0.18 | 1.39<br>1.23 | 685<br>1400 | 7.8 | 8.29 | BE05 | 7000<br>4000 | 12000<br>7000 | 3.5 | 10 | 9.59 |
| DRS 71M 8/4 | 0.16<br>0.3 | 2.25<br>2.05 | 685<br>1400 | 9.1 | 11.9 | BE05 | 5300<br>3100 | 9800<br>5300 | 5 | 12 | 13.2 |
| DRS 80M 8/4 | 0.22<br>0.4 | 2.95<br>2.65 | 710<br>1440 | 14 | 22.3 | BE1 | 3800<br>2300 | 7000<br>4200 | 7 | 17 | 23.8 |
| DRS 90M 8/4 | 0.3<br>0.6 | 4.05<br>4 | 710<br>1440 | 18 | 36.6 | BE1 | 2600<br>2000 | 6700<br>3700 | 10 | 21 | 38.2 |
| DRS 90L 8/4 | 0.44<br>0.88 | 6<br>5.9 | 700<br>1425 | 21 | 44.9 | BE2 | 2500<br>2000 | 5800<br>3400 | 20 | 26 | 49.6 |
| DRS 100M 8/4 | 0.66<br>1.3 | 9.1<br>8.7 | 690<br>1420 | 26 | 57.2 | BE2 | 2400<br>1800 | 5200<br>3400 | 20 | 31 | 61.9 |
| DRS 100L 8/4 | 0.9<br>1.8 | 12.5<br>12.2 | 690<br>1410 | 29 | 69.5 | BE5 | 2300<br>1400 | 4700<br>2500 | 28 | 35 | 75.5 |
| DRS 112M 8/4 | 1.2<br>2.2 | 17<br>15.1 | 675<br>1390 | 41 | 152 | BE5 | -<br>- | 3800<br>1800 | 40 | 48 | 157 |
| DRS 132S 8/4 | 1.6<br>3.3 | 22.5<br>23 | 680<br>1385 | 44 | 196 | BE5 | -<br>- | 3000<br>1600 | 55 | 51 | 200 |
| DRS 132M 8/4 | 2.1<br>4.2 | 29.5<br>29 | 680<br>1390 | 60 | 258 | BE11 | -<br>- | 3000<br>1500 | 80 | 74 | 269 |
| DRS 160S 8/4 | 2.7<br>5.5 | 35.5<br>35.5 | 725<br>1470 | 80 | 366 | BE11 | -<br>- | 2600<br>1400 | 80 | 98 | 388 |
| DRS 160M 8/4 | 3.8<br>7.5 | 49.5<br>48.5 | 730<br>1470 | 92 | 442 | BE11 | -<br>- | 1900<br>1300 | 110 | 110 | 464 |
| DRS 180S 8/4 | 5.5<br>10 | 72<br>65 | 730<br>1465 | 120 | 909 | BE20 | -<br>- | 1600<br>1200 | 150 | 155 | 969 |
| DRS 180L 8/4 | 7.5<br>15 | 97<br>97 | 735<br>1470 | 150 | 1310 | BE20 | -<br>- | 1100<br>900 | 200 | 185 | 1370 |
| DRS 200L 8/4 | 11<br>22 | 143<br>142 | 735<br>1475 | 260 | 2390 | BE30 | -<br>- | 900<br>700 | 300 | 310 | 2520 |
| DRS 225S 8/4 | 14<br>28 | 182<br>181 | 735<br>1475 | 295 | 2970 | BE32 | -<br>- | 700<br>500 | 400 | 350 | 3200 |
| DRS 225M 8/4 | 18<br>34 | 230<br>220 | 740<br>1475 | 315 | 3470 | BE32 | -<br>- | 600<br>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 |

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| $n_N$ | 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 |

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

| $n_N$ | Motor type | $M_N$ | $I_N$ | BE.. | $M_B$ D1 | $M_B$ D2 | $m_B$ | $J_{Mot_BE}$ |
|---|---|---|---|---|---|---|---|---|
| | | Nm | A | | Nm | Nm | kg[1)] | $10^{-4}$ kgm$^2$ |
| 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) | △ /人人 | 400 V | | |
| | △- 人/人人 | - | 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 人 / 人, 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 人, 50 Hz can be constructed in the S1 design, besides the DRM71S12. The S1 limit voltage for the DRM71S12 is 277 V △ / 480 V 人 in the 50 Hz grid. The smallest design voltage amounts to 88 V △ / 153 V 人, 50 Hz for all S1-DRM.. sizes.

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

  voltage range of 254 – 277 V △ / 440 – 480 V 人, 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 人, 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.

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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 | △ / 人 | 3000 |
| 4-pole | △ / 人 | 1500 |
| 6-pole | △ / 人 | 1000 |
| 12-pole | △ / 人 | 0 (500) |
| | △ [1] / 人 | |
| 4/2-pole | △ / 人 人 | 1500 / 3000 |
| | 人 - △ / 人 人 | |
| 8/4-pole | △ / 人 人 | 750 / 1500 |
| | 人 - △ / 人 人 | |
| 8/2-pole | 人 / 人 | 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 人 | △ | 230 | +20 % | 0 % | -17 % | -17 % |
| AC 230 △/ 400 V 人 | 人 | 460 | +20 % | +20 % | 0 % | 0 % |
| AC 400 △/ 690 V 人 | △ | | | | | |

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)<br>with copper rotor 155 (F) |
| DRS.. (two speed) | Dahlander winding 130 (B), occasionally 155 (F)<br>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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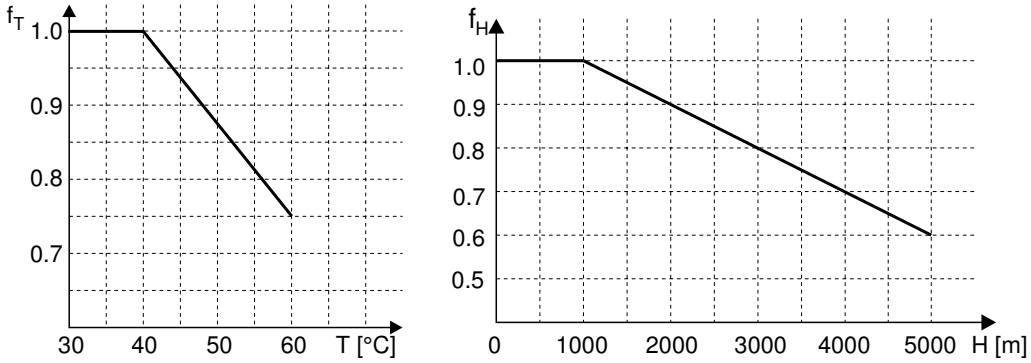
The factors $f_T$ and $f_H$ apply for the motors:




*9007207957178763*

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

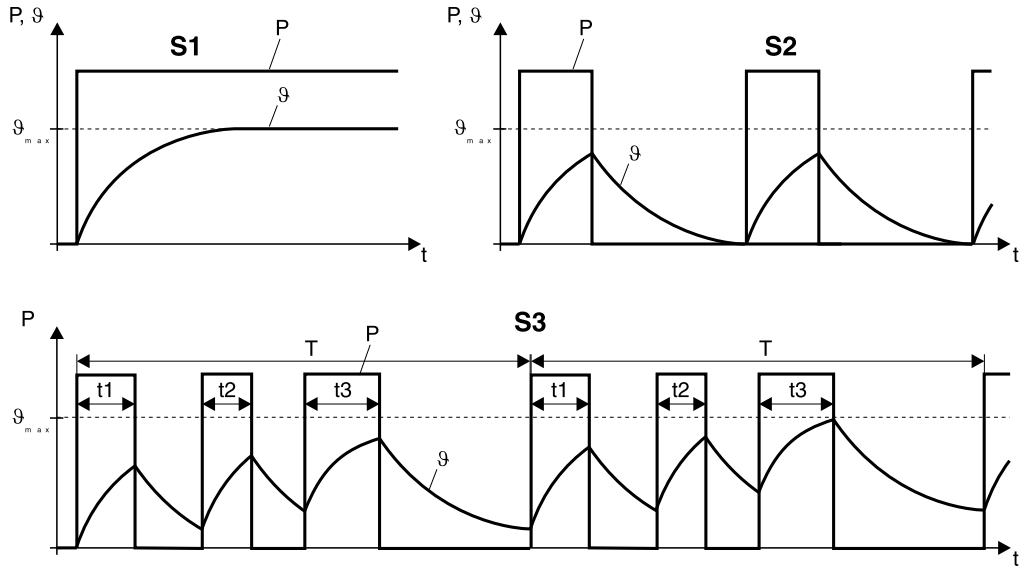
Motor standard IEC / EN 60034-1: 2011-02 defines the following operating modes, among other things.

| Designation of the operating mode | Text explanation |
|---|---|
| S1 | Continuous duty: Operation with a constant load.<br>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.<br>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.<br>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.<br>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.<br>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.<br>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.

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.<br>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.<br>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.<br>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. |

### 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 |

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## 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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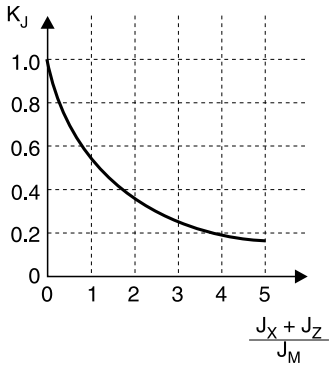
### 6.3.3 Permitted starting frequency of the motor

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

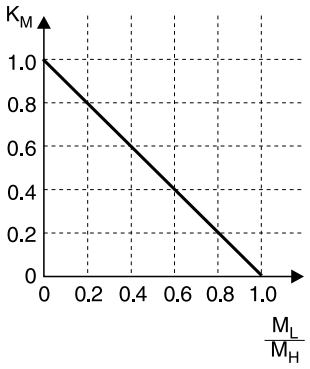
$$\mathbf{Z = Z_0 \times K_J \times K_M \times K_P}$$

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

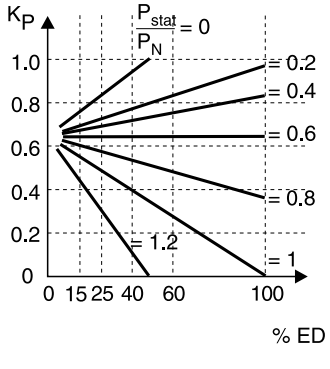
Depending on the additional moment of inertia




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<br>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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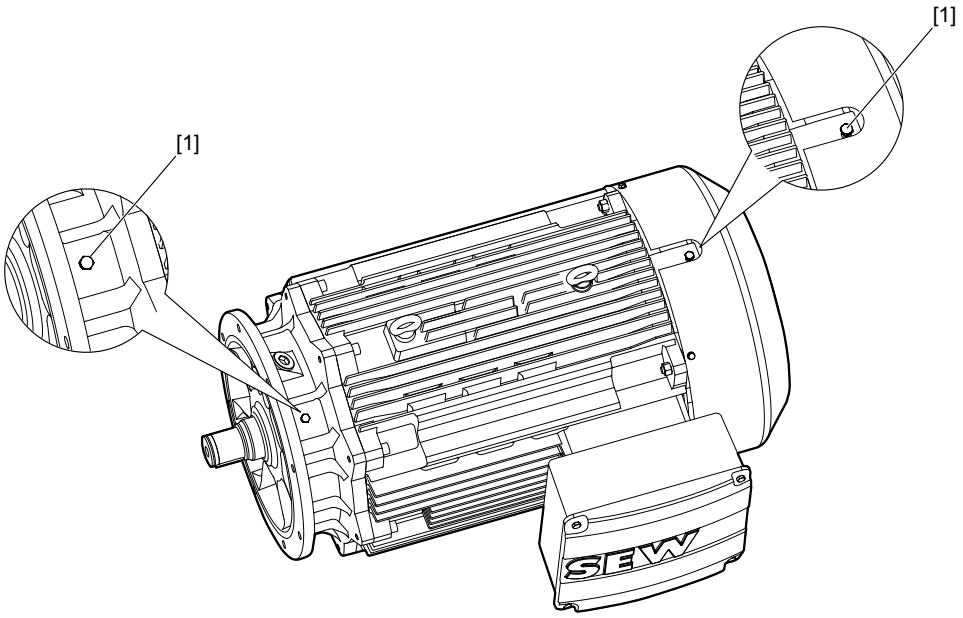
### 6.4.4 Vibration monitoring

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.

| Motor type | A-side bearings | | B-side bearings | |
|---|---|---|---|---|
| | Foot-mounted and/or Flange-mounted motor | Gearmotor | Motor | Brakemotor |
| DR.71 | 6204-2Z-J-C3 | 6303-2Z-J-C3 | 6203-2Z-J-C3 | 6203-2RS-J-C3 |
| DR.80 | 6205-2Z-J-C3 | 6304-2Z-J-C3 | 6304-2Z-J-C3 | 6304-2RS-J-C3 |
| DR.90/100 | 6306-2Z-J-C3 | | 6205-2Z-J-C3 | 6205-2RS-J-C3 |
| DR.112/132 | 6308-2Z-J-C3 | | 6207-2Z-J-C3 | 6207-2RS-J-C3 |
| DR.160 | 6309-2Z-J-C3 | | 6209-2Z-J-C3 | 6209-2RS-J-C3 |
| DR.180 | 6312-2Z-J-C3 | | 6213-2Z-J-C3 | 6213-2RS-J-C3 |
| DR.200/225 | 6314-2Z-J-C3 | | 6214-2Z-J-C3 | 6214-2RS-J-C3 |

| 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.250 | 6317-2Z-C4 | | 6315-2Z-C3 | |
| DR.280 | | | | |
| DR.250../NS | 6317-C4 | | 6315-C3 | |
| DR.280../NS | | | | |
| DR.250../ERF/NS | NU 317 E C3 | | | |
| DR.280../ERF/NS | | | | |

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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<br>DR.315K../NS | 6319-J-C3 | 6319-J-C3 | 6319-J-C3 | 6319-J-C3 |
| DR.315S<br>DR.315S../NS | | | | |
| DR.315M<br>DR.315M../NS | | 6322-J-C3 | | 6322-J-C3 |
| DR.315L<br>DR.315L../NS | | | | |
| DR.315K../ERF/NS | NU 319 E | | 6319-J-C3 | 6319-J-C3 |
| DR.315S../ERF/NS | | | | |
| DR.315M../ERF/NS | | | | 6322-J-C3 |
| DR.315L../ERF/NS | | | | |

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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.

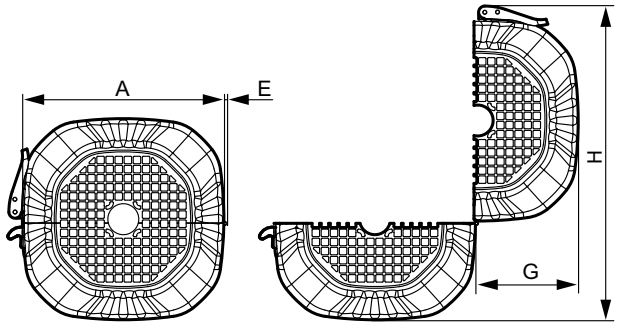
### 6.8.3 Axially separable fan guards on the brakemotor, brakemotor with encoder or with a second shaft end

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<br>in mm | Radial for separated brakemotor fan guards (A+E+G) × H<br>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<br>in mm | Radial for separated brakemotor fan guards (A+E+G) × H<br>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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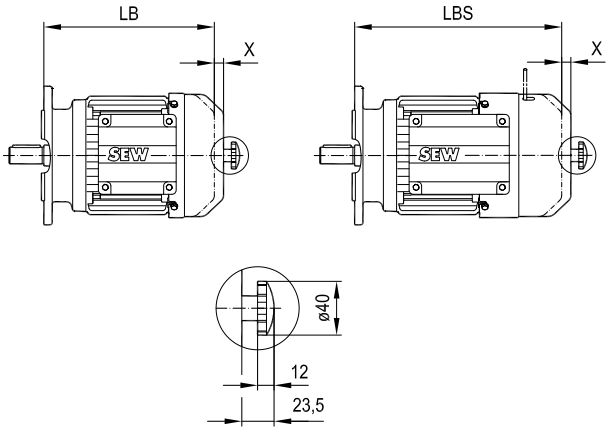
### 6.8.4 Air filter

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 |

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### 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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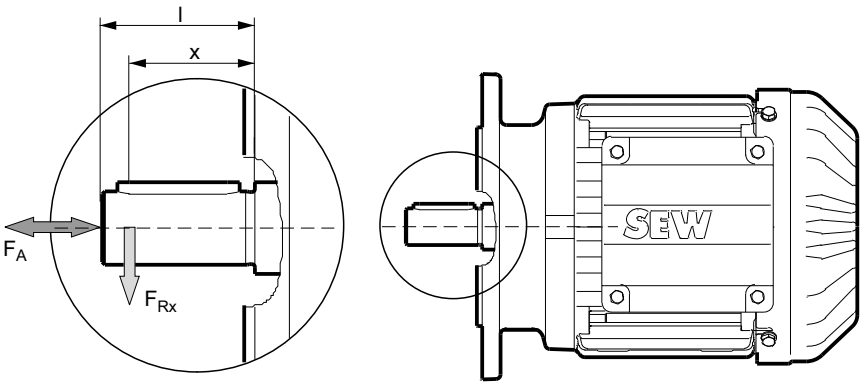
## 6.10 Overhung and axial loads

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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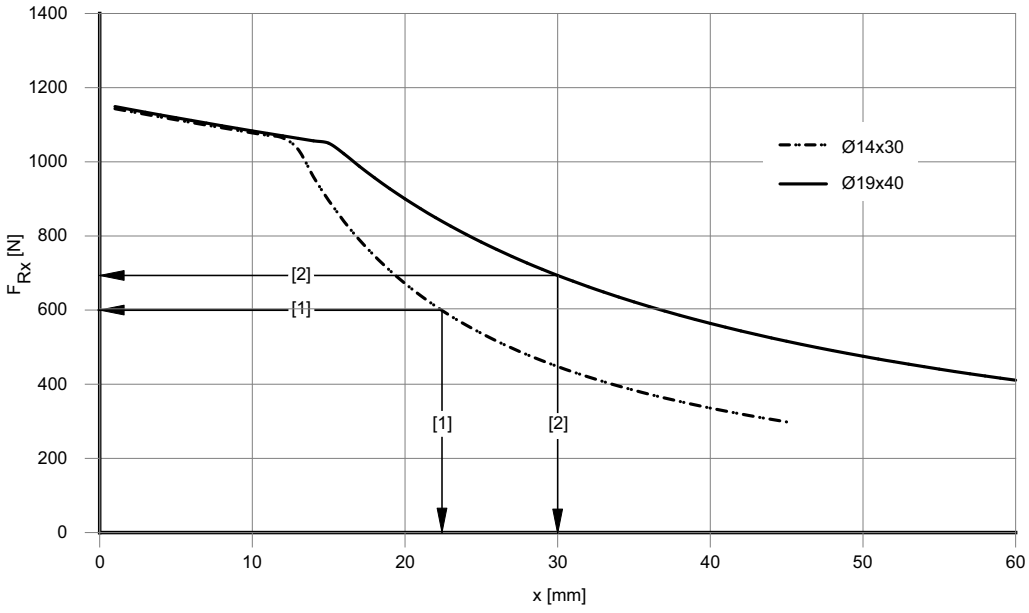
l = Length of the shaft end
x = Distance between overhung load application point and shaft shoulder
$F_{Rx}$ = Overhung load at force application point
$F_A$ = Axial force

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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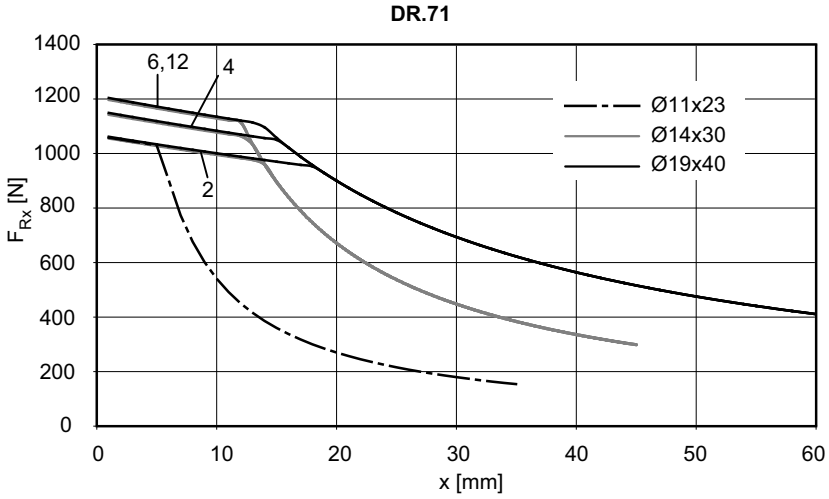
### 6.10.8 Overhung load diagrams for 2-, 4-, 6-, 12-pole motors

**Overhung load diagram for DR.71**

Overhung load diagrams for 2-, 4-, 6-, 12-pole DR.71 motors:

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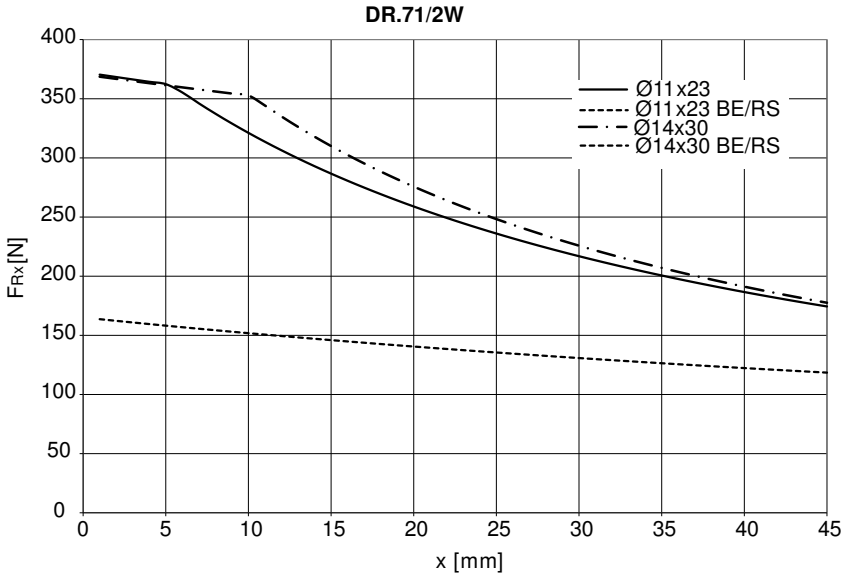
2: 2-pole 4: 4-pole 6, 12: 6- and 12-pole

**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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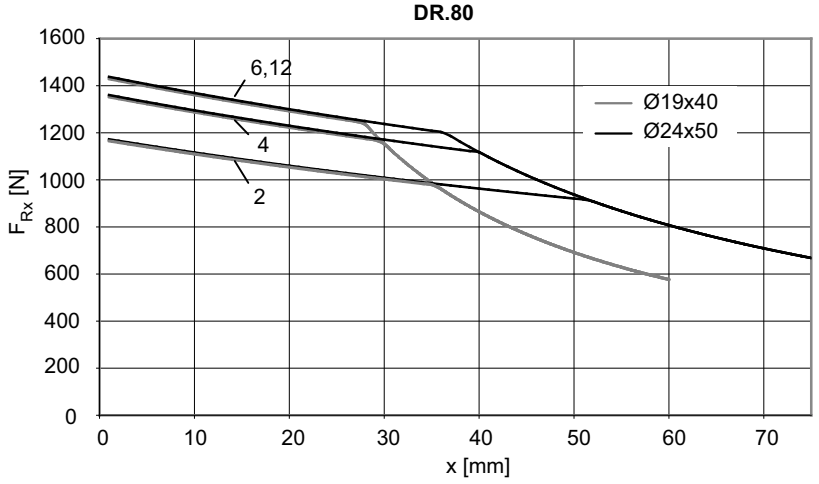
### Overhung load diagram for DR.80

Overhung load diagram for 2-, 4-, 6-, 12-pole DR.80 motors:

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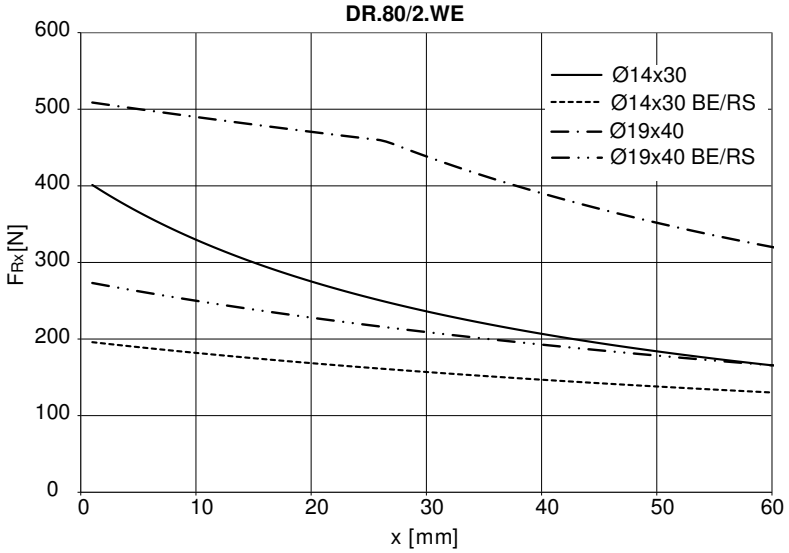
2: 2-pole 4: 4-pole 6, 12: 6- and 12-pole

### 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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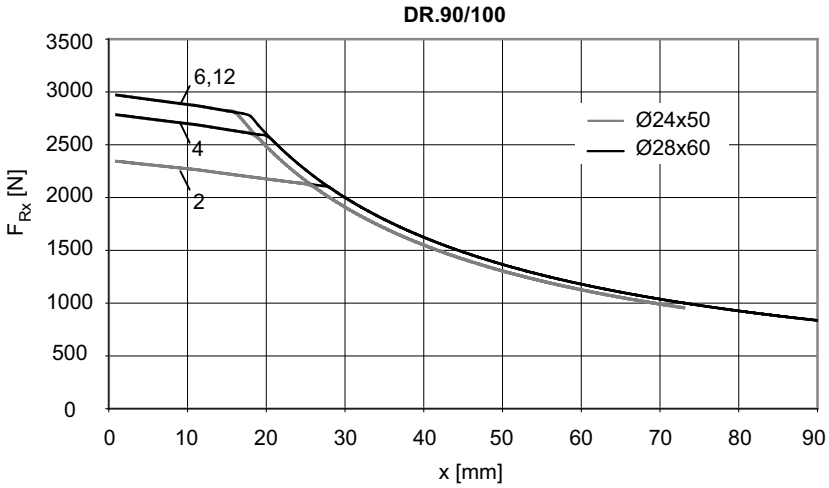
### Overhung load diagram for DR.90 and DR.100

Overhung load diagram for 2-, 4-, 6-, 12-pole DR.90 and DR.100 motors:

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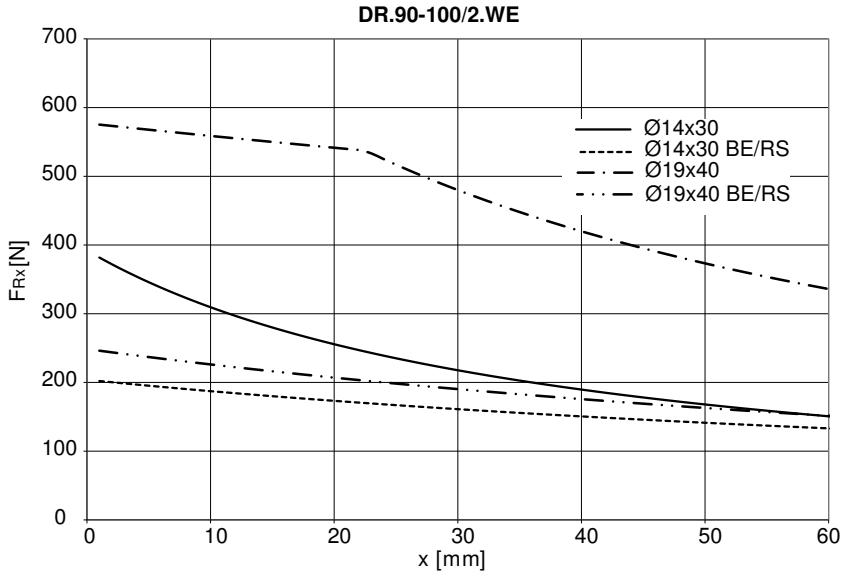
2: 2-pole 4: 4-pole 6, 12: 6- and 12-pole

### 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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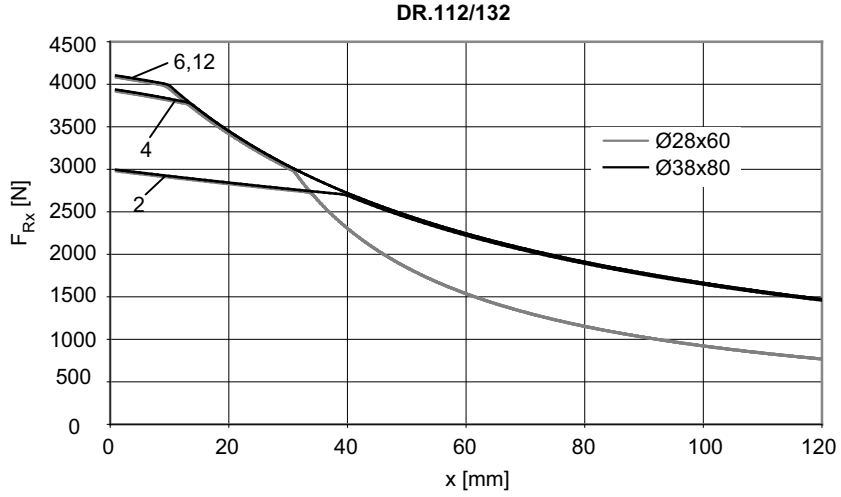
### Overhung load diagram for DR.112 and DR.132

Overhung load diagram for 2-, 4-, 6-, 12-pole DR.112 and DR.132 motors:

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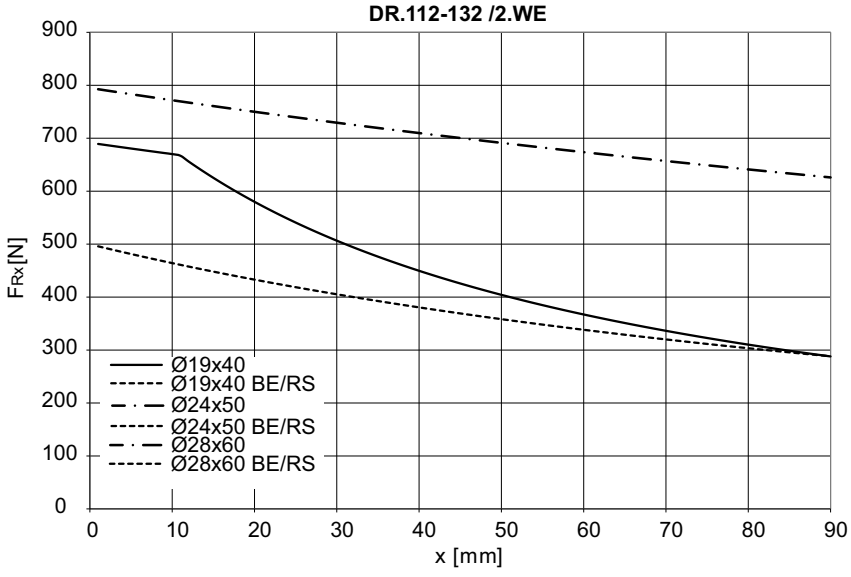
2: 2-pole 4: 4-pole 6, 12: 6- and 12-pole

### 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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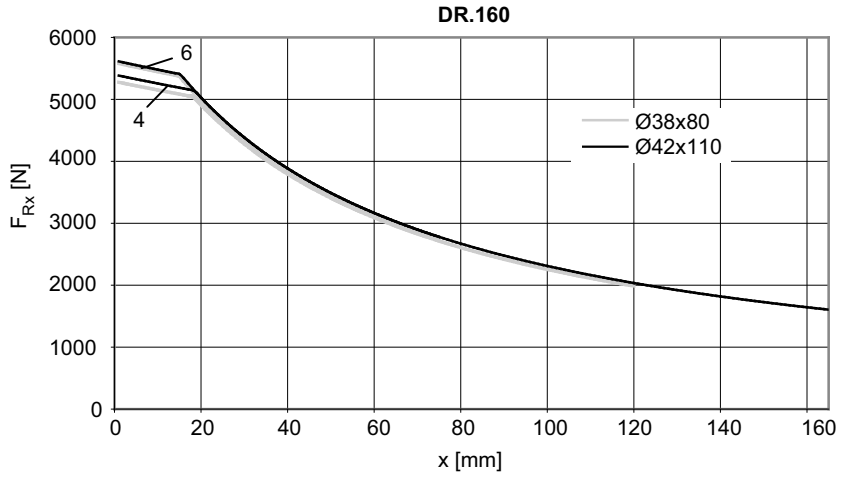
### Overhung load diagram for DR.160

Overhung load diagram for 4- and 6-pole DR.160 motors:

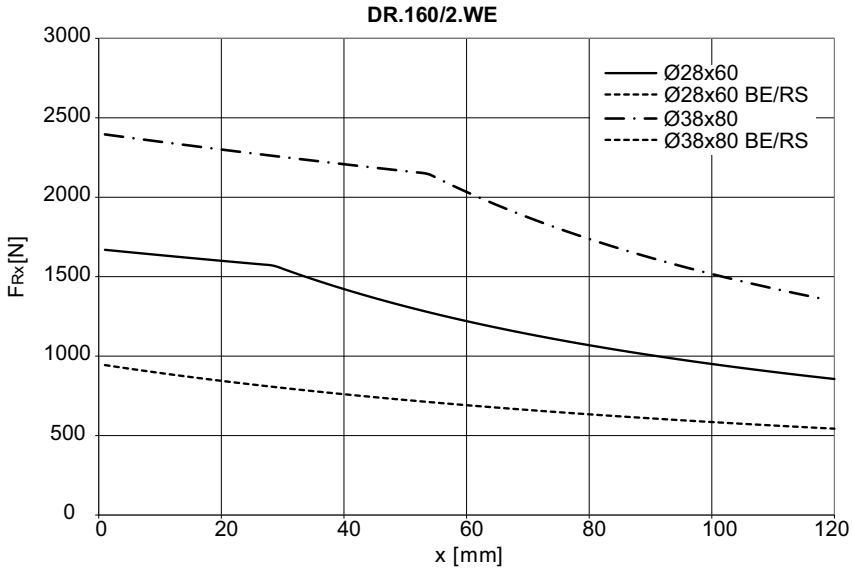



*3980520843*

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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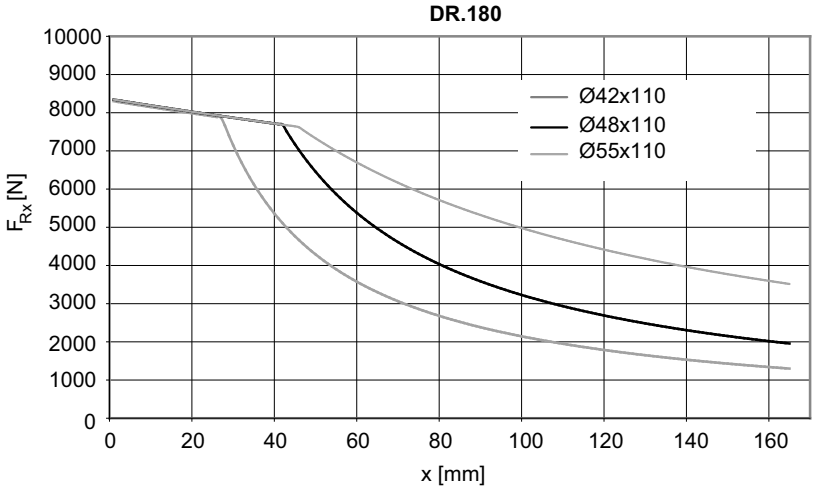
### Overhung load diagram for DR.180

Overhung load diagram for 4-pole DR.180 motors:

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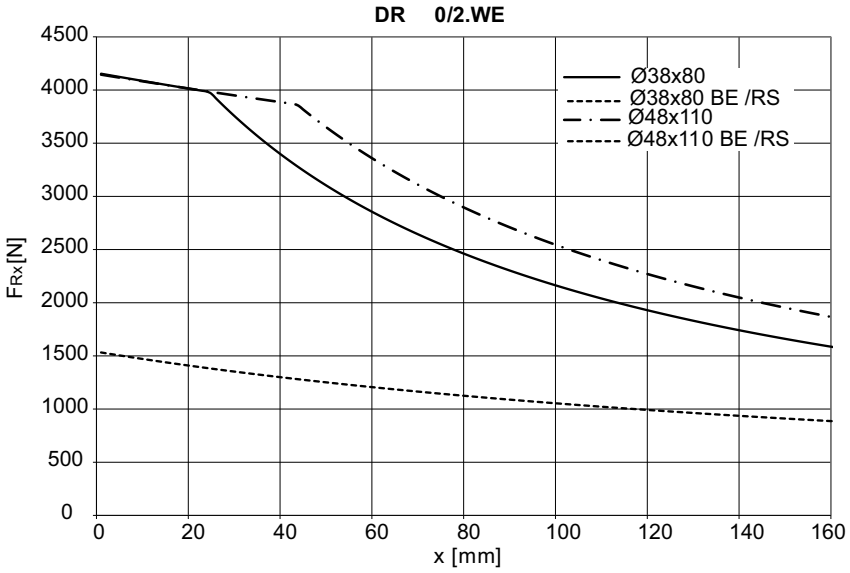
### Overhung load diagram for DR.180 at the second shaft end

Overhung load diagram for 4-pole DR.180 motors at the second shaft end:

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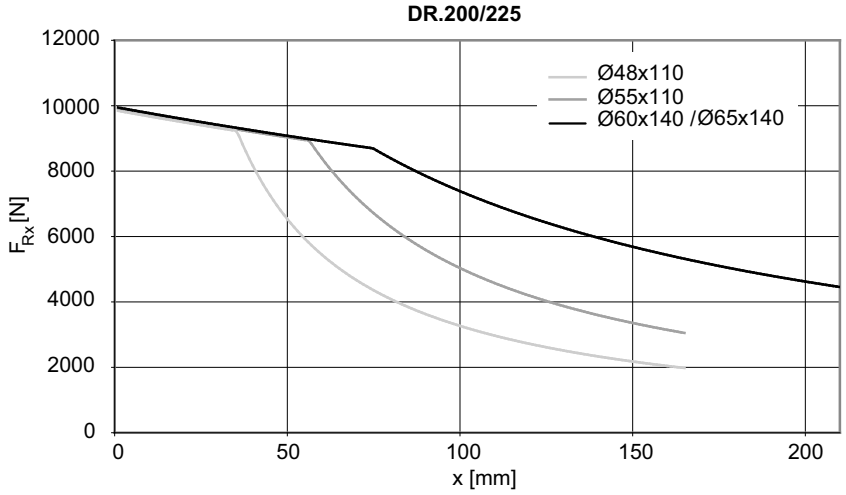
### Overhung load diagram for DR.200 and DR.225

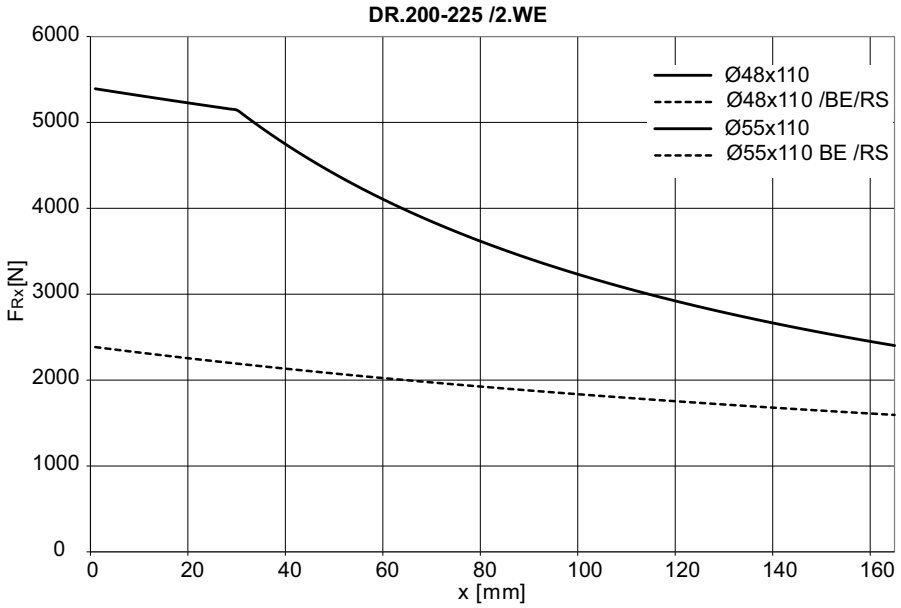
Overhung load diagram for 4-pole DR.200 and DR.250 motors:




*3980531595*

### 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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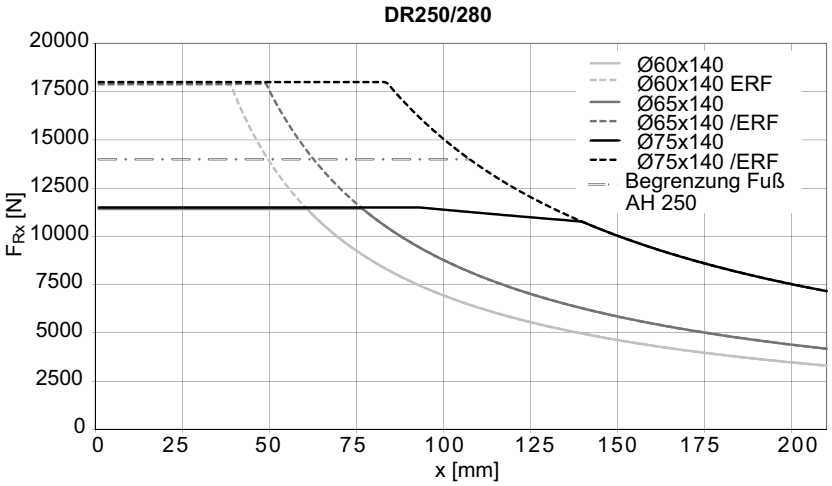
### Overhung load diagram for DR.250 and DR.280

Overhung load diagram for 4-pole DR.250 and DR.280 motors:

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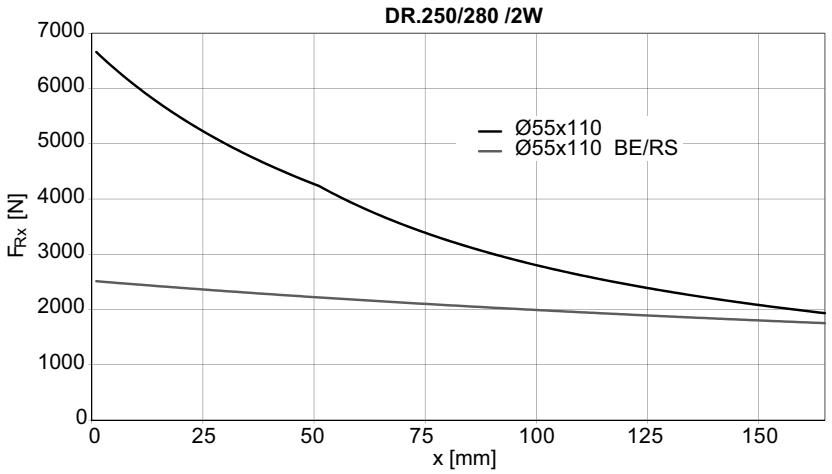
### Overhung load diagram for DR.250 and DR.280 at the second shaft end

Overhung load diagram for 4-pole DR.250 and DR.280 motors at the second shaft end:

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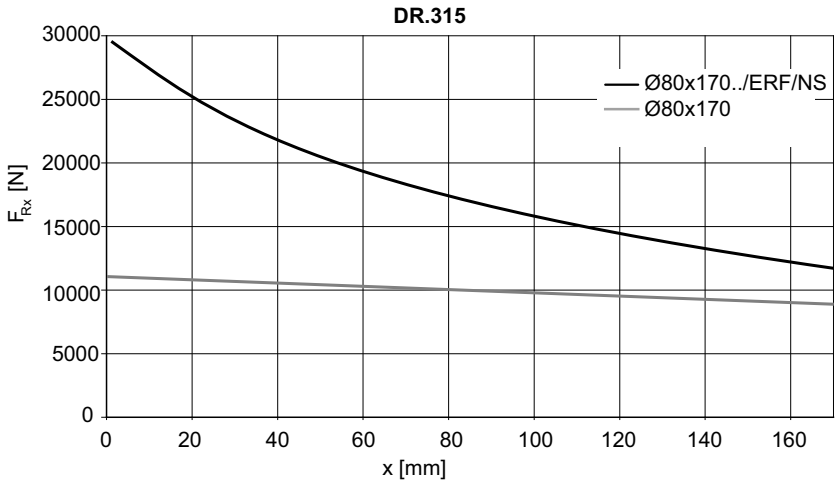
### Overhung load diagram for DR.315

Overhung load diagram for 4-pole DR.315 motors:

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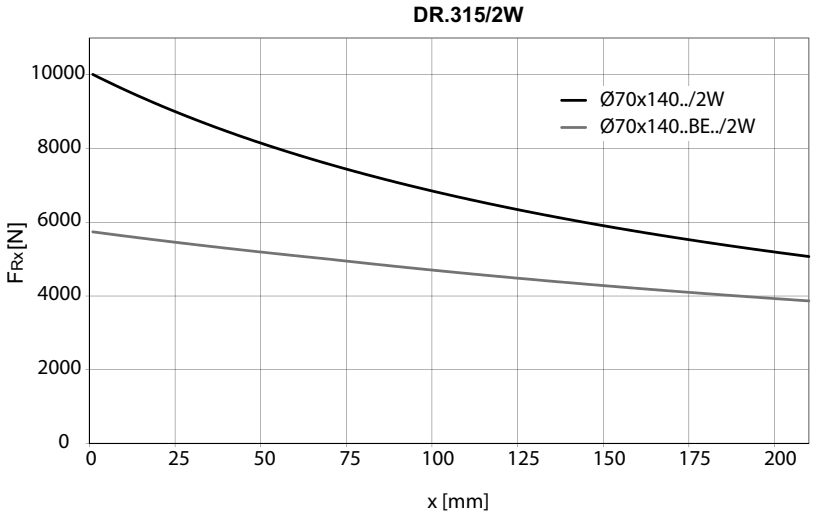
## INFORMATION

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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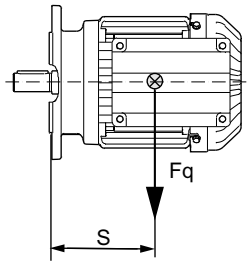
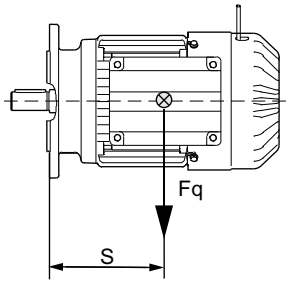
## 6.11 Center of gravity of motors

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.

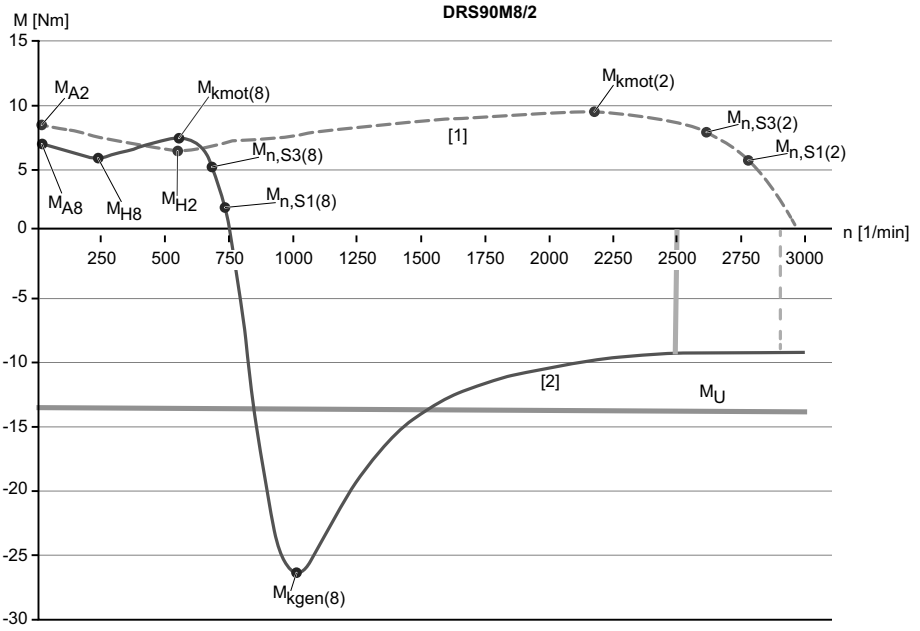
$M_U = f_U \times M_{A8}$

$M_U$ = 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 |

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### $M_U$ 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 |



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### $M_U$ 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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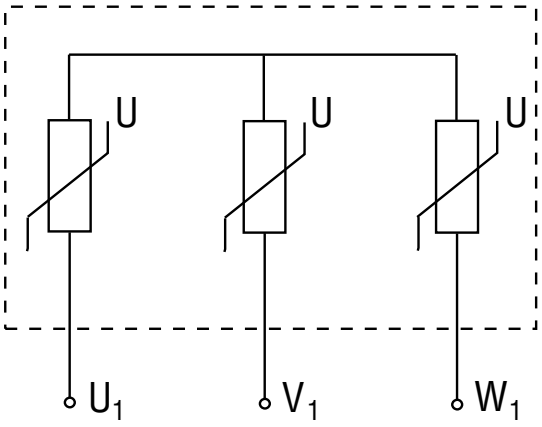
## 6.14 Drive selection – DRM.. torque motors

### 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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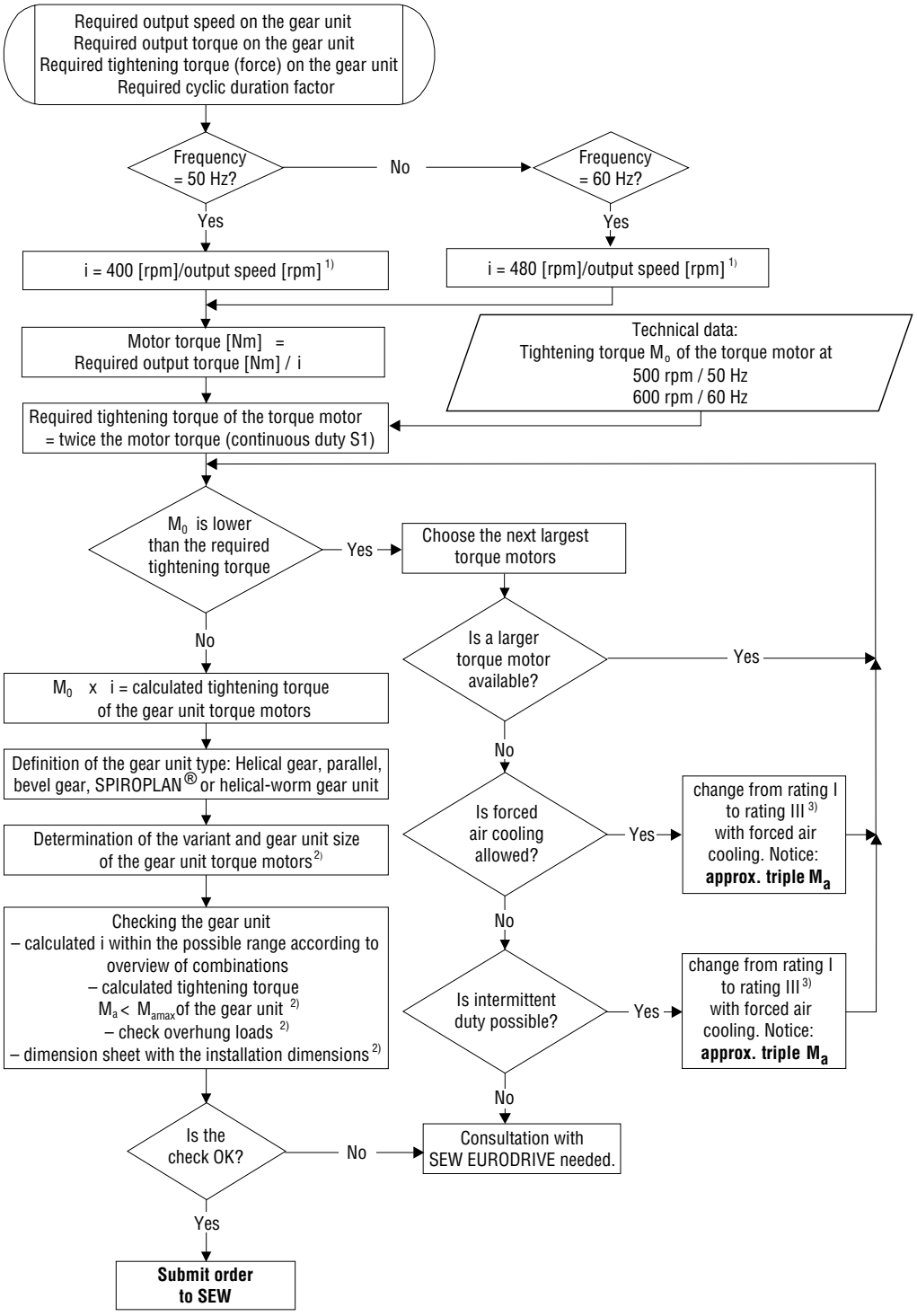


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1) The speeds of 400 and 480 rpm during operation with approx. half the initial torque only serve to calculate the required gear ratio

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

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## 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

↓

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**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.

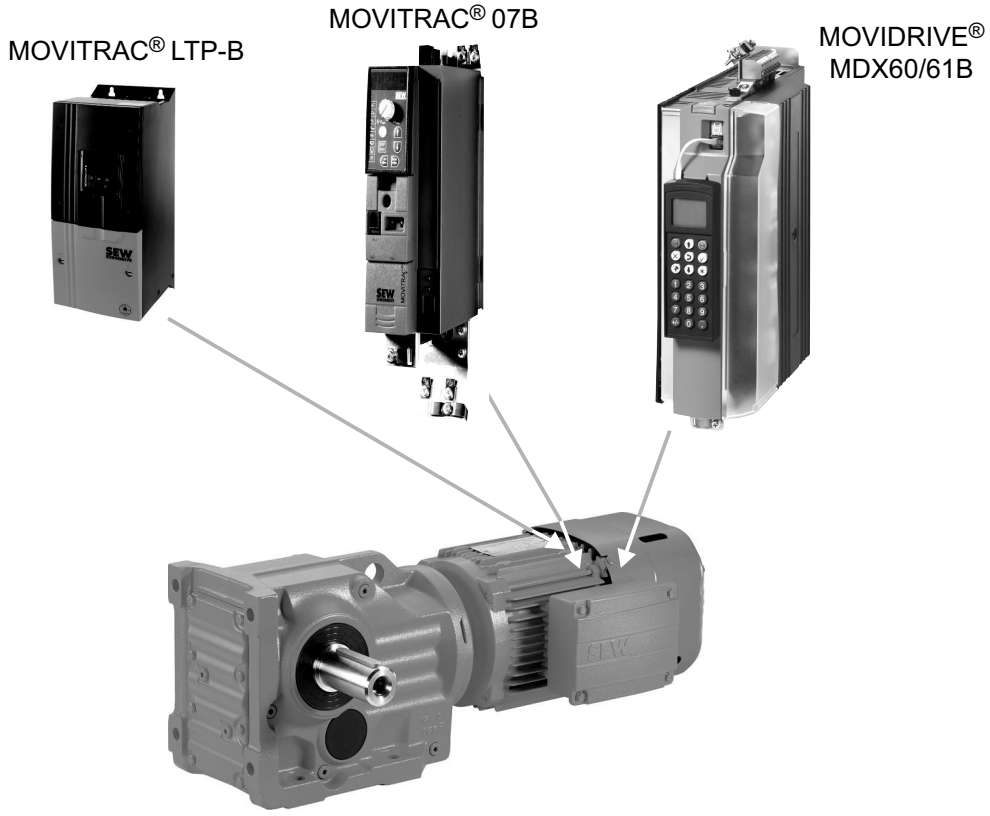
The following inverters are available for voltage-controlled flux vector control (VFC):

- **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<br>(0.75 to 2.2 kW)<br>3 × 200 – 240 V AC<br>(0.75 to 75 kW)<br>3 × 380 – 480 V AC<br>(0.75 to 160 kW)<br>3 × 500 – 600 V AC<br>(0.75 to 110 kW) | 1 × 200 – 240 V AC (limited power range)<br>3 × 200 – 240 V AC (limited power range)<br>3 × 380 – 500 V AC | 3 × 200 – 240 V AC (limited power range)<br>3 × 380 – 500 V AC |
| Power range | 0.75 – 15 kW (IP20)<br>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<br>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<br>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<br>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<br>Synchronous operation<br>Absolute encoder card<br>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.



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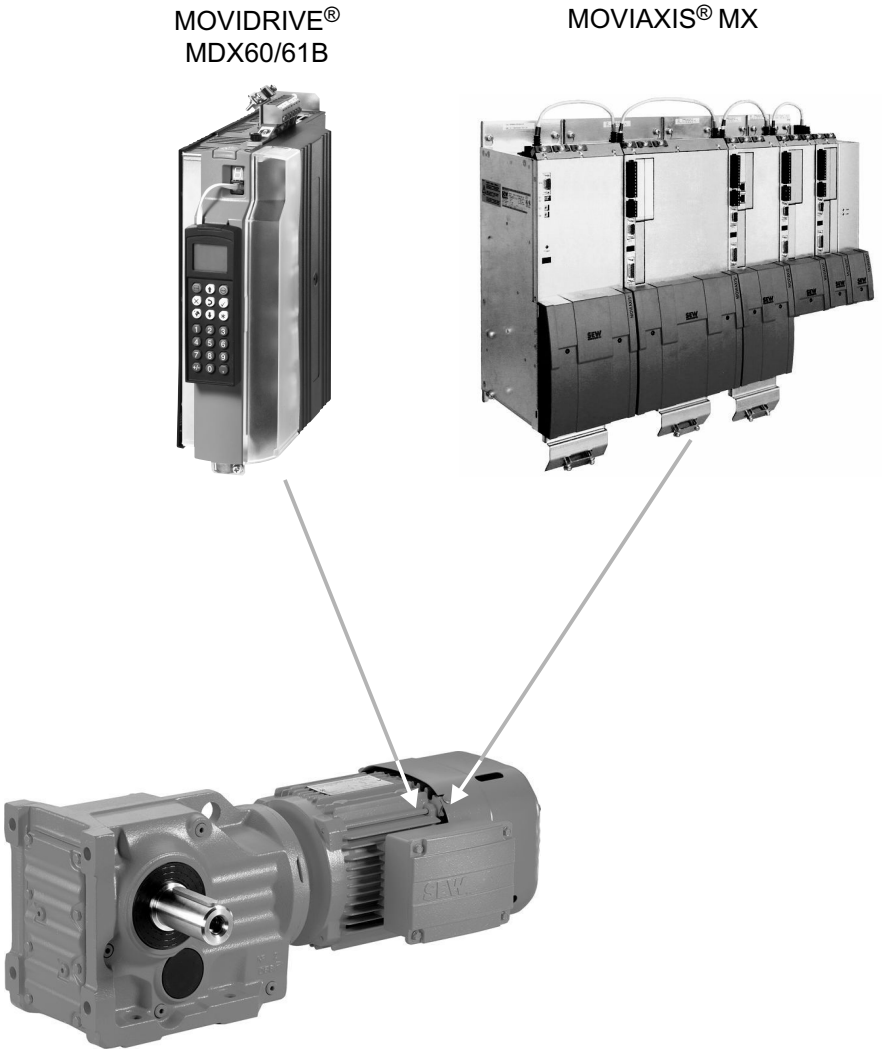
### 6.15.3 Inverter operation of DRL.. motors in CFC mode

**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<br>(1.5 to 30 kW)<br>3 × 380 – 500 V AC<br>(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<br>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)<br>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<br>Synchronous operation<br>Absolute encoder card<br>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

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$n_{base}$ = 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.

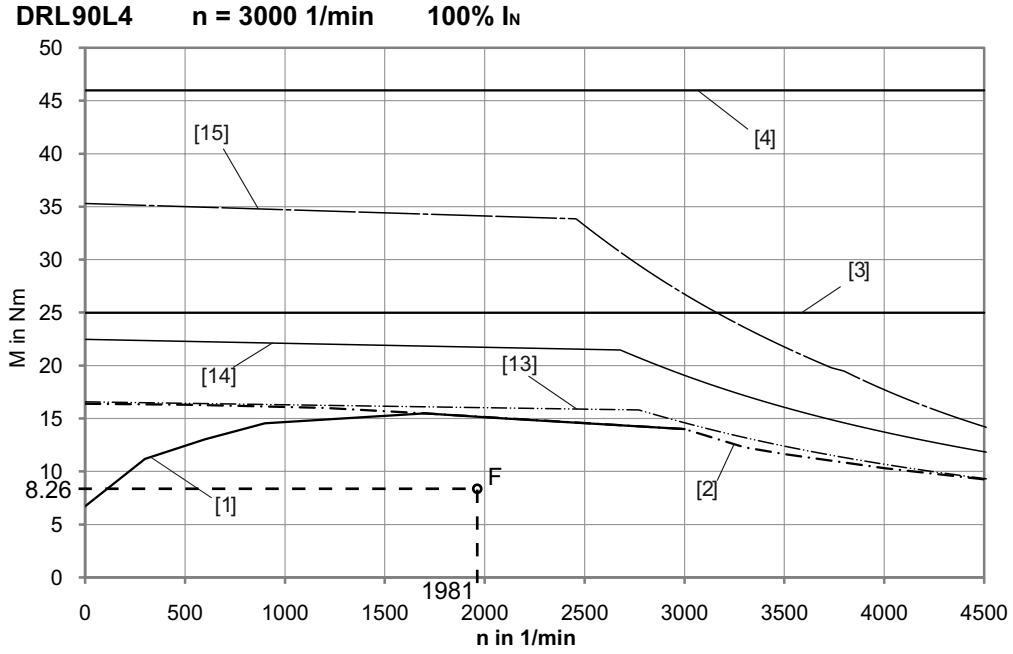
### MOVIDRIVE® B inverter selection



- 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:

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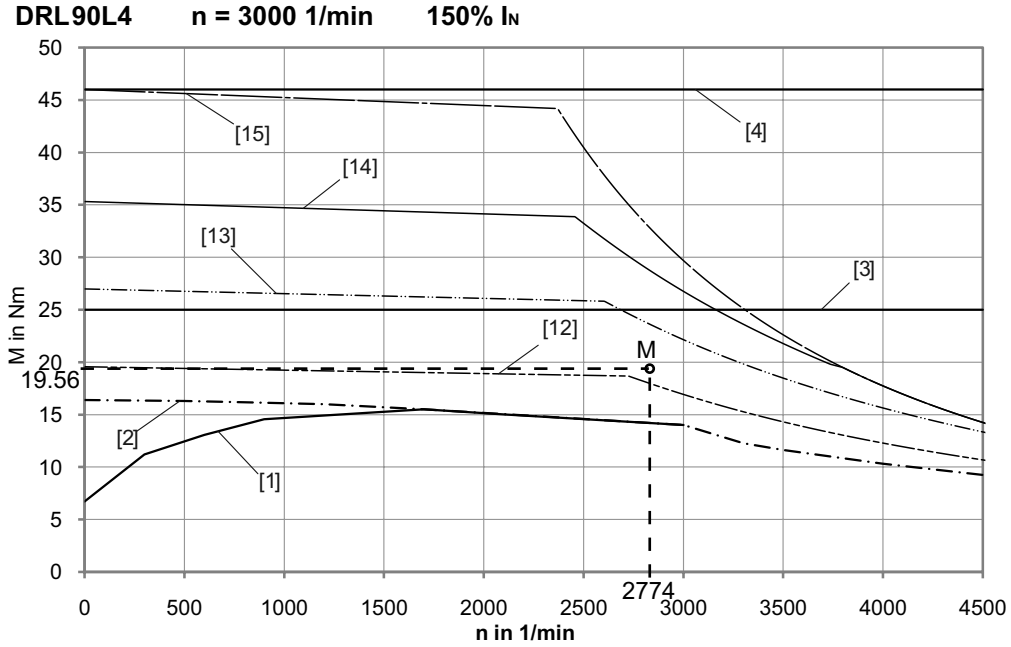
| | | | |
|---|---|---|---|
| [1] | S1 characteristic curve | [13] | 5.5 kW inverter power |
| [2] | S1 characteristic curve with forced cooling fan | [14] | 7.5 kW inverter power |
| [3] | Maximum limit torque of dynamics package 1 | [15] | 11 kW inverter power |
| [4] | Maximum limit torque of dynamics package 2 | | |

DRL90L4, $n_N$ = 3000 rpm, 150% $I_N$

Determining the maximum operating point:

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| | | | |
|---|---|---|---|
| [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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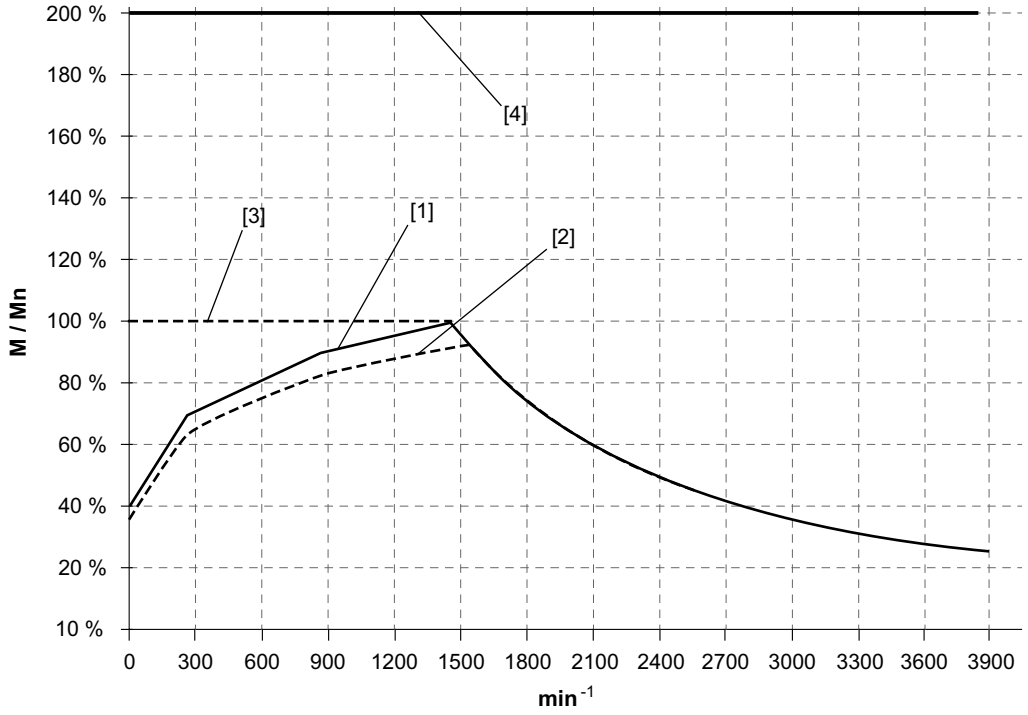
*$f_{base}$ = 50 Hz (400 V ⅄, 50 Hz) – DRS.. motor*

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).

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[1] S1 operation with self-cooling (= without optional forced cooling fan)

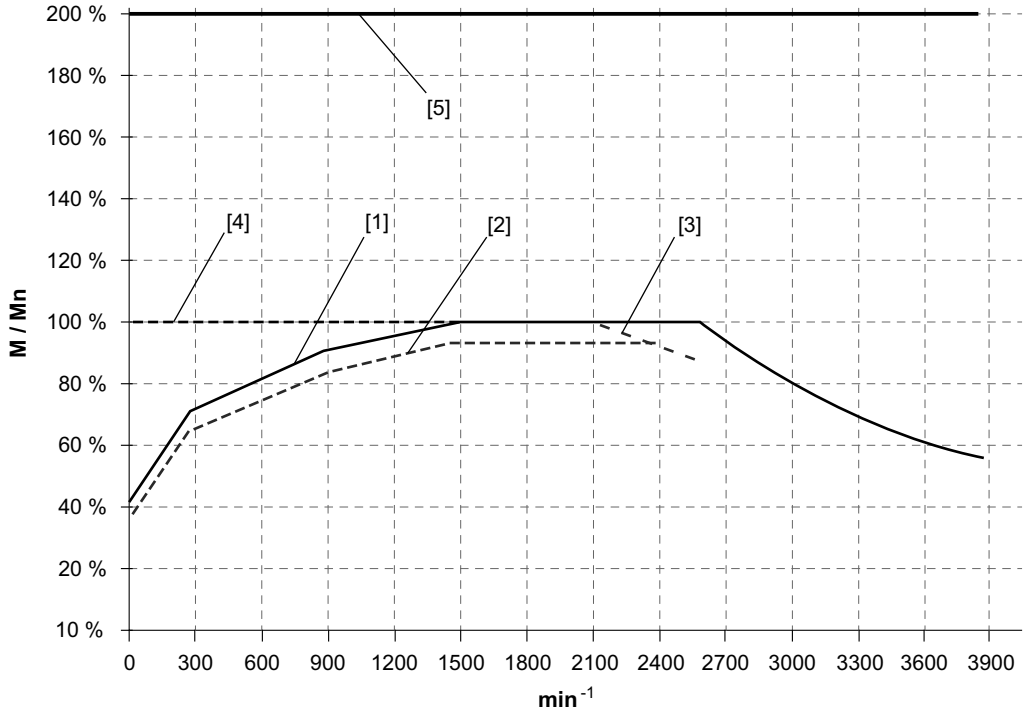
[2] S1 operation with self-cooling (= without optional forced cooling fan) for DRS280M4

[3] S1 operation with forced cooling (= with optional forced cooling fan)

[4] Mechanical limitations for gearmotors

*$f_{base}$ = 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).

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[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

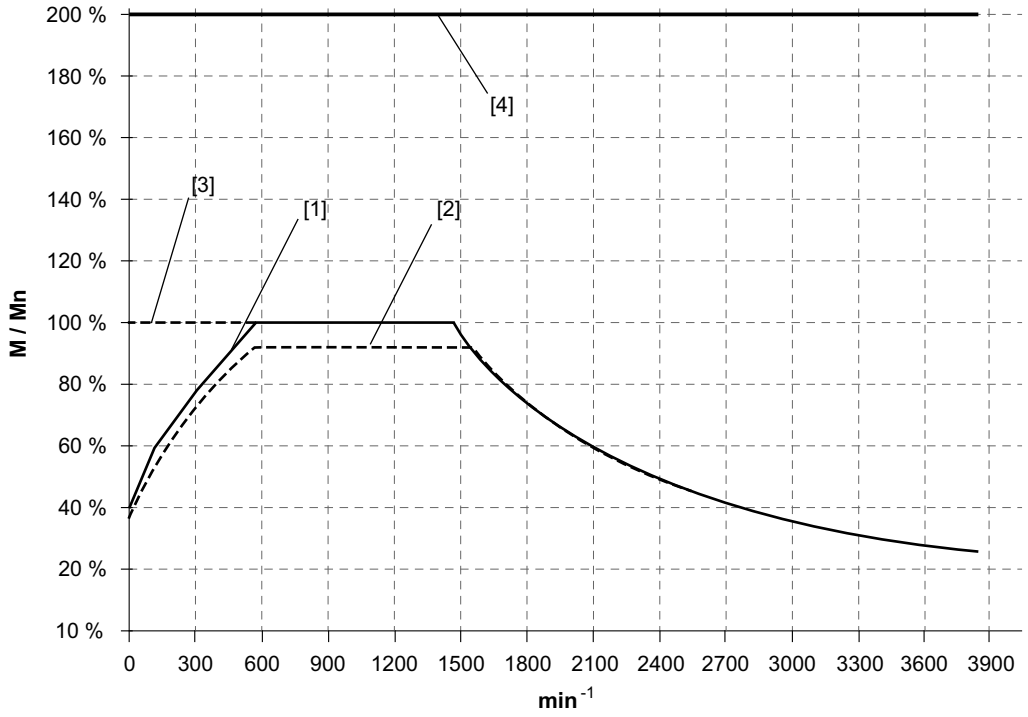
The following conditions apply to the shown limit curves:

- Motor in duty type S1 on 50 Hz supply system
- Line voltage of motor 230 V △ / 400 V 人 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 人 , 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 "人" at 400 V. Separate curves are provided for motors with self-cooling and forced cooling (optional /V forced cooling fan).

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[1] S1 operation with self-cooling (= without optional forced cooling fan)

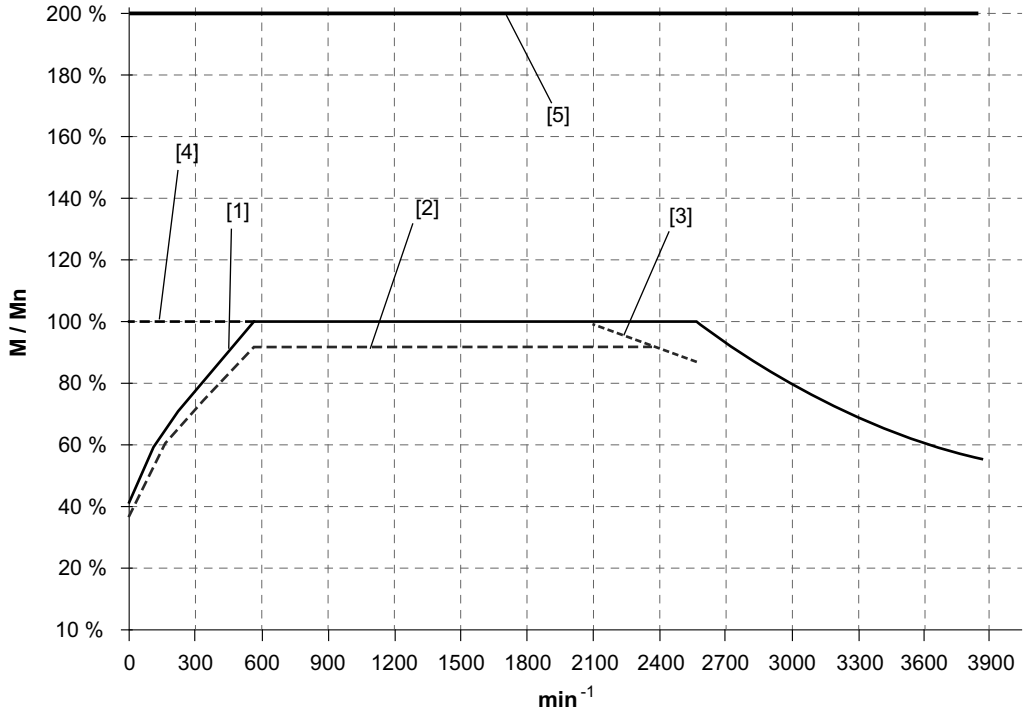
[2] S1 operation with self-cooling (= without optional forced cooling fan) for DRE280M4

[3] S1 operation with forced cooling (= with optional forced cooling fan)

[4] Mechanical limitations for gearmotors

*$f_{base}$ = 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)

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- 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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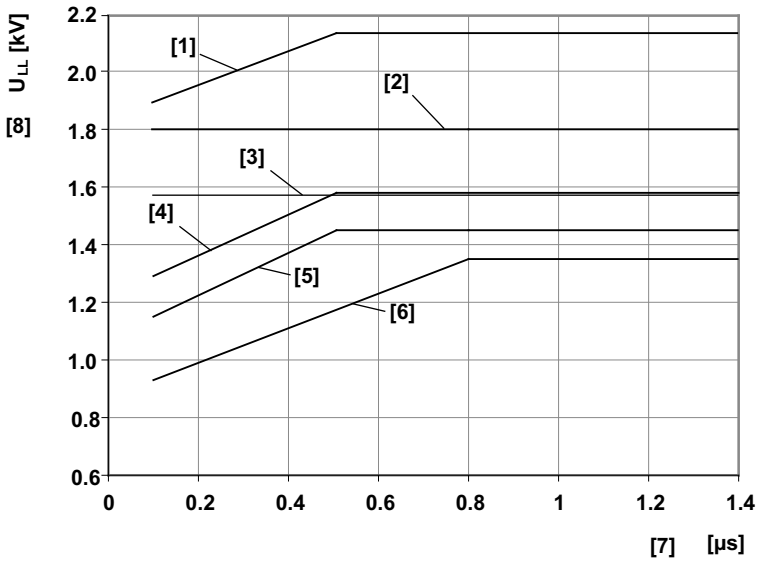
### 6.15.8 DR.. AC motors on non-SEW inverters

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, $U_N \leq 500$ V

[4] Permitted pulse voltage according to IEC 60034-25, limit value curve A for nominal voltage $U_N \leq 500$ V, star connection

[5] Permitted pulse voltage according to IEC 60034-25, limit value curve A for nominal voltage $U_N \leq 500$ 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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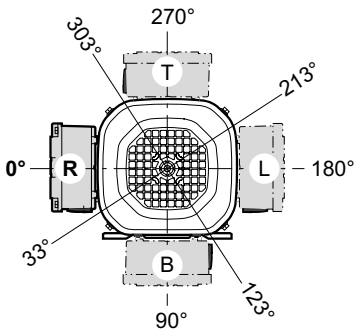
# 7 Dimension sheets for DR.. motors/brakemotors

## 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 | > 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)

### 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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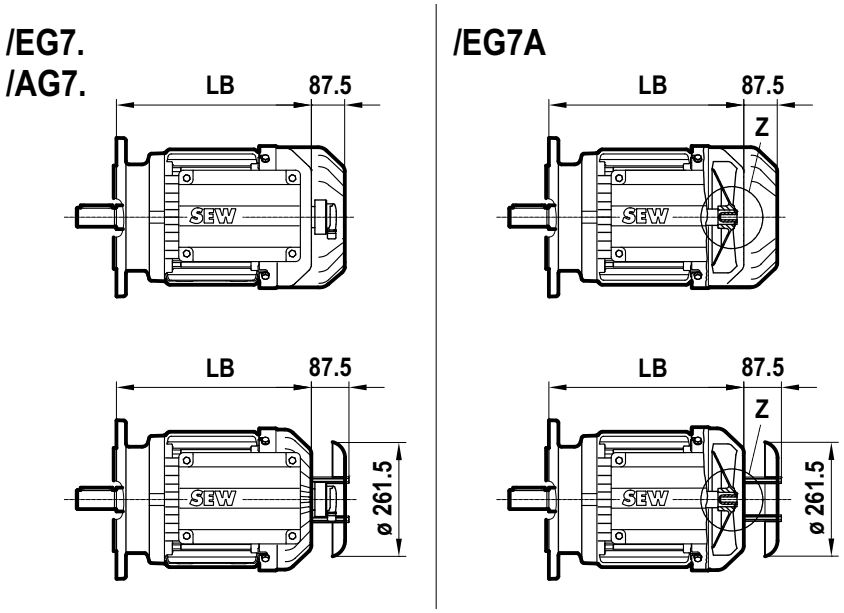
The standard cover is similar to the canopy design. Customers can choose to replace this version with an extended fan guard. The lower diagrams show the standard version, while the upper diagrams show the optional extended fan guard.

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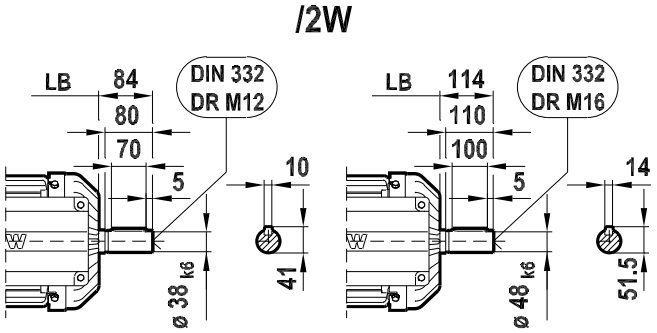
**2. Shaft end**

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.

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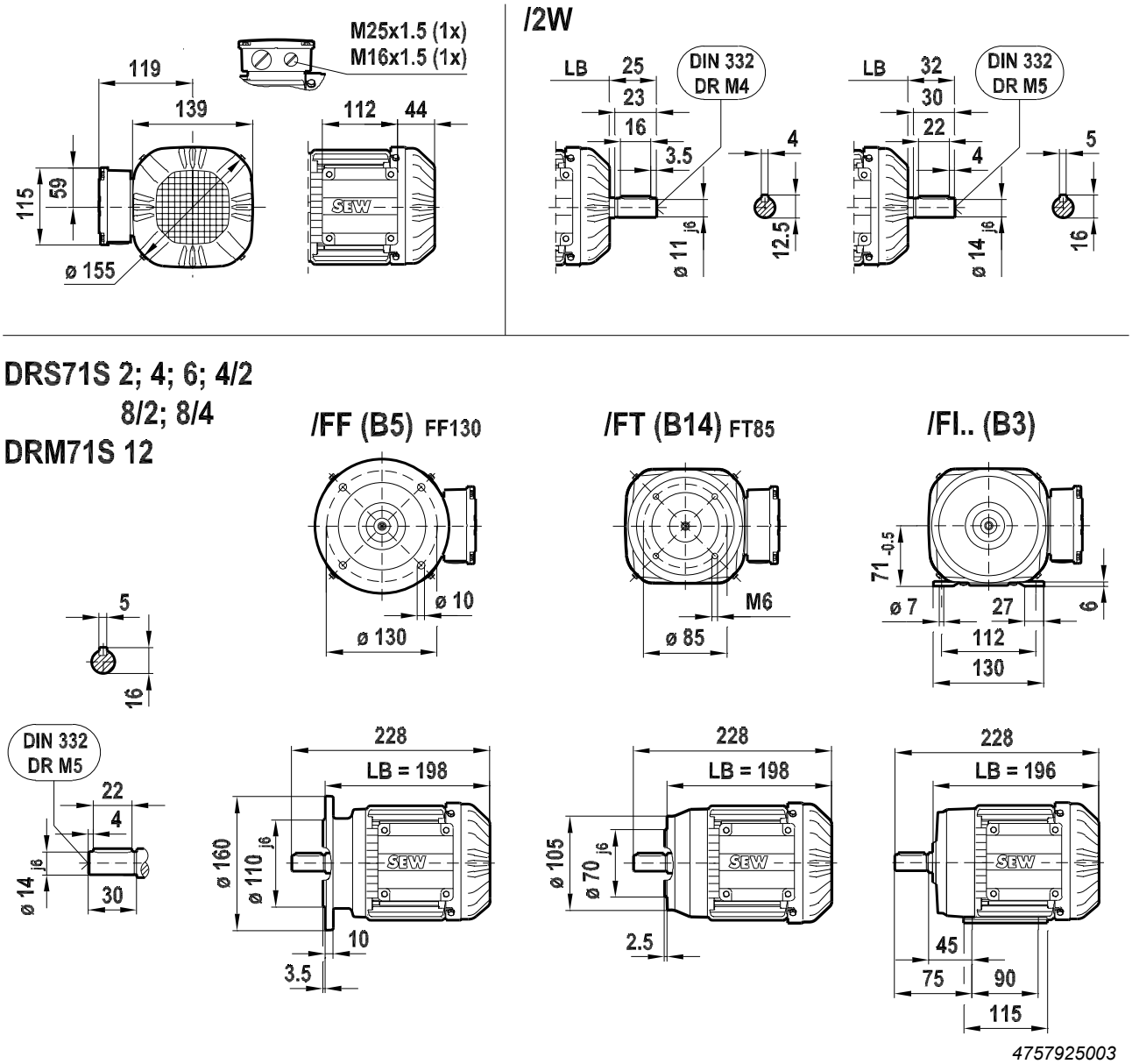
## 7.2 Dimension sheets for DR.. motors/brakemotors

**DR.71S**

**08 191 03 06**
1 (2)

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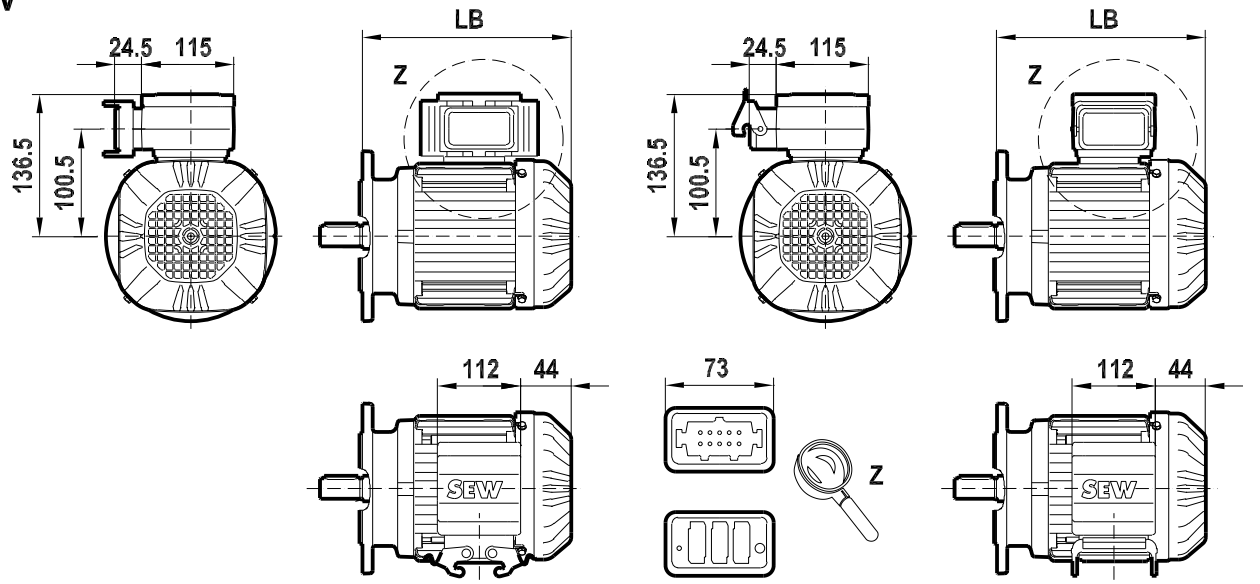
## DR.71S

08 191 04 06
2 (2)

/IV

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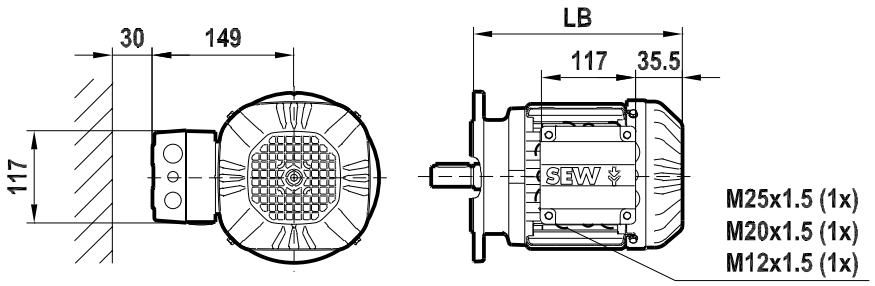


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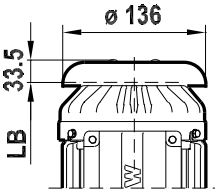


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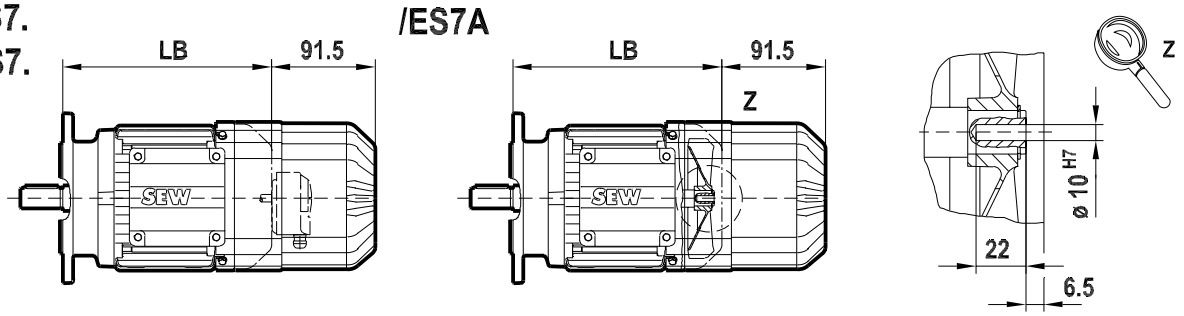
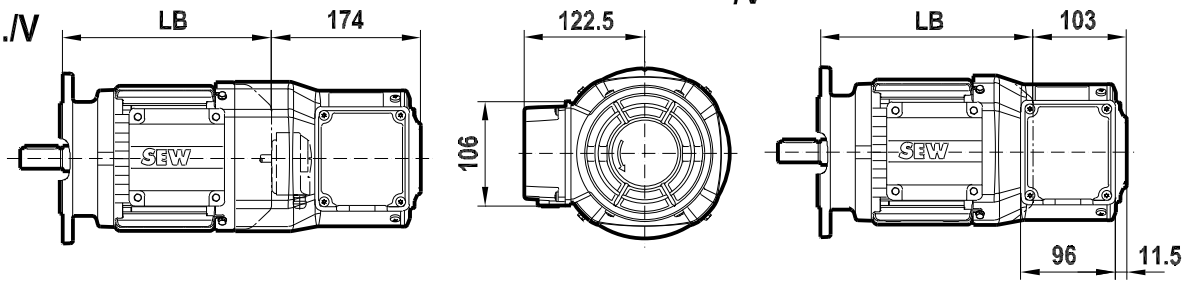
/AS7.

/ES7A




/ES7./V
/AS7./V

/V

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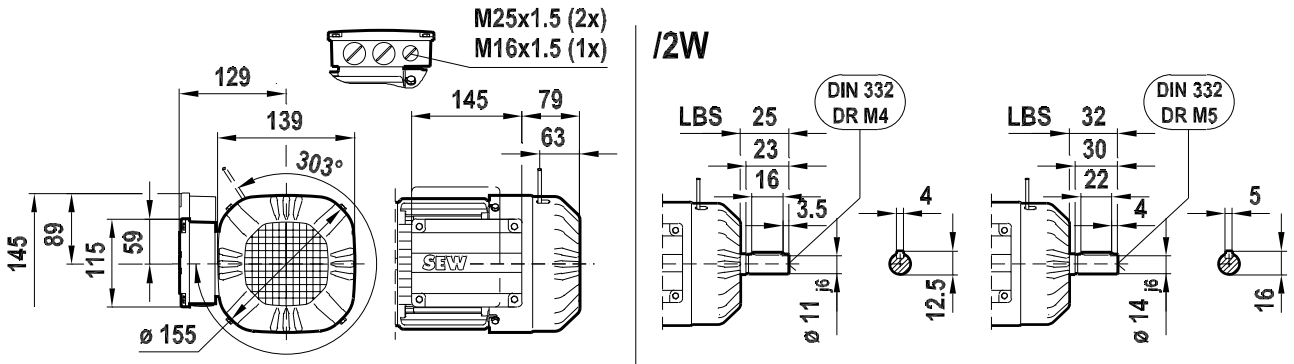
## DR.71S BE

09 151 04 06

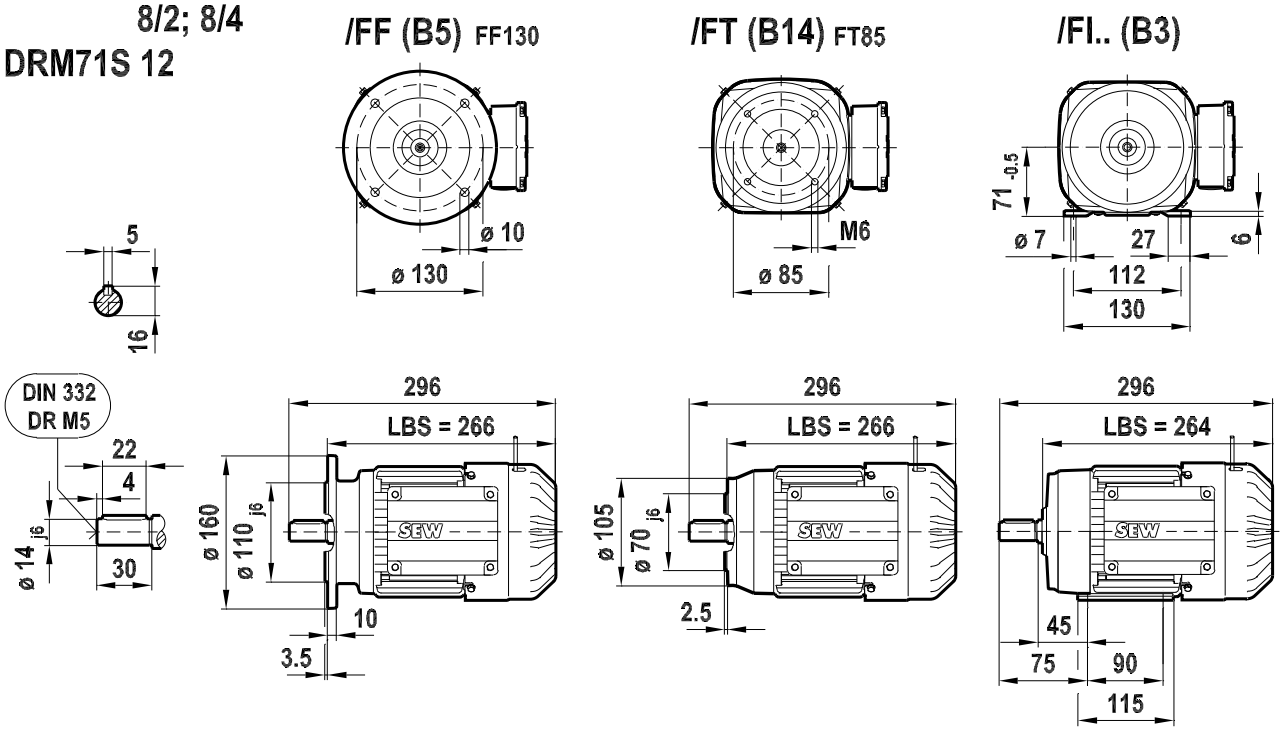



## DRS71S 2; 4; 6; 4/2 8/2; 8/4
## DRM71S 12

/FF (B5) FF130

/FT (B14) FT85

/FI.. (B3)

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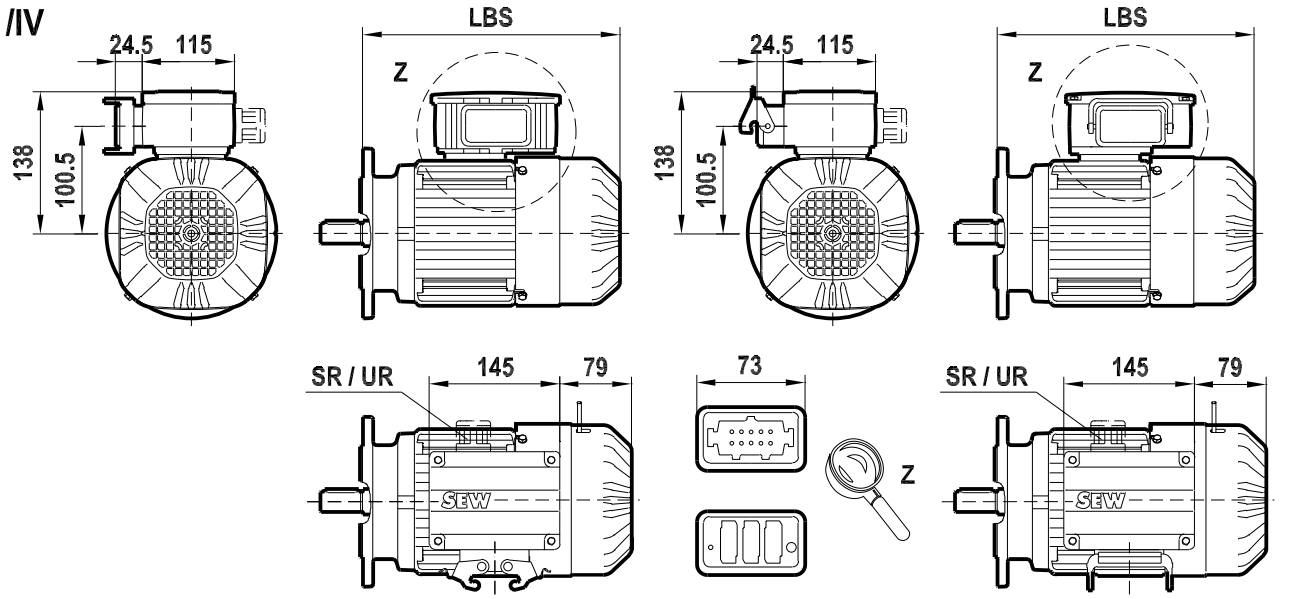
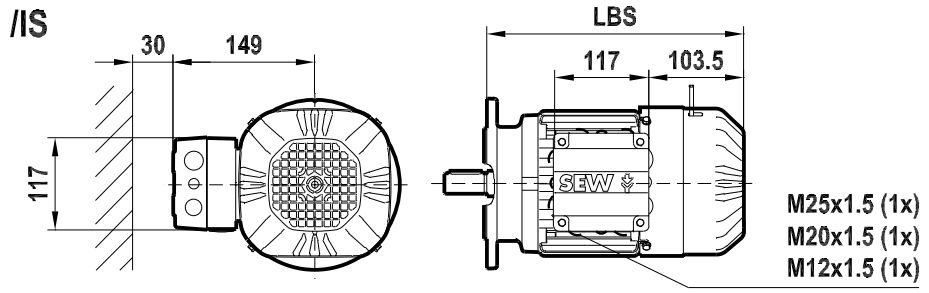
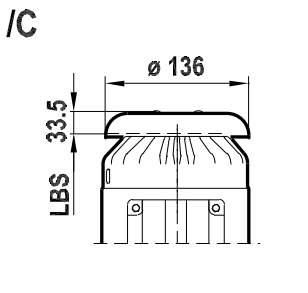
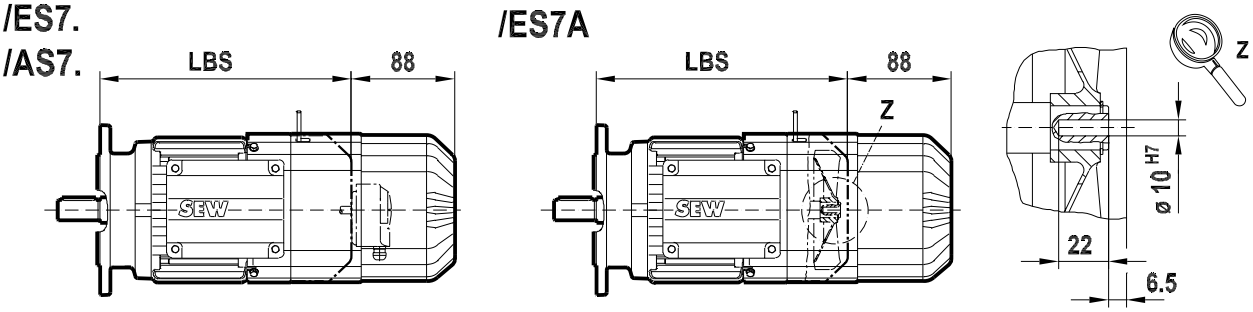
## DR.71S BE

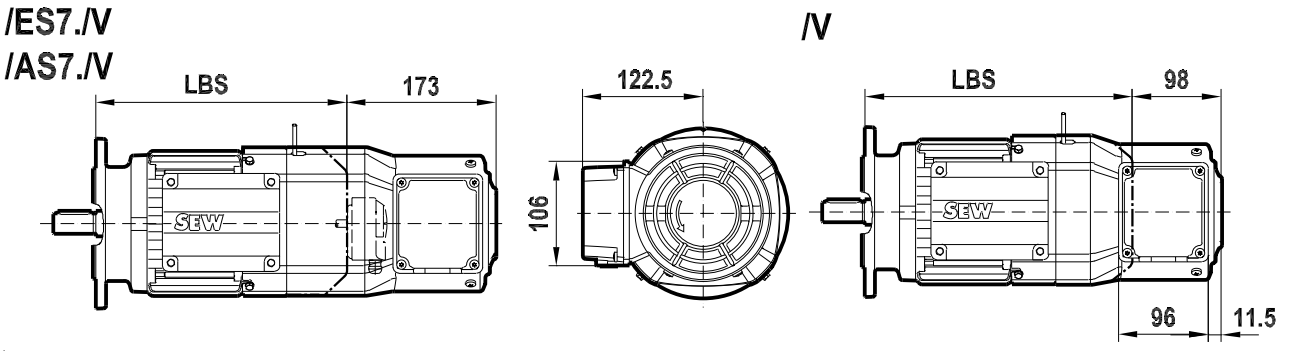
09 151 05 06
2 (2)

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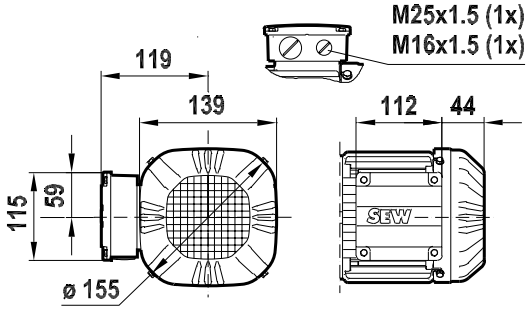
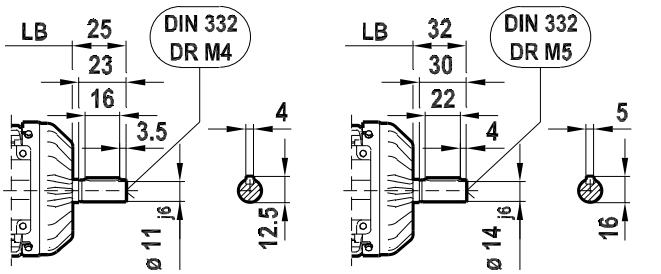
## DR.71M



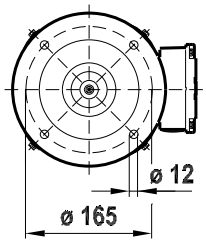

## /2W

08 192 03 06
1 (2)

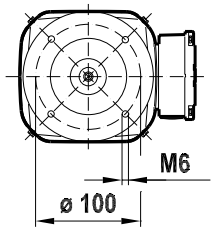



## DRS71M 4; 6; 4/2 8/2; 8/4
## DRM71M 12

### /FF (B5) FF165




### /FT (B14) FT100

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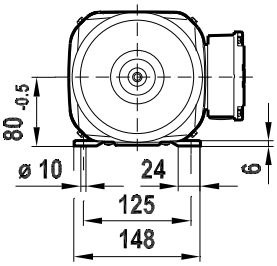
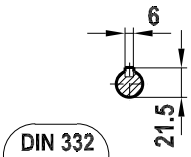
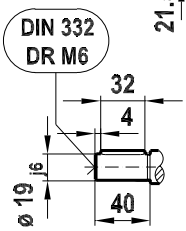
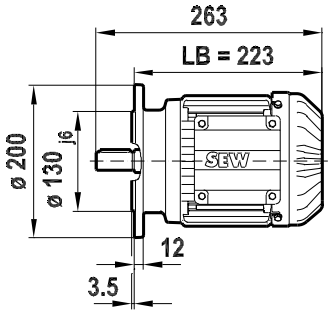
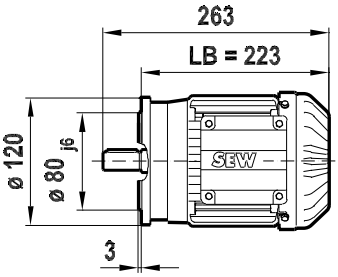
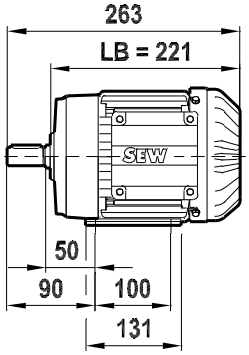


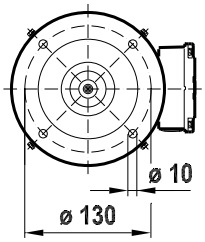



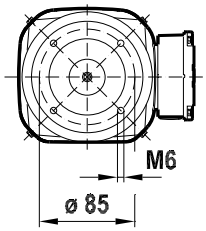




## DRS71M 2
## DRE71M 6

### /FF (B5) FF130




### /FT (B14) FT85

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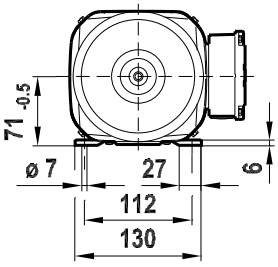


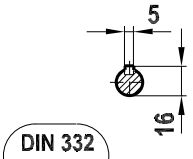


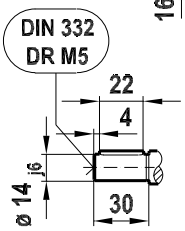


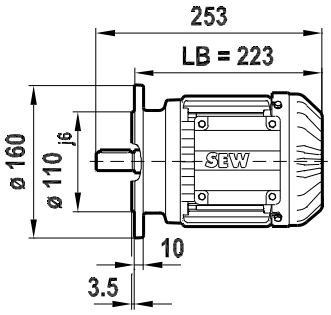


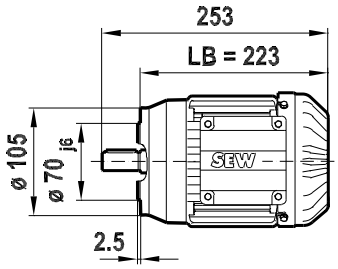


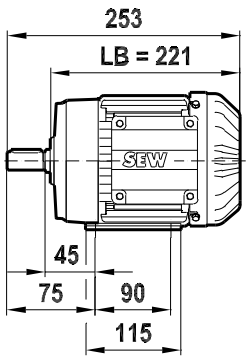


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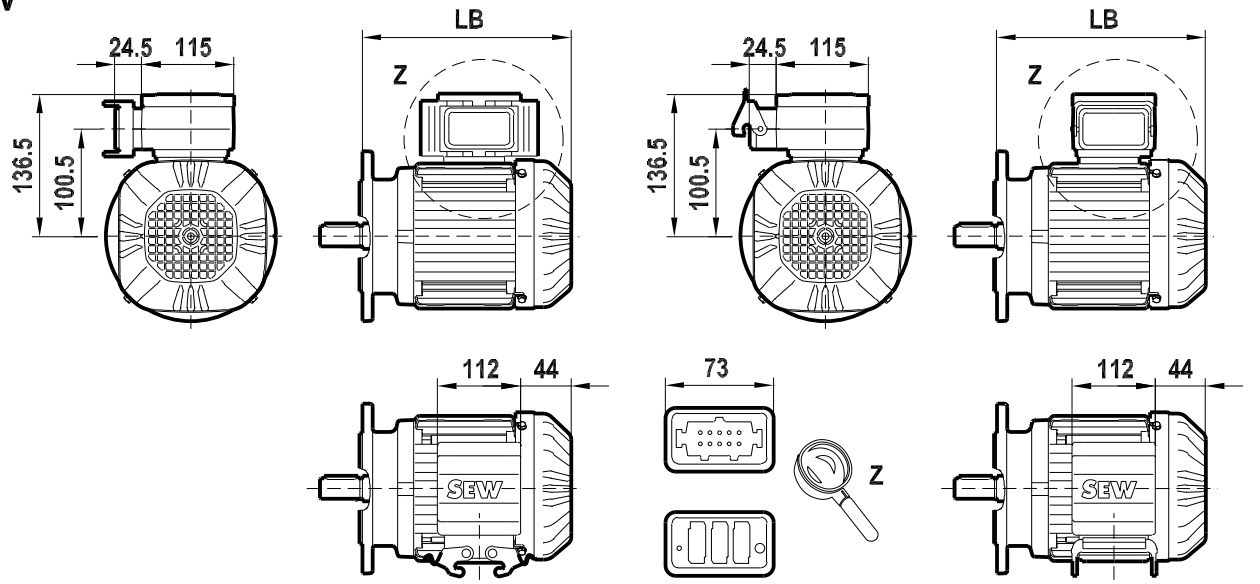
## DR.71M

08 192 04 06
2 (2)

### /IV

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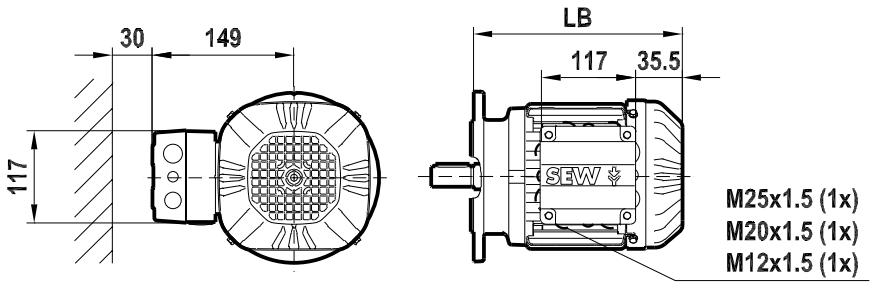


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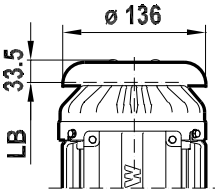


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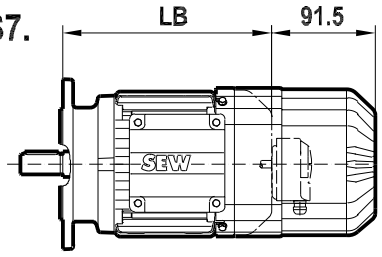
### /AS7.

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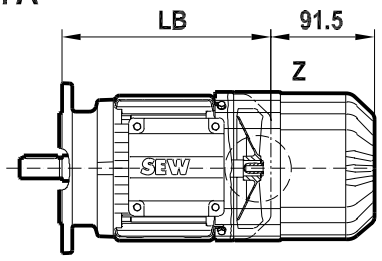


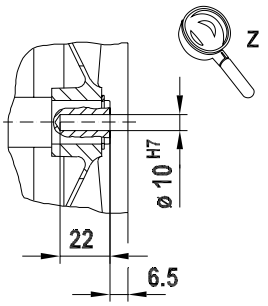


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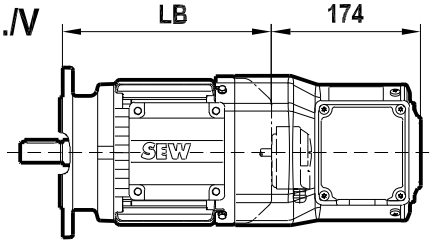
### /AS7./V

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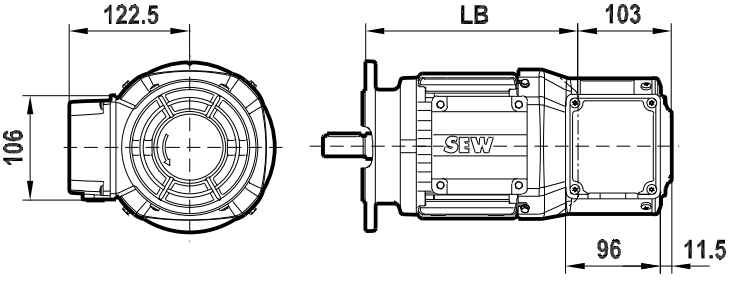


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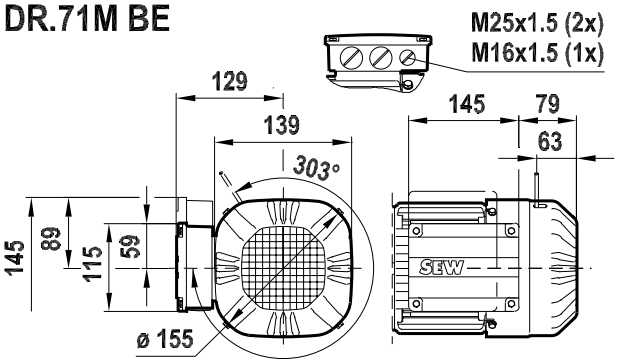
## DR.71M BE

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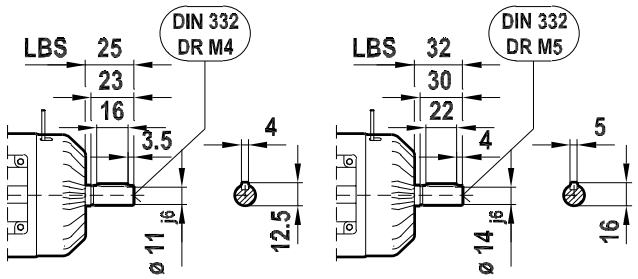
09 152 04 06
1 (2)




## DRS71M 4; 6; 4/2 8/2; 8/4
## DRM71M 12

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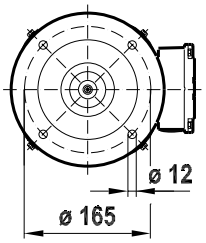


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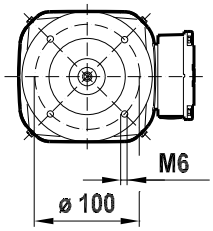


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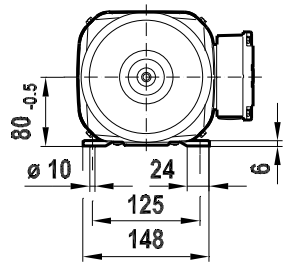


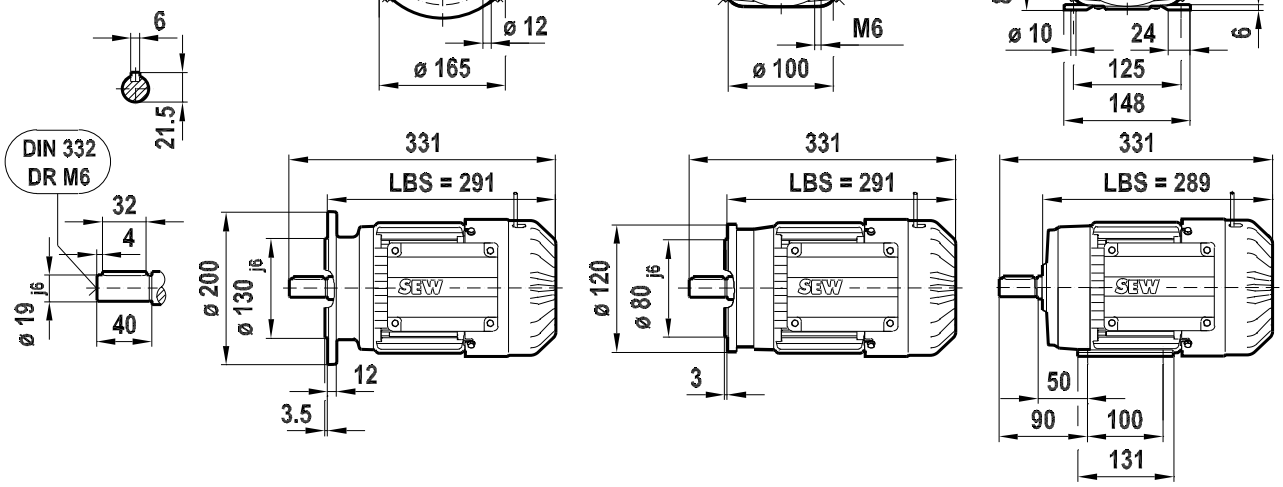


## DRS71M 2
## DRE71M 6

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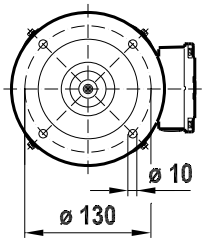


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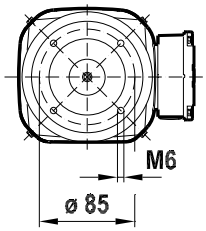


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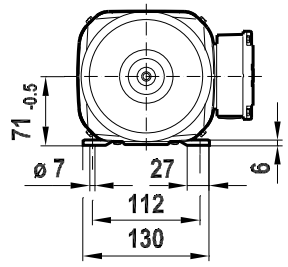


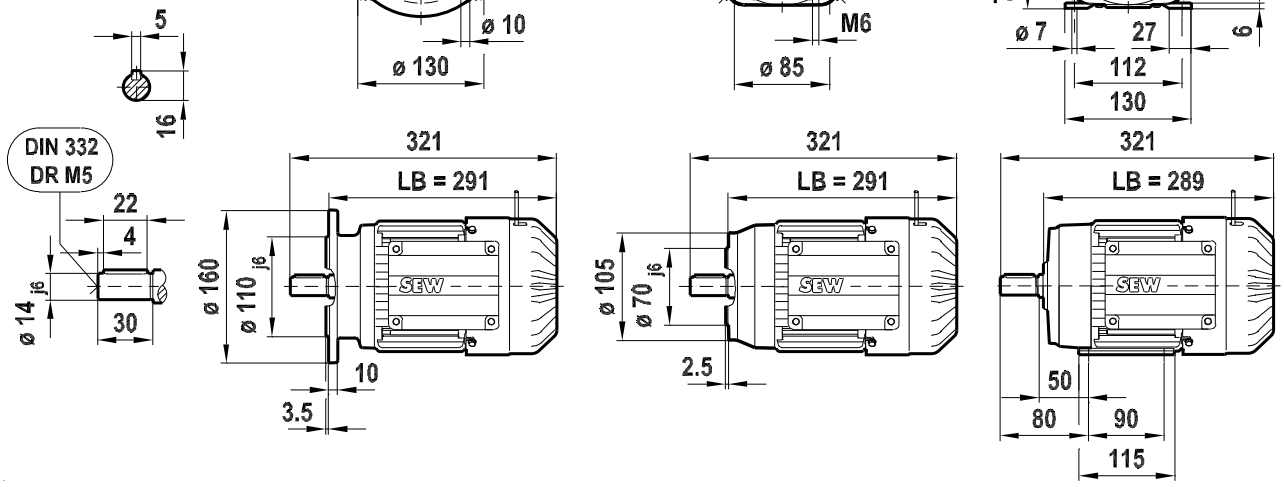


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## DR.71M BE

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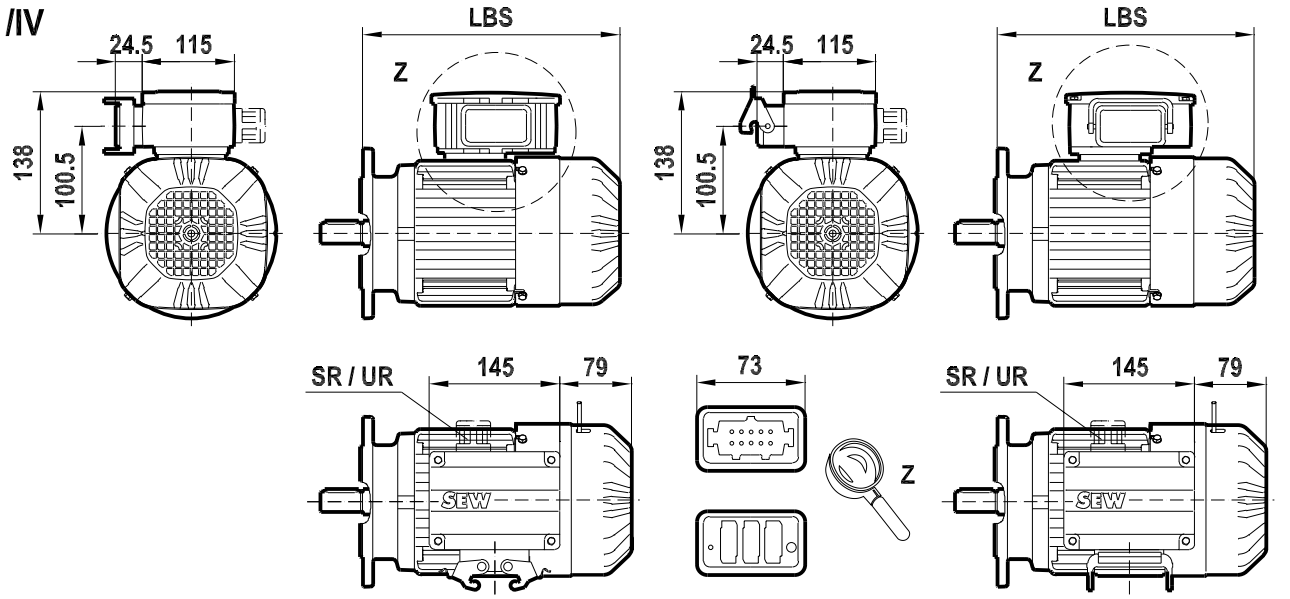
2 (2)

/IV

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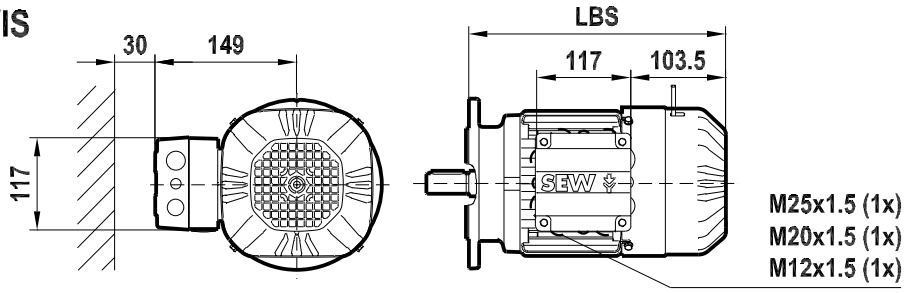


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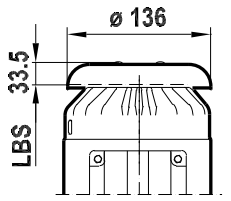


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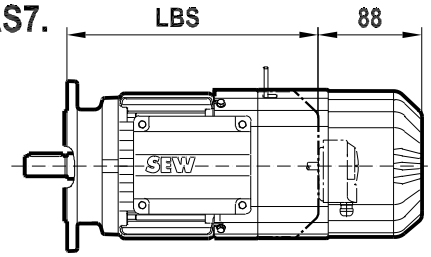


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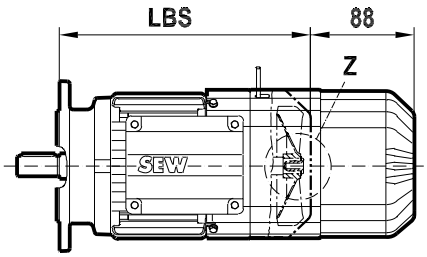


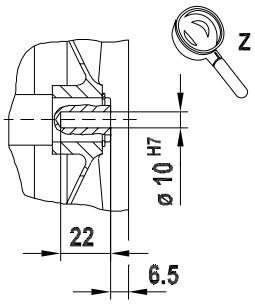


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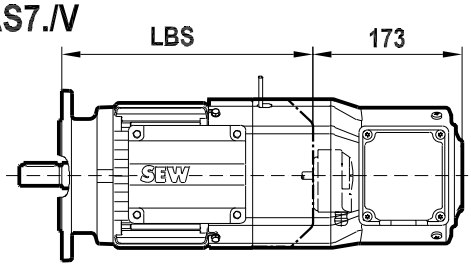


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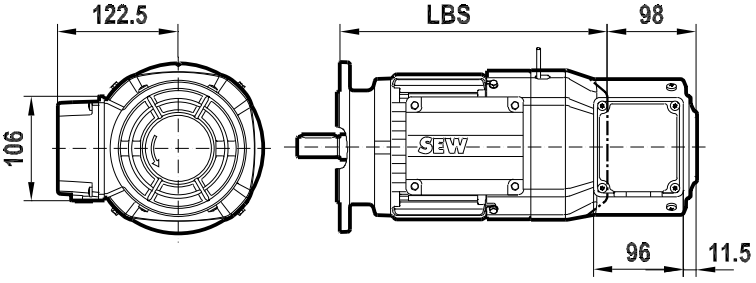


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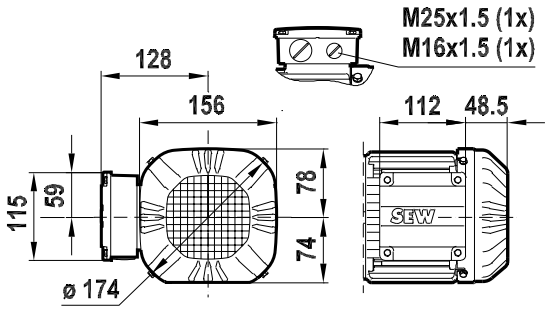
## DR.80S

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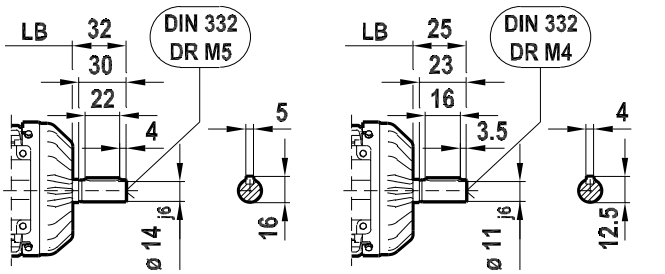
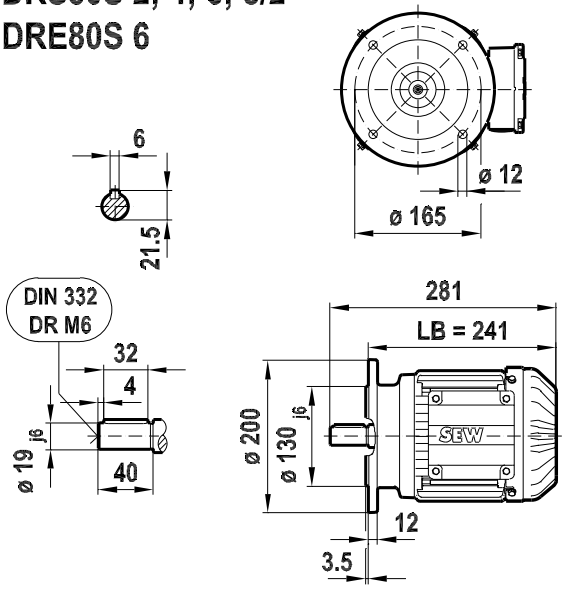
1 (2)




## DRS80S 2; 4; 6; 8/2
## DRE80S 6

### /FF (B5) FF165

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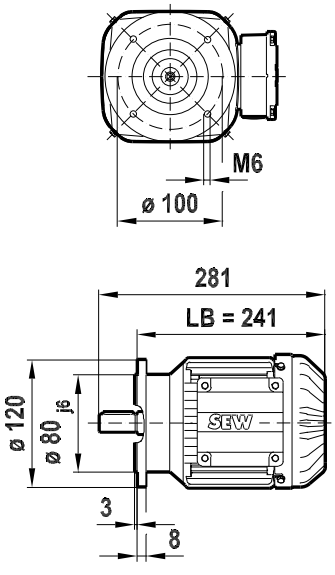


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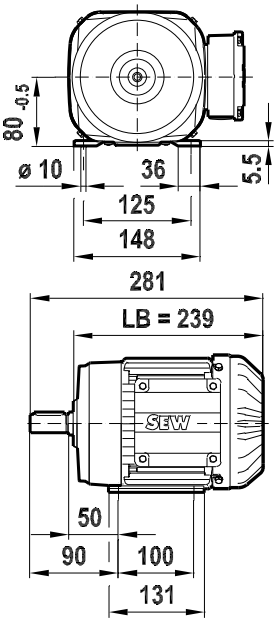


## DRE80S 4

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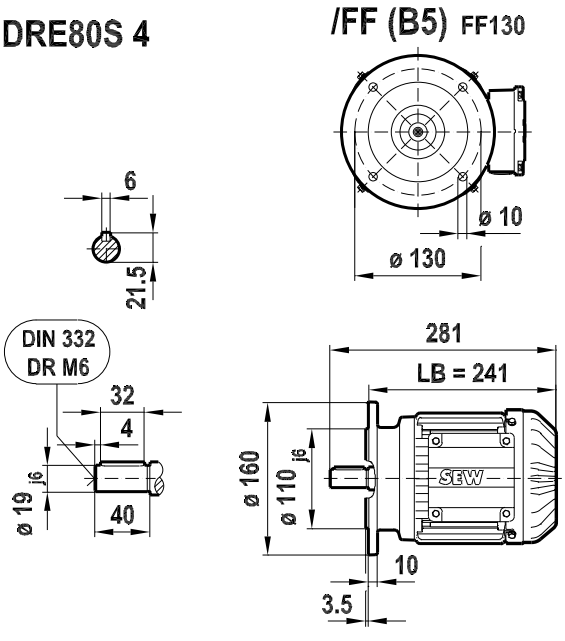


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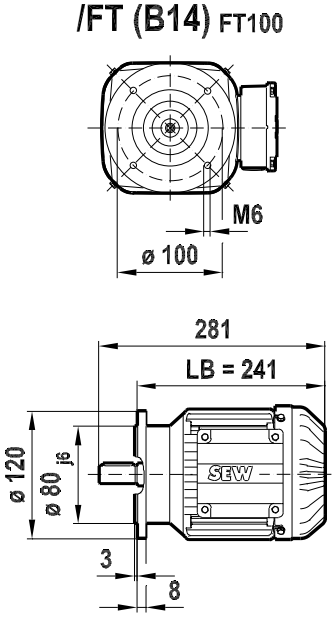


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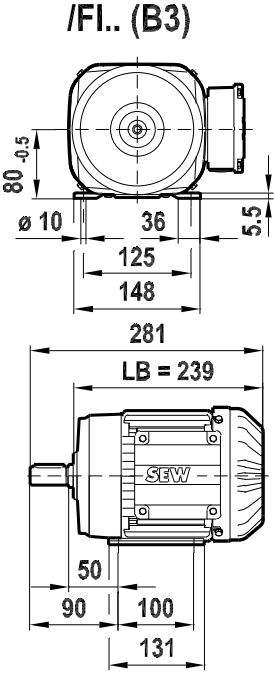


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## DR.80S

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2 (2)

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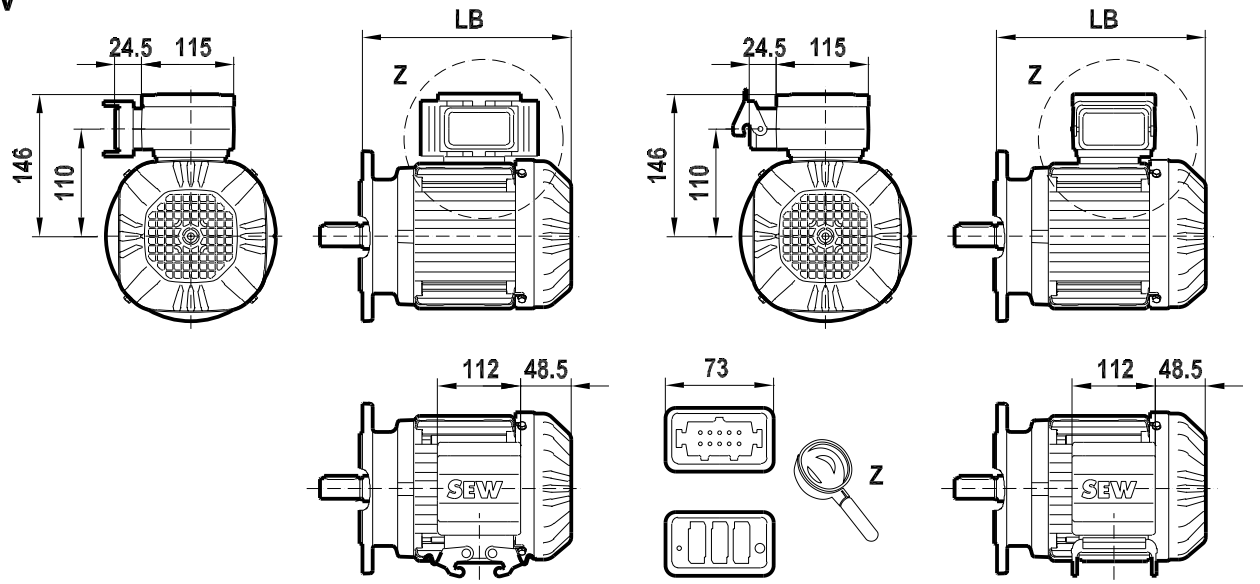


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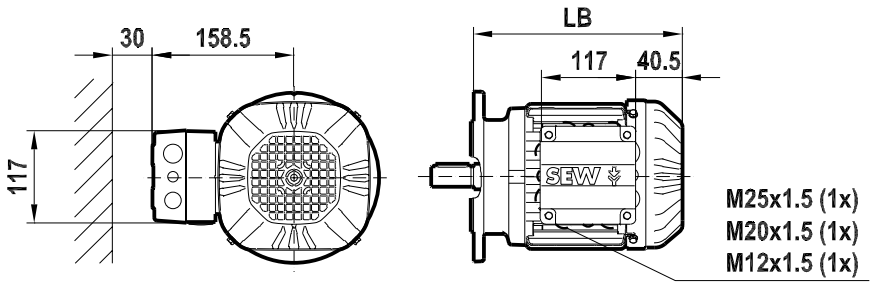


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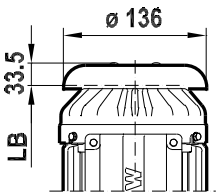


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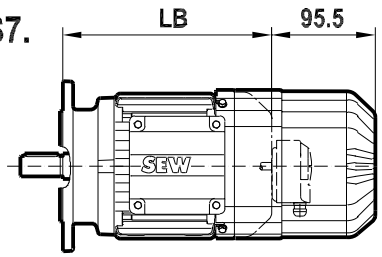


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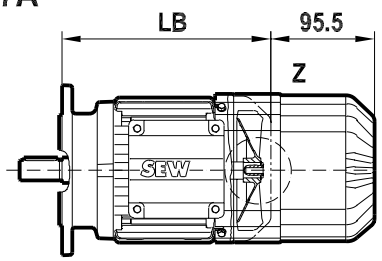


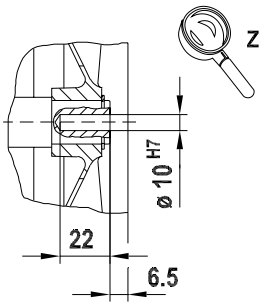


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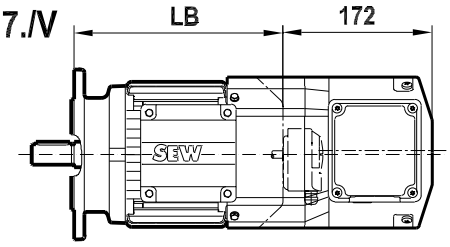


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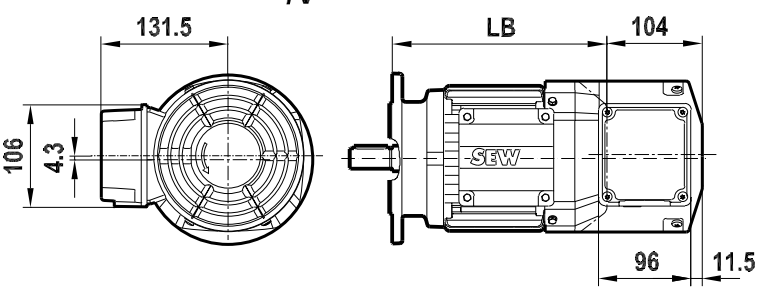


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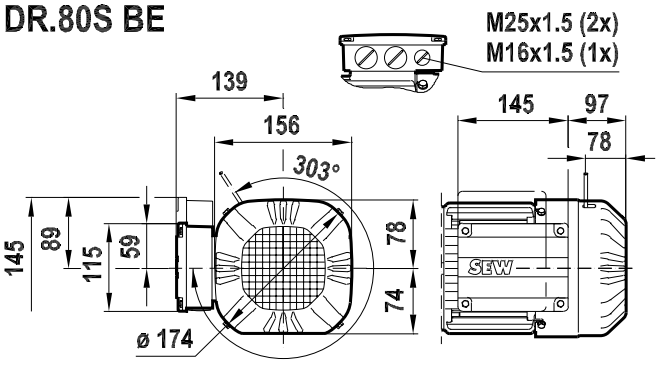
## DR.80S BE

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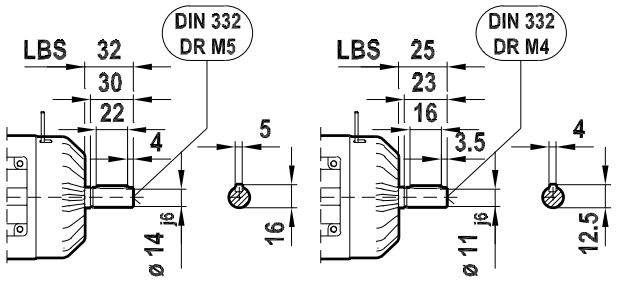
1 (2)




## DRS80S 2; 4; 6; 8/2
## DRE80S 6

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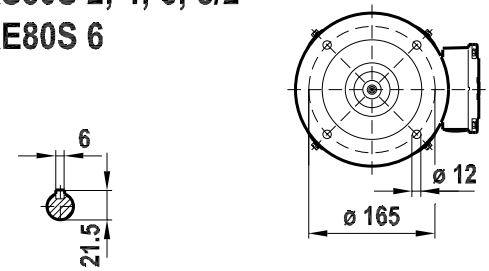


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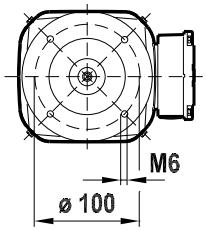


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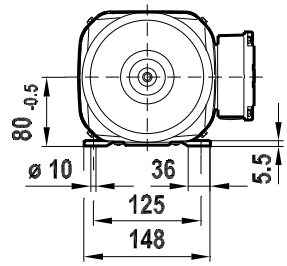


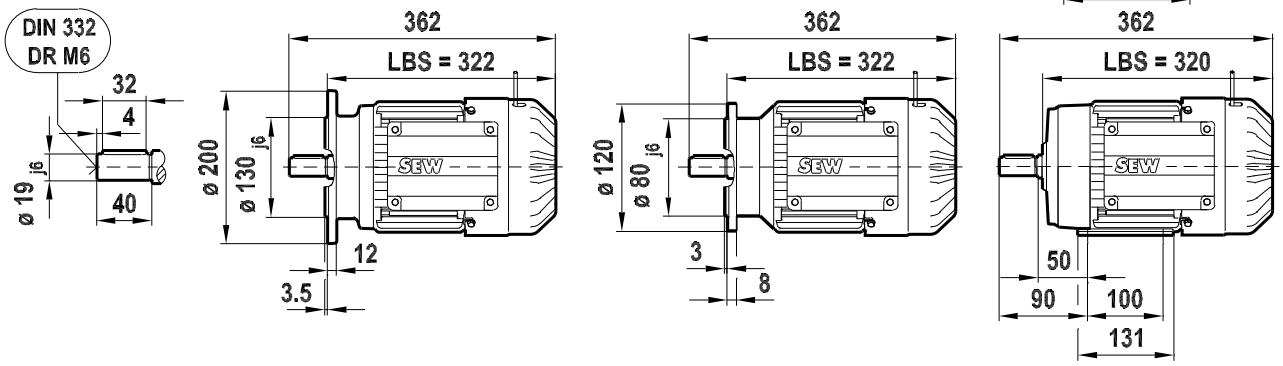


## DRE80S 4

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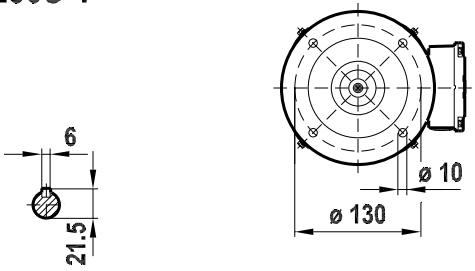


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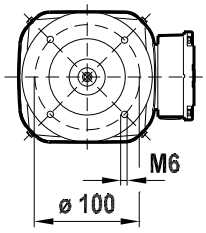


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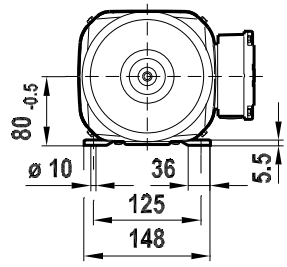


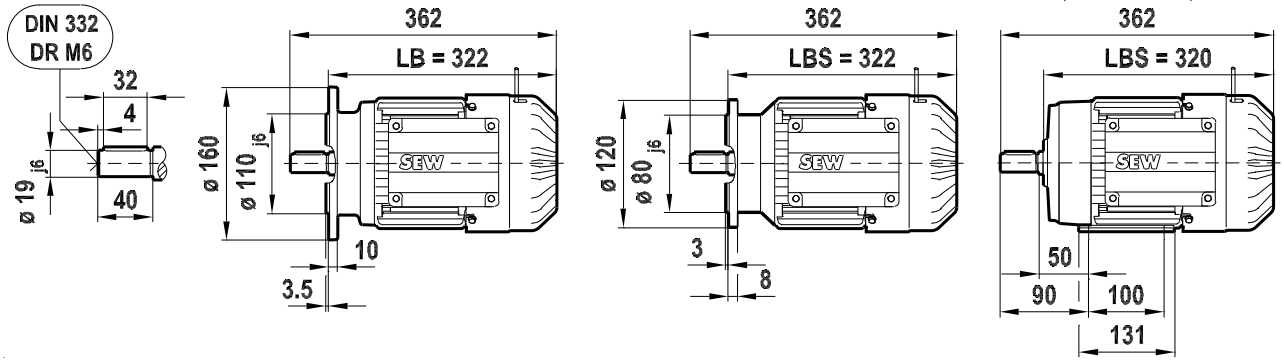


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## DR.80S BE

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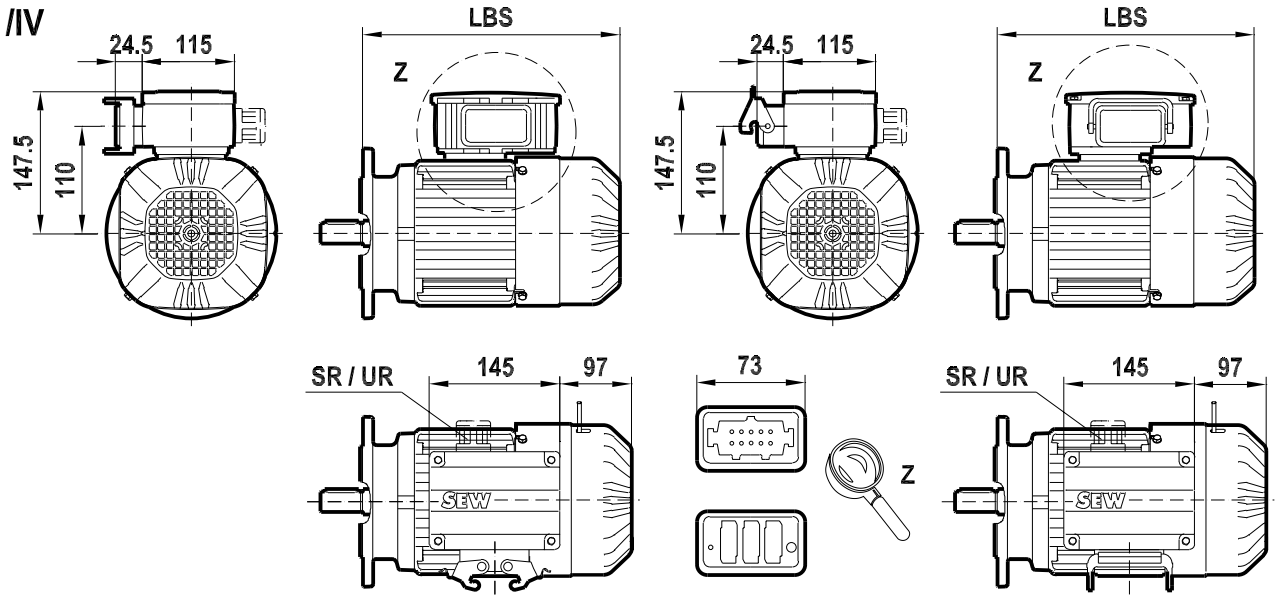


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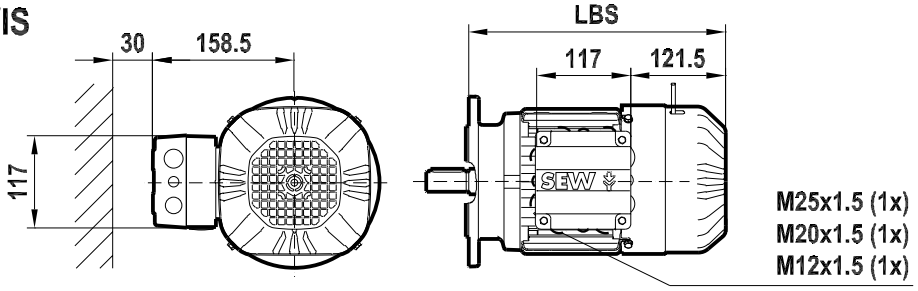


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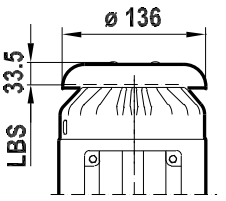


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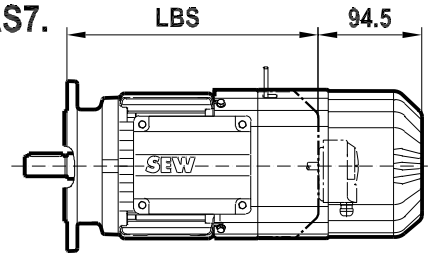


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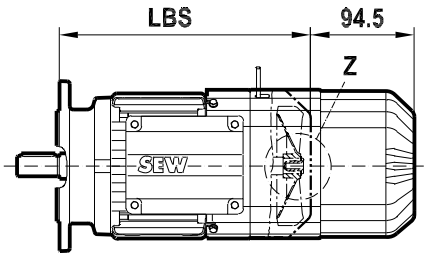


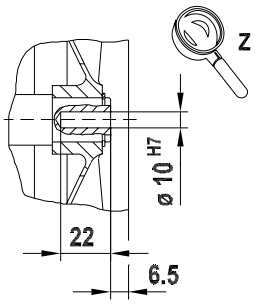


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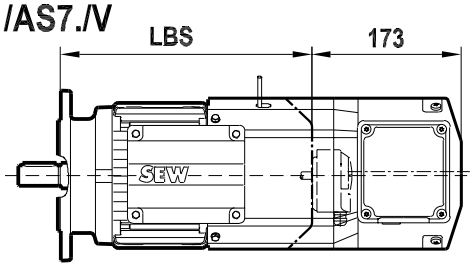


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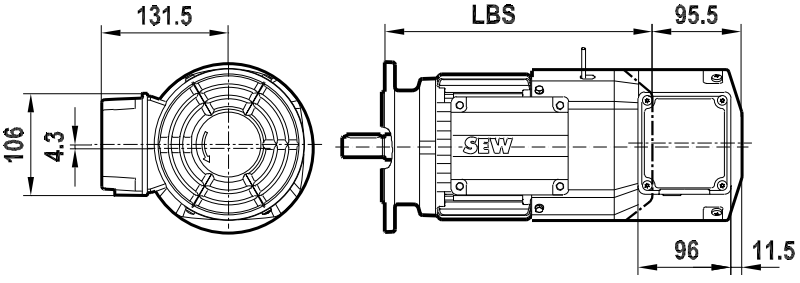


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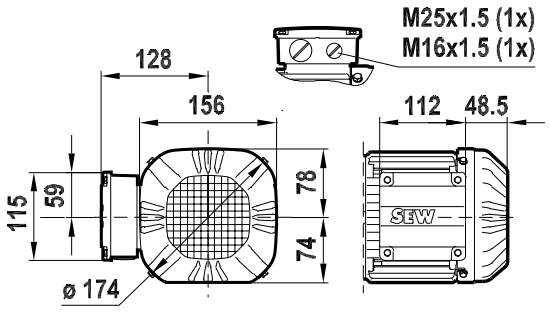
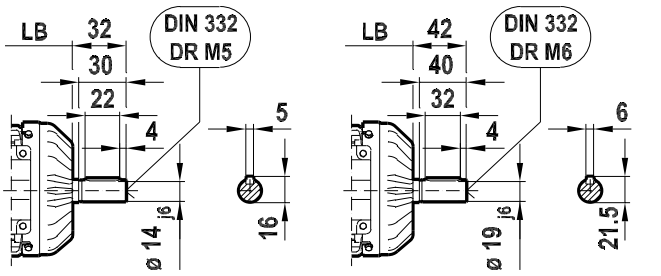
## DR.80M



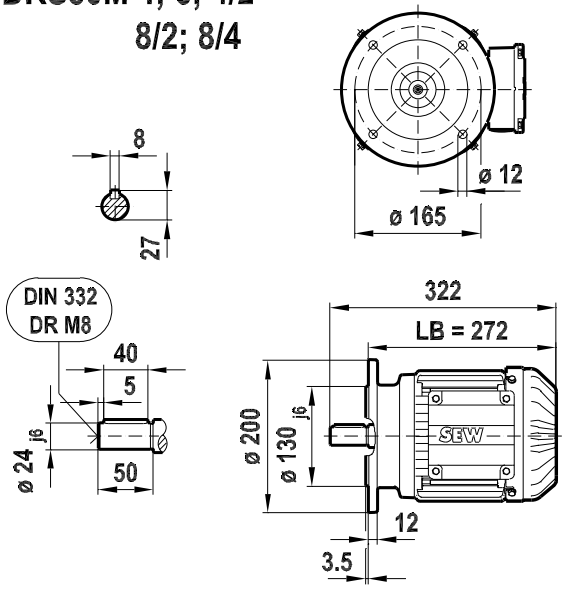

08 194 04 06
1 (2)

## /2W




## DRS80M 4; 6; 4/2 8/2; 8/4

### /FF (B5) FF165

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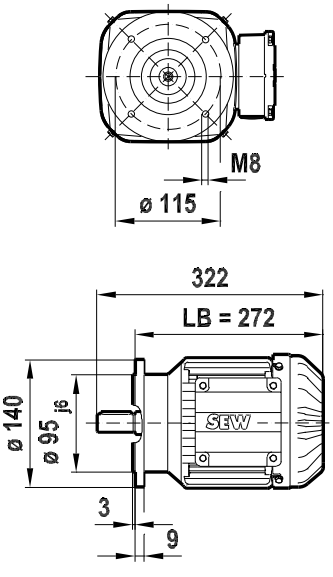


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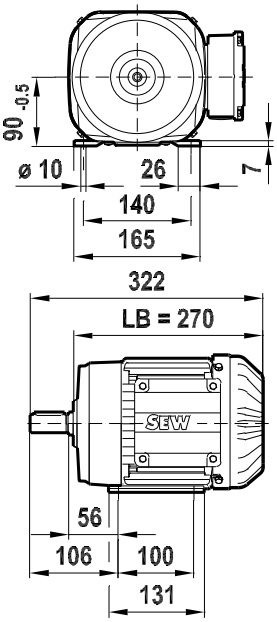


## DRS80M 2 DRE80M 2; 4; 6 DRP80M 2

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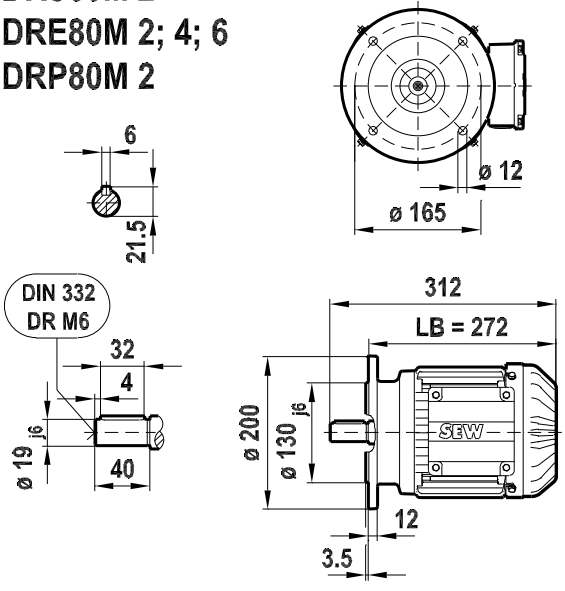


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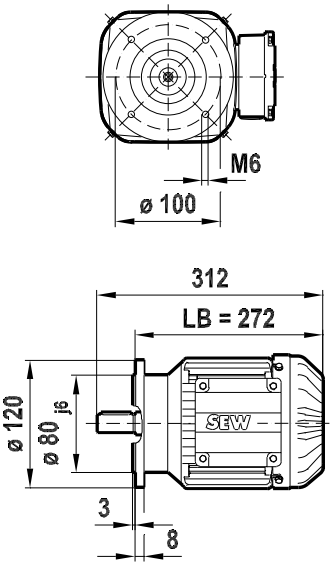


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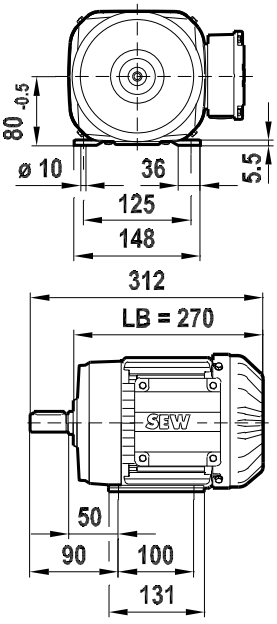


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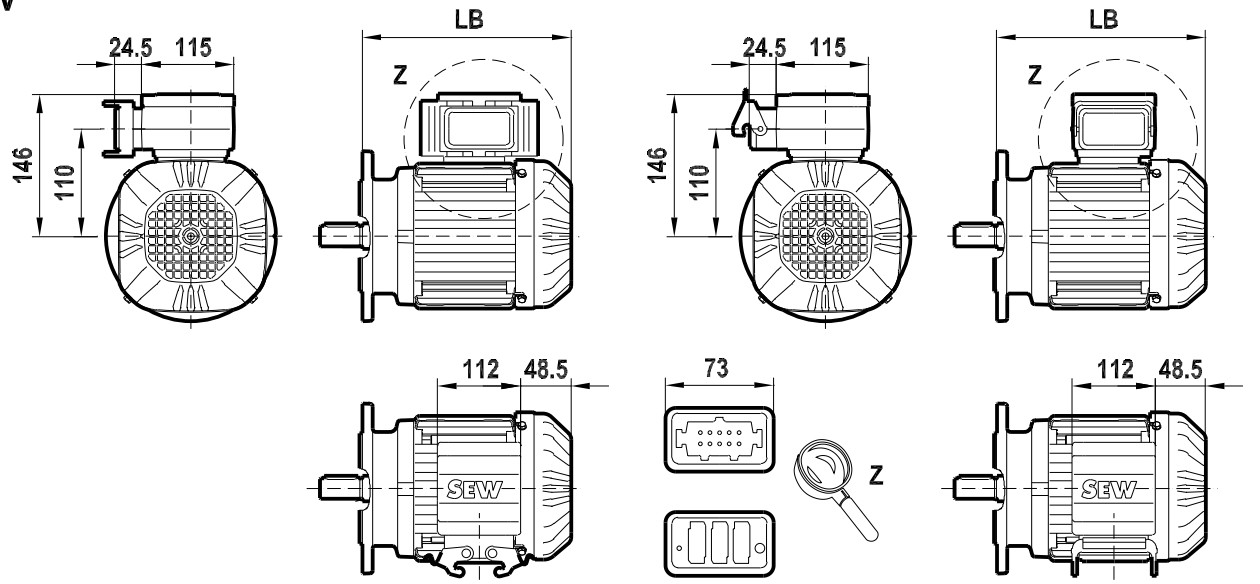
## DR.80M

08 194 04 06
2 (2)

/IV

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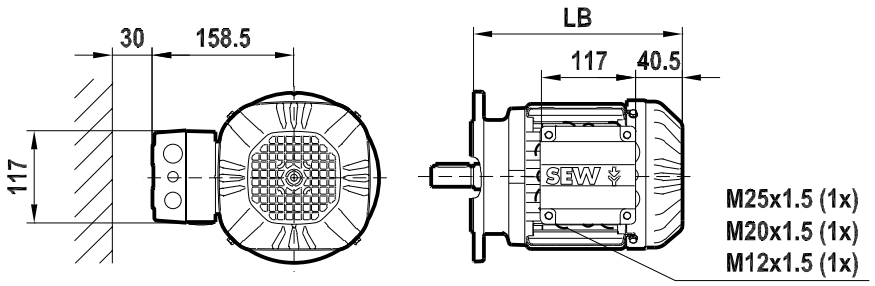


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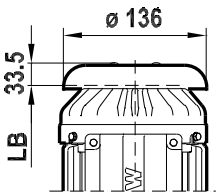


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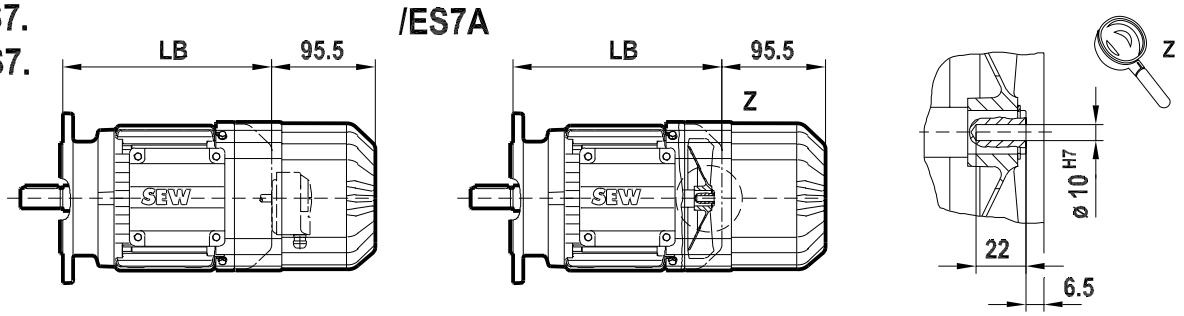
/AS7.

/ES7A

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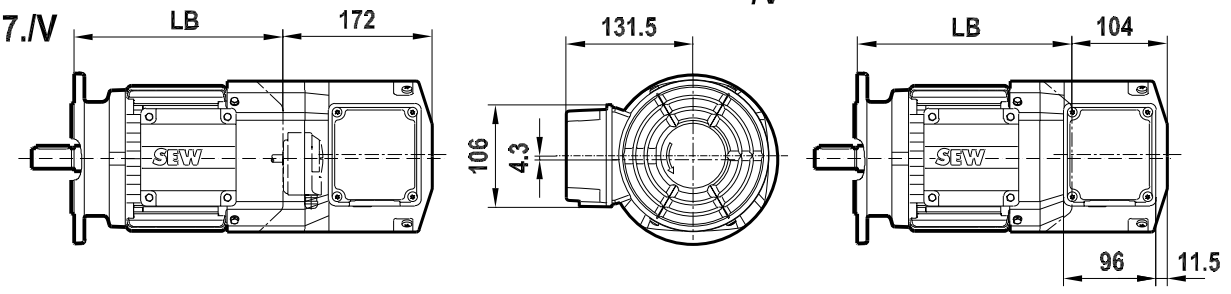
/V

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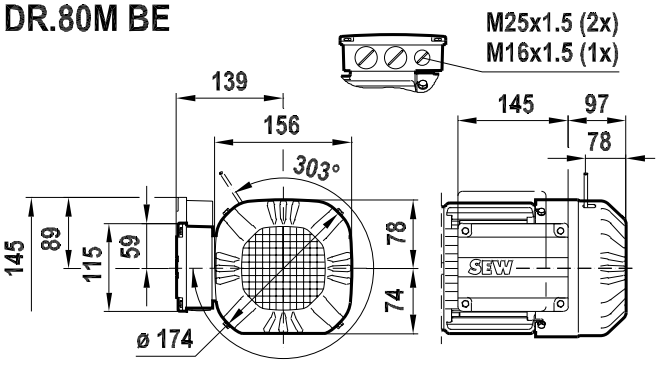
## DR.80M BE




## /2W

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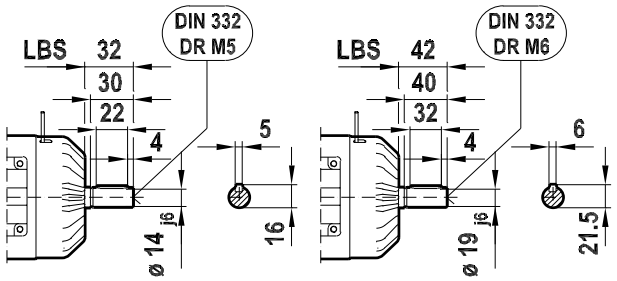
1 (2)




## DRS80M 4; 6; 4/2 8/2; 8/4

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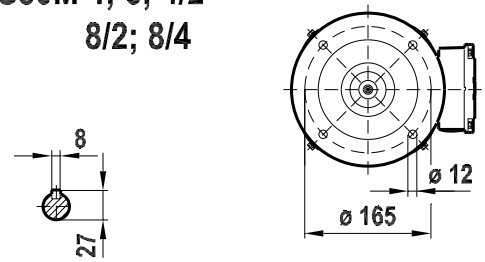


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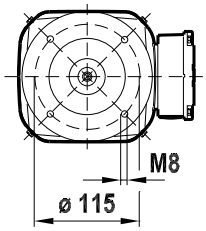


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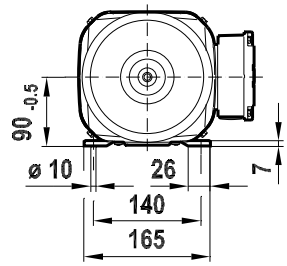
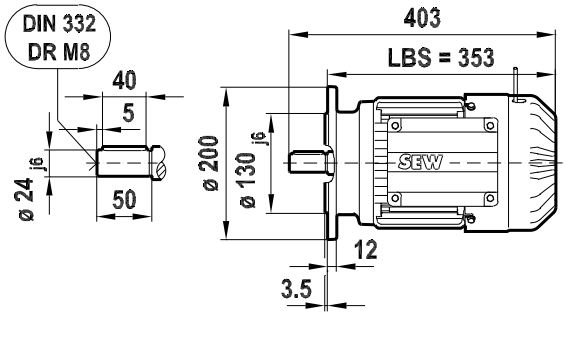
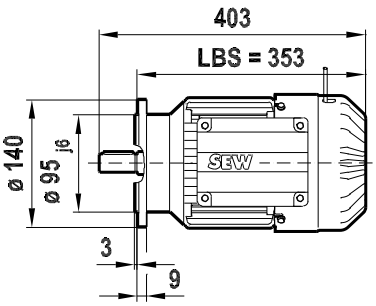
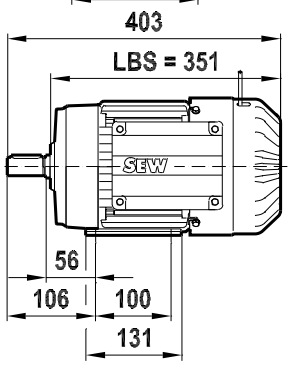


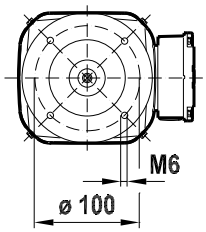




## DRS80M 2
## DRE80M 2; 4; 6
## DRP80M 2

/FF (B5) FF165

/FT (B14) FT100

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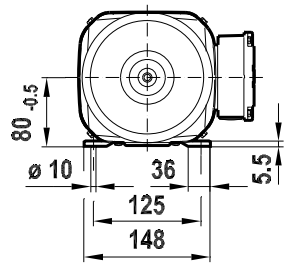


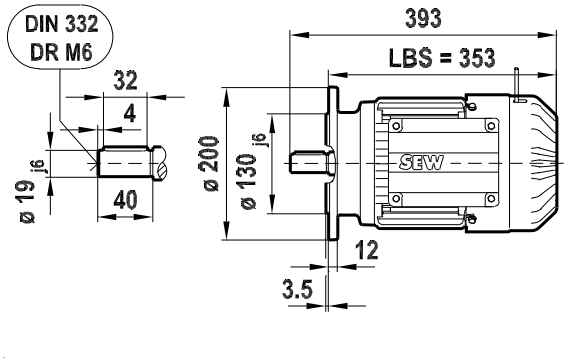


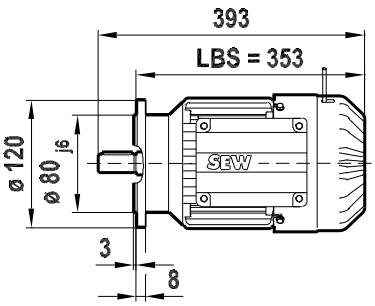


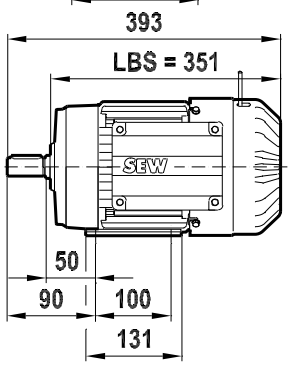


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## DR.80M BE

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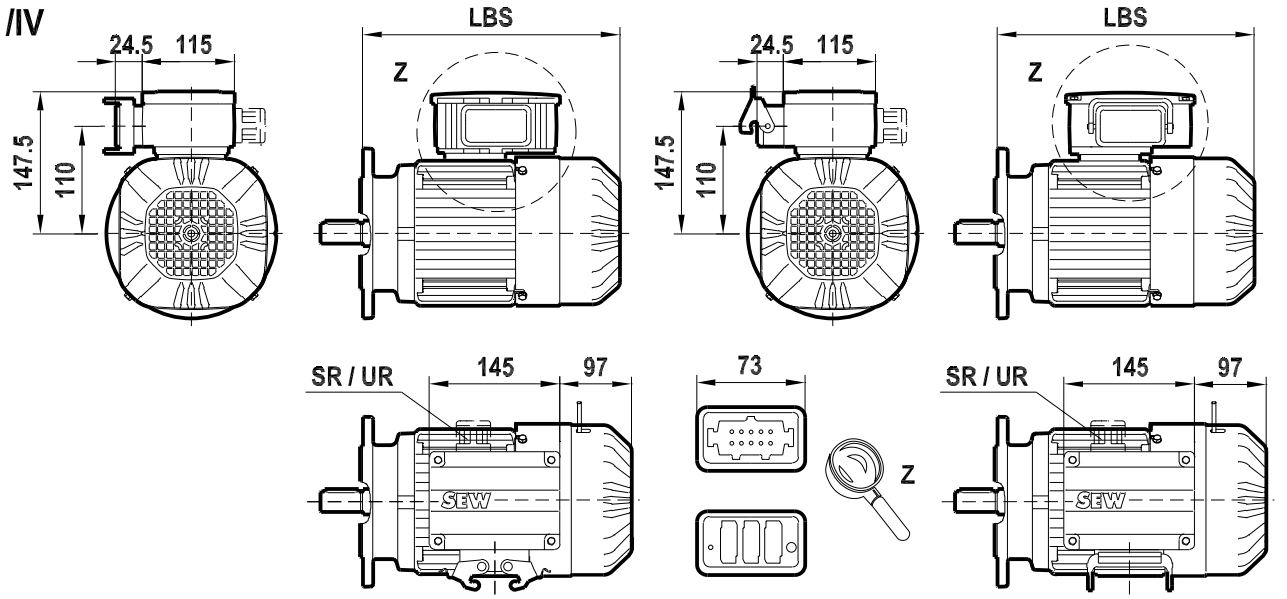
2 (2)

/IV

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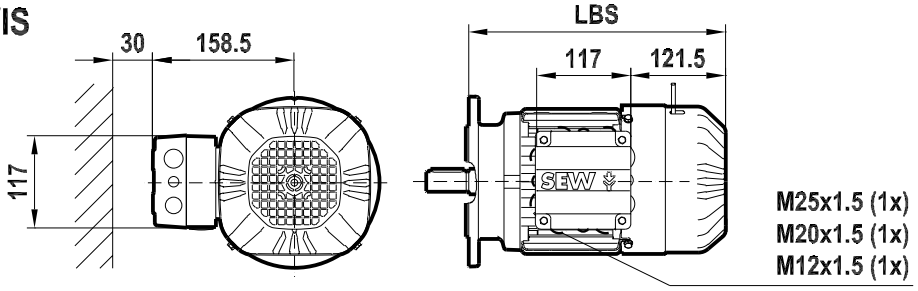


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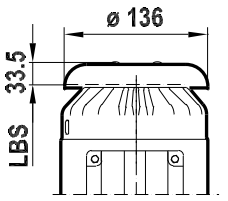


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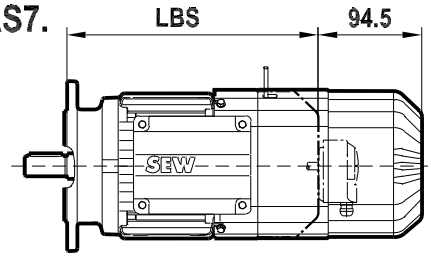


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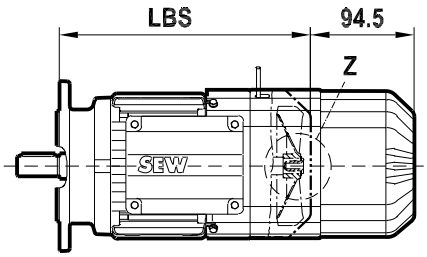


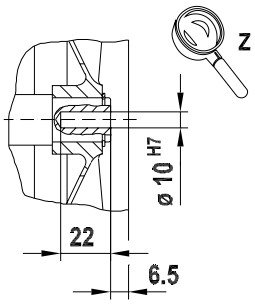


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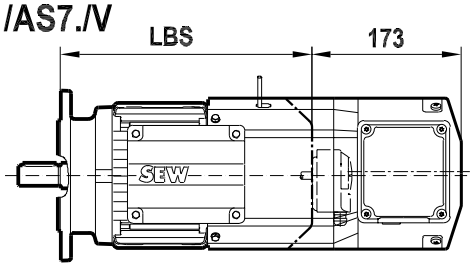


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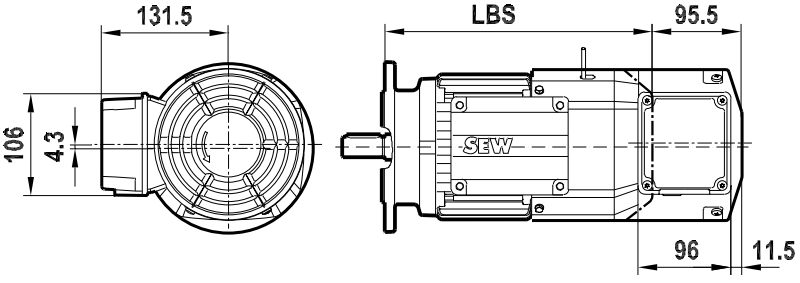


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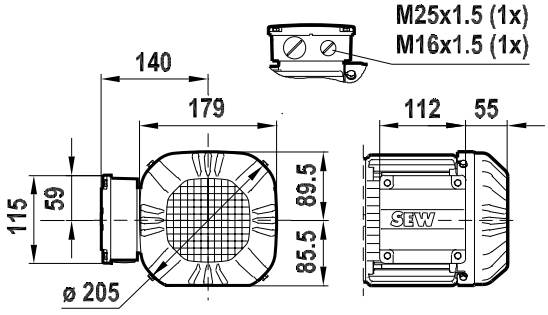
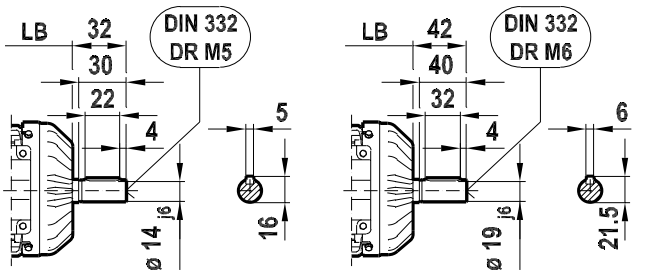
## DR.90M



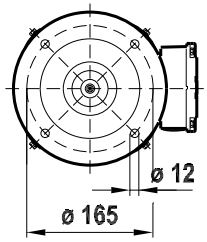

## /2W

08 195 04 06
1 (2)




## DRS90M 2; 4; 4/2
## 8/2; 8/4
## DRE90M 2; 4
## DRM90M 12

### /FF (B5) FF165

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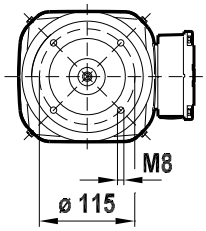


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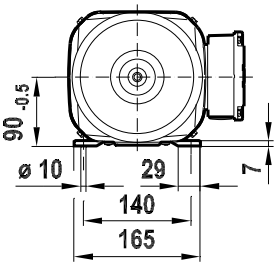
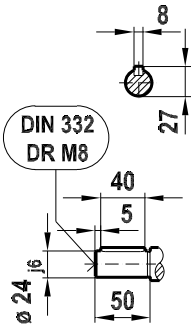
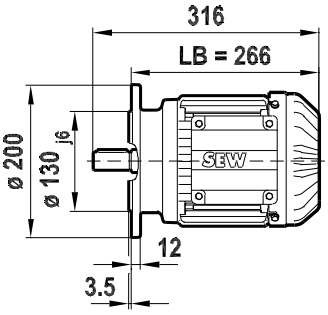
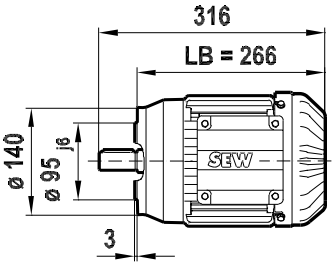
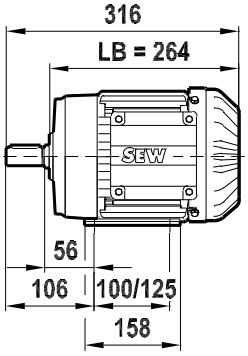


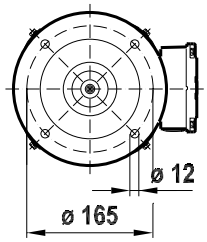




## DRP90M 2;4

### /FF (B5) FF165

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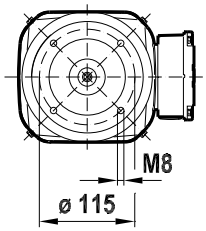


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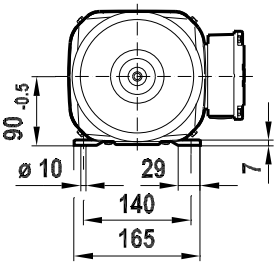


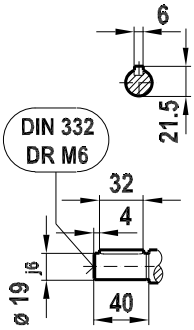


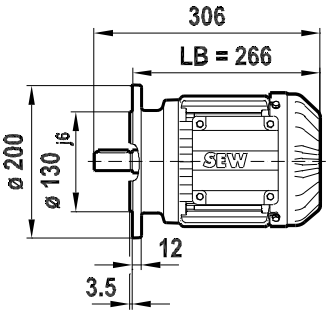


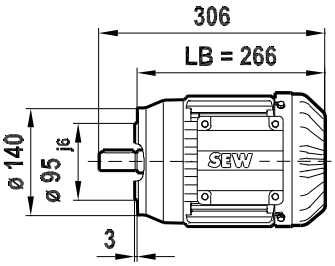


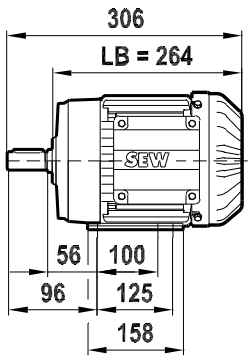


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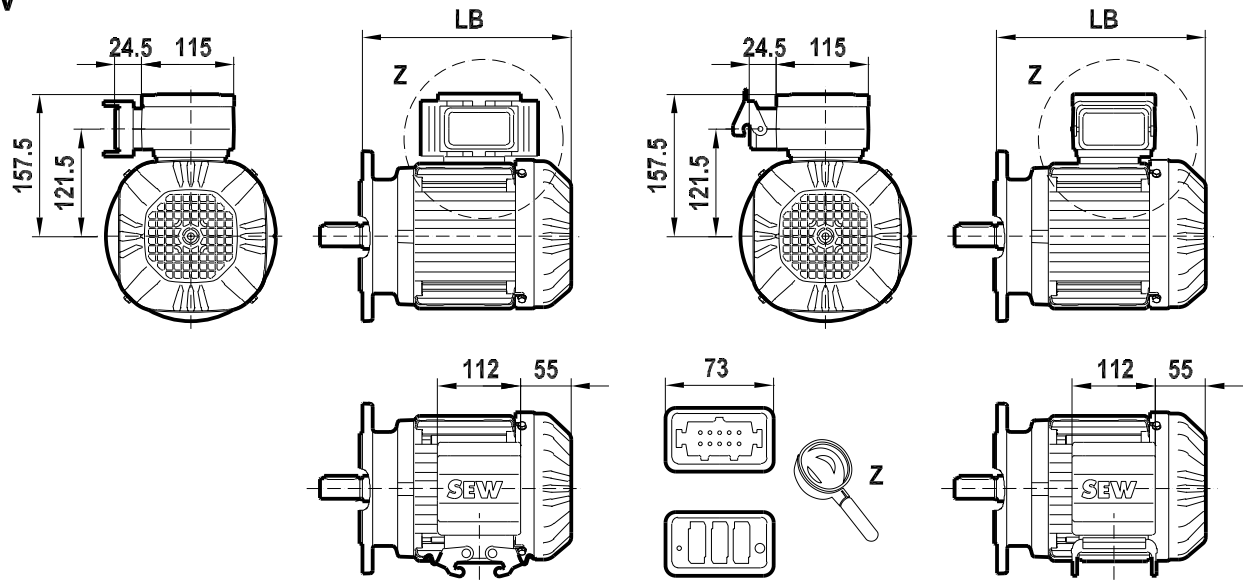
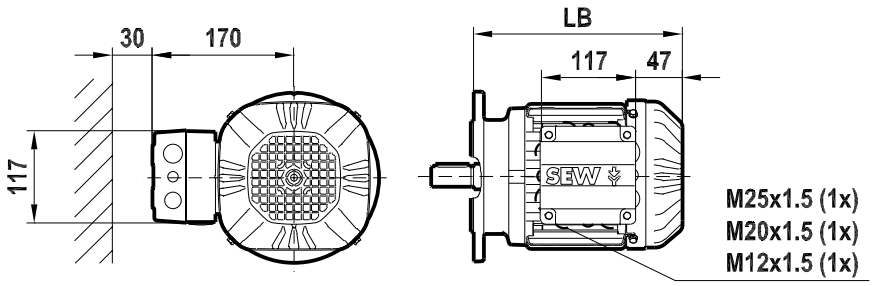
## DR.90M

08 195 04 06
2 (2)

### /IV




### /IS

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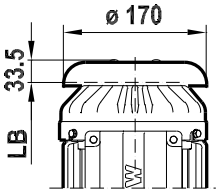


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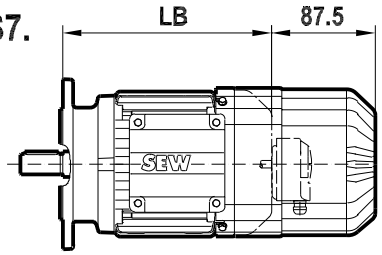
### /AS7.

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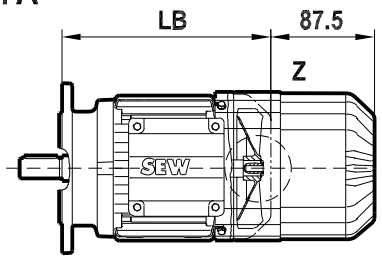
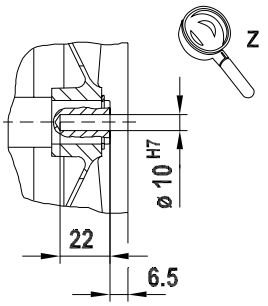
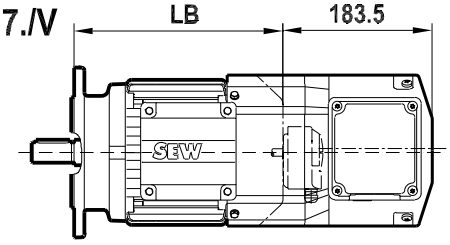
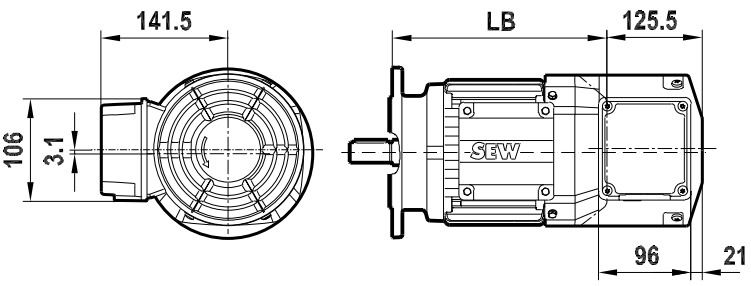



### /ES7./V
### /AS7./V




### /V

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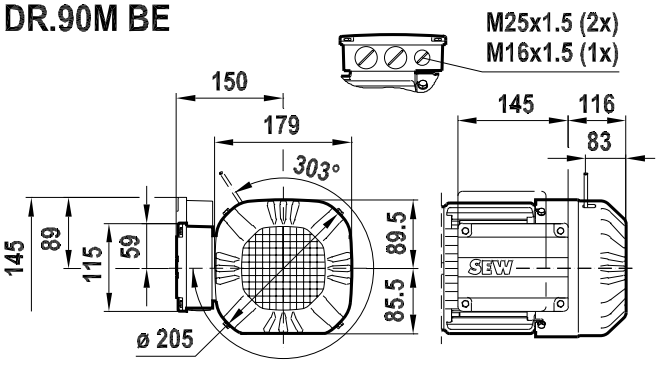
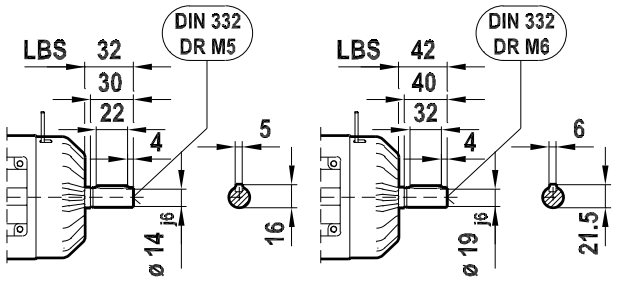
## DR.90M BE



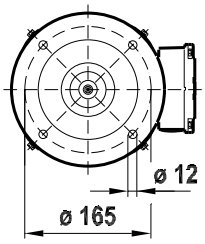

## /2W

09 155 04 06
1 (2)

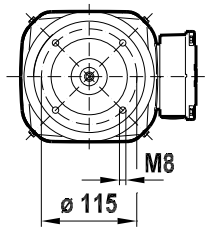



## DRS90M 2; 4; 4/2
## 8/2; 8/4
## DRE90M 2; 4
## DRM90M 12

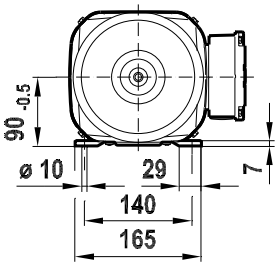
### /FF (B5) FF165

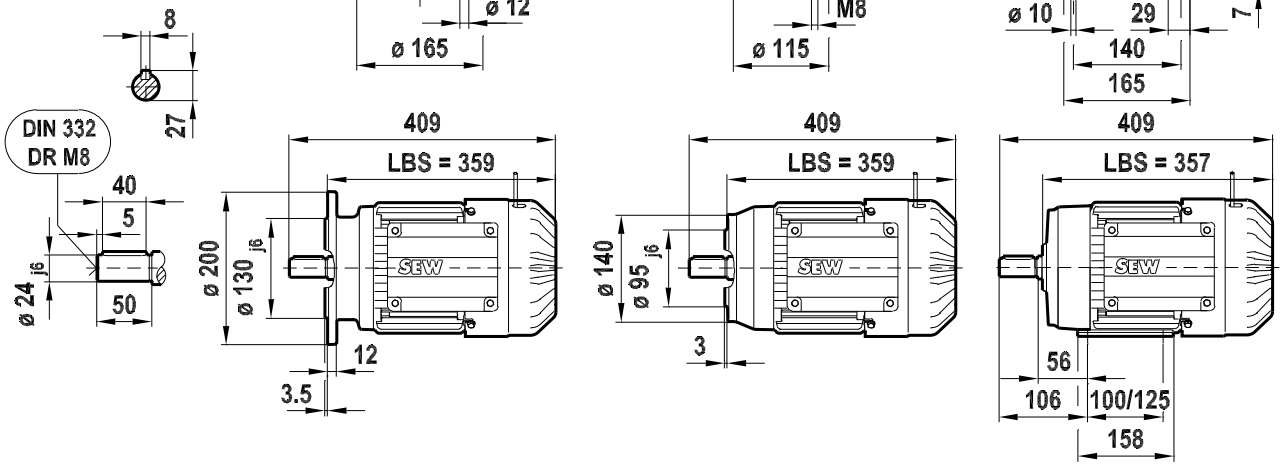



### /FT (B14) FT115



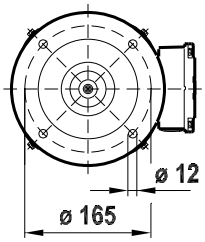

### /FI.. (B3)



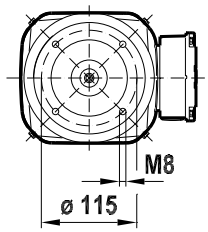




## DRP90M 2; 4

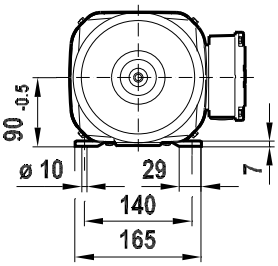
### /FF (B5) FF165

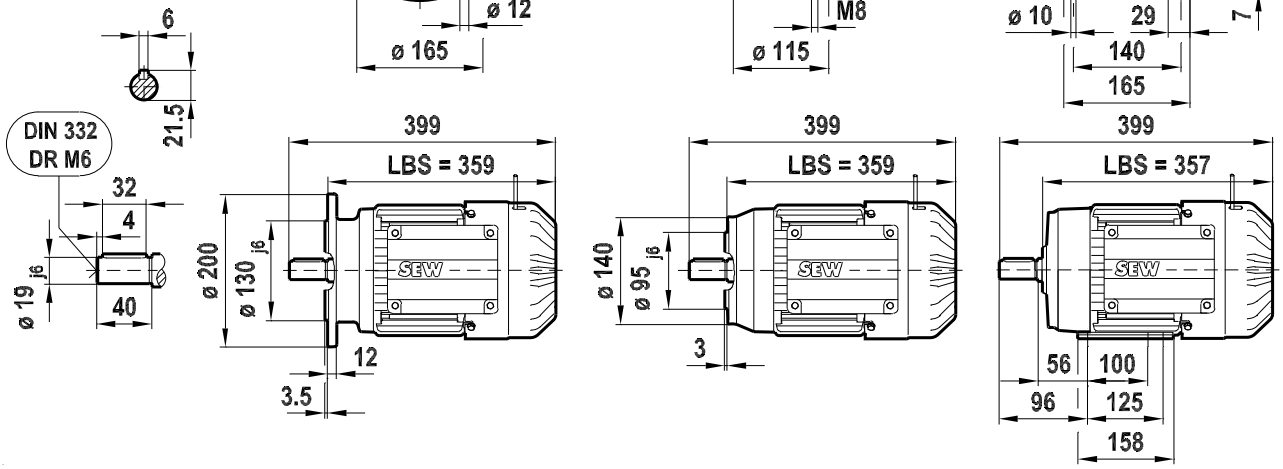



### /FT (B14) FT115




### /FI.. (B3)

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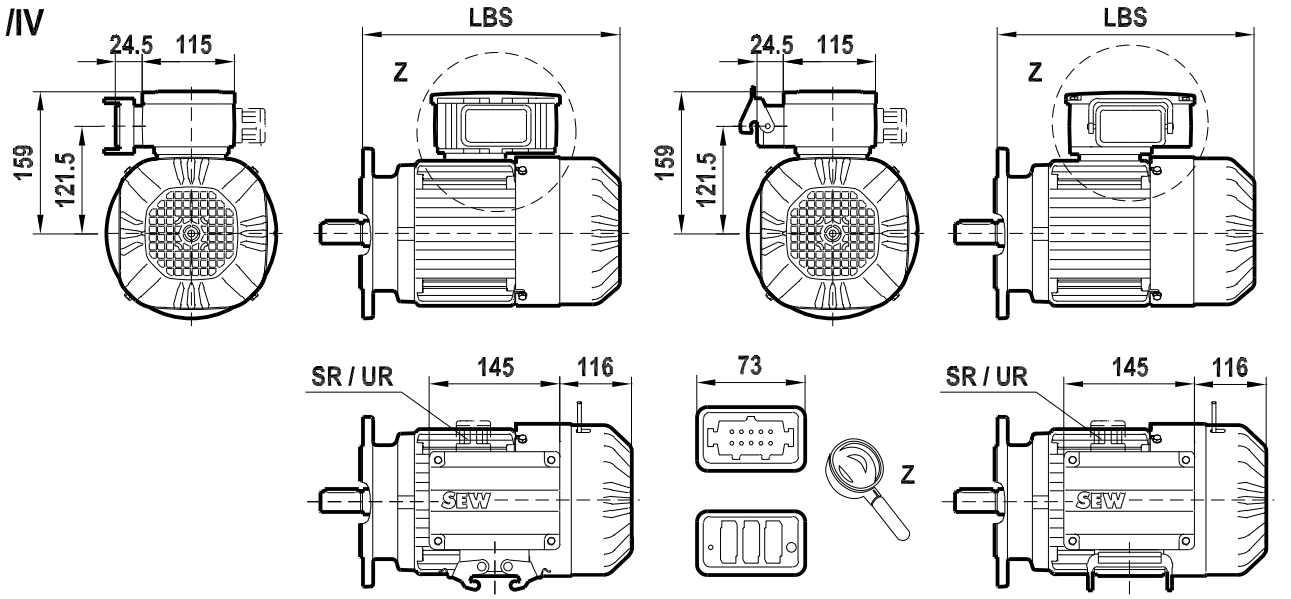
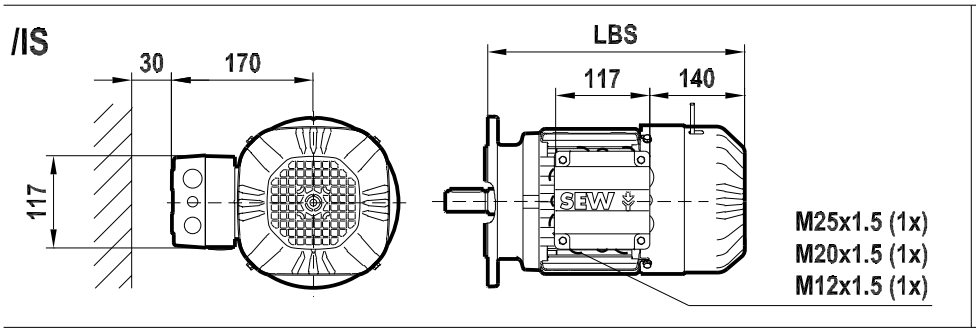
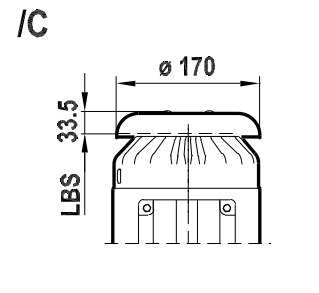
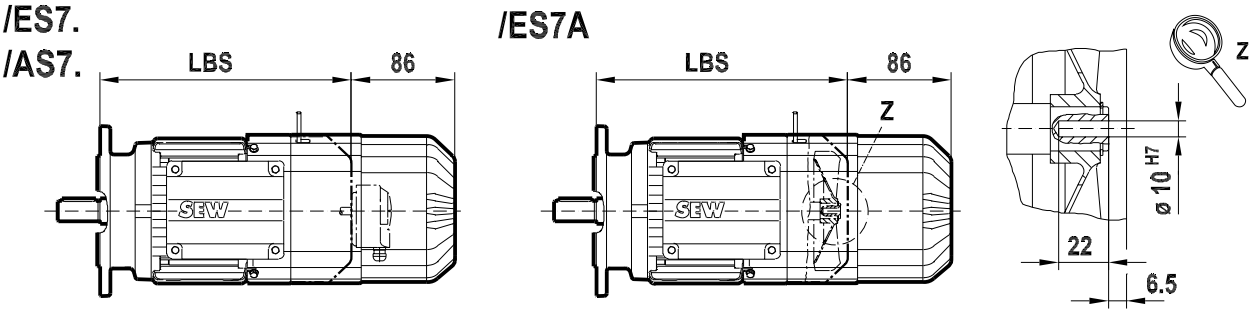
## DR.90M BE

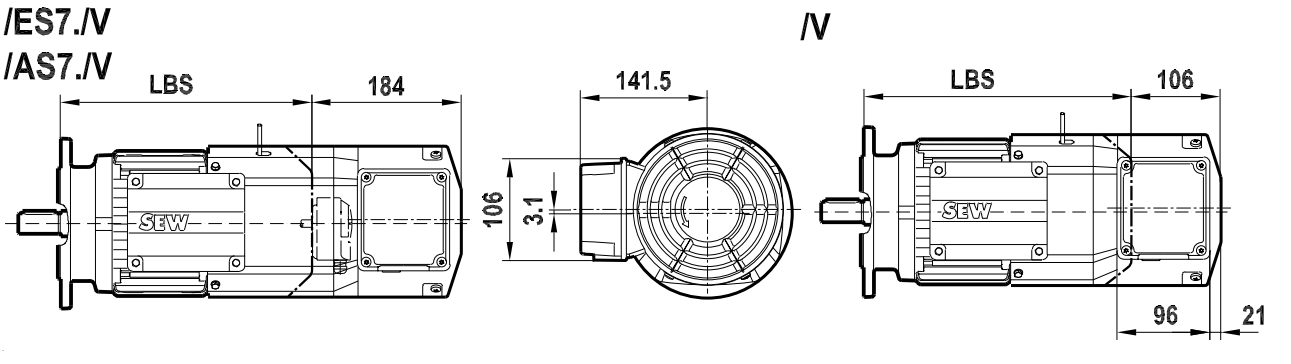
09 155 04 06
2 (2)

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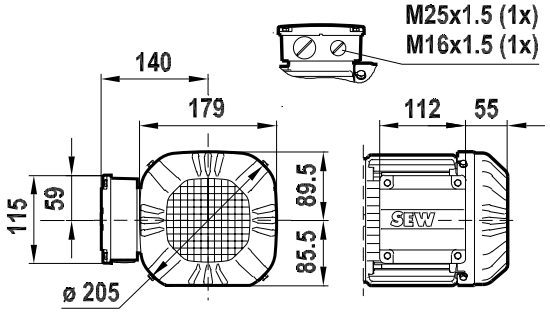
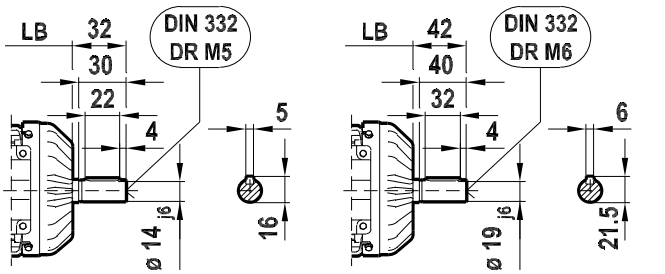
## DR.90L



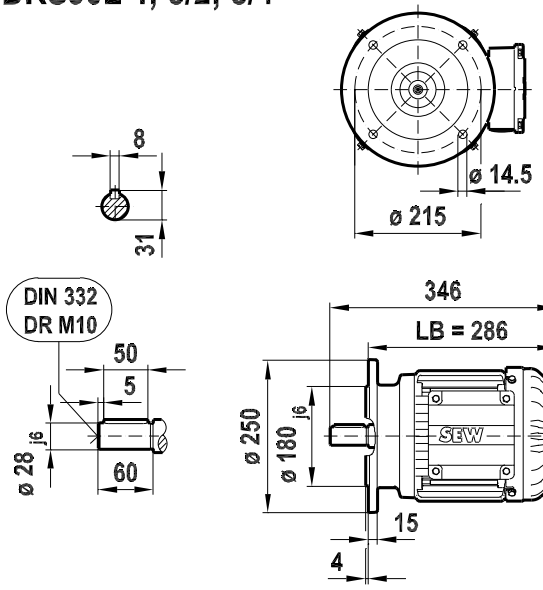

## /2W

08 196 04 06
1 (2)

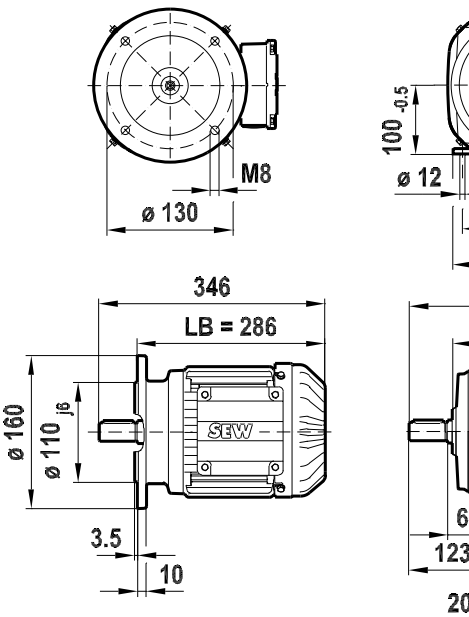



## DRS90L 4; 8/2; 8/4

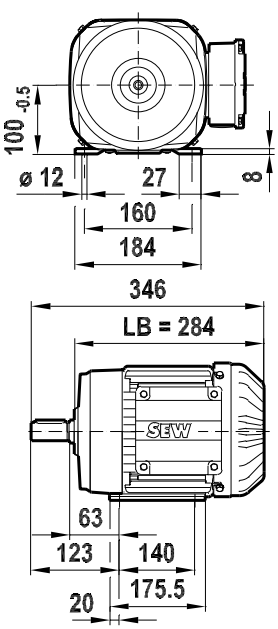
### /FF (B5) FF215




### /FT (B14) FT130

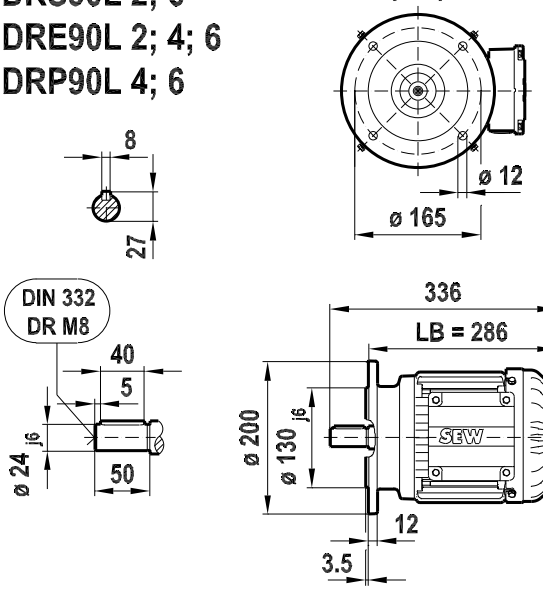



### /FI.. (B3)

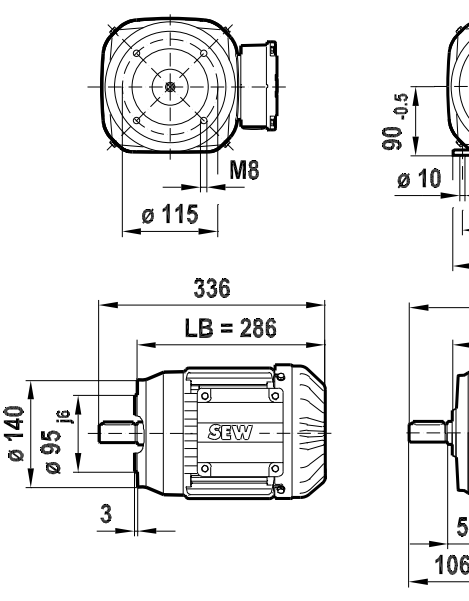



## DRS90L 2; 6
## DRE90L 2; 4; 6
## DRP90L 4; 6

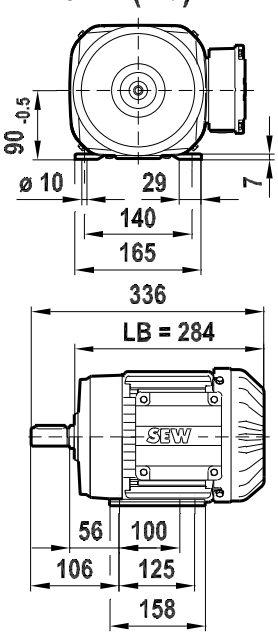
### /FF (B5) FF165




### /FT (B14) FT115




### /FI.. (B3)

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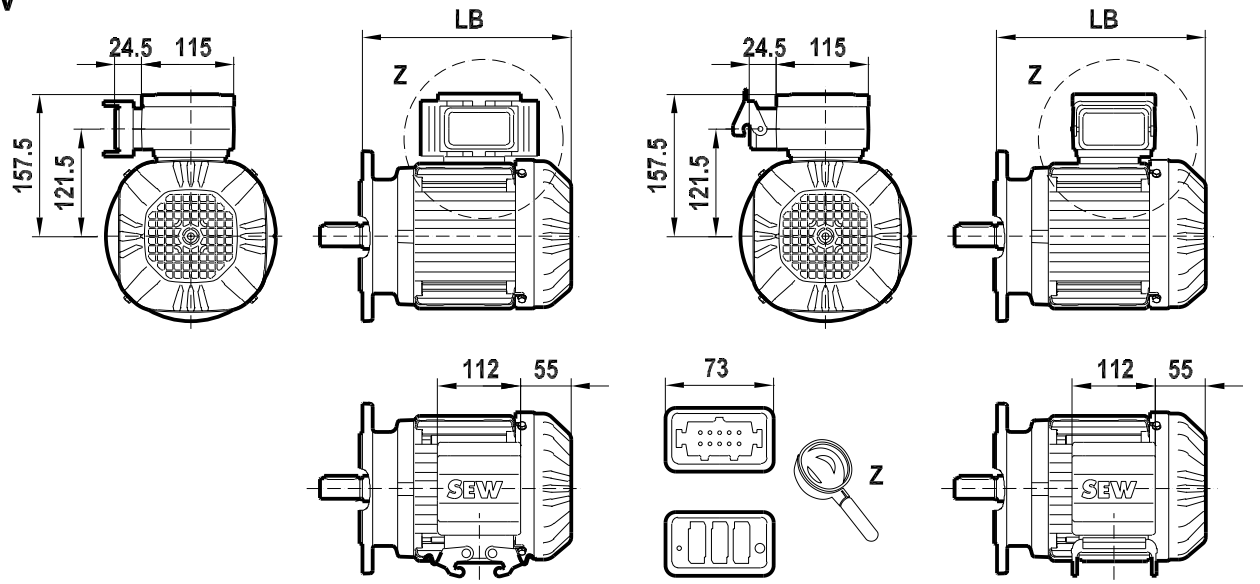
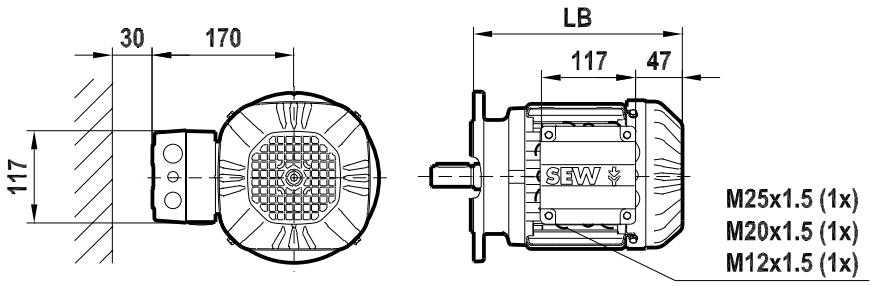
## DR.90L

08 196 04 06
2 (2)

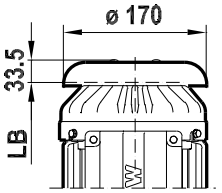
### /IV



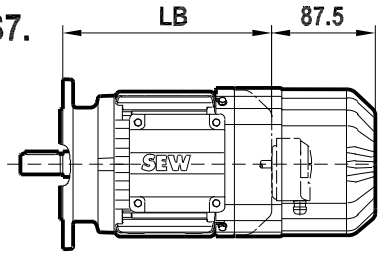

### /IS



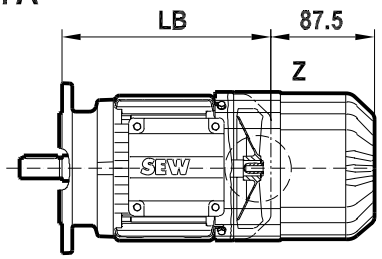

### /C

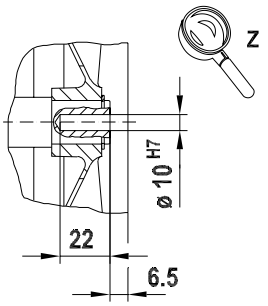



### /ES7.
### /AS7.

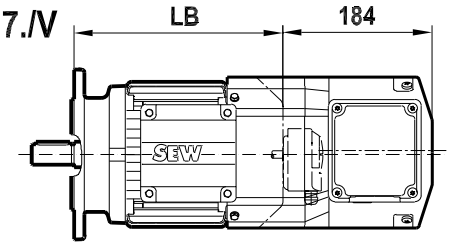



### /ES7A

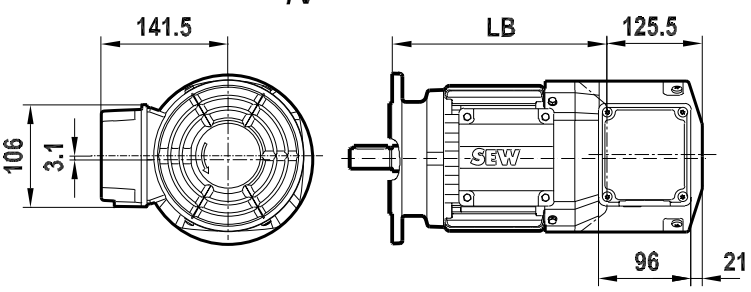



### /ES7./V
### /AS7./V




### /V

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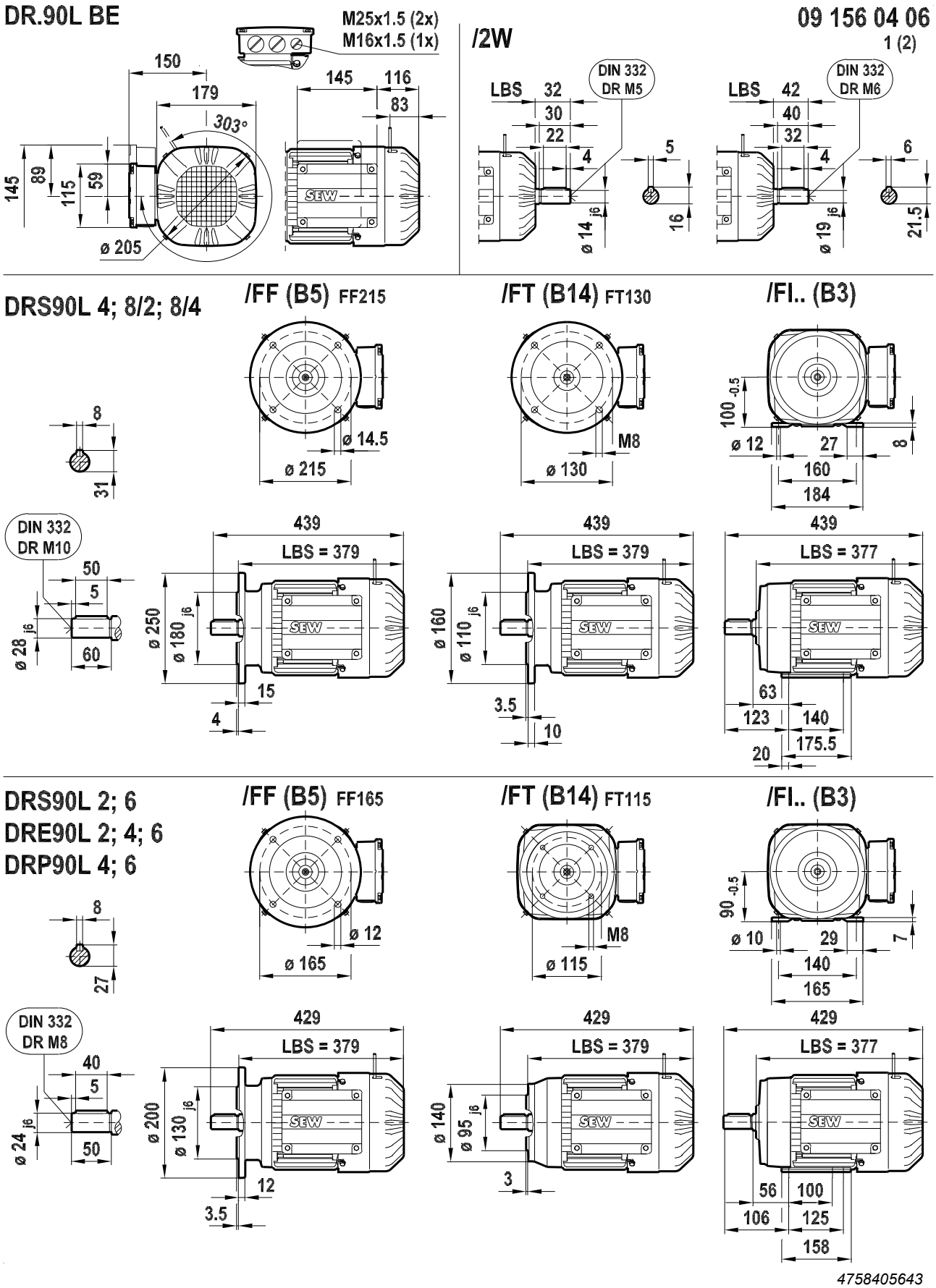
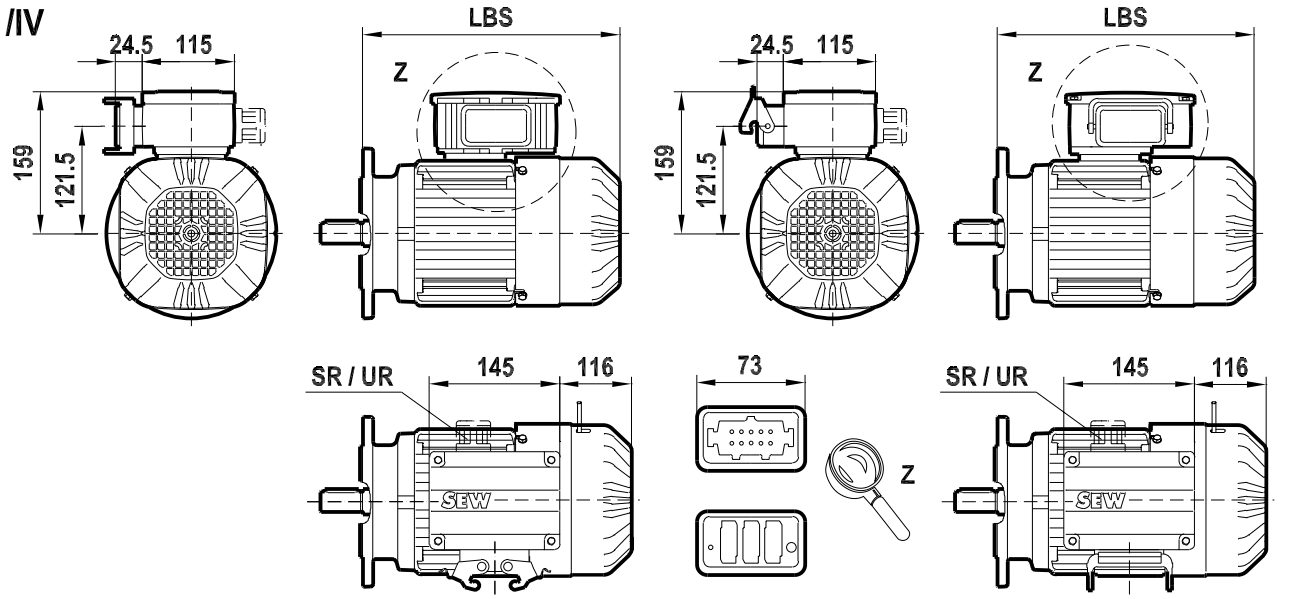

DR.90L BE
M25x1.5 (2x)
M16x1.5 (1x)
150
179
303°
145
116
83
145
89
115
59
ø 205
/2W
09 156 04 06
1 (2)
LBS 32
DIN 332
DR M5
30
22
4
5
ø 14 j6
16
LBS 42
DIN 332
DR M6
40
32
4
6
ø 19 j6
21.5
DRS90L 4; 8/2; 8/4
/FF (B5) FF215
/FT (B14) FT130
/FI.. (B3)
8
31
ø 14.5
ø 215
M8
ø 130
100 -0.5
ø 12
27
8
160
184
DIN 332
DR M10
50
5
ø 28 j6
60
439
LBS = 379
ø 250
ø 180 j6
15
4
ø 160
ø 110 j6
3.5
10
LBS = 377
63
123
140
175.5
20
DRS90L 2; 6
DRE90L 2; 4; 6
DRP90L 4; 6
/FF (B5) FF165
/FT (B14) FT115
/FI.. (B3)
8
27
ø 12
ø 165
M8
ø 115
90 -0.5
ø 10
29
7
140
165
DIN 332
DR M8
40
5
ø 24 j6
50
429
LBS = 379
ø 200
ø 130 j6
12
3.5
ø 140
ø 95 j6
3
LBS = 377
56
100
106
125
158
4758405643

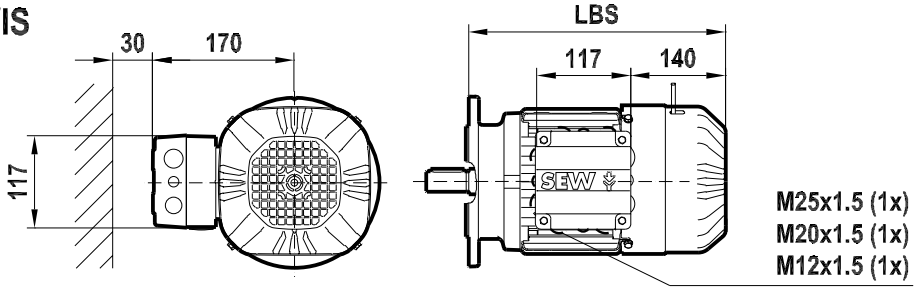
## DR.90L BE

09 156 04 06
2 (2)

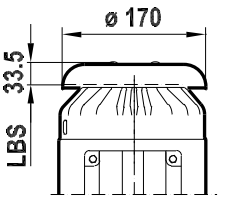
/IV




/IS

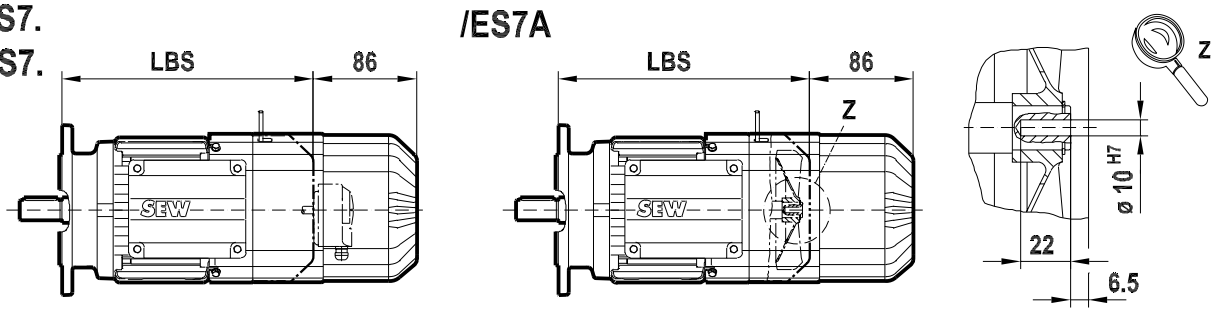



/C



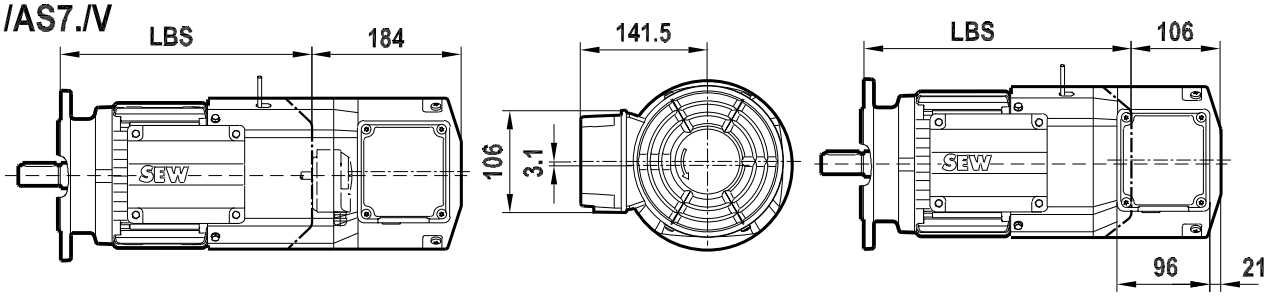

/ES7.
/AS7.

/ES7A




/ES7./V
/AS7./V

/V

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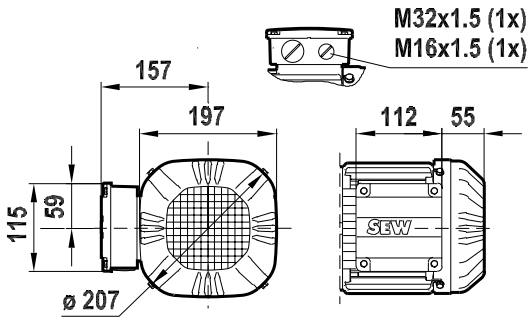
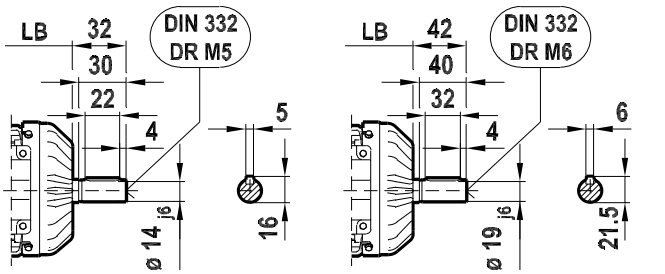
## DR.100M



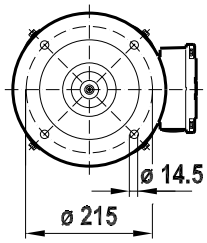

## /2W

08 197 03 06
1 (2)

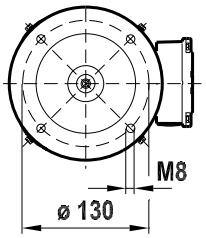



## DRS100M 2; 4; 6; 4/2 8/2; 8/4
## DRE100M 4
## DRM100M 12

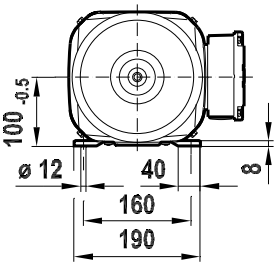
### /FF (B5) FF215

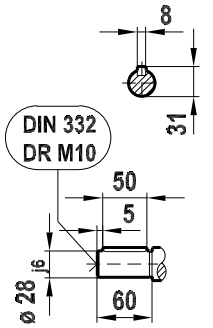


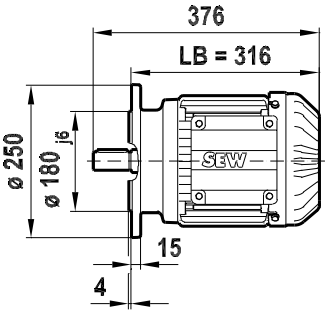

### /FT (B14) FT130

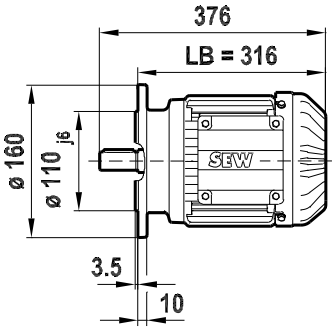


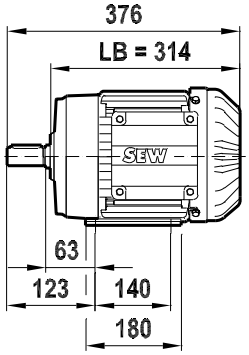

### /FI.. (B3)



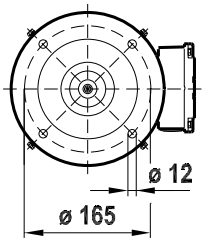




## DRE100M 2; 6
## DRP100M 2; 4

### /FF (B5) FF165

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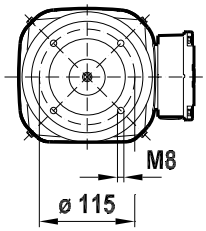


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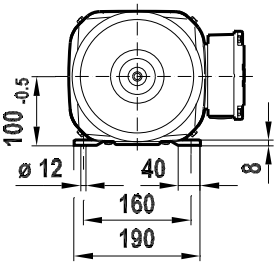


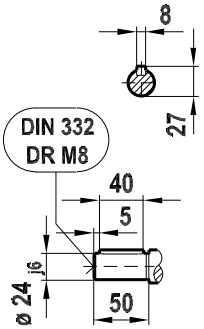


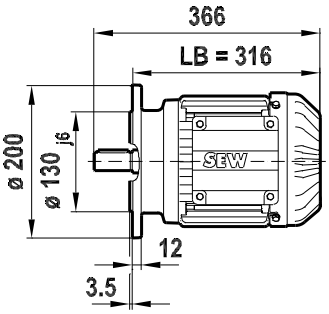


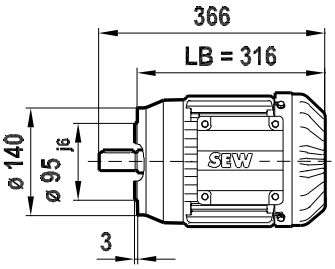


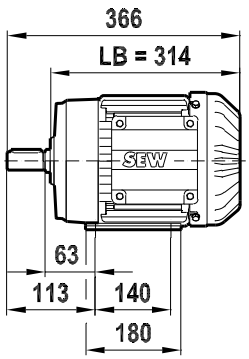


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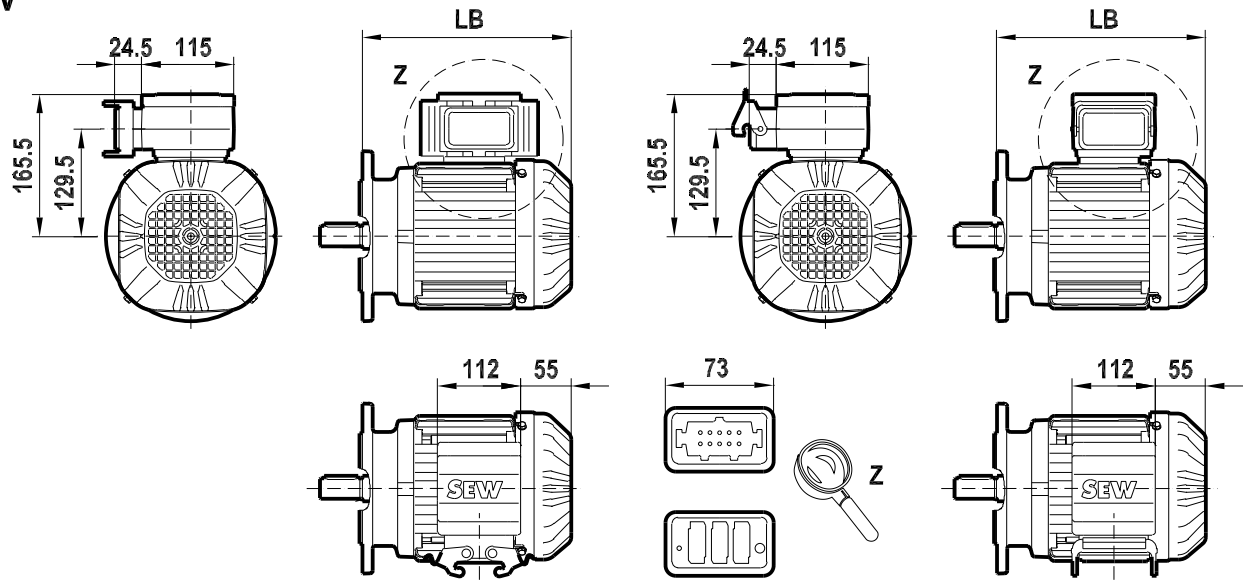
## DR.100M

08 197 03 06
2 (2)

### /IV

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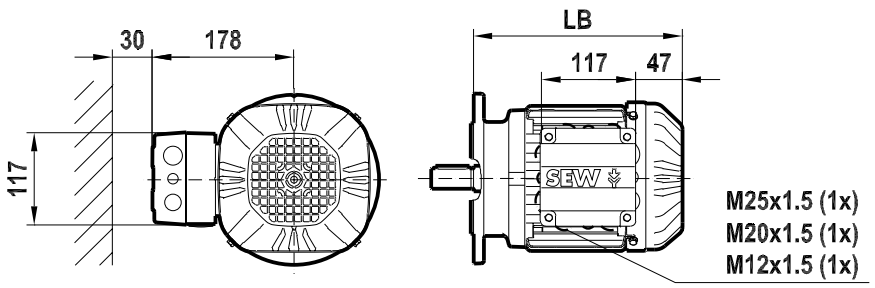
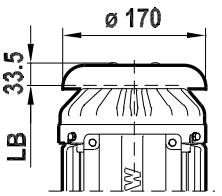



### /C

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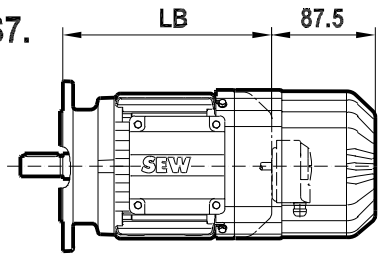
### /AS7.

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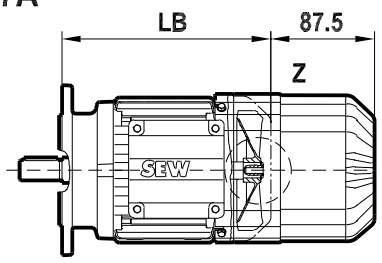


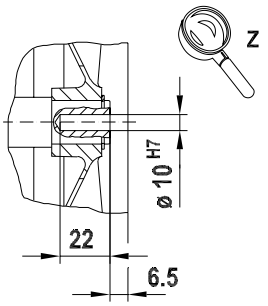


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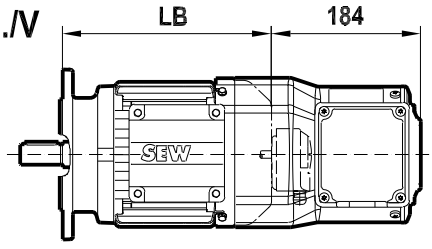
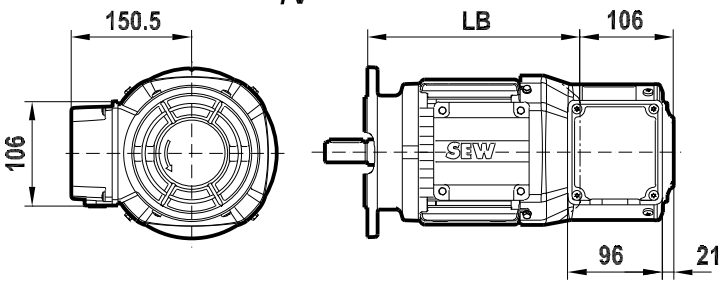
### /AS7./V




### /V

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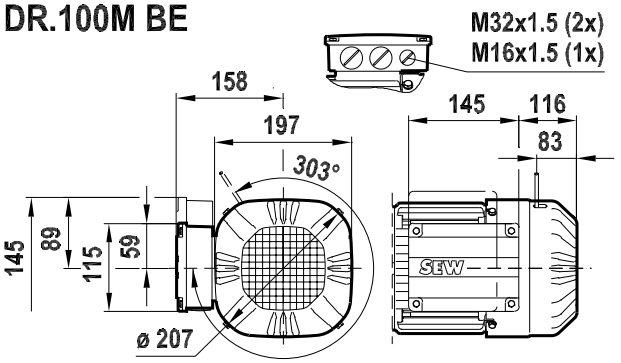
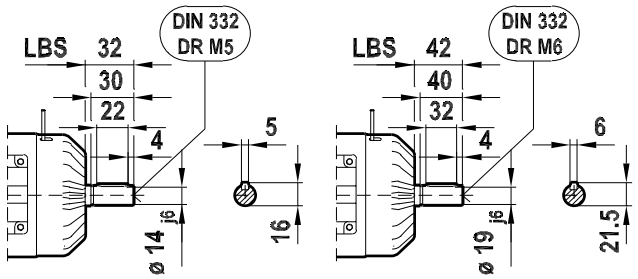
## DR.100M BE



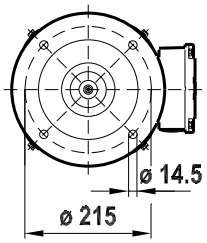

## /2W

09 157 04 06
1 (2)

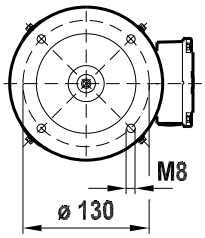



## DRS100M 2; 4; 6; 4/2 8/2; 8/4
## DRE100M 4
## DRM100M 12

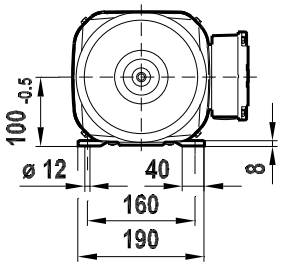
### /FF (B5) FF215

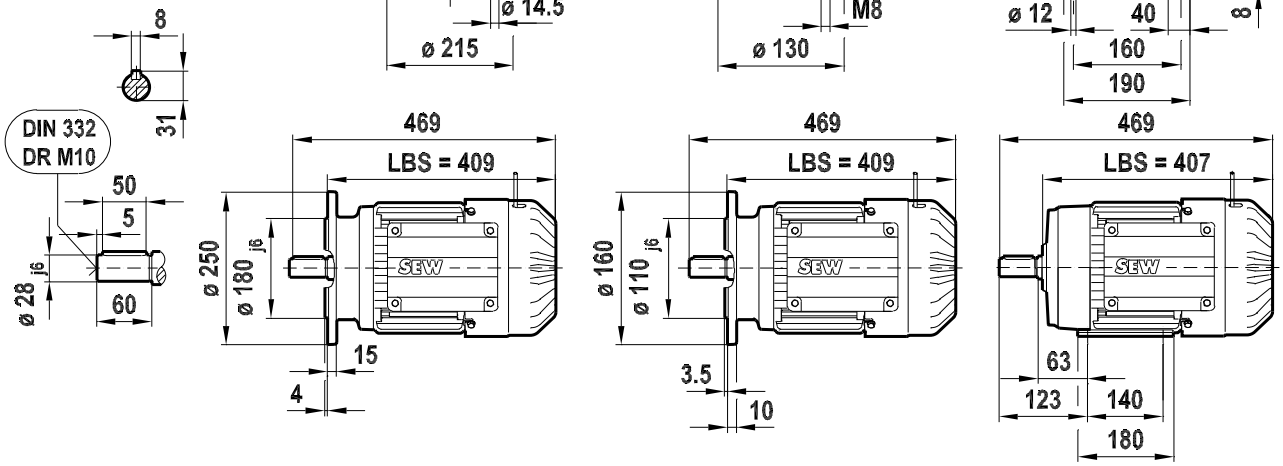



### /FT (B14) FT130



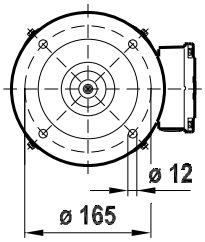

### /FI.. (B3)



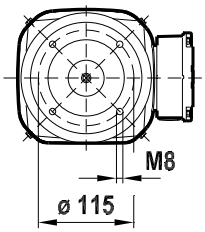




## DRE100M 2; 6
## DRP100M 2; 4

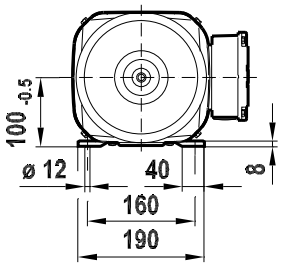
### /FF (B5) FF165

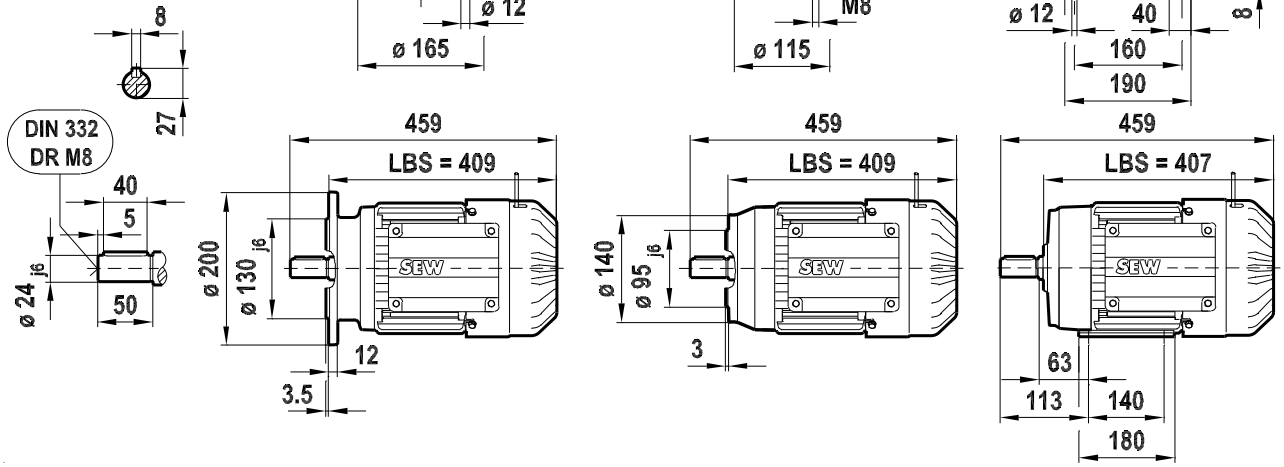



### /FT (B14) FT115




### /FI.. (B3)

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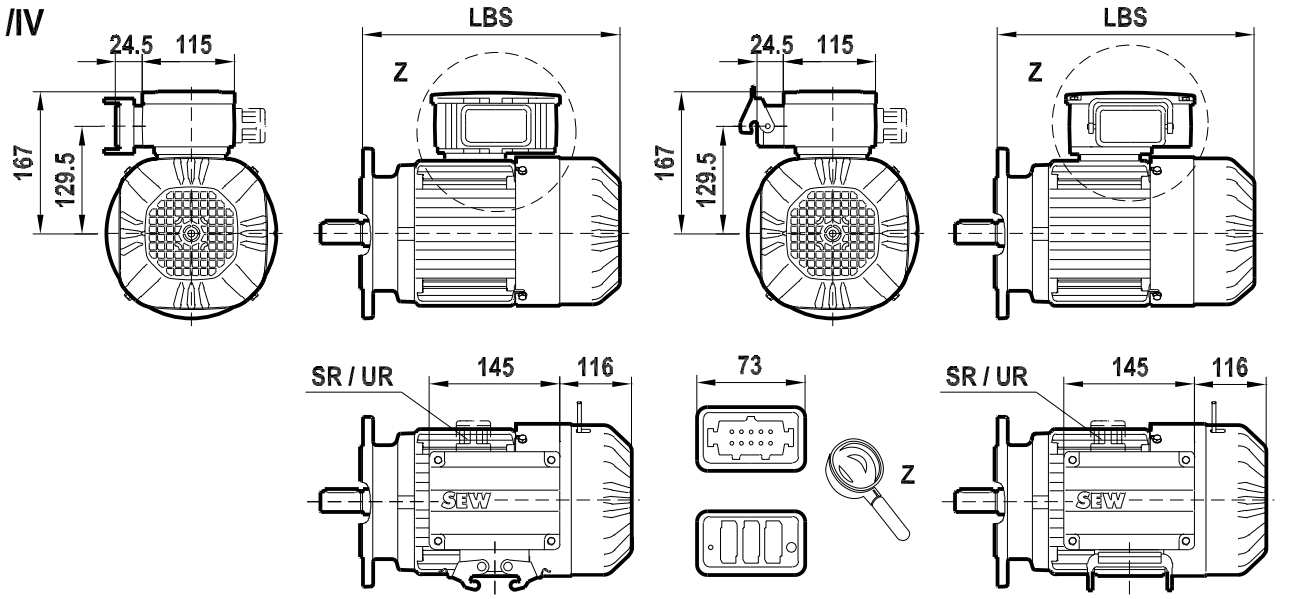
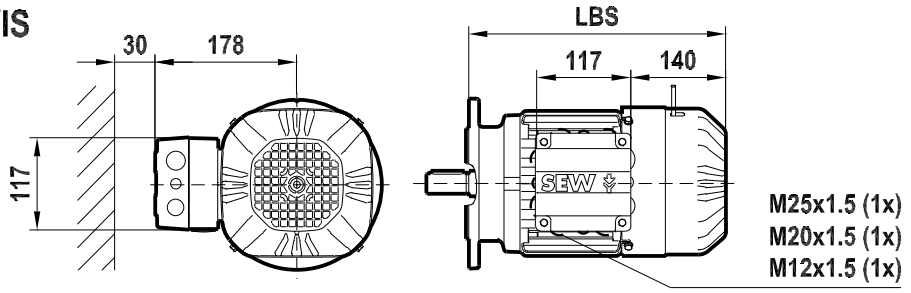
## DR.100M BE

09 157 04 06
2 (2)

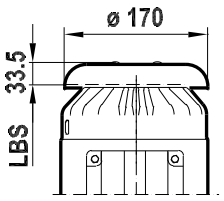
/IV




/IS




/C

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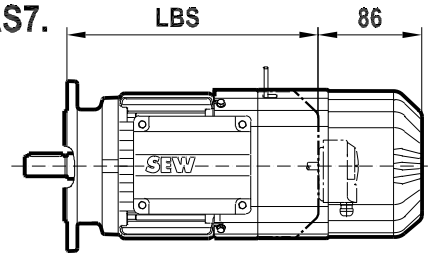
/AS7.

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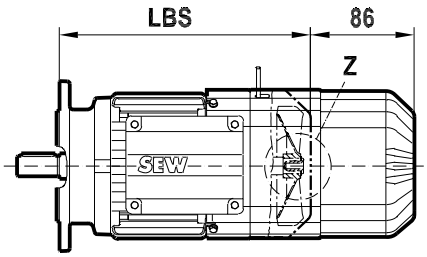


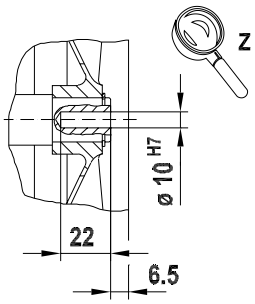


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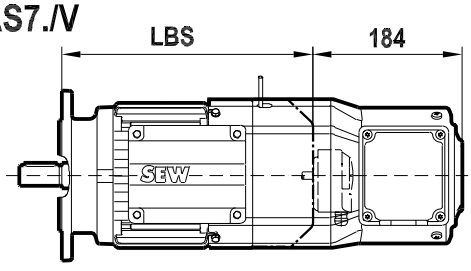
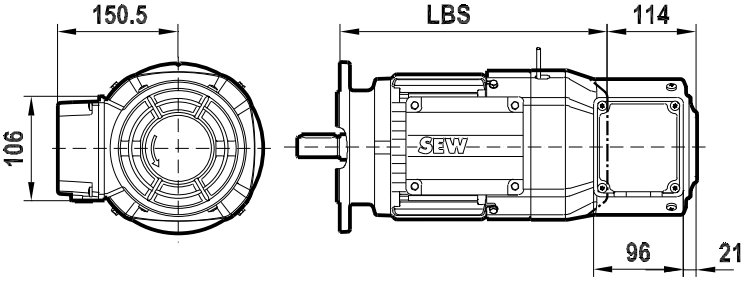
/AS7./V




/V

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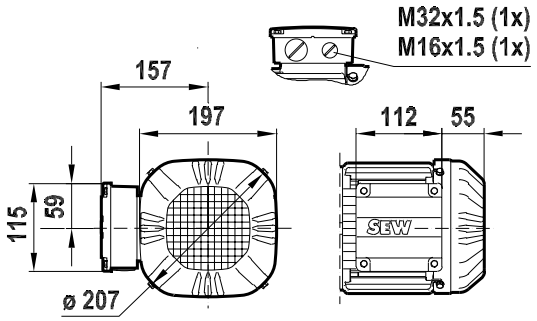
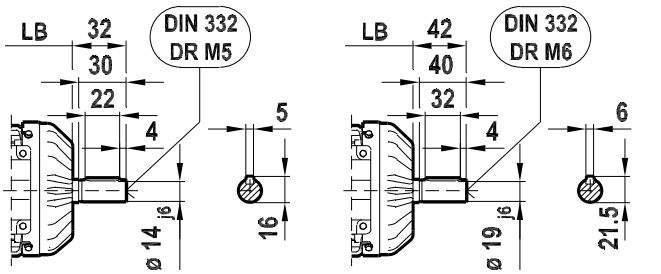
## DR.100L



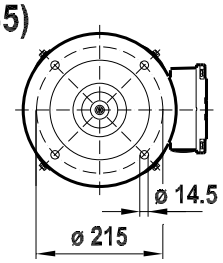

## /2W

08 198 04 06
1 (2)

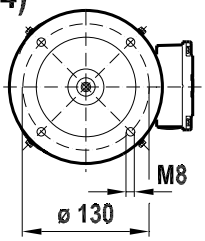



## DRS100L 8/4
## DRE100L 2; 4; 6
## DRP100L 4
## DRM100L 12

### /FF (B5)
FF215




### /FT (B14)
FT130

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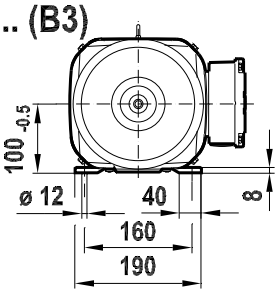
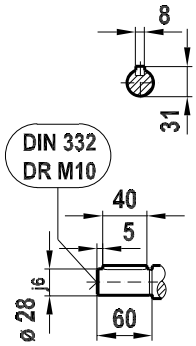
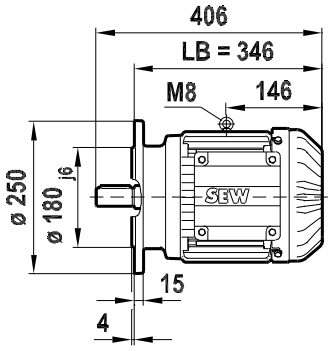
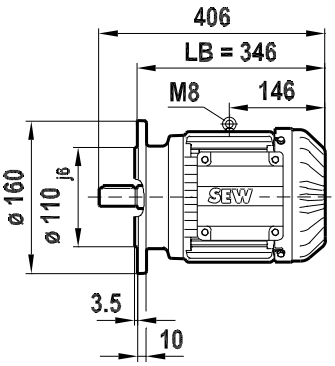
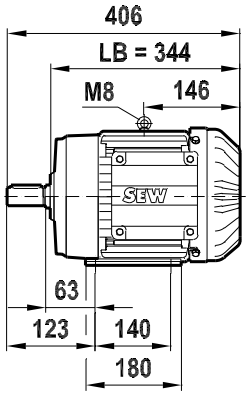


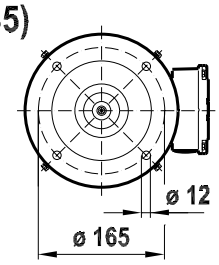



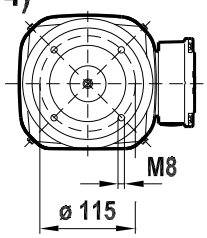




## DRP100L 6
## DRE100LC 6

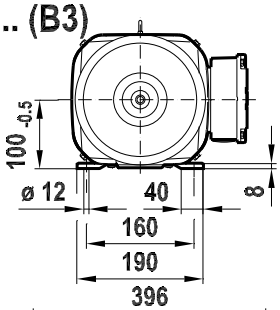
### /FF (B5)
FF165

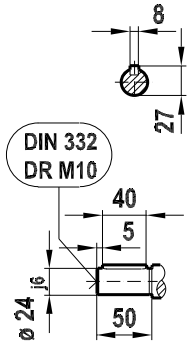


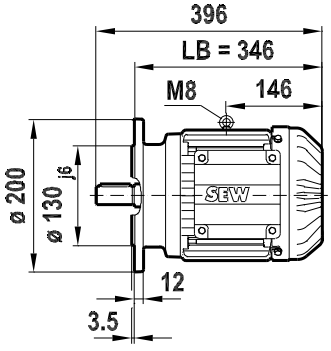

### /FT (B14)
FT115

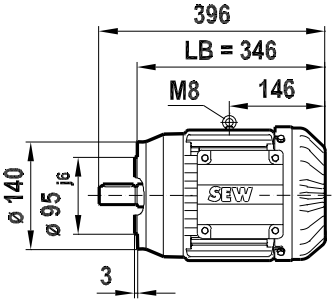


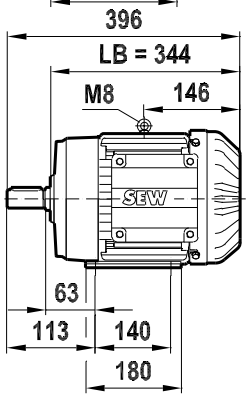

### /FI.. (B3)

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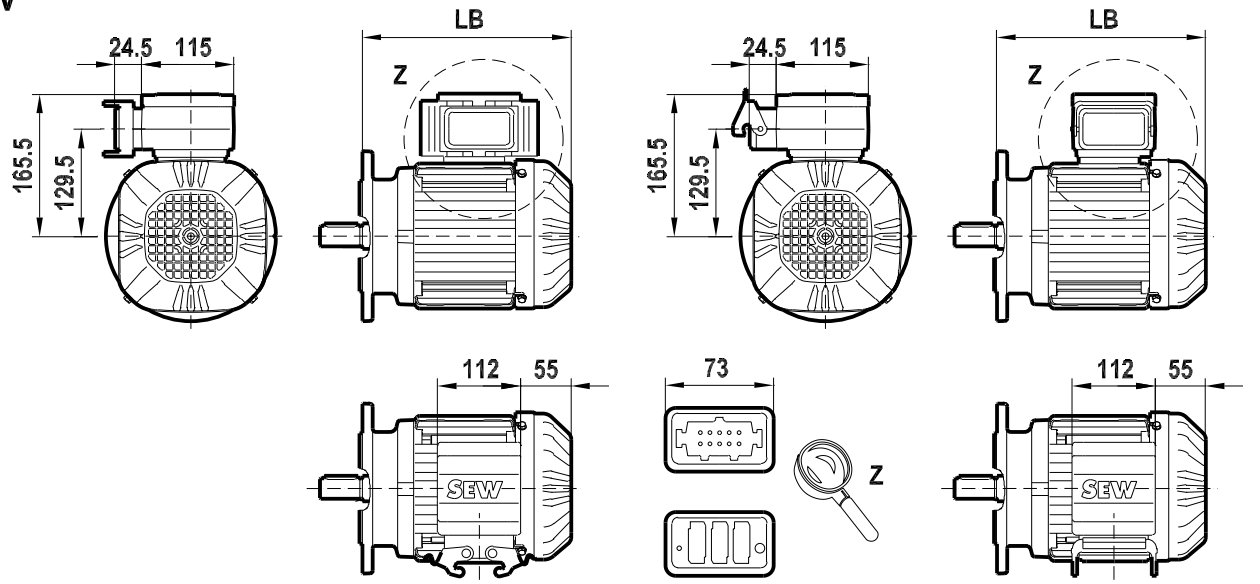
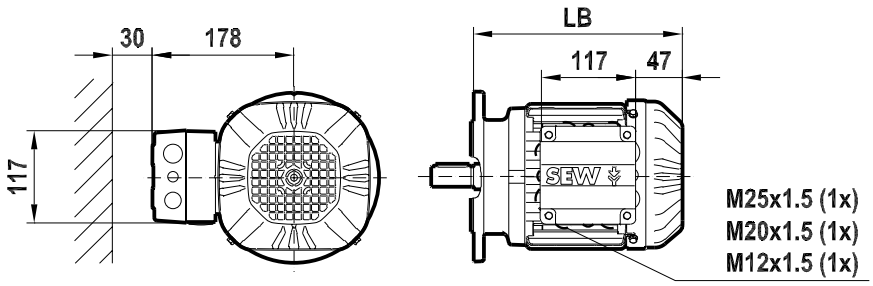
## DR.100L

08 198 04 06
2 (2)

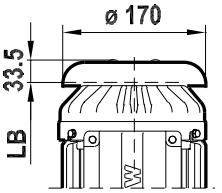
### /IV



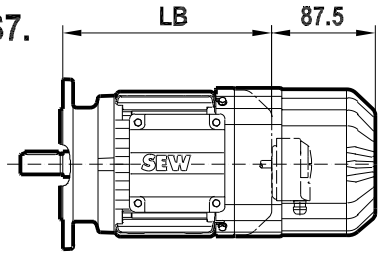

### /IS



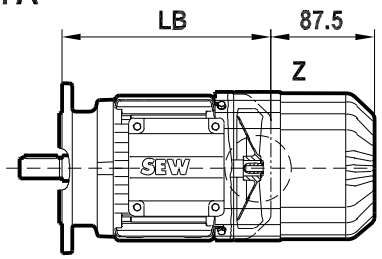

### /C

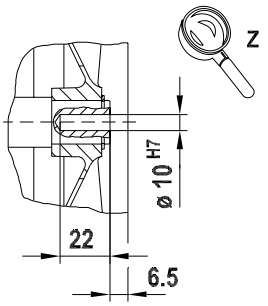



### /ES7.
### /AS7.




### /ES7A

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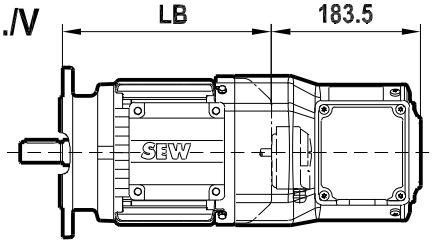
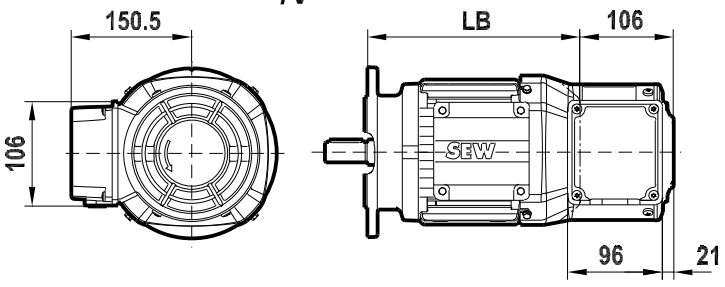
### /AS7./V




### /V

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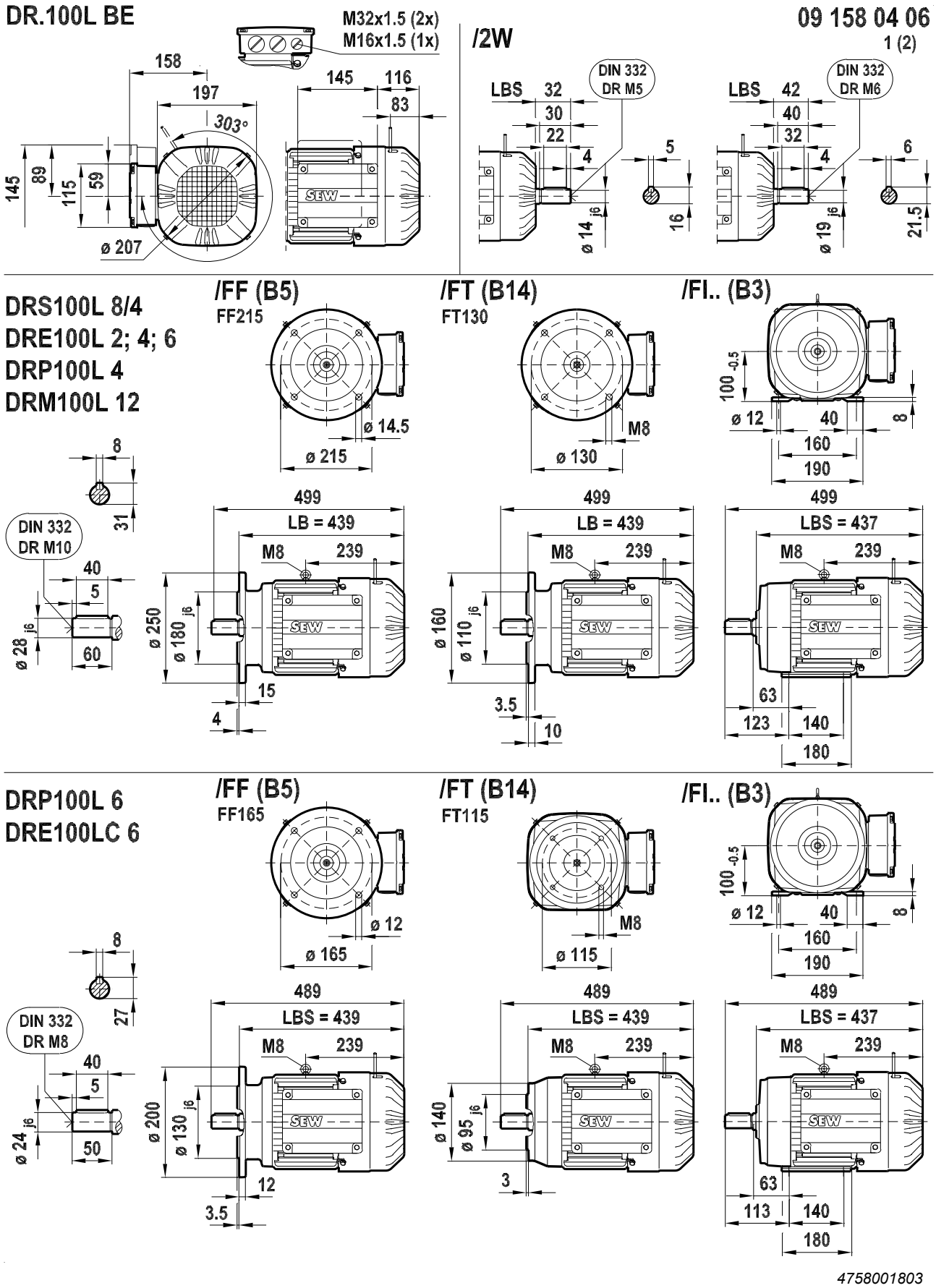
DR.100L BE
M32x1.5 (2x)
M16x1.5 (1x)
158
197
303°
145
116
83
145
89
115
59
ø 207
/2W
09 158 04 06
1 (2)
LBS 32
DIN 332
DR M5
30
22
4
5
ø 14 j6
16
LBS 42
DIN 332
DR M6
40
32
4
6
ø 19 j6
21.5
DRS100L 8/4
DRE100L 2; 4; 6
DRP100L 4
DRM100L 12
/FF (B5)
FF215
ø 14.5
ø 215
/FT (B14)
FT130
M8
ø 130
/FI.. (B3)
100 -0.5
ø 12
40
8
160
190
8
31
DIN 332
DR M10
40
5
ø 28 j6
60
499
LB = 439
M8
239
ø 250
ø 180 j6
15
4
499
LB = 439
M8
239
ø 160
ø 110 j6
3.5
10
499
LBS = 437
M8
239
63
123
140
180
DRP100L 6
DRE100LC 6
/FF (B5)
FF165
ø 12
ø 165
/FT (B14)
FT115
M8
ø 115
/FI.. (B3)
100 -0.5
ø 12
40
8
160
190
8
27
DIN 332
DR M8
40
5
ø 24 j6
50
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LBS = 439
M8
239
ø 200
ø 130 j6
12
3.5
489
LBS = 439
M8
239
ø 140
ø 95 j6
3
489
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M8
239
63
113
140
180

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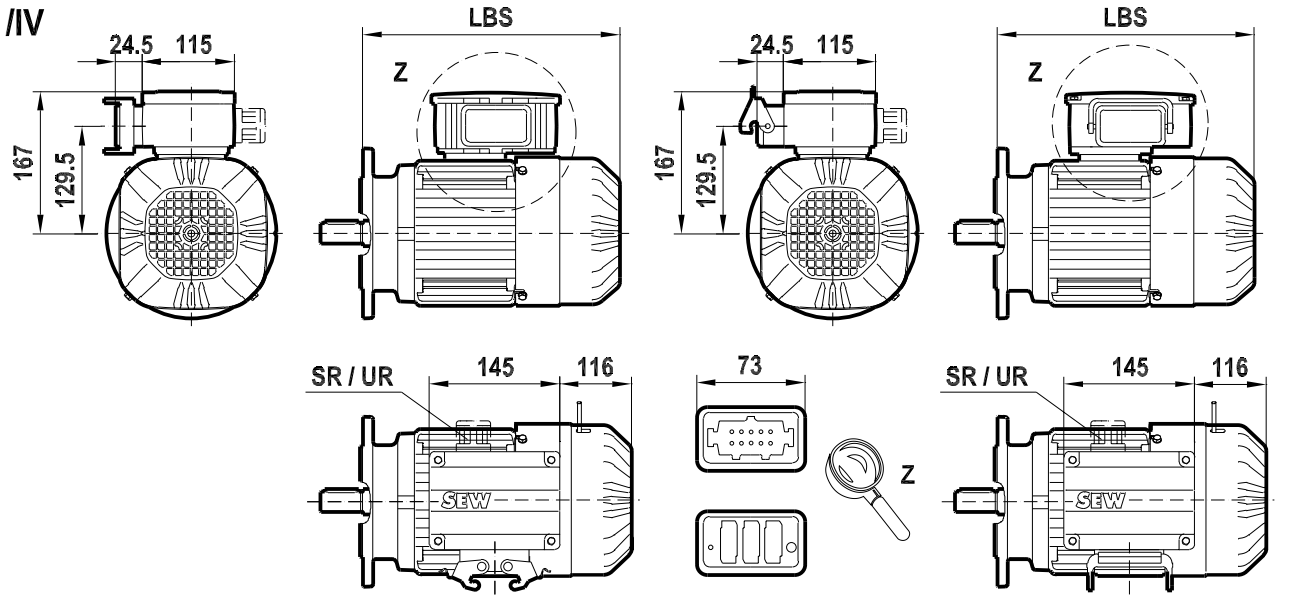
## DR.100L BE

09 158 04 06
2 (2)

/IV

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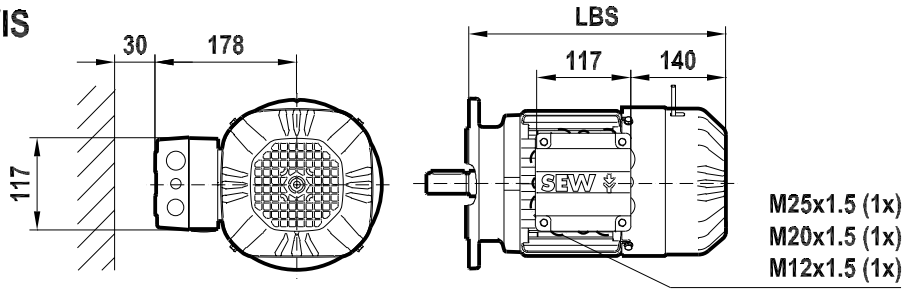
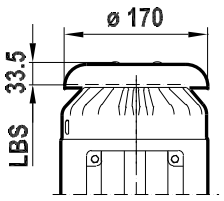



/C

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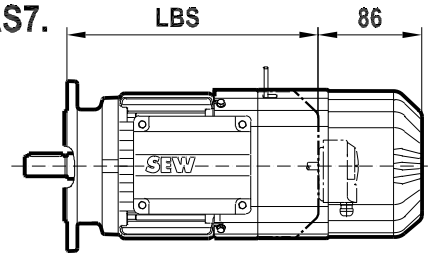
/AS7.

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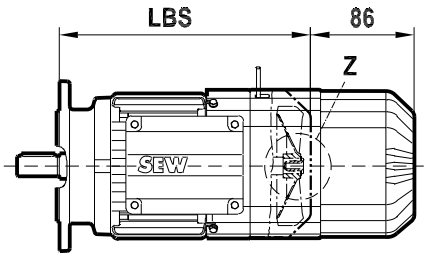
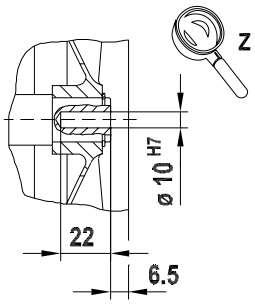
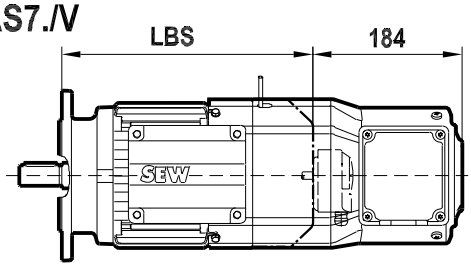
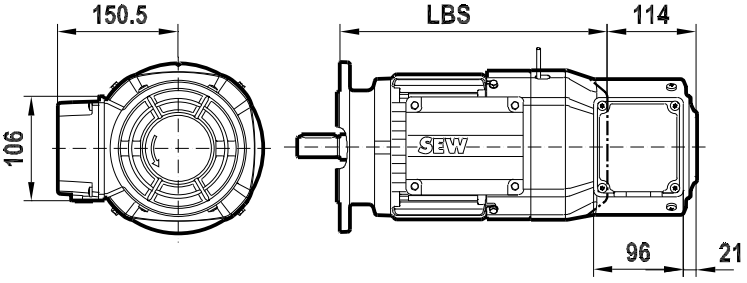



/ES7./V
/AS7./V




/V

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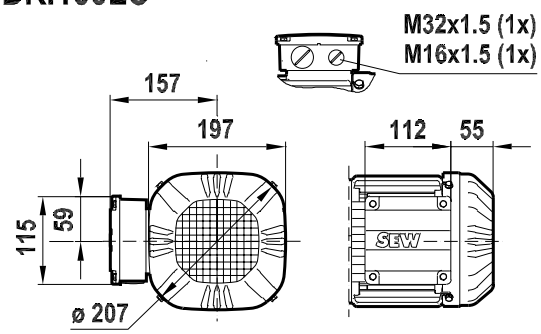
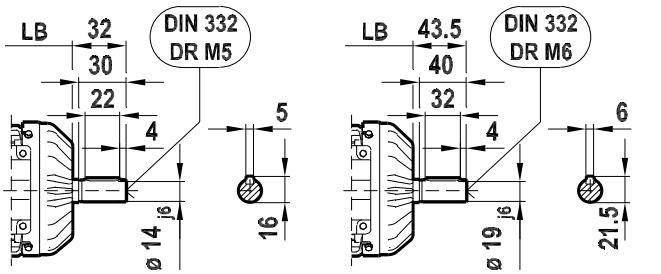
## DR.100LC



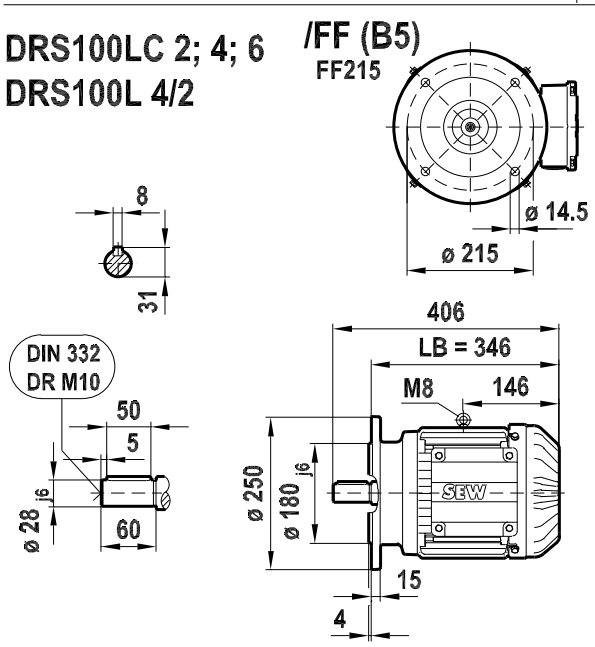

## /2W

08 102 00 12
1 (2)

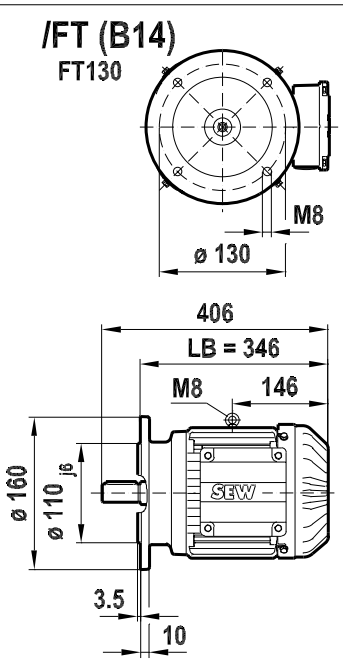



## DRS100LC 2; 4; 6
## DRS100L 4/2

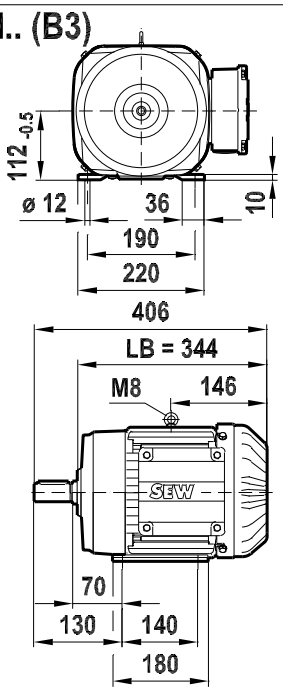
### /FF (B5)
FF215




### /FT (B14)
FT130

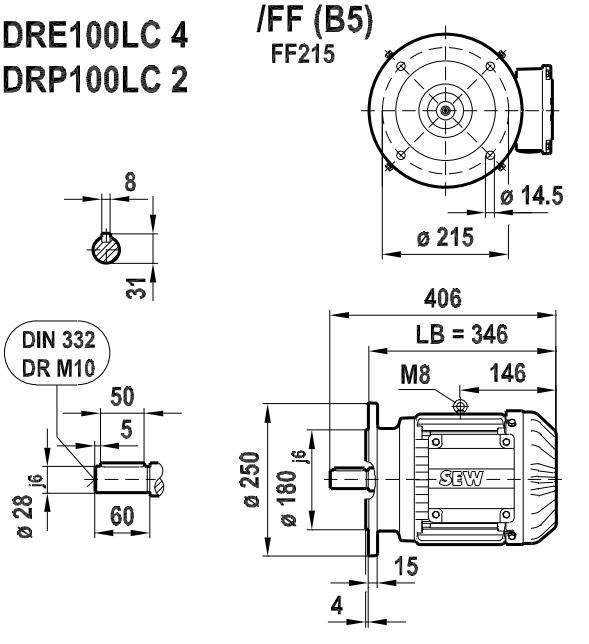



### /FI.. (B3)




## DRE100LC 4
## DRP100LC 2

### /FF (B5)
FF215

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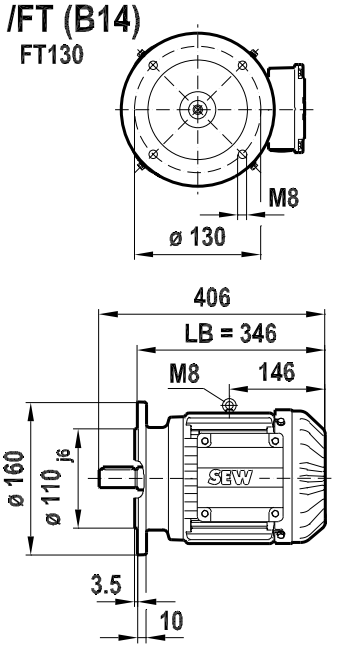
FT130

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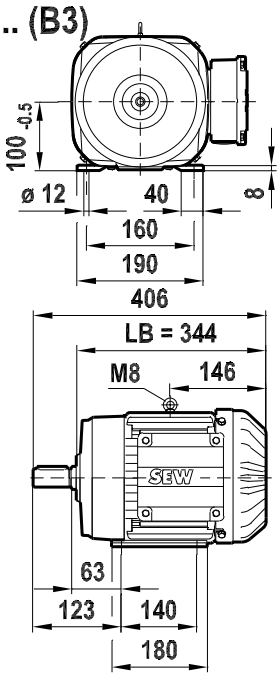


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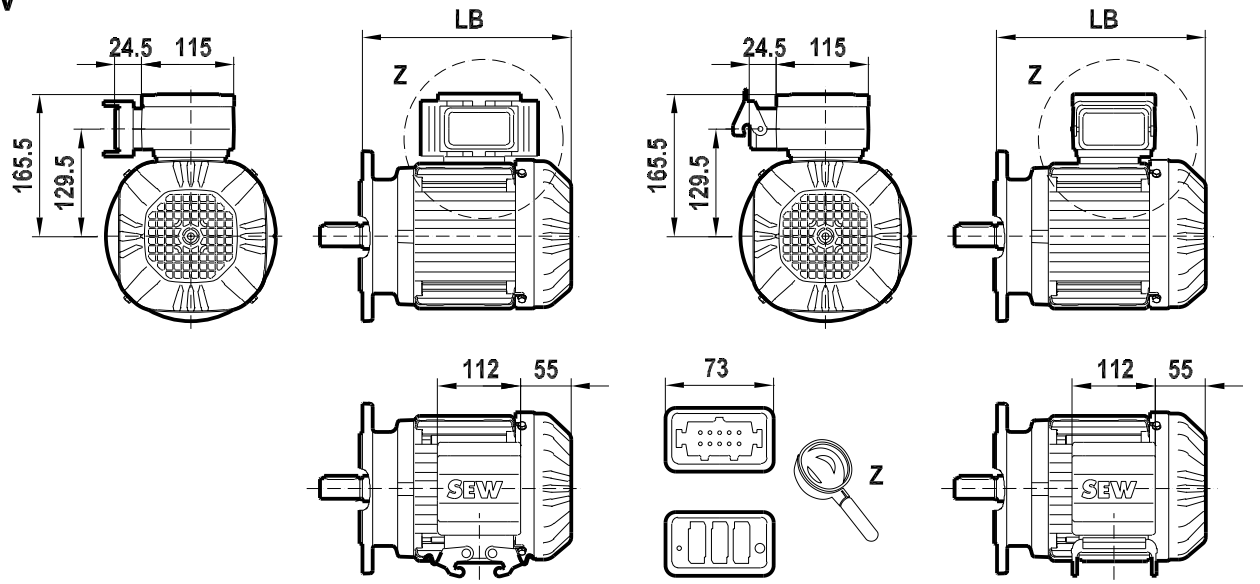
## DR.100LC

08 102 00 12
2 (2)

### /IV

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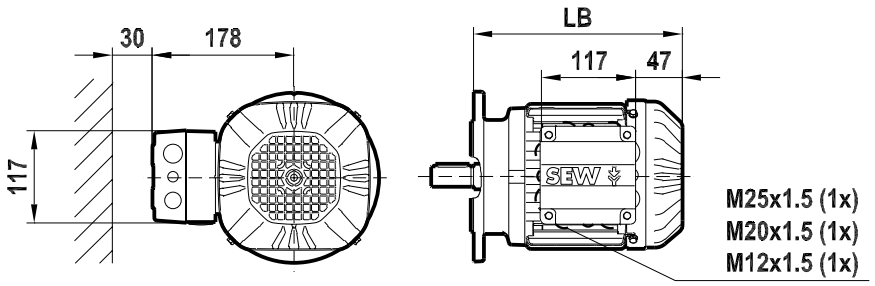


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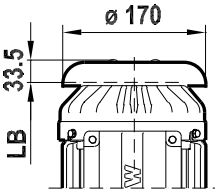


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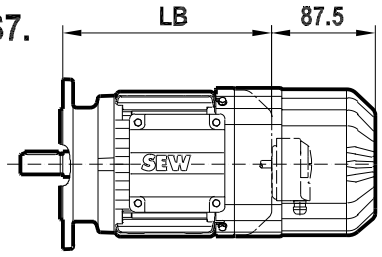
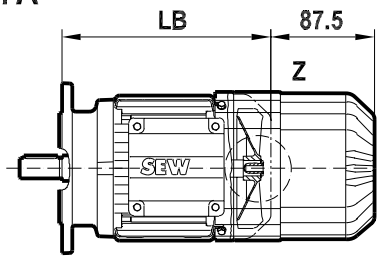
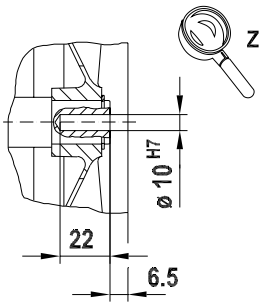
### /AS7.

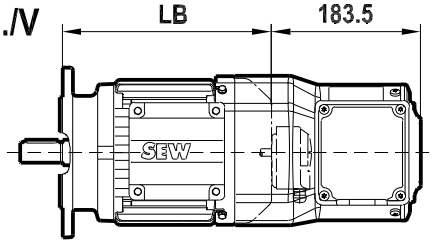



### /ES7A

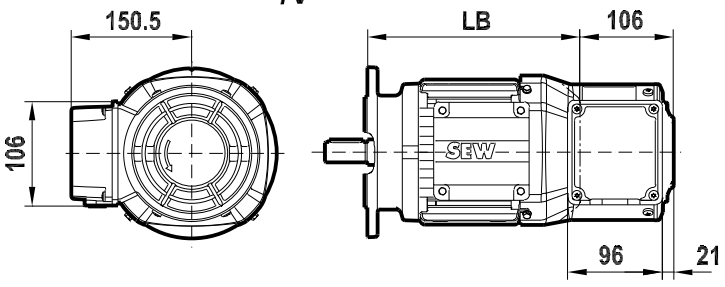



### /ES7./V
### /AS7./V




### /V

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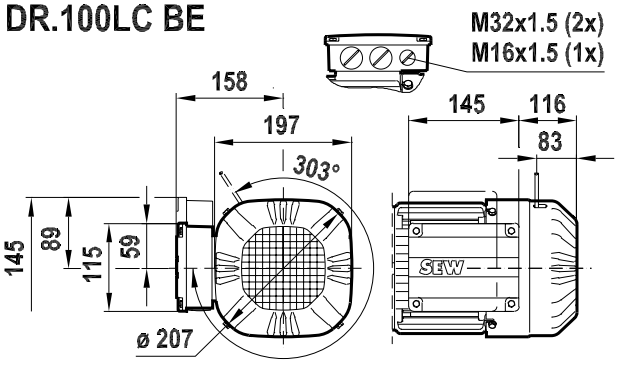
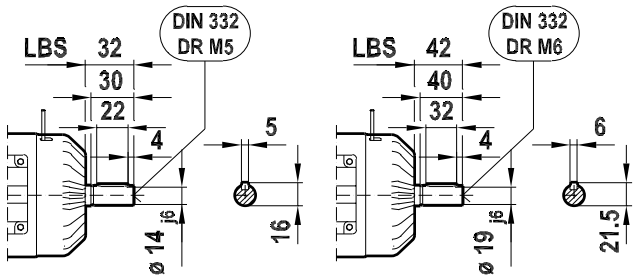
## DR.100LC BE



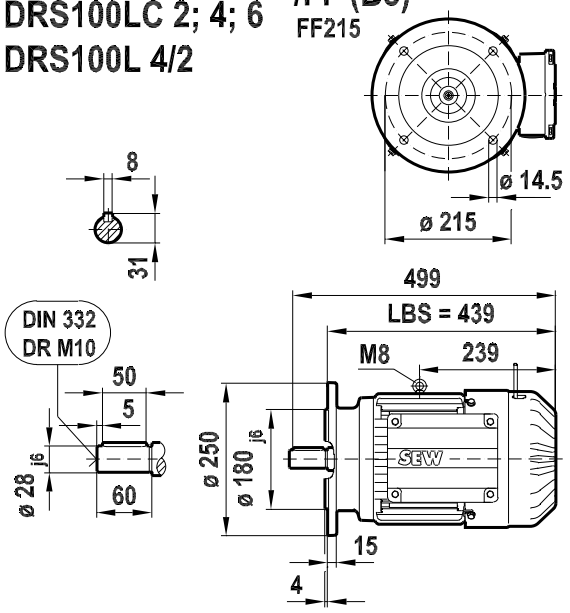

## /2W

09 756 00 12
1 (2)

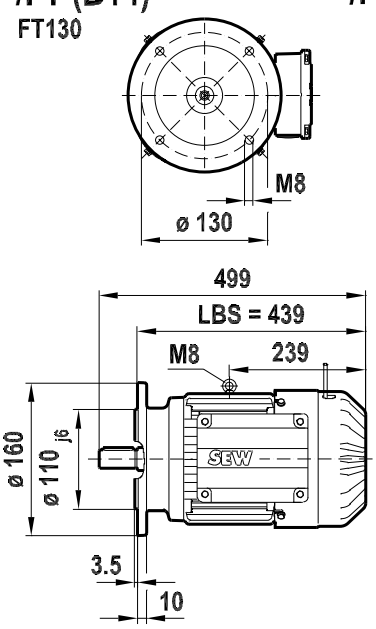



## DRS100LC 2; 4; 6
## DRS100L 4/2

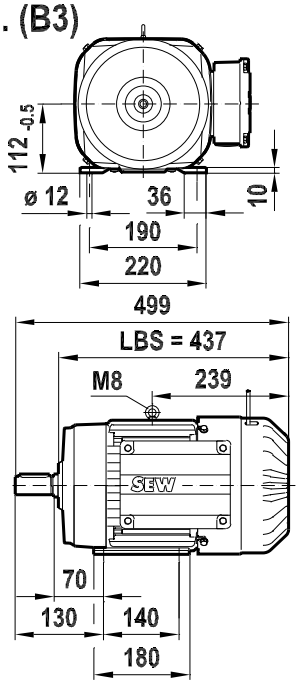
### /FF (B5)
FF215




### /FT (B14)
FT130

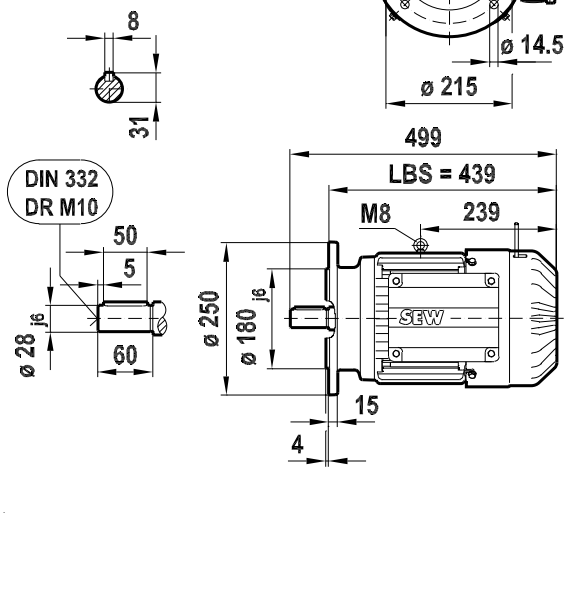



### /FI.. (B3)

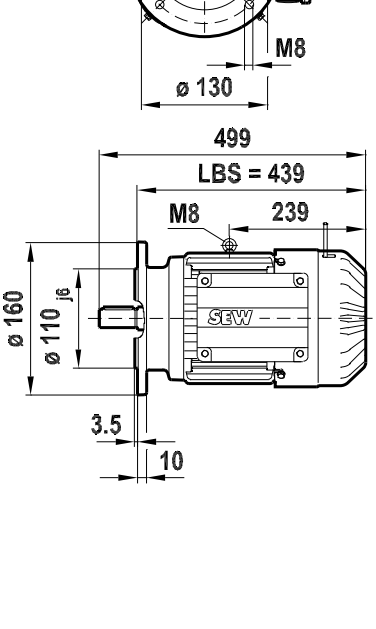



## DRE100LC 4
## DRP100LC 2

### /FF (B5)
FF215




### /FT (B14)
FT130

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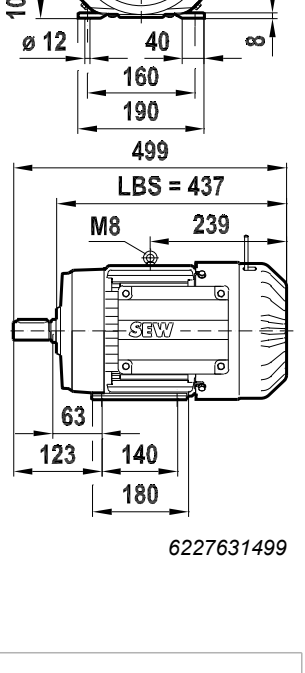


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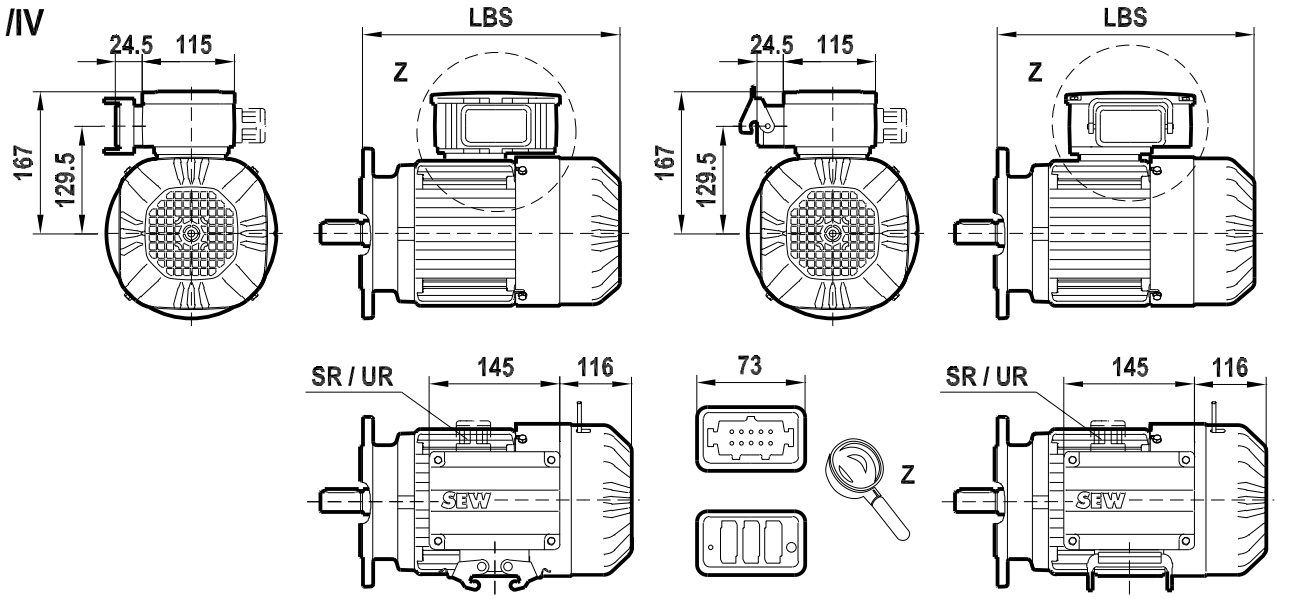
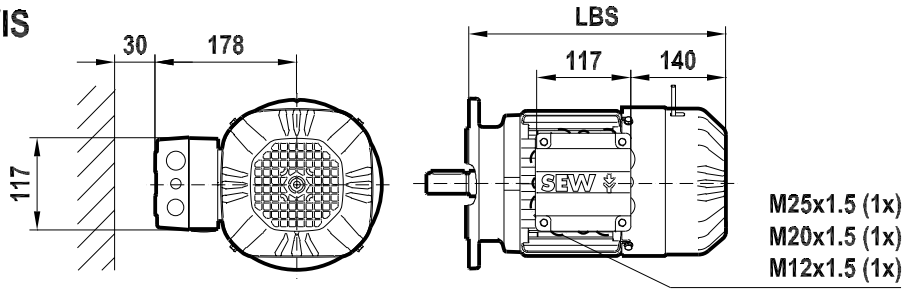
## DR.100LC BE

09 756 00 12
2 (2)

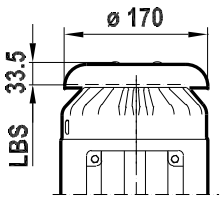
/IV




/IS




/C

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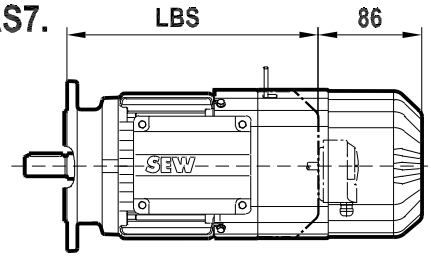
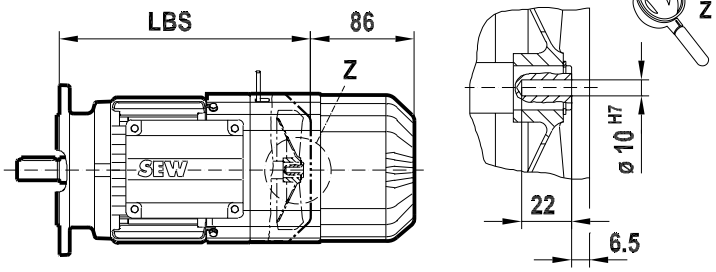
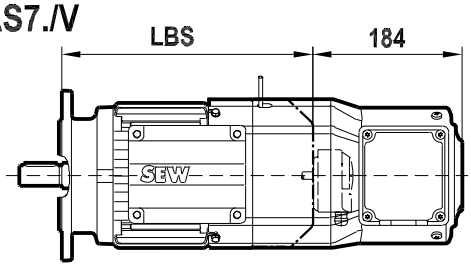
/AS7.



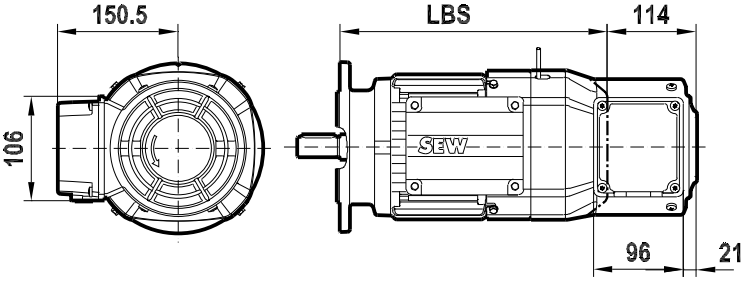

/ES7A




/ES7./V
/AS7./V




/V

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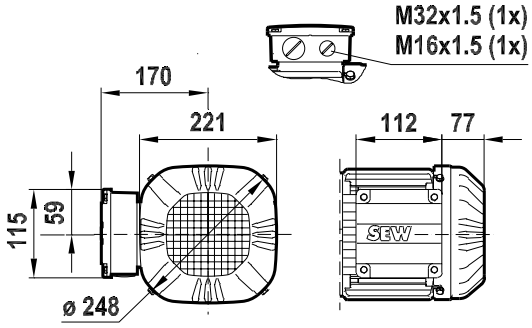
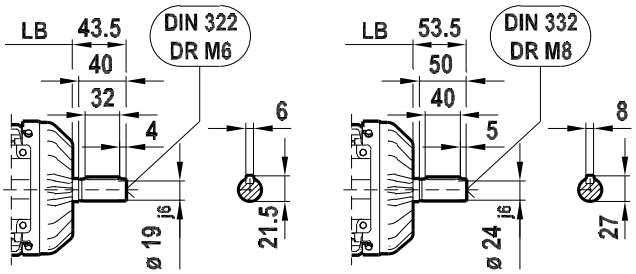
## DR.112M

08 276 04 07
1 (2)

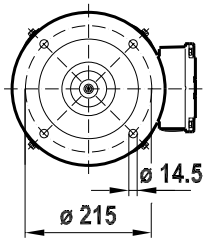



### /2W




## DRS112M 2; 4; 6; 8/2; 8/4
## DRE112M 2; 4; 6
## DRP112M 2; 4; 6

### /FF (B5) FF215

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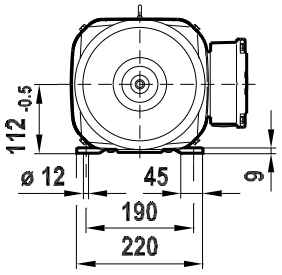


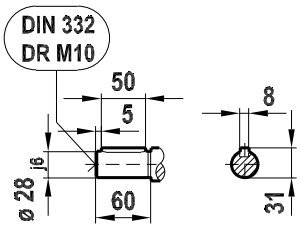


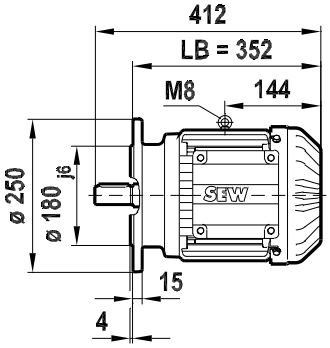


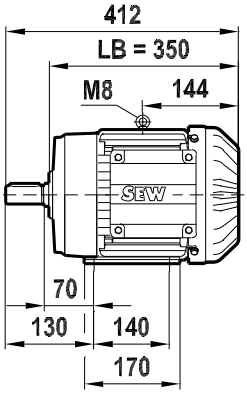


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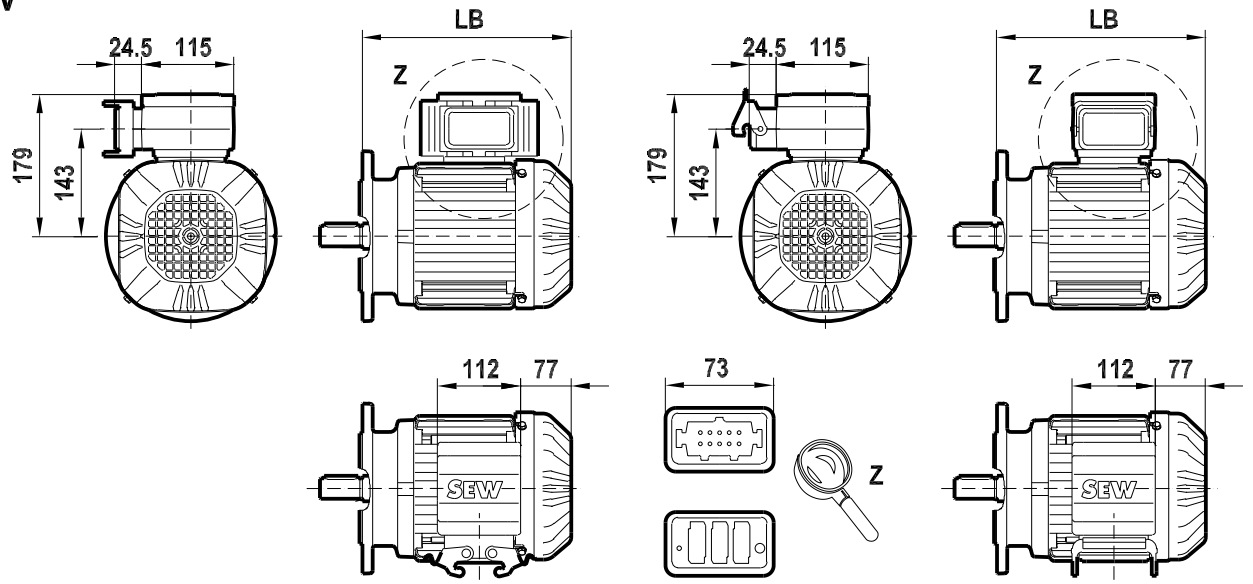
## DR.112M

08 276 04 07
2 (2)

### /IV

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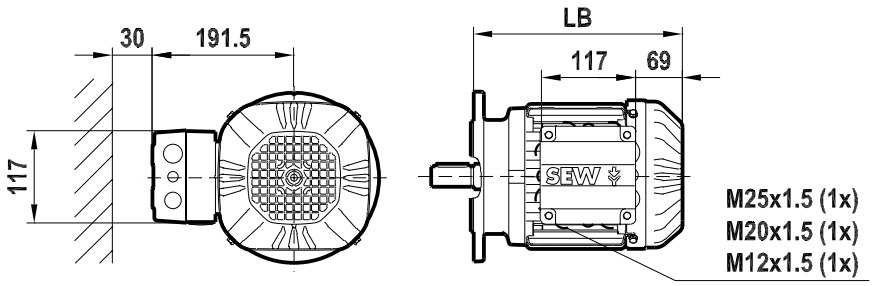


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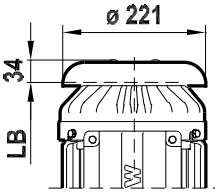


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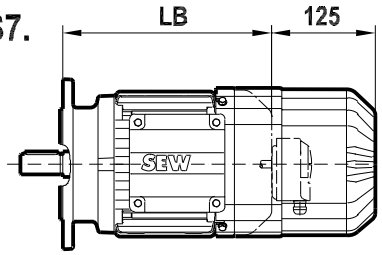
### /AS7.

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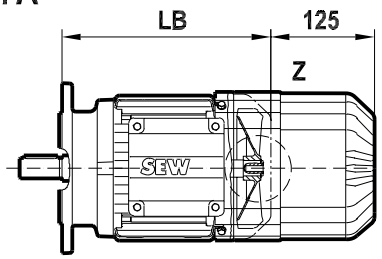
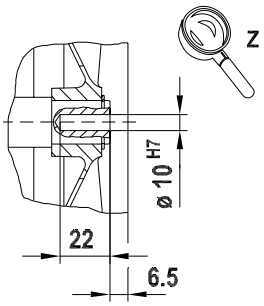
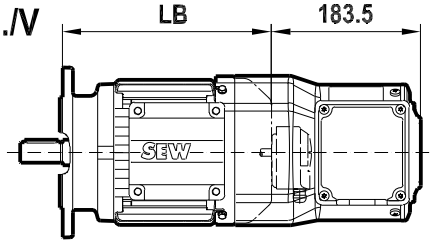
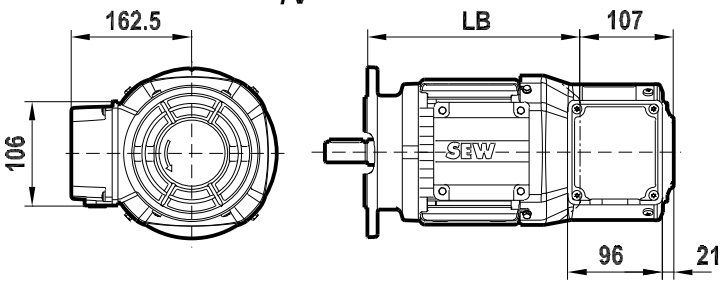



### /ES7./V
### /AS7./V




### /V

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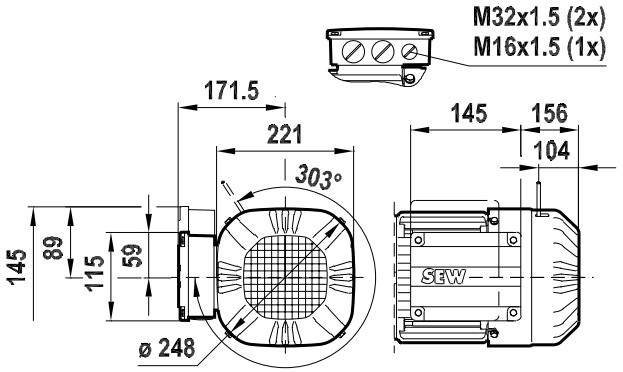
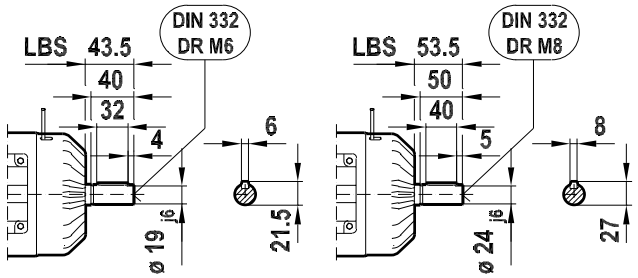
## DR.112M BE

09 197 04 07
1 (2)

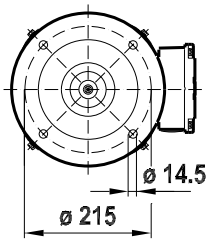



/2W

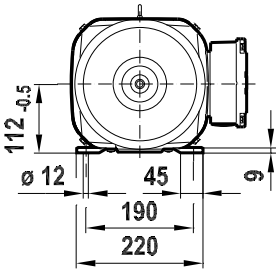


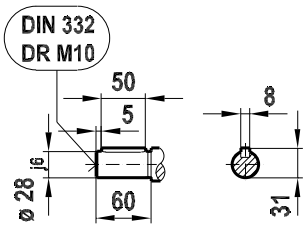

## DRS112M BE 2; 4; 6; 8/2; 8/4
## DRE112M BE 2; 4; 6
## DRP112M BE 2; 4; 6

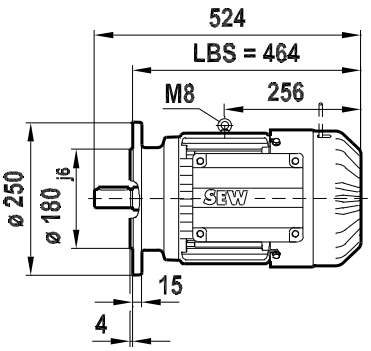
/FF (B5) FF215

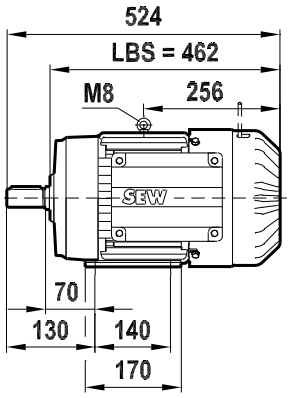



/FI.. (B3)

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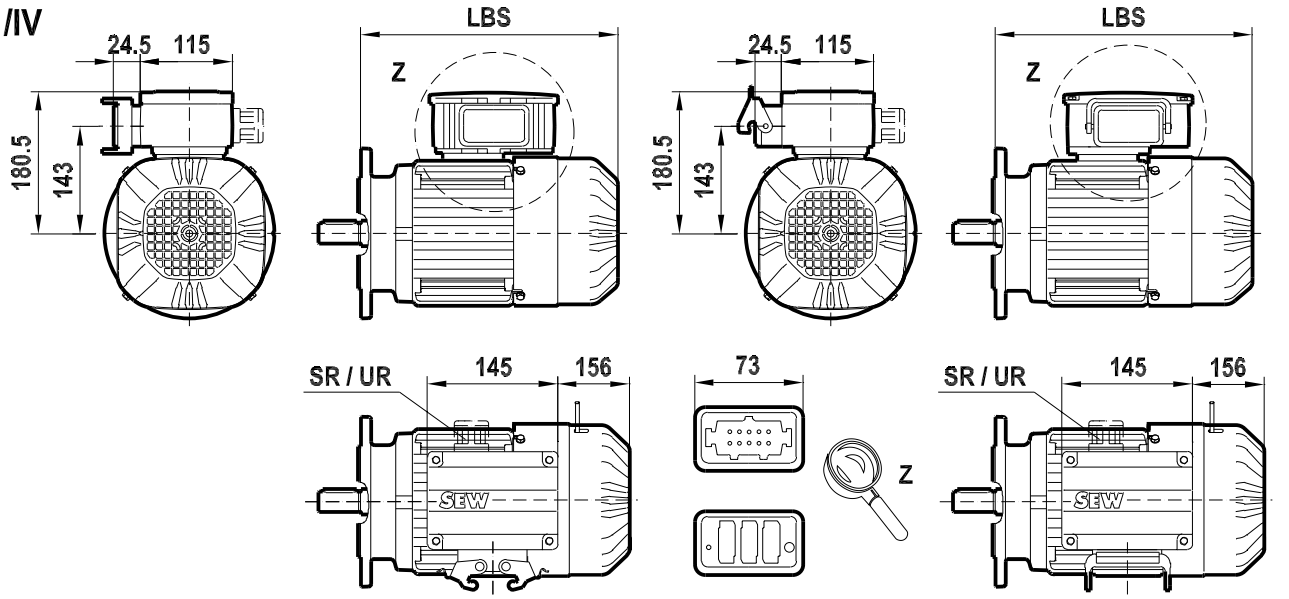
## DR.112M BE

09 197 04 07
2 (2)

/IV

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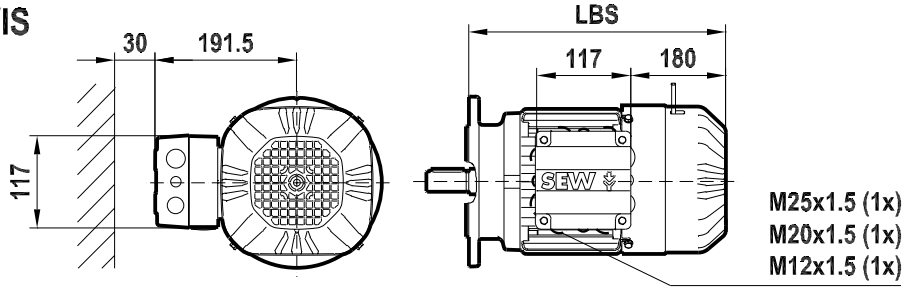


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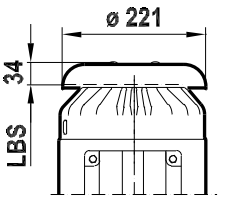


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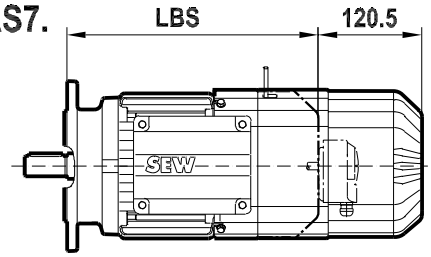
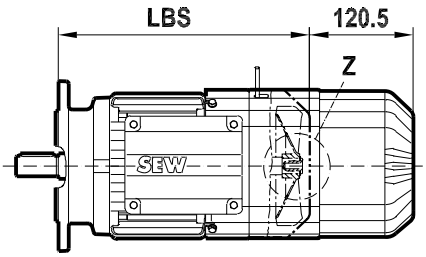
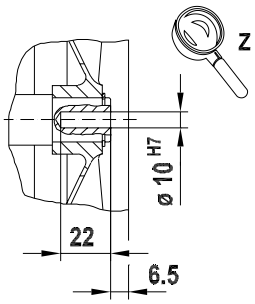
/AS7.

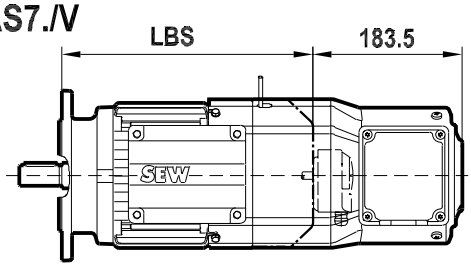



/ES7A

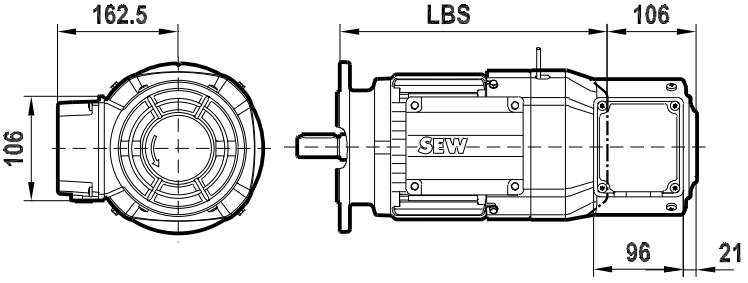



/ES7./V
/AS7./V




/V

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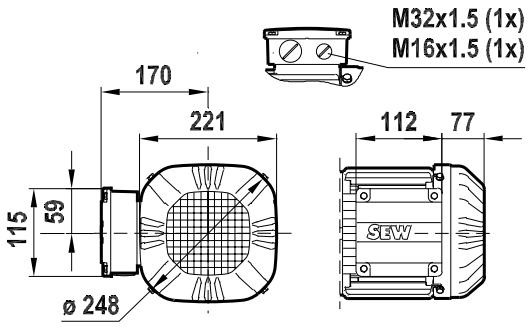
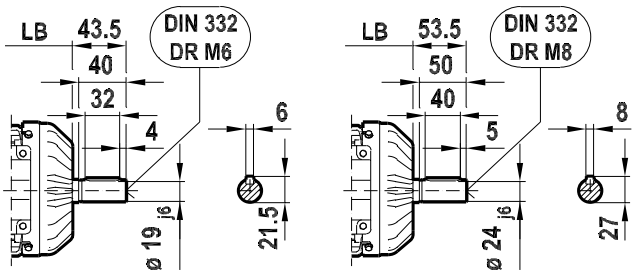
## DR.132S



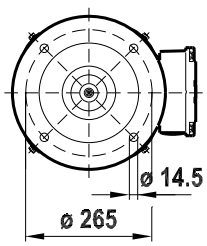

## /2W

08 277 04 07
1 (2)

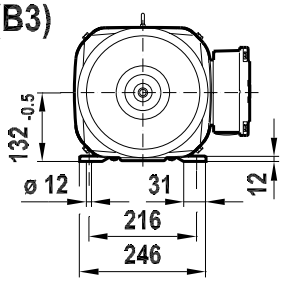


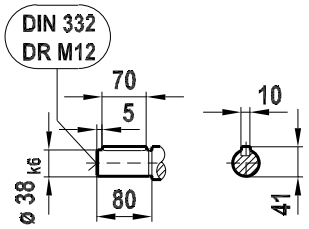

## DRS132S 2; 4; 6; 4/2; 8/4
## DRE132S 2; 6
## DRM132S 12

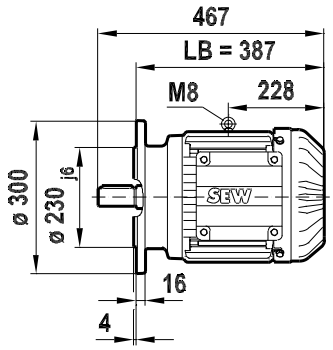
### /FF (B5)
FF265

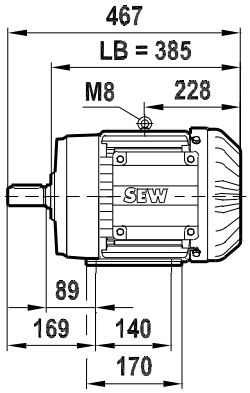



### /FI.. (B3)



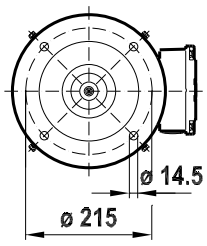



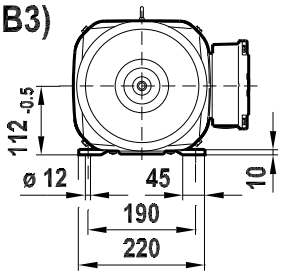



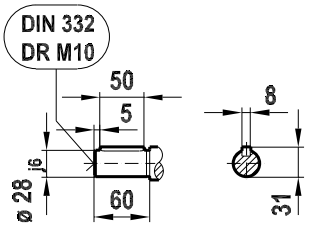

## DRE132S 4
## DRP132S 2; 6

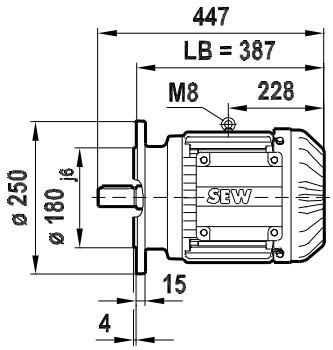
### /FF (B5)
FF215

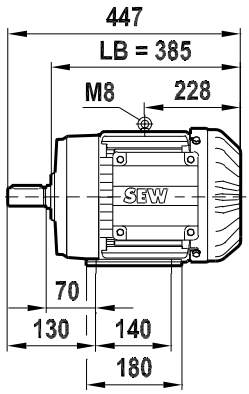



### /FI.. (B3)

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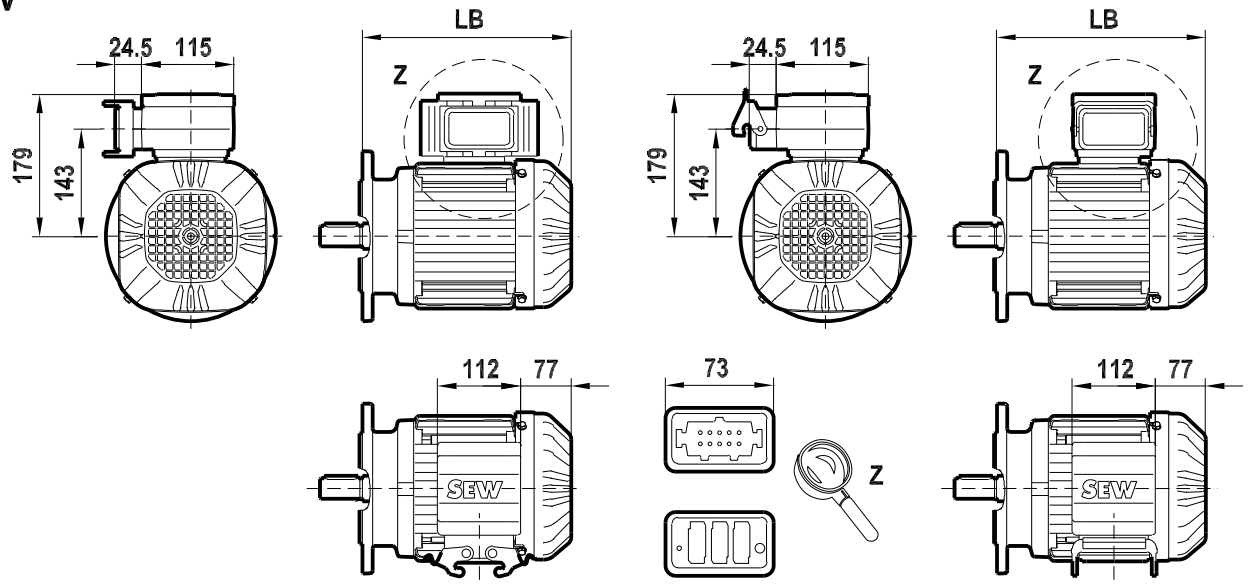
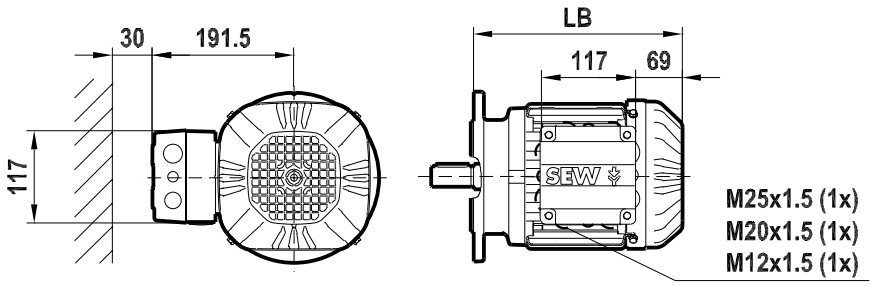
## DR.132S

08 277 04 07
2 (2)

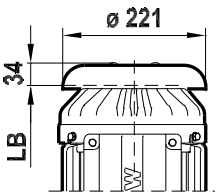
### /IV




### /IS




### /C

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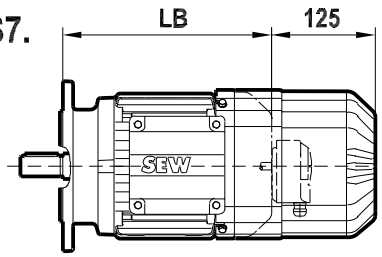
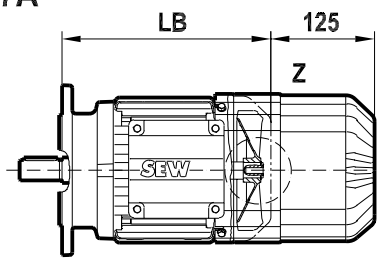
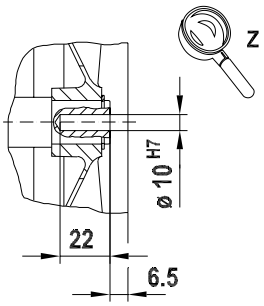
### /AS7.

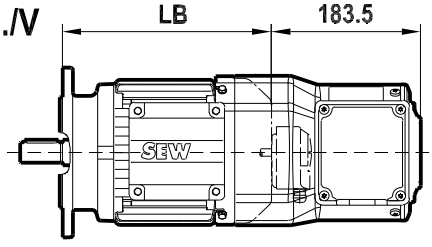



### /ES7A

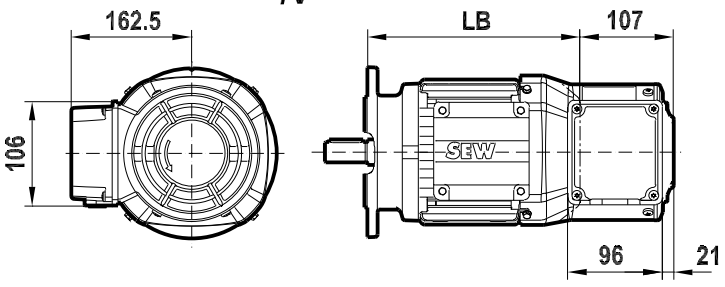



### /ES7./V
### /AS7./V




### /V

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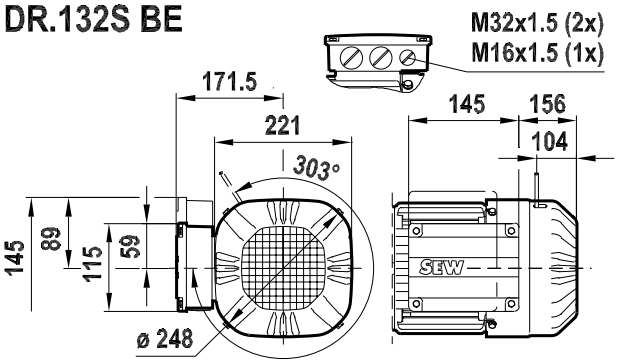
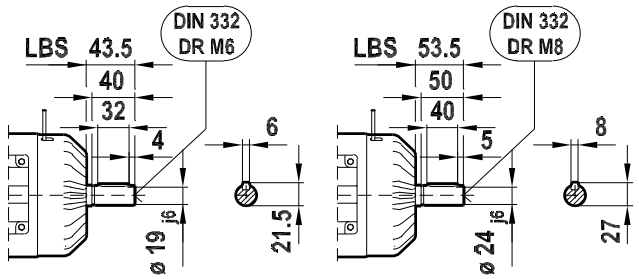
## DR.132S BE



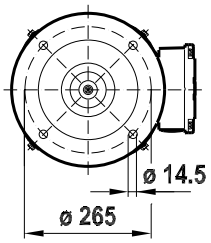

## /2W

09 198 04 07
1 (2)

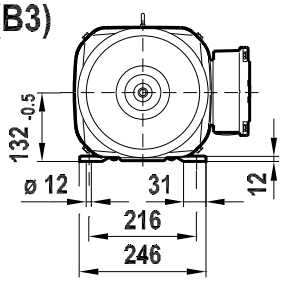


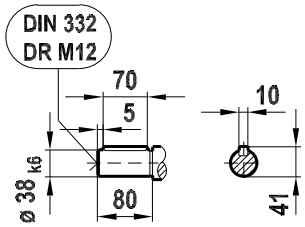

## DRS132S 2; 4; 6; 4/2; 8/4
## DRE132S 2; 6
## DRM132S 12

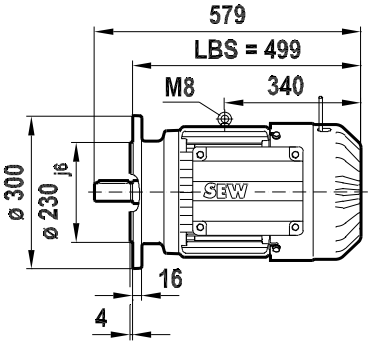
### /FF (B5)
FF265

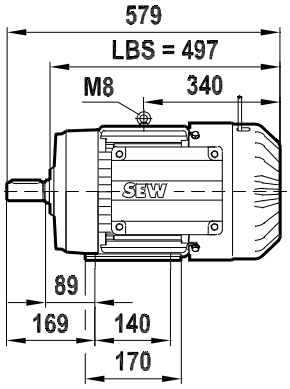



### /FI.. (B3)



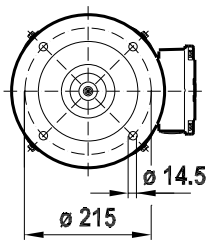




## DRE132S 4
## DRP132S 2; 6

### /FF (B5)
FF215

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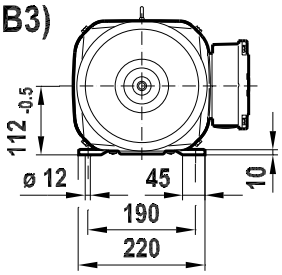


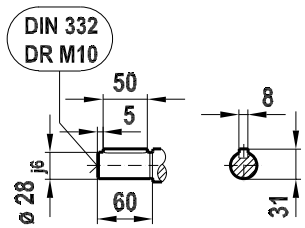


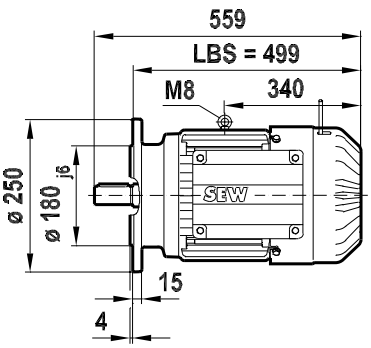


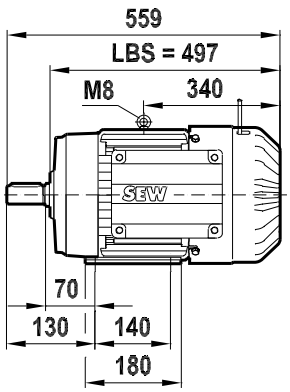


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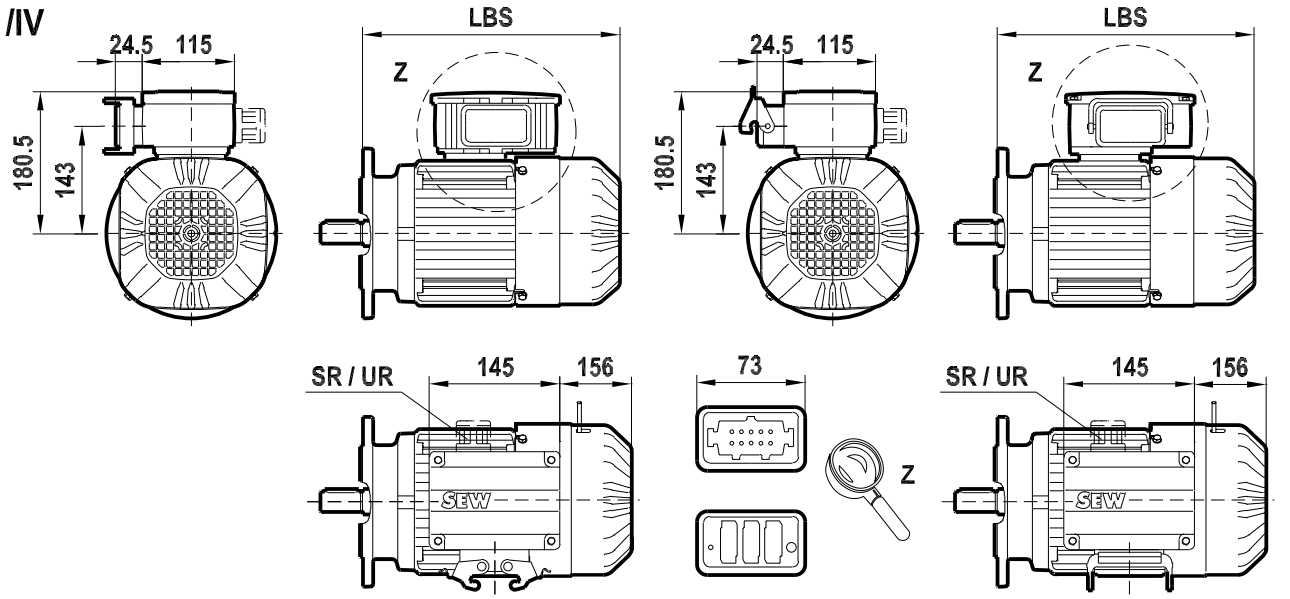
## DR.132S BE

09 198 04 07
2 (2)

/IV

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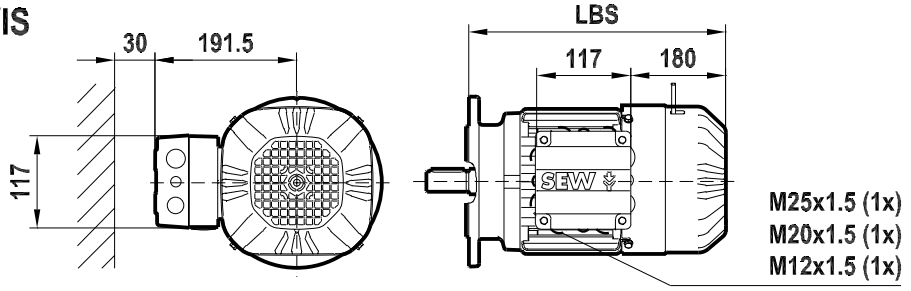


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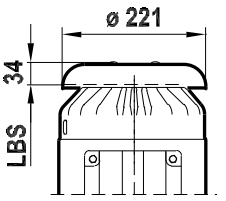


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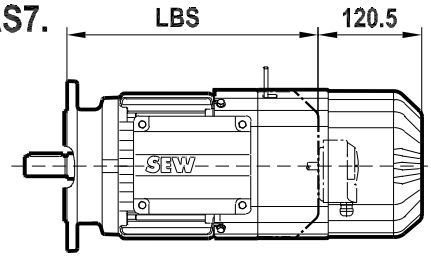
/AS7.

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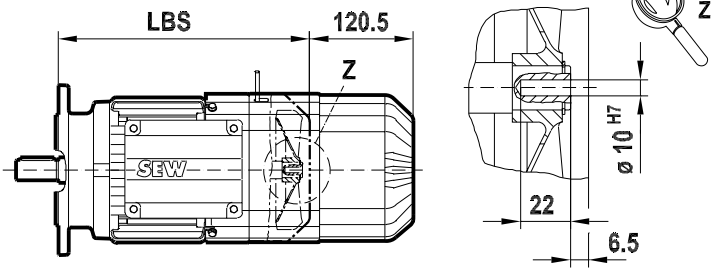


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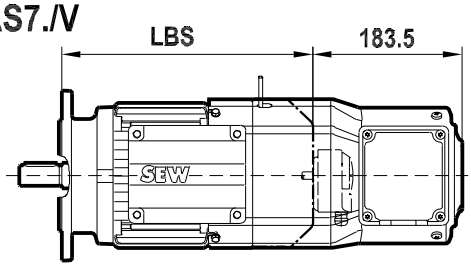
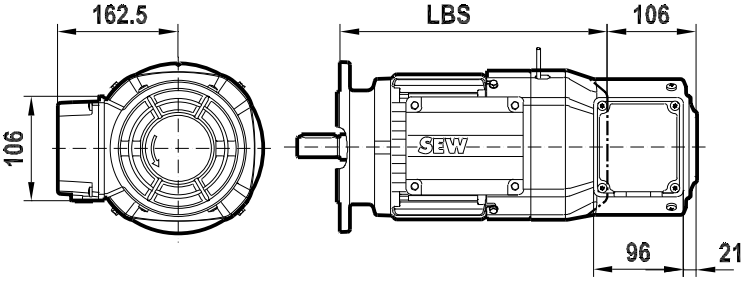



/V

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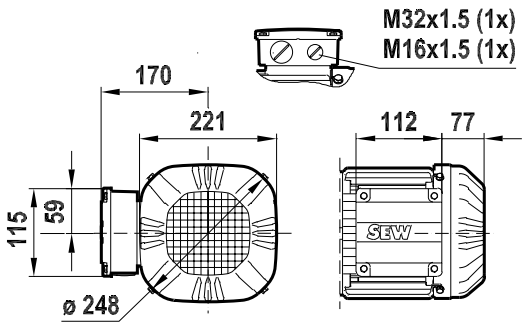
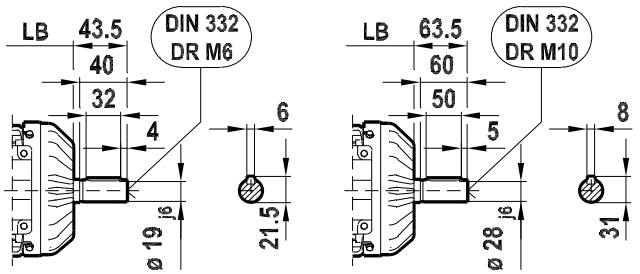
## DR.132M



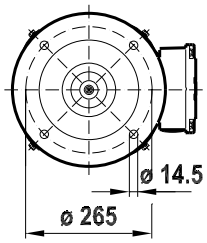

## /2W

08 278 04 07
1 (2)

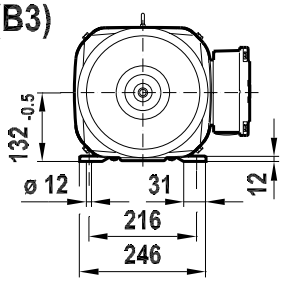


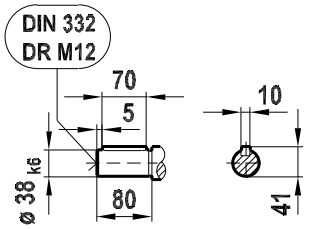

## DRS132M 2; 4; 4/2; 8/2; 8/4
## DRE132M 2; 4; 6
## DRP132M 2; 6
## DRM132M 12

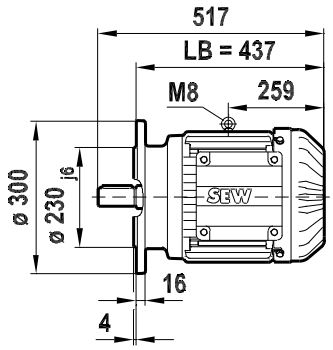
### /FF (B5)
FF265

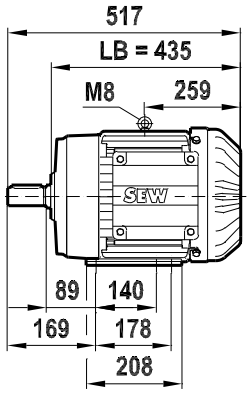



### /FI.. (B3)



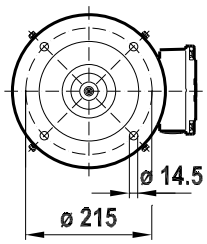



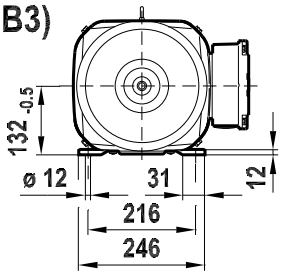



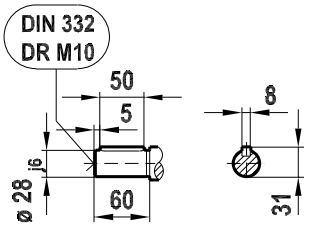

## DRP132M 4
## DRE132M 6

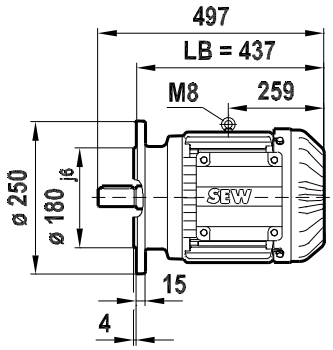
### /FF (B5)
FF215

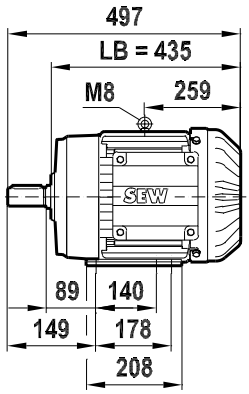



### /FI.. (B3)

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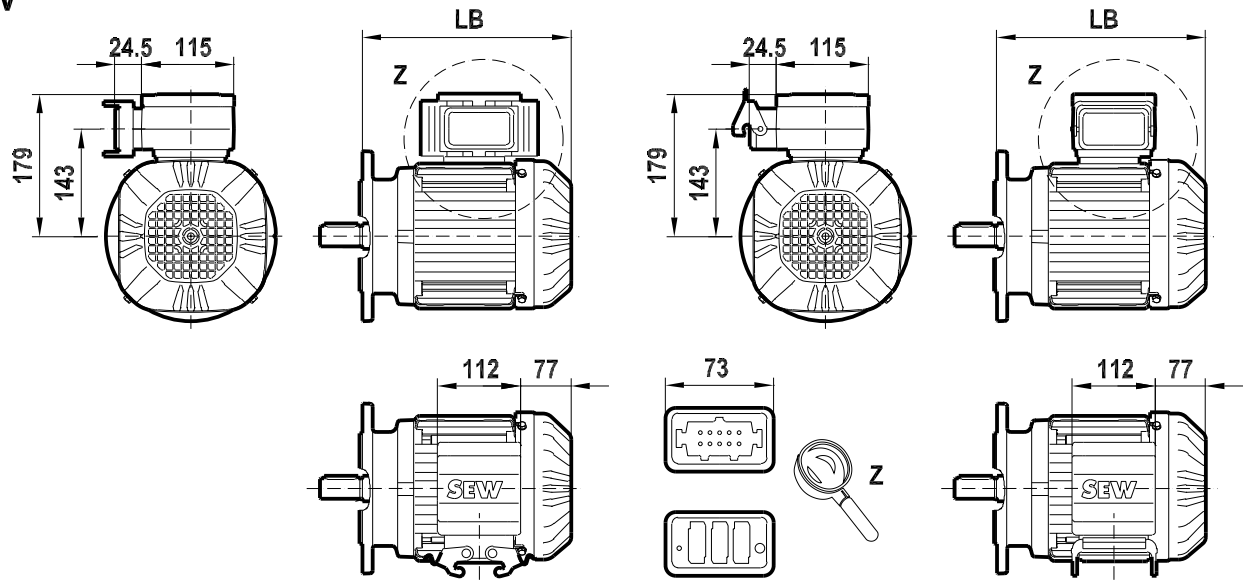
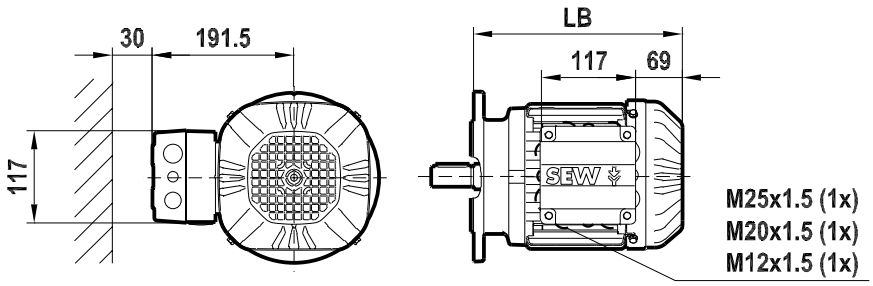
## DR.132M

08 278 04 07
2 (2)

/IV




/IS

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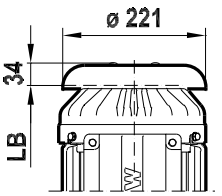


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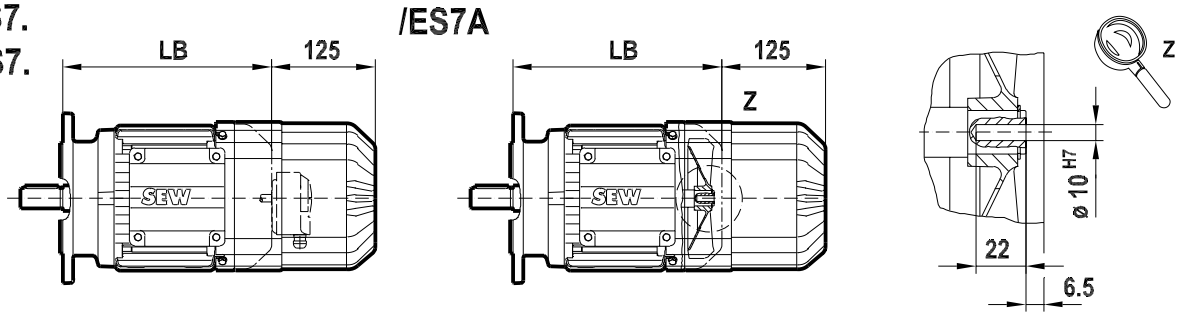


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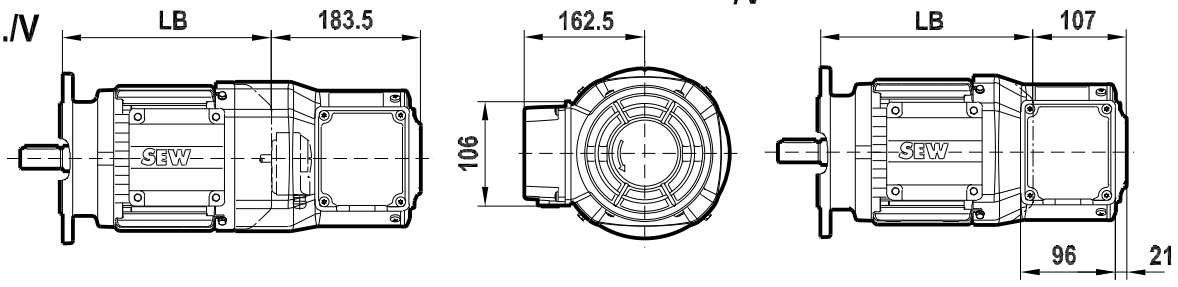
/AS7./V

/V

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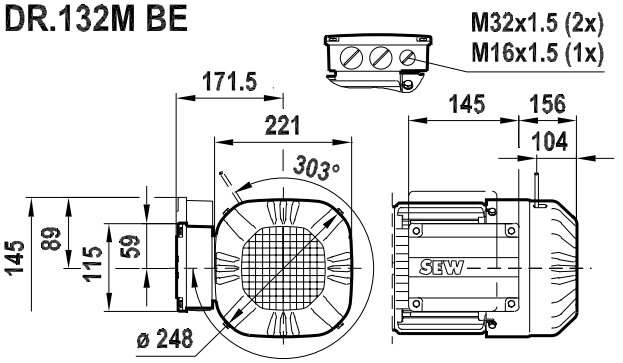
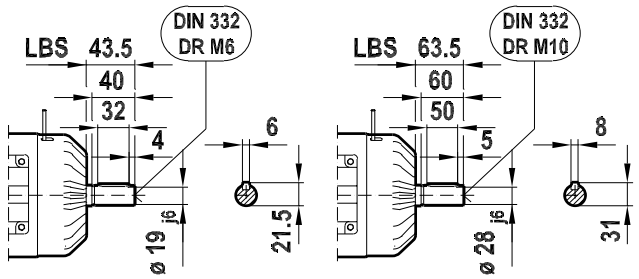
## DR.132M BE



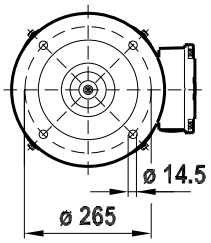

## /2W

09 199 04 07
1 (2)

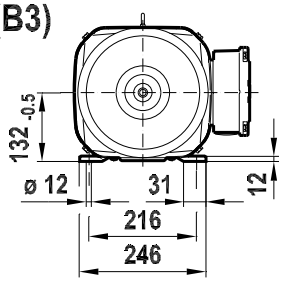


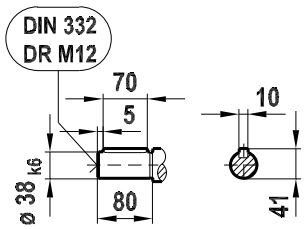

## DRS132M 2; 4; 4/2; 8/2; 8/4
## DRE132M 2; 4; 6
## DRP132M 2; 6
## DRM132M 12

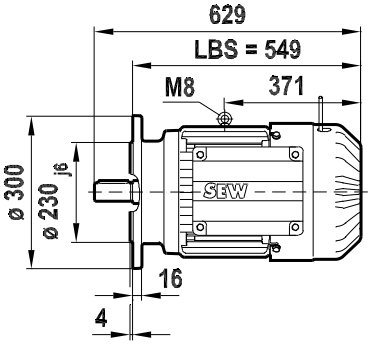
### /FF (B5)
FF265

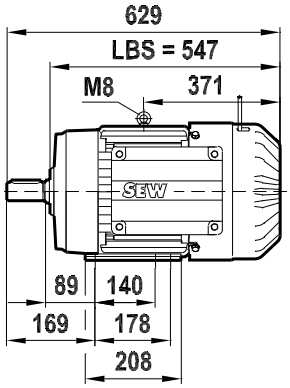



### /FI.. (B3)



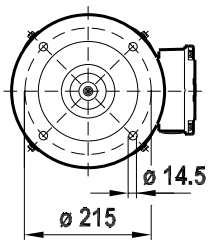




## DRP132M 4
## DRE132M 6

### /FF (B5)
FF215

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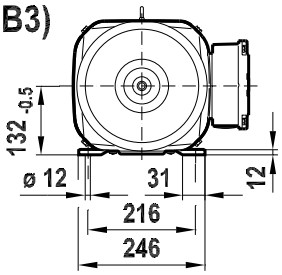


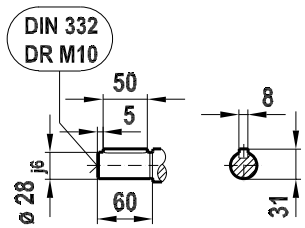


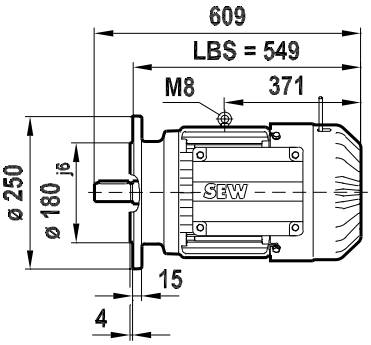


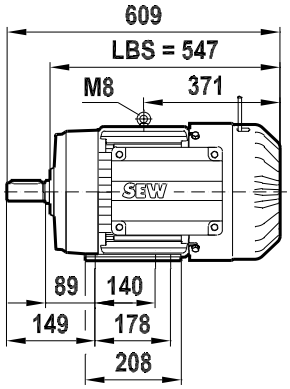


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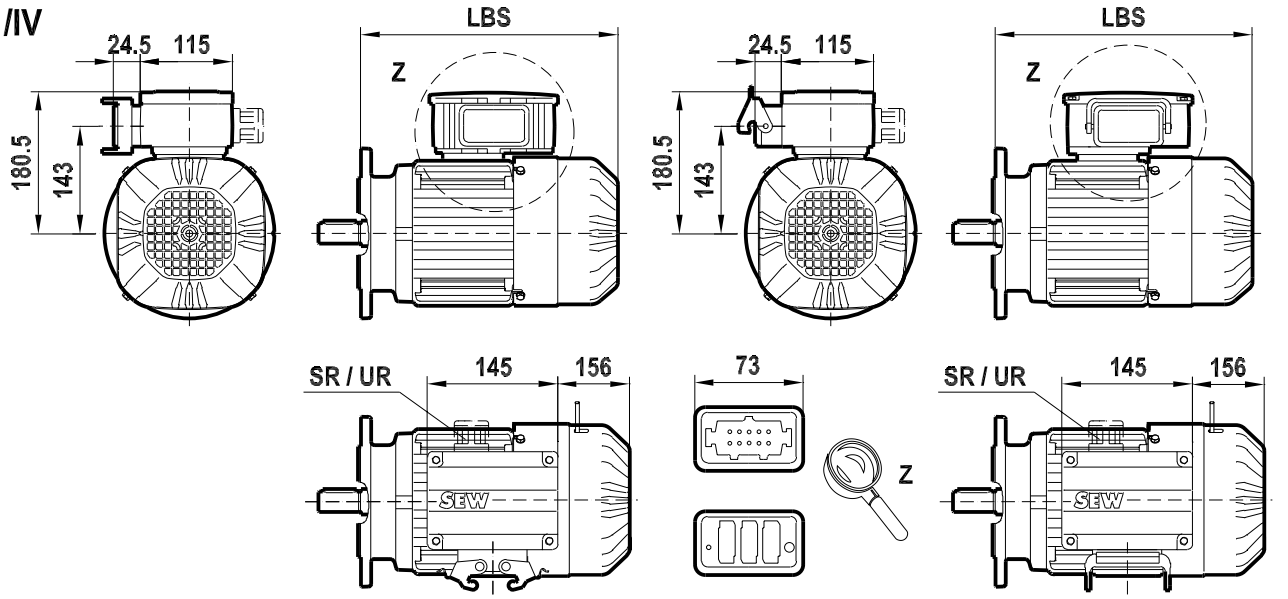
## DR.132M BE

09 199 04 07
2 (2)

/IV

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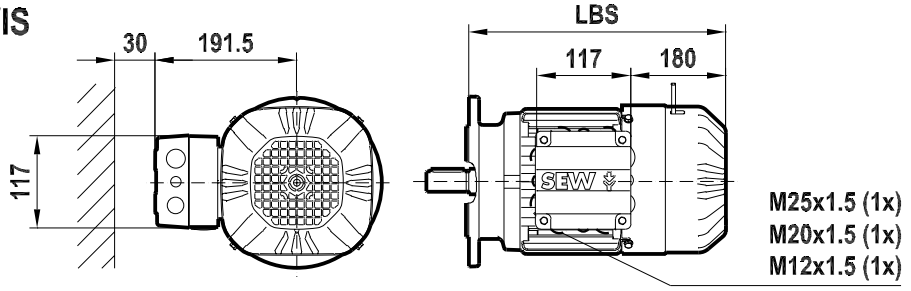
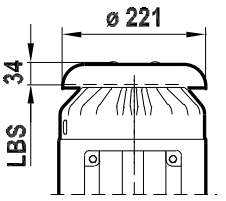



/C

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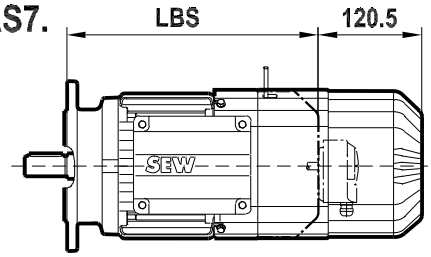
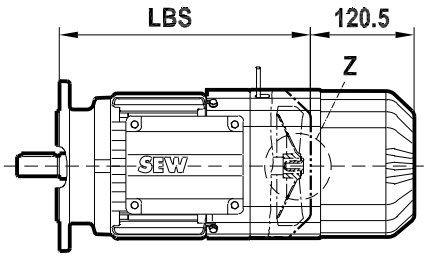
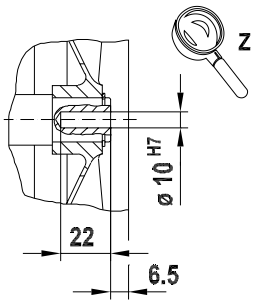
/AS7.




/ES7A

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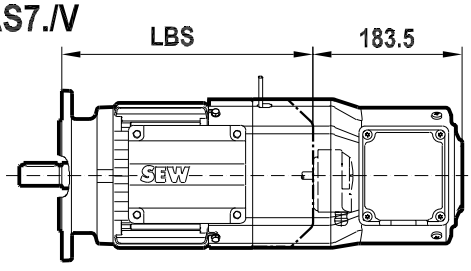
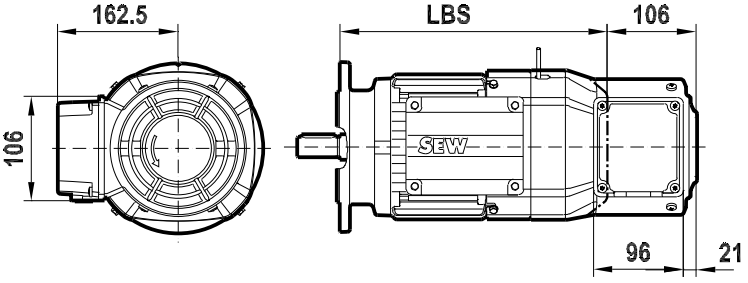
/AS7./V




/V

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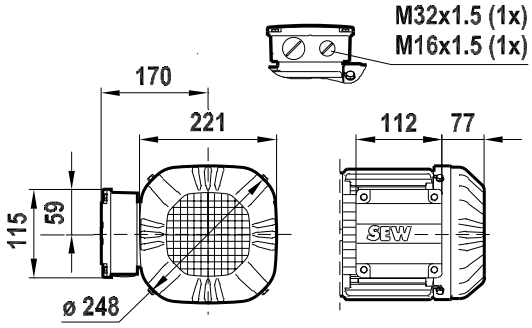
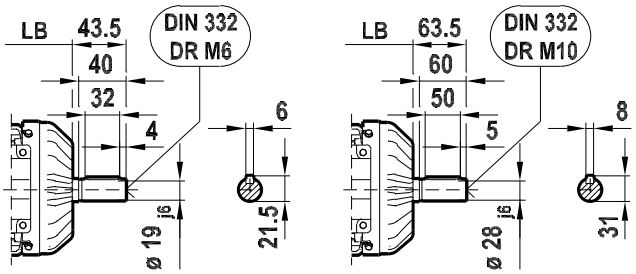
## DR.132MC

08 113 00 12
1 (2)

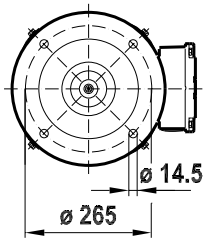



### /2W

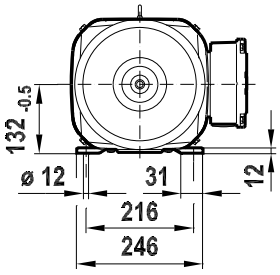


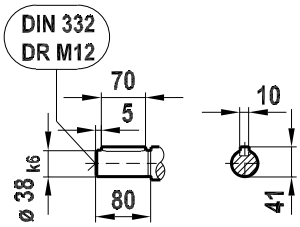

## DRS132MC 4; 6
## DRE132MC 2; 4; 6
## DRP132MC 4; 6

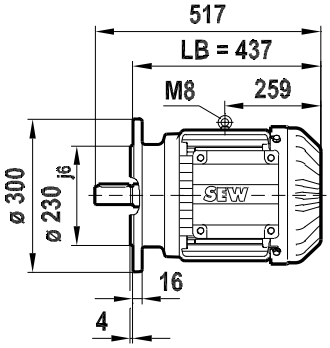
### /FF (B5) FF265

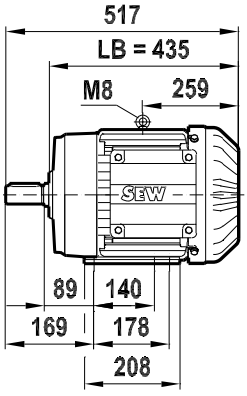



### /FI.. (B3)

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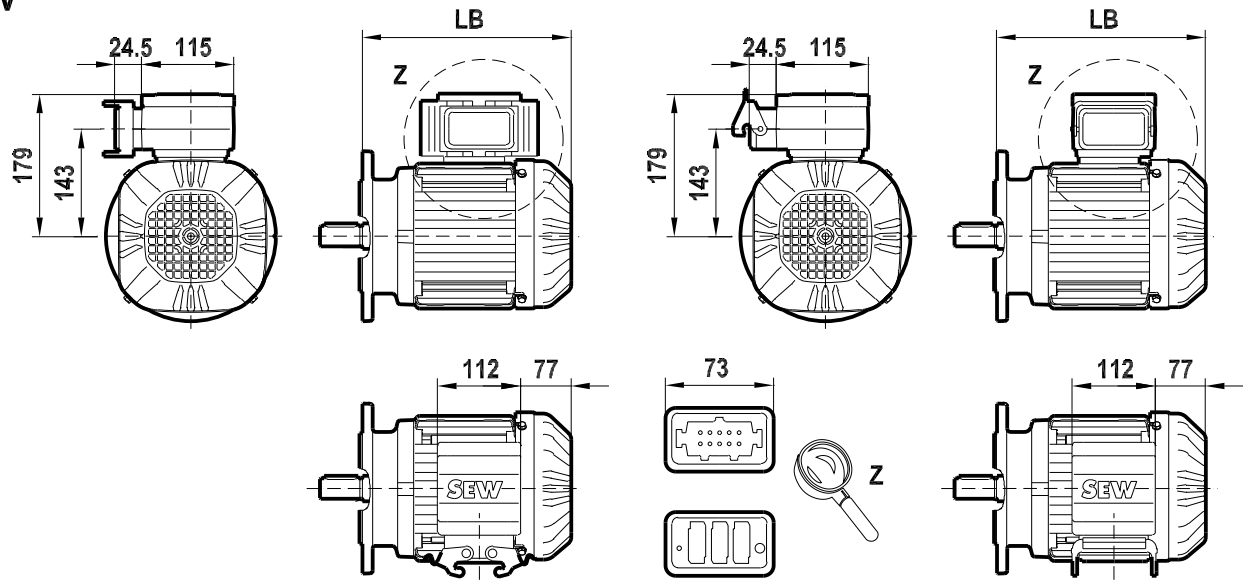
## DR.132MC

08 113 00 12
2 (2)

/IV

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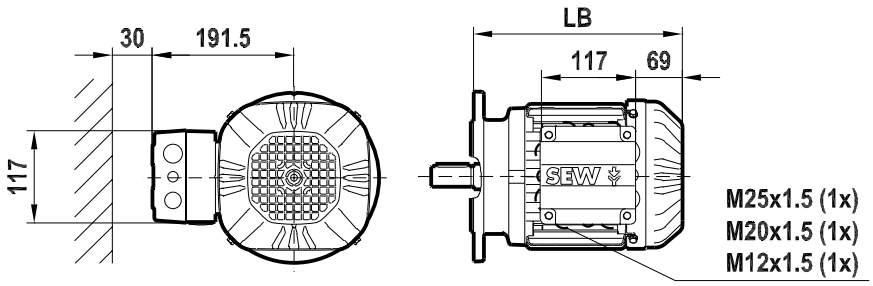


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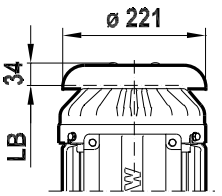


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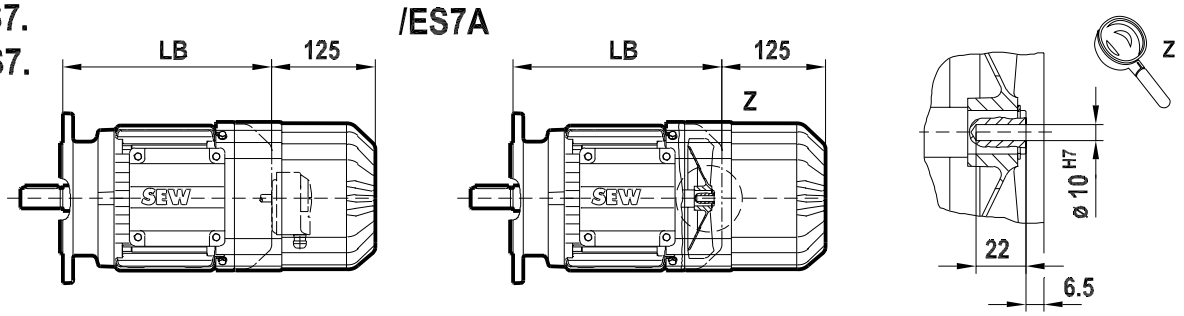
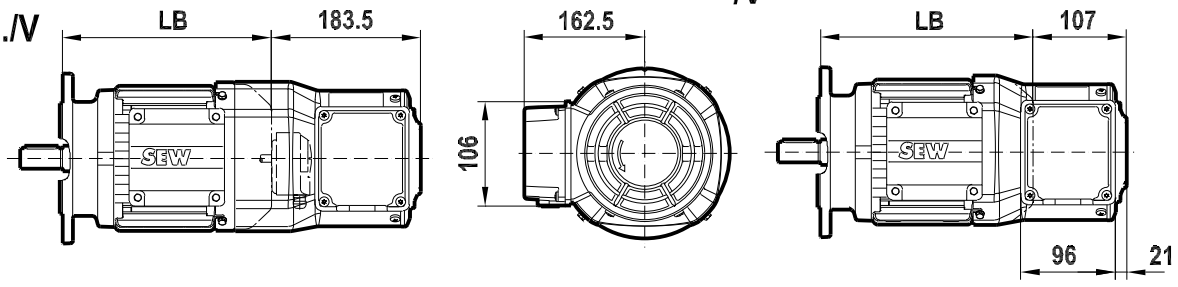
/AS7.

/ES7A




/ES7./V
/AS7./V

/V

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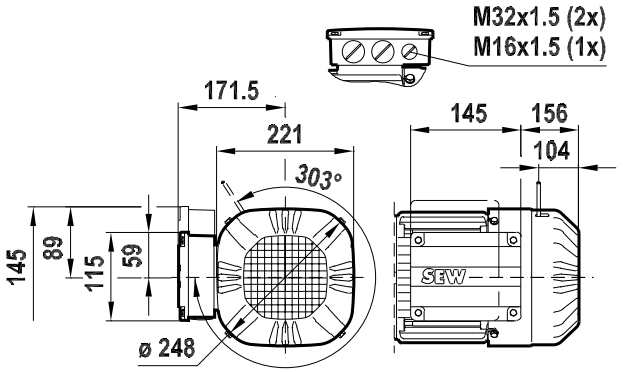
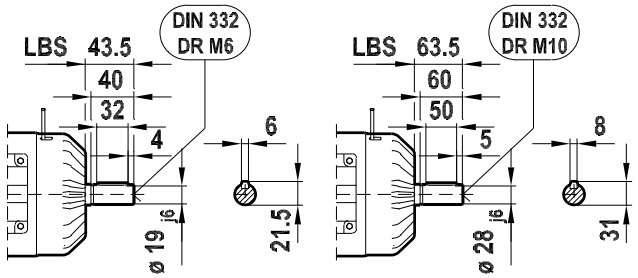
## DR.132MC BE

09 759 00 12
1 (2)

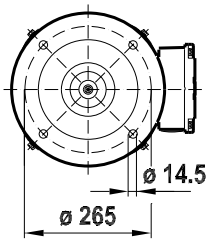



/2W

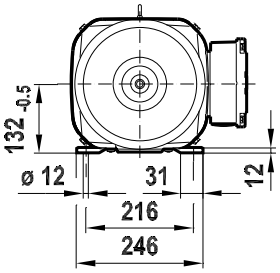


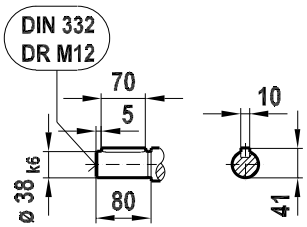

## DRS132MC 4; 6
## DRE132MC 2; 4; 6
## DRP132MC 4; 6

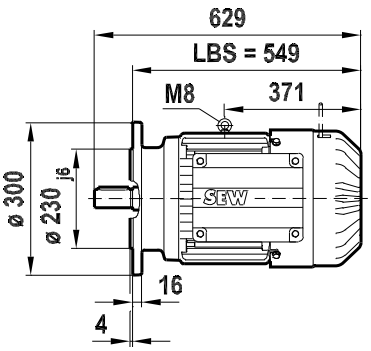
/FF (B5) FF265

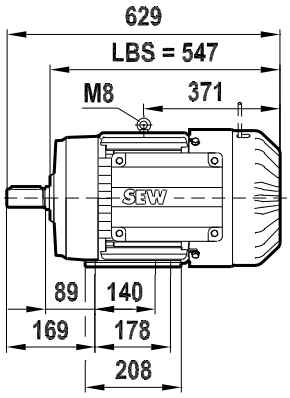



/FI.. (B3)

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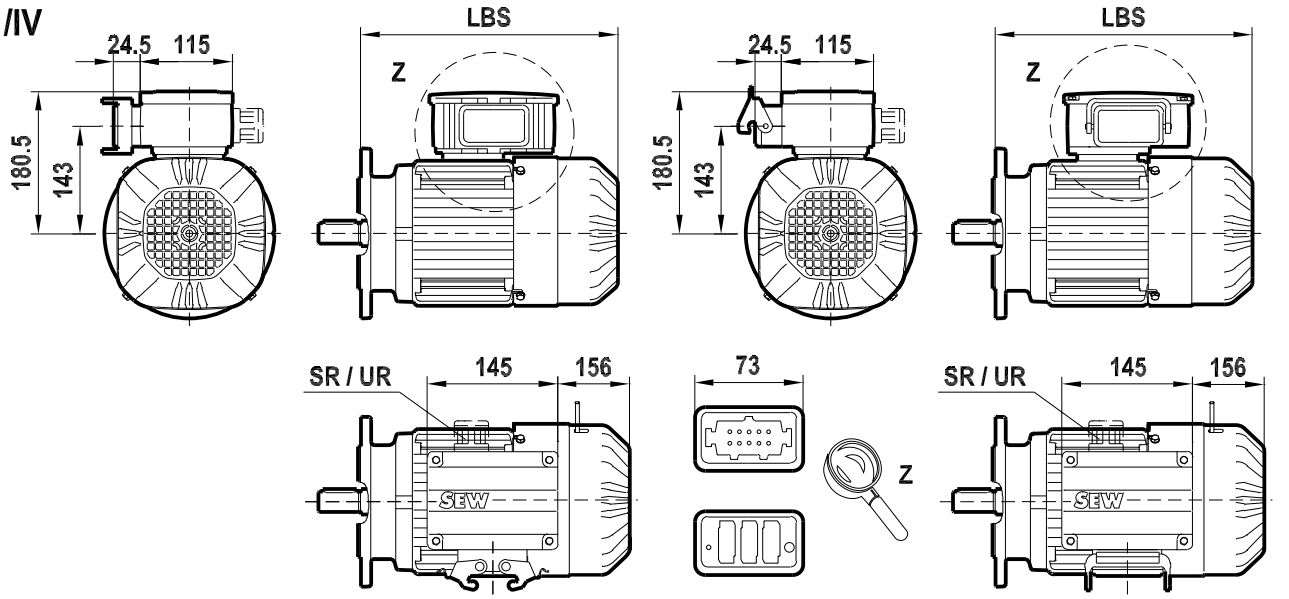
## DR.132MC BE

09 759 00 12
2 (2)

/IV

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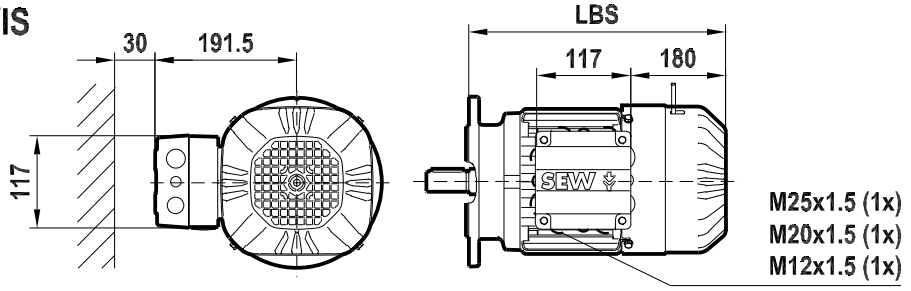


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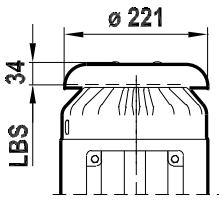


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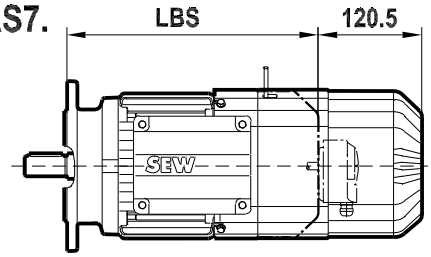


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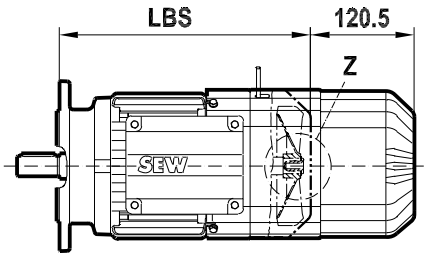


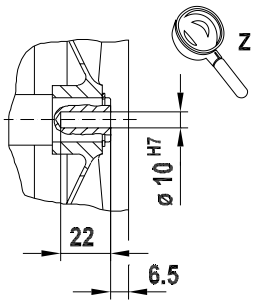


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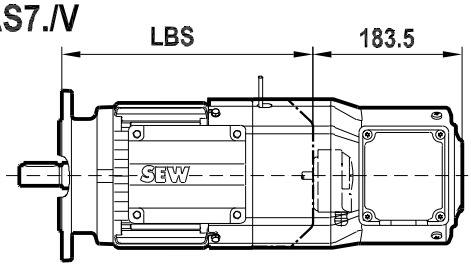
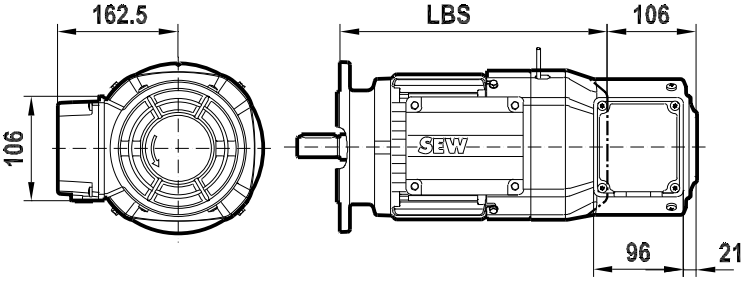
/AS7./V




/V

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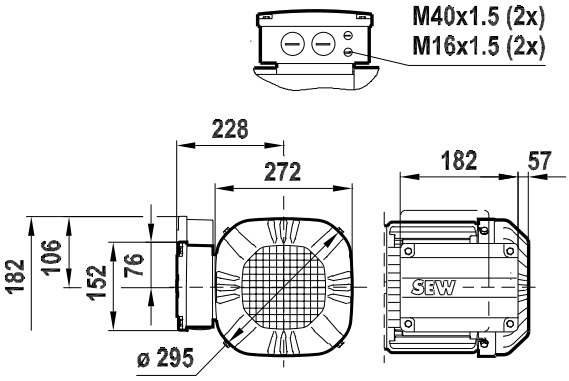
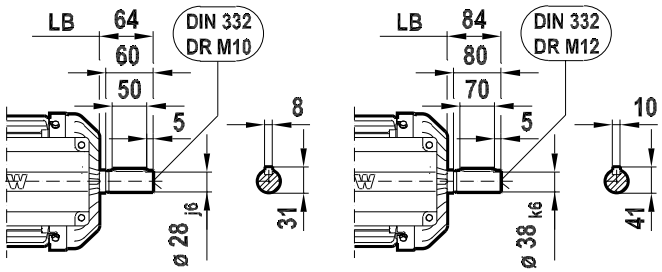
## DR.160S

08 122 00 12
1 (2)

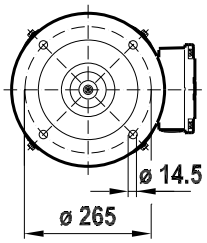



/2W

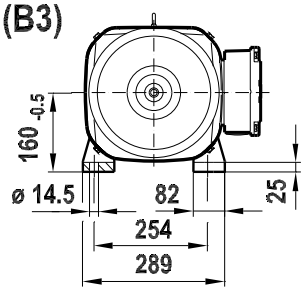


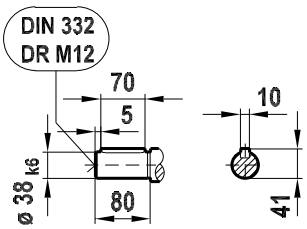

## DRS160S 4; 6; 4/2; 8/4
## DRE160S 4
## DRP160S 4

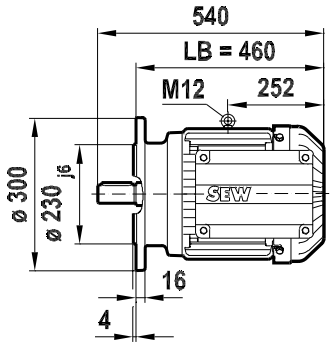
/FF (B5)
FF265

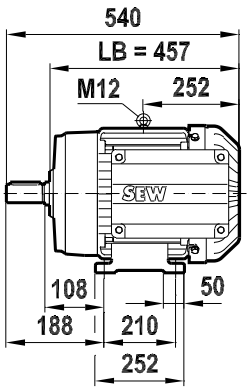



/FI.. (B3)

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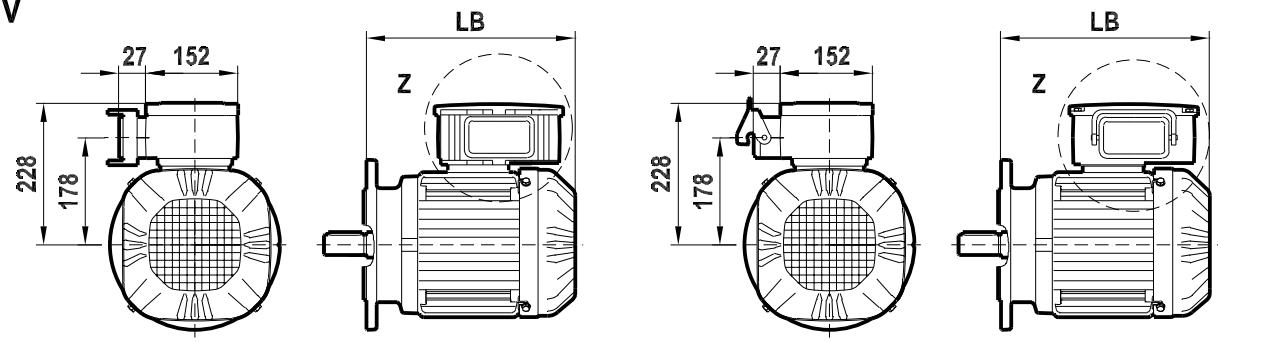
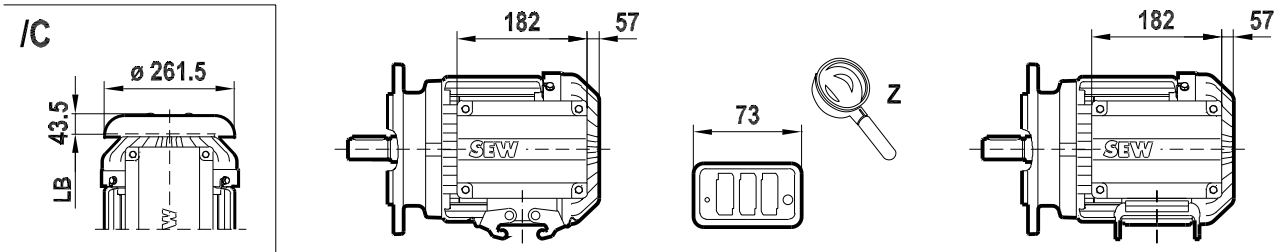
## DR.160S

08 122 00 12
2 (2)

### /IV




### /C

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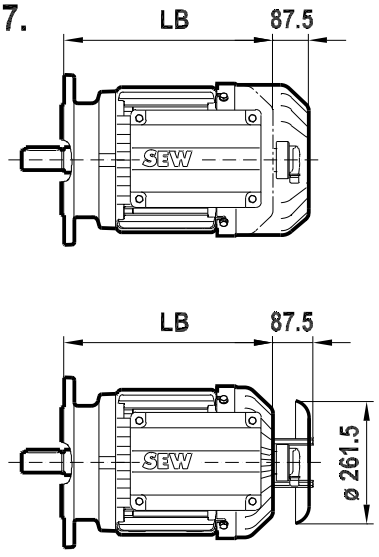
### /AG7.

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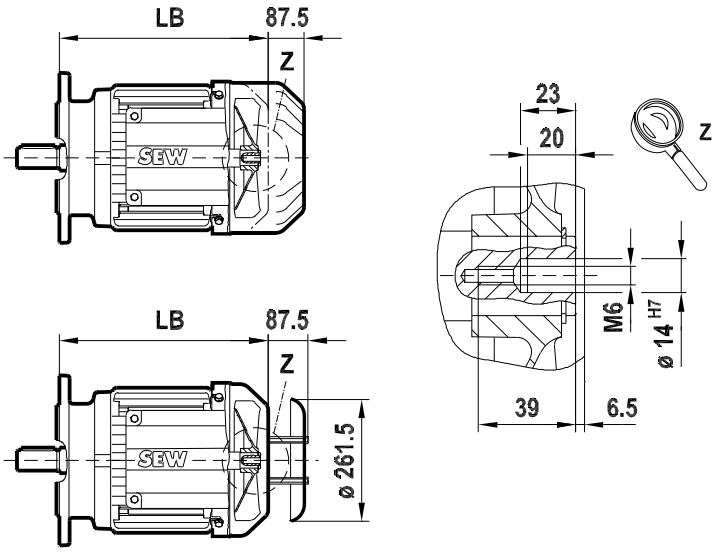
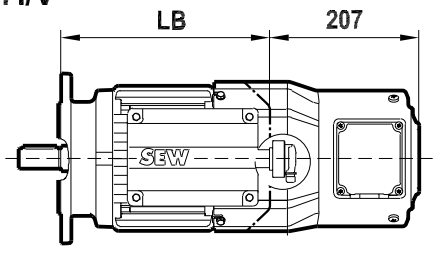
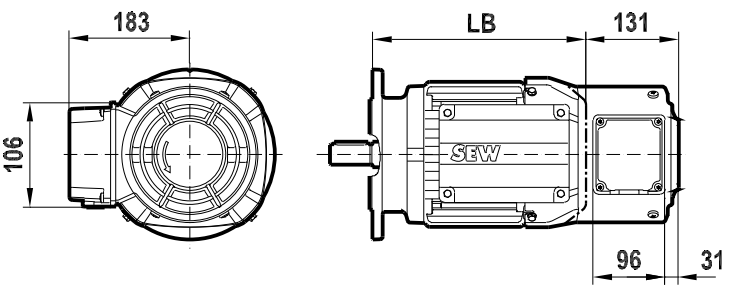



### /EG7./V
### /AG7./V




### /V

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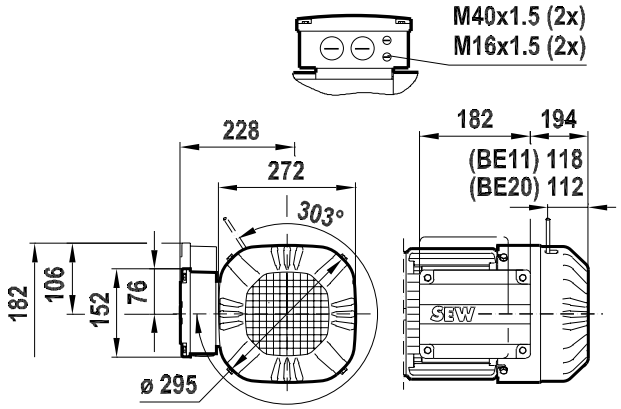
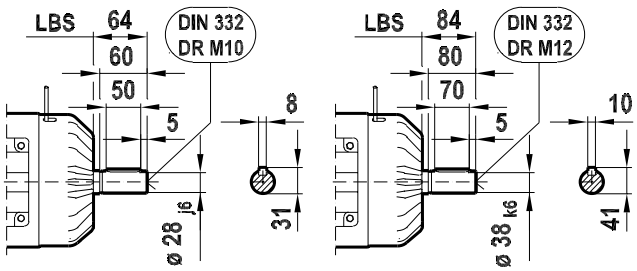
## DR.160S BE

09 763 00 12
1 (2)

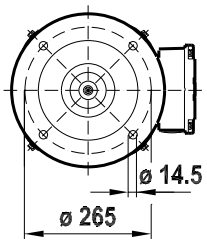



/2W

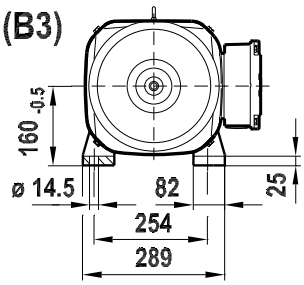


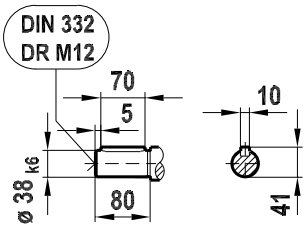

## DRS160S 4; 6; 4/2; 8/4
## DRE160S 4
## DRP160S 4

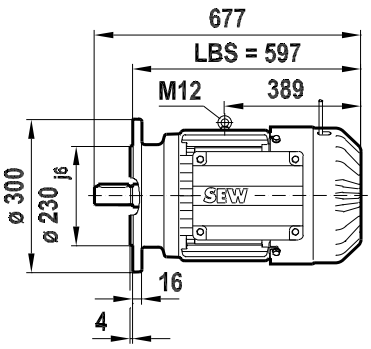
/FF (B5)
FF265

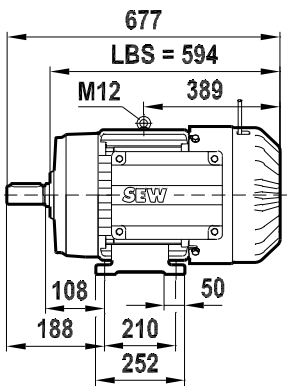



/FI.. (B3)

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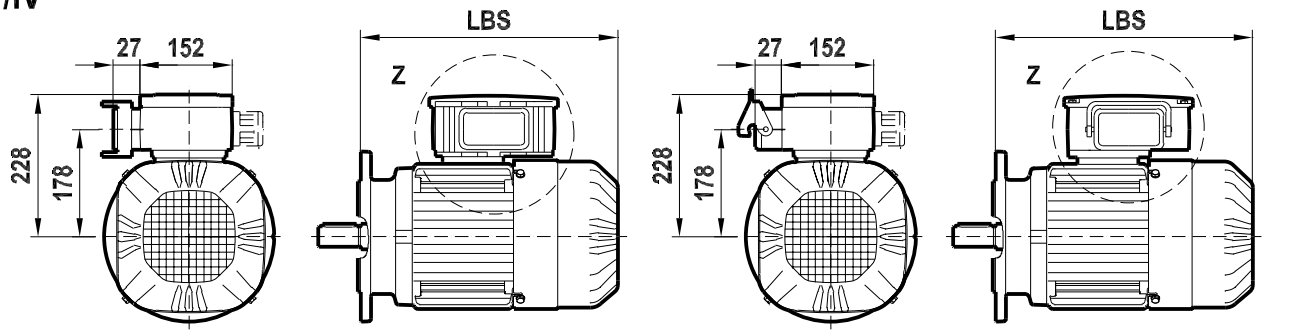
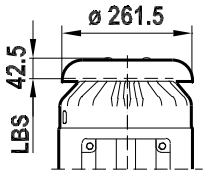
## DR.160S BE

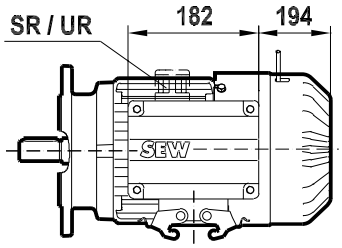
09 763 00 12
2 (2)

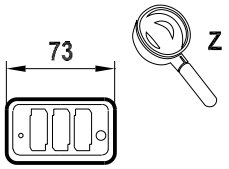
### /IV

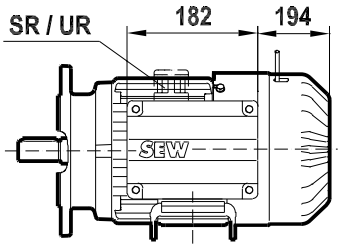



### /C

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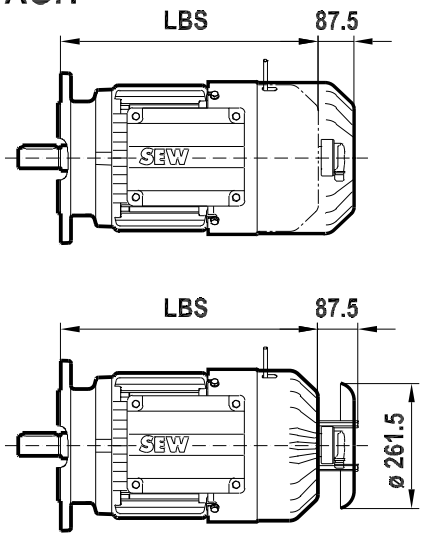
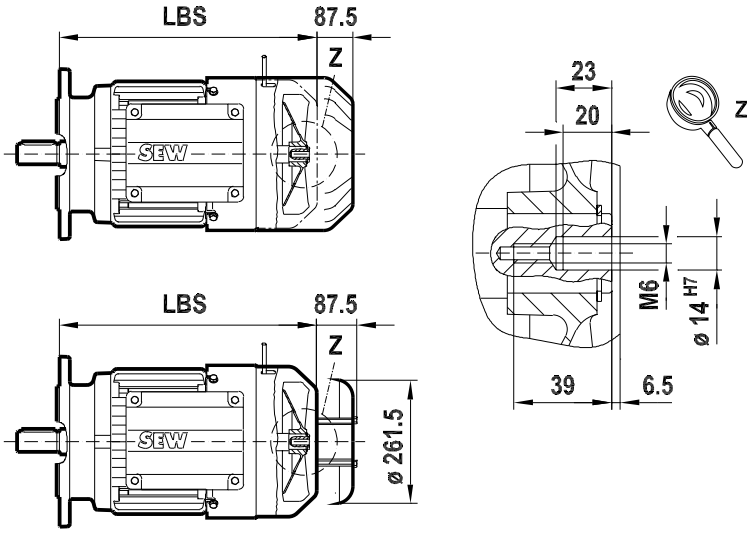
### /AG7.




### /EG7A

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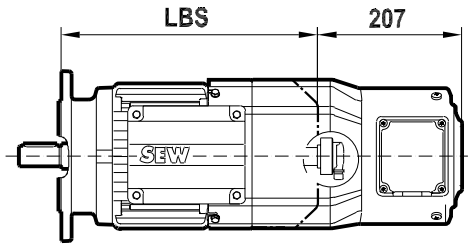
### /AG7./V

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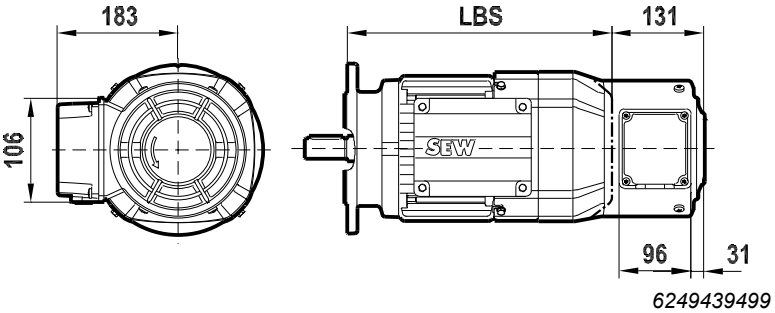


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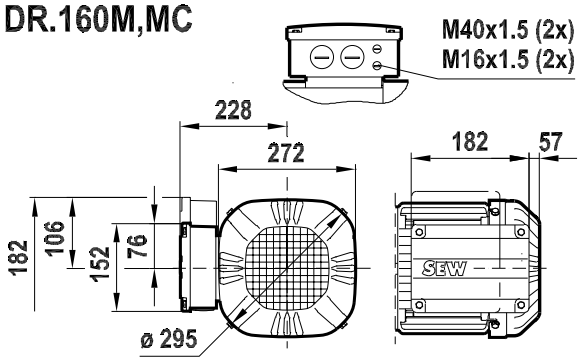
## DR.160M,MC




## /2W

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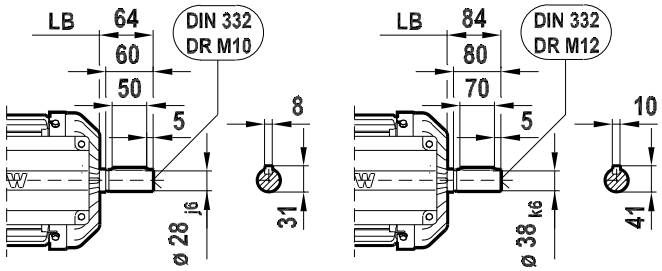
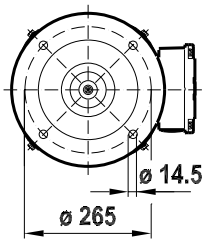
1 (2)




## DRE160M 4; 6
## DRP160M 4; 6
## DRP160MC 4

### /FF (B5)
FF265

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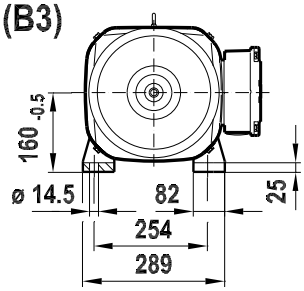
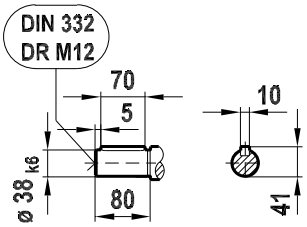
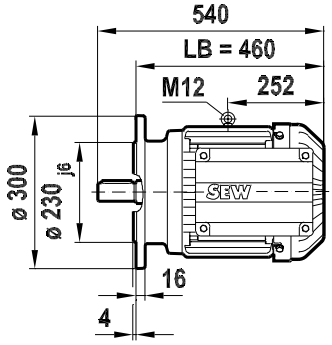
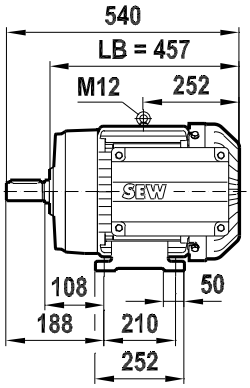


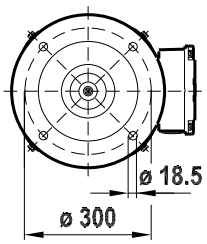




## DRS160M 4; 6; 4/2; 8/4
## DRS160MC 4
## DRE160MC 4

### /FF (B5)
FF300

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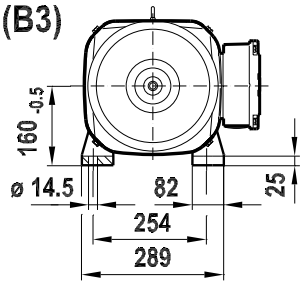


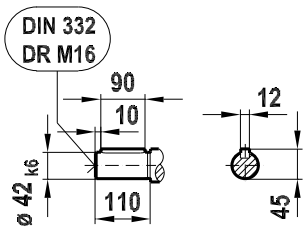


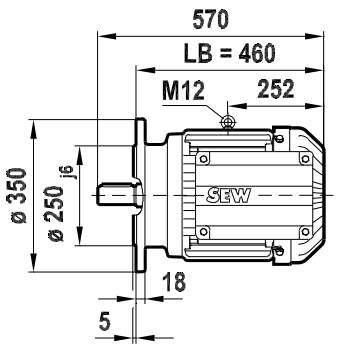


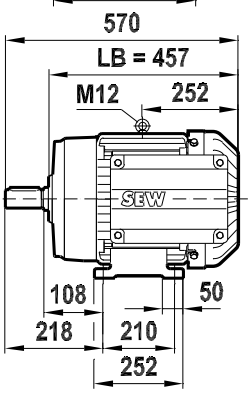


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## DR.160M,MC

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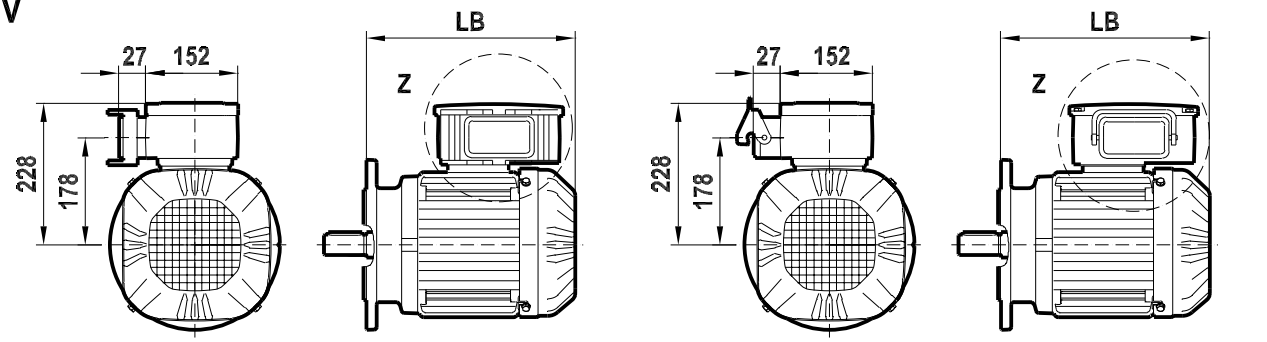
2 (2)

/IV

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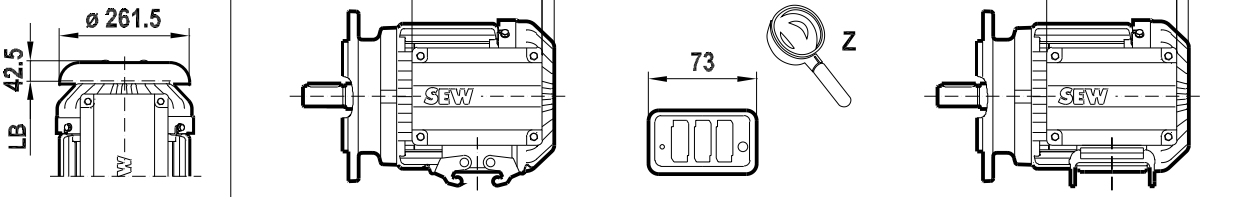


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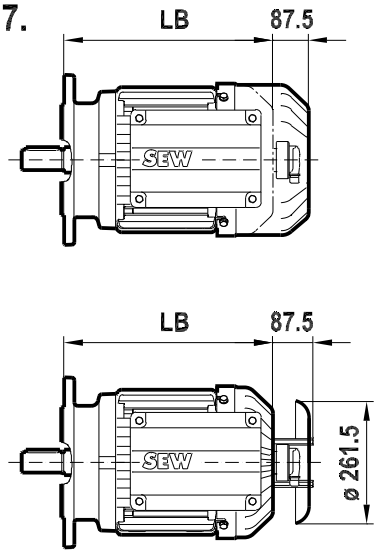


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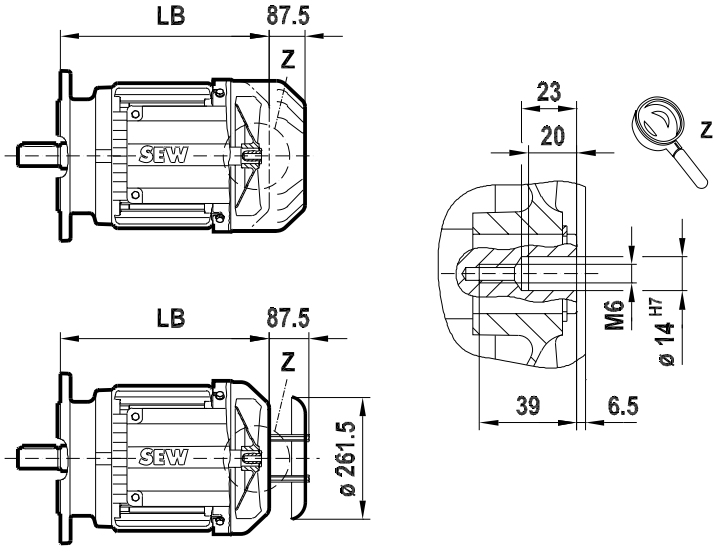
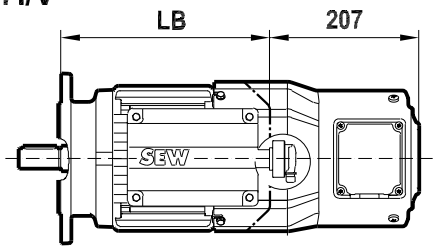



/EG7./V
/AG7./V

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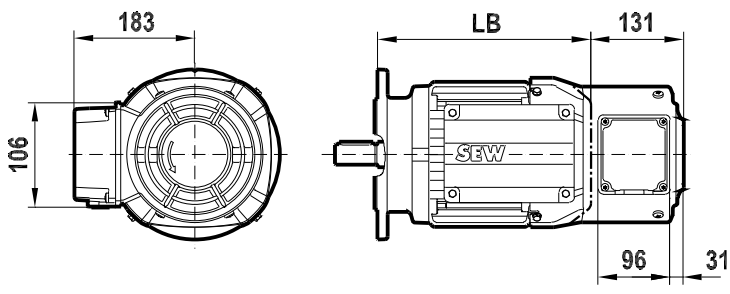


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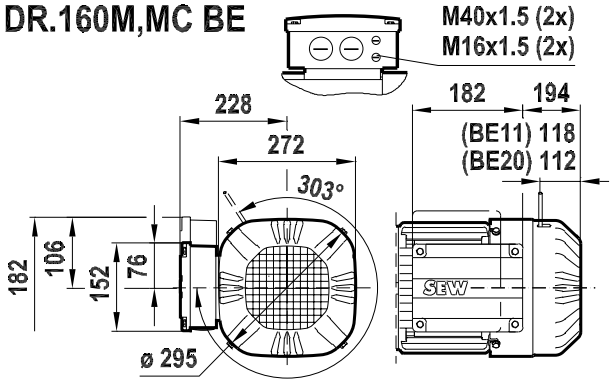
## DR.160M,MC BE

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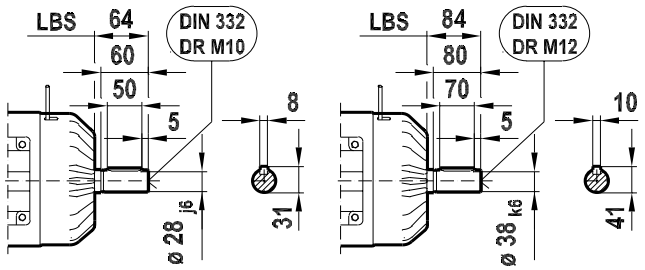
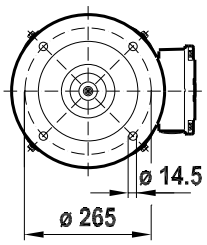
## /2W

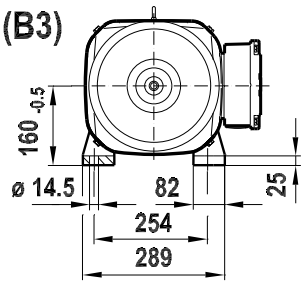


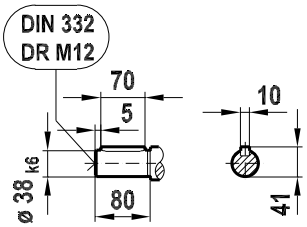

## DRE160M 4; 6
## DRP160M 4; 6
## DRP160MC 4

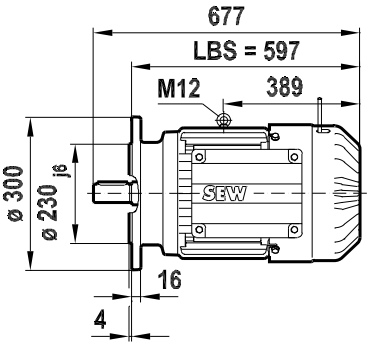
### /FF (B5)
FF265

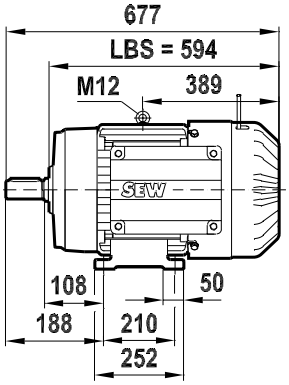



### /FI.. (B3)



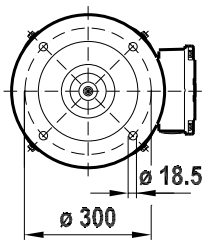



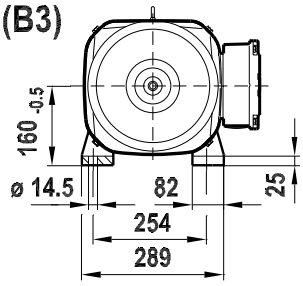



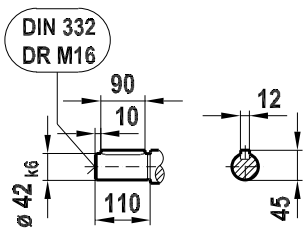

## DRS160M 4; 6; 4/2; 8/4
## DRS160MC 4
## DRE160MC 4

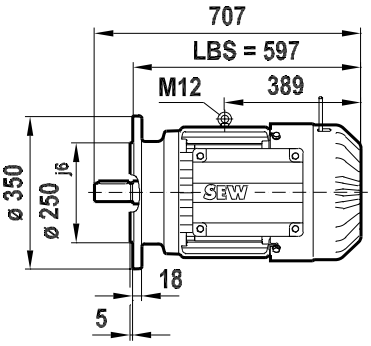
### /FF (B5)
FF300

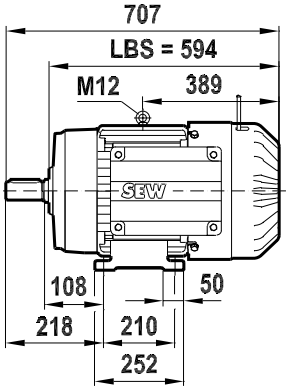



### /FI.. (B3)

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## DR.160M,MC BE

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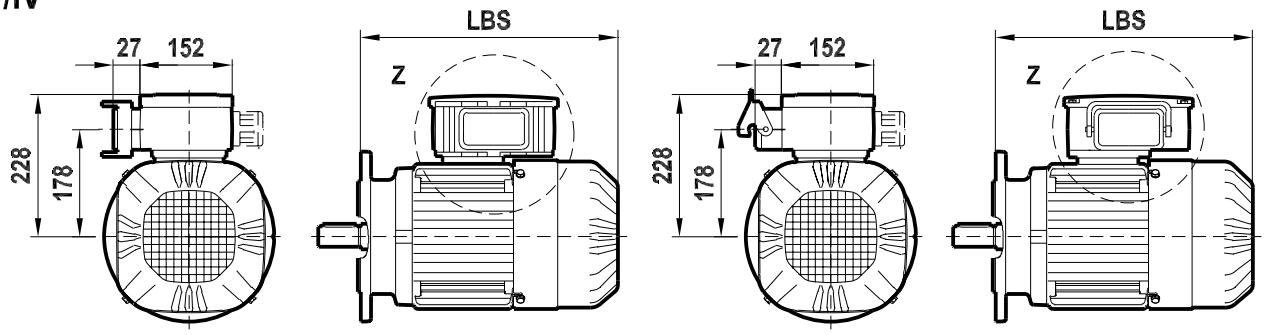
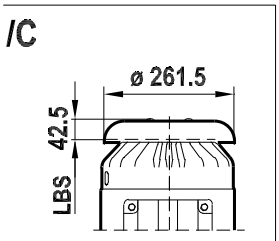
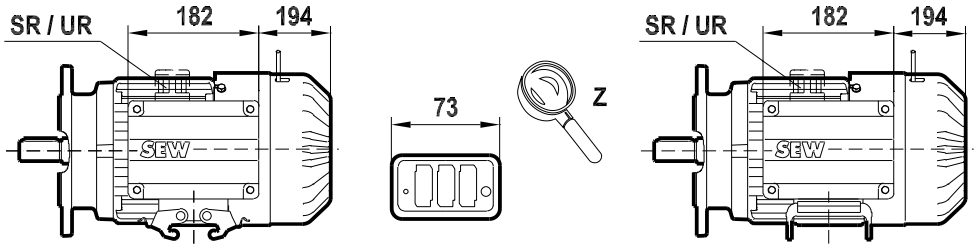
### /IV




### /C

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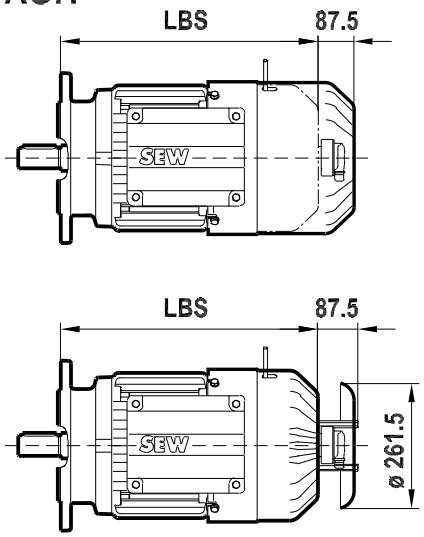
### /AG7.

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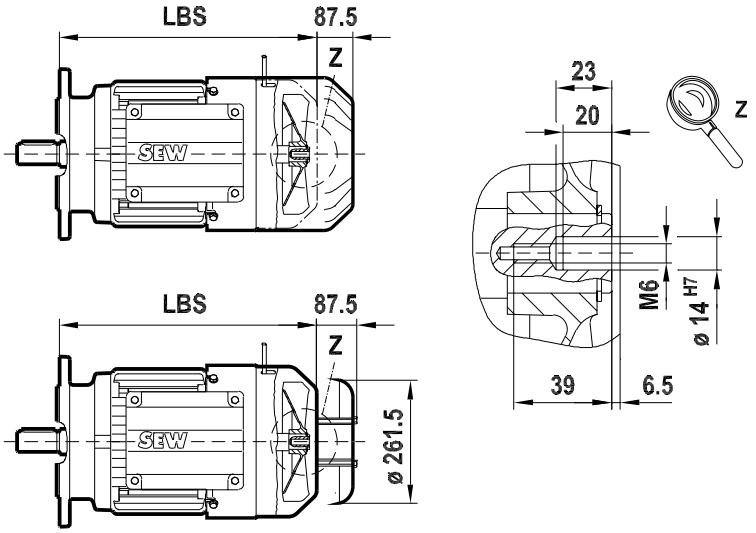
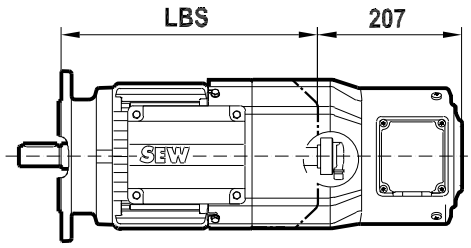



### /EG7./V
### /AG7./V

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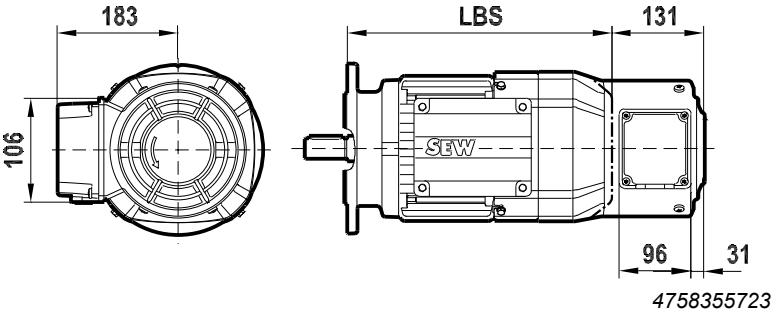


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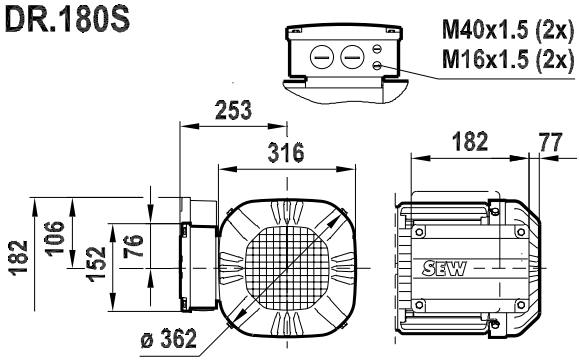
## DR.180S




/2W

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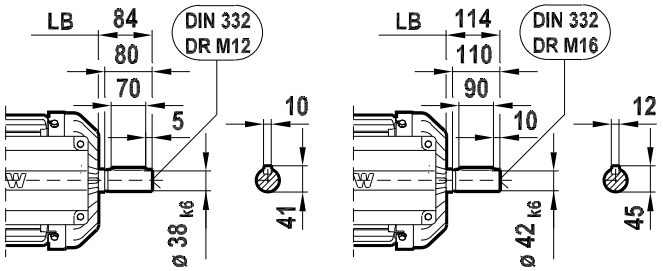
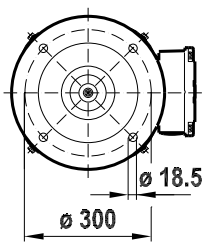
1 (2)

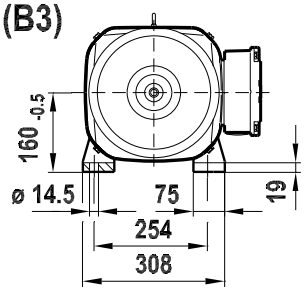


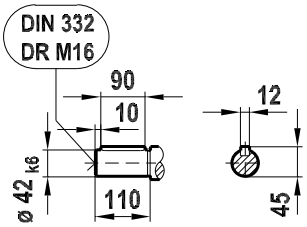

## DRS180S 4; 8/4
## DRE180S 4

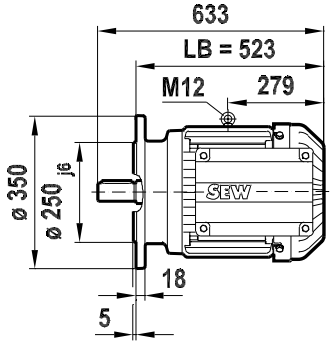
/FF (B5)
FF300

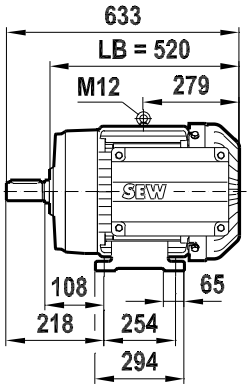



/FI.. (B3)



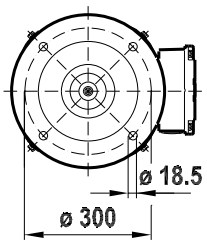



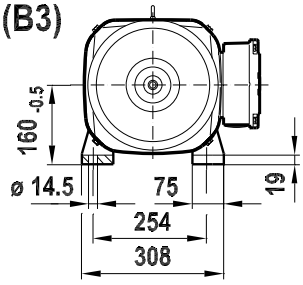



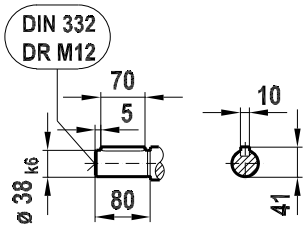

## DRP180S 4

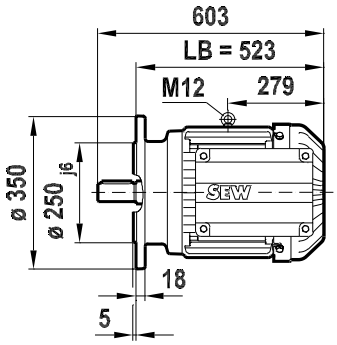
/FF (B5)
FF300

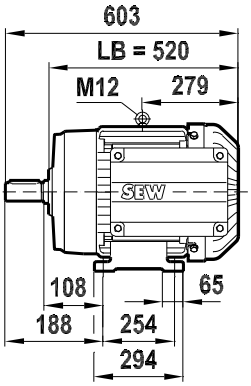



/FI.. (B3)

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## DR.180S

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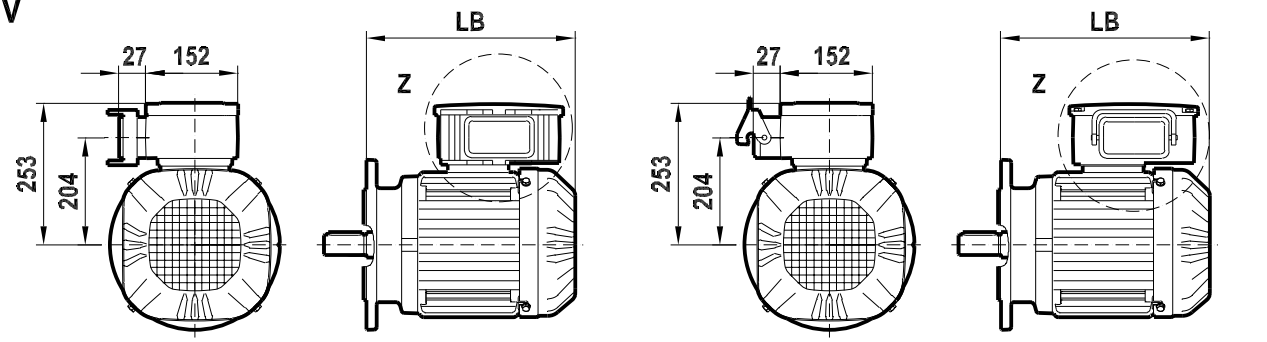
2 (2)

### /IV

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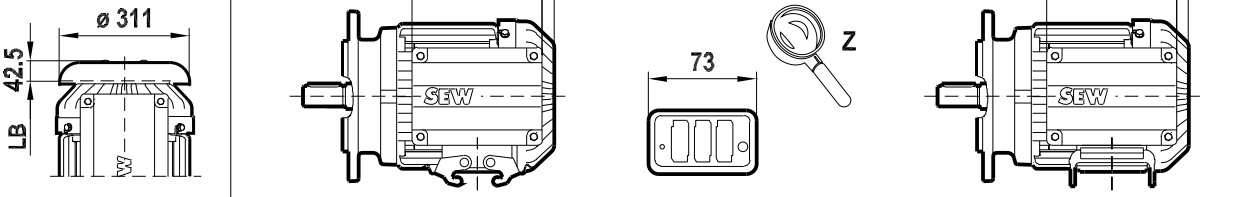


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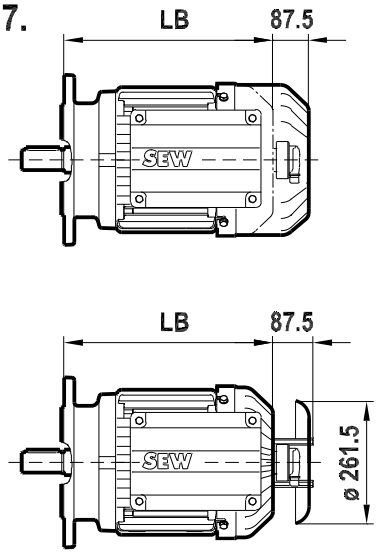


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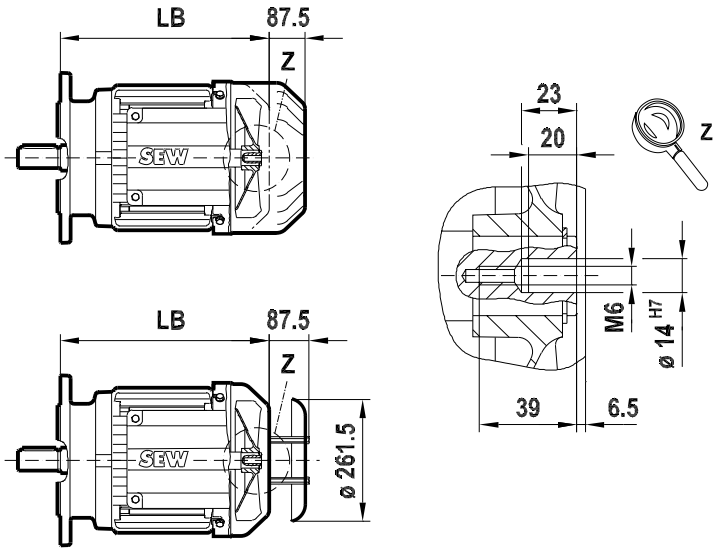


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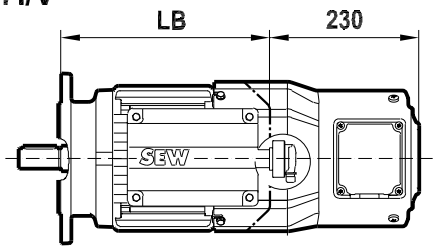


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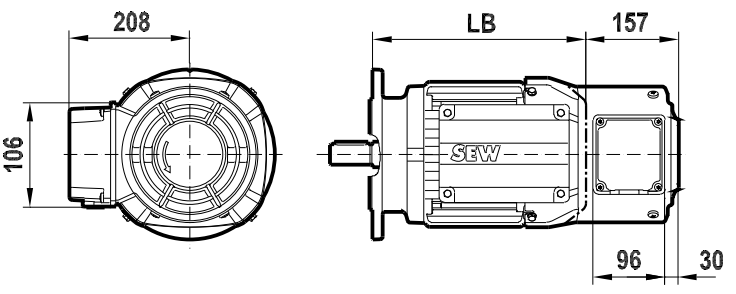


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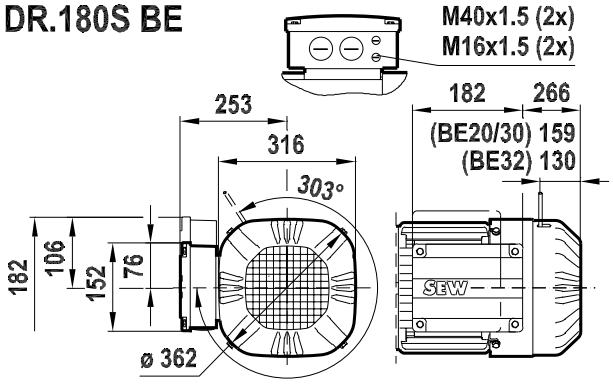
## DR.180S BE

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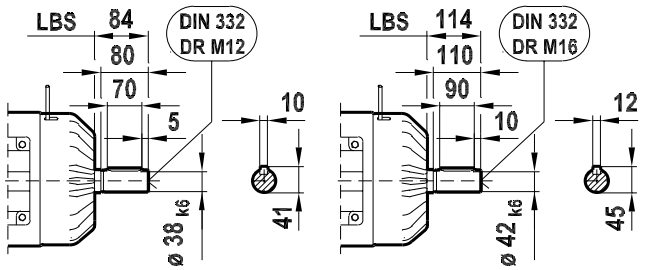


## DRS180S 4; 8/4
## DRE180S 4

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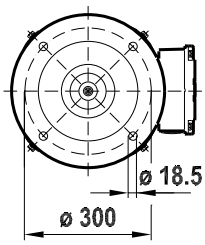


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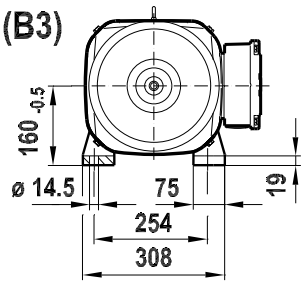


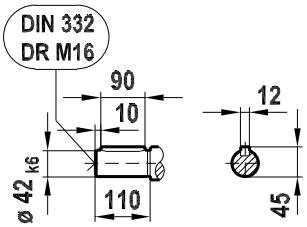


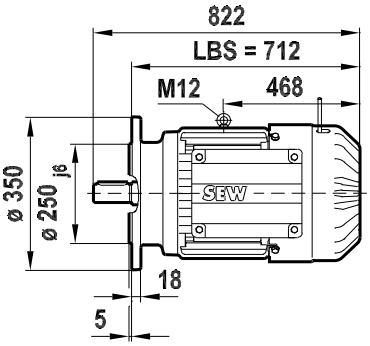


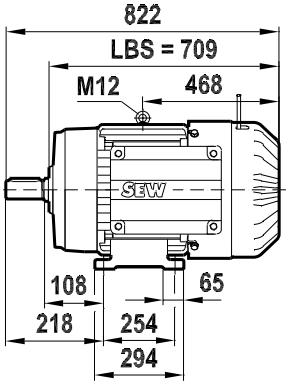


## DRP180S 4

### /FF (B5)
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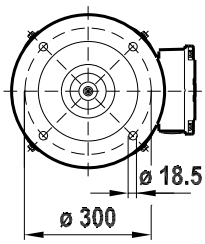


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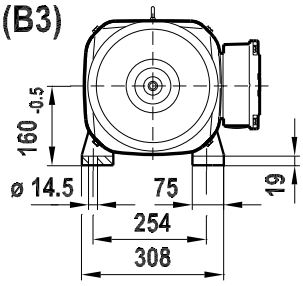


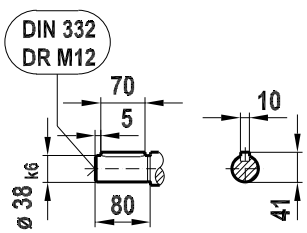


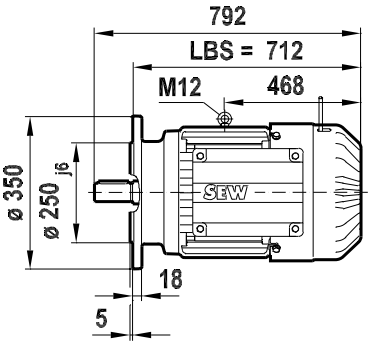


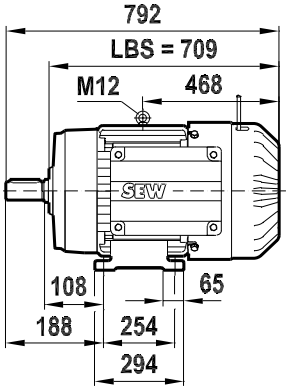


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## DR.180S BE

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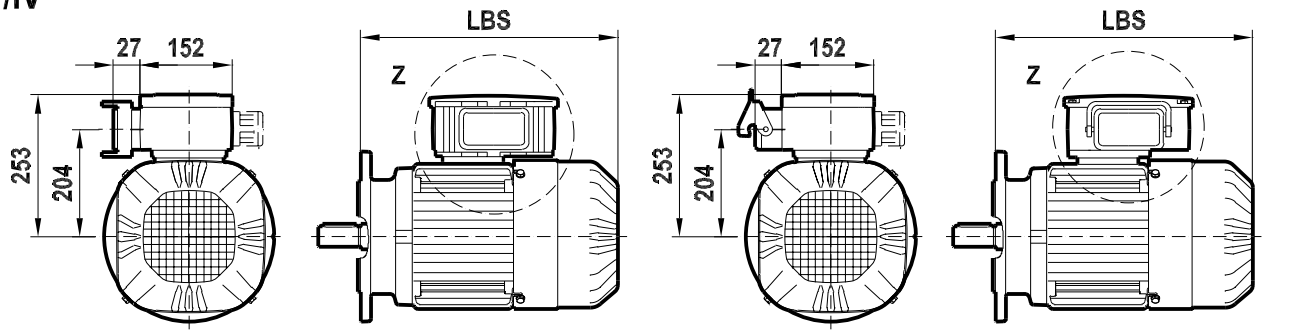


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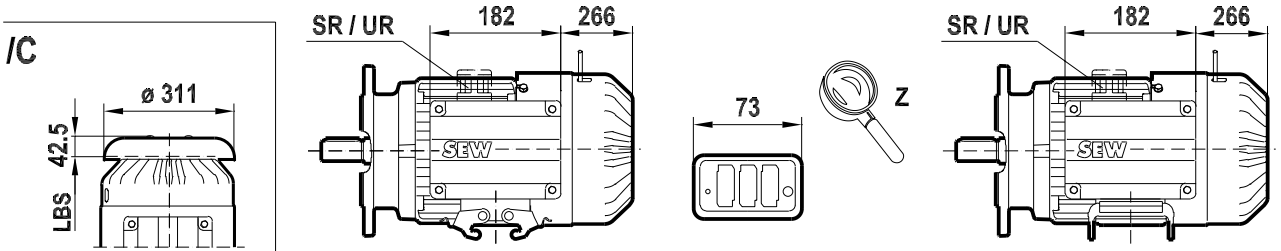


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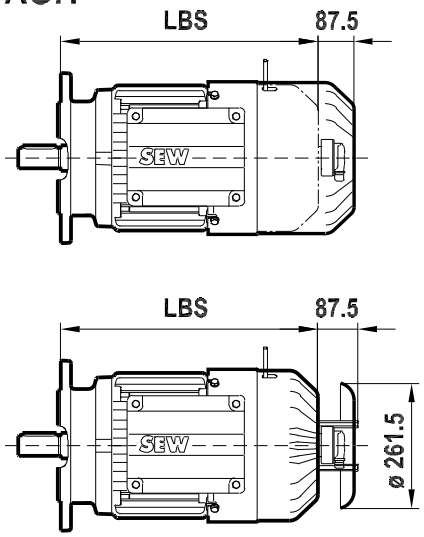


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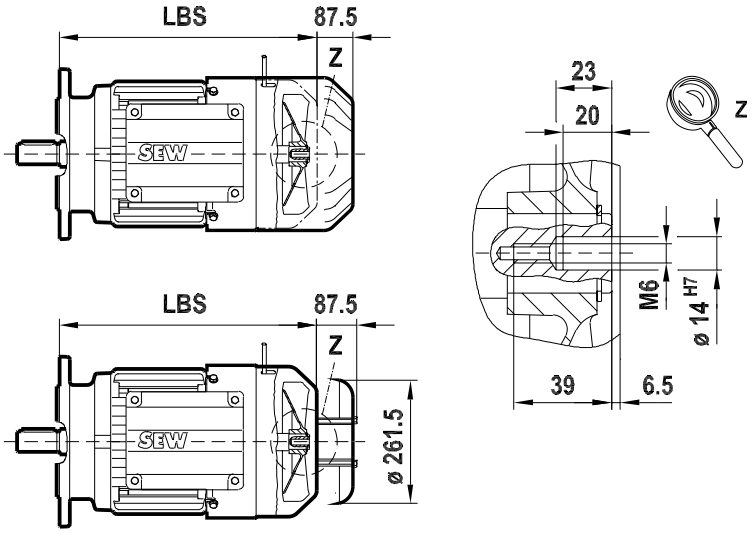


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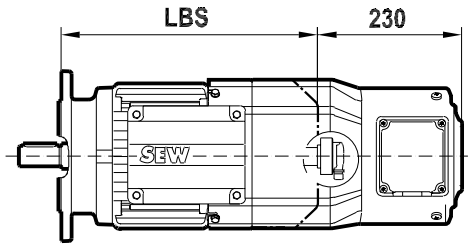


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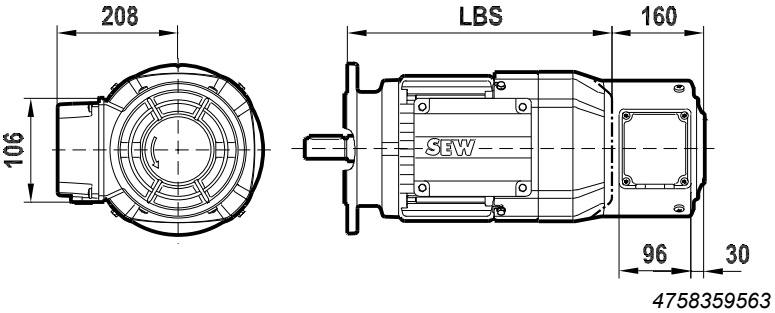


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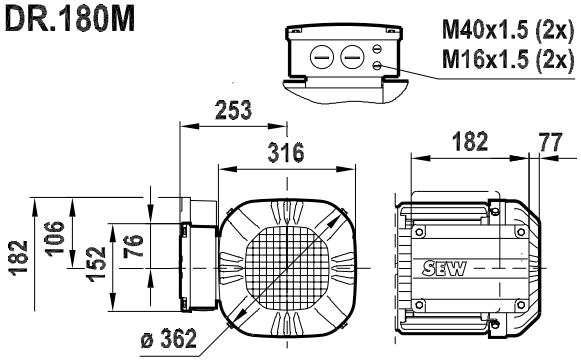
## DR.180M

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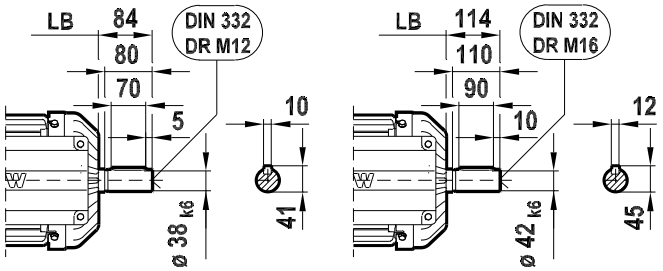


## DRS180M 4

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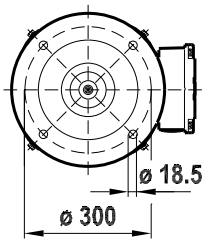


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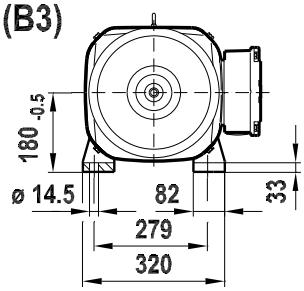


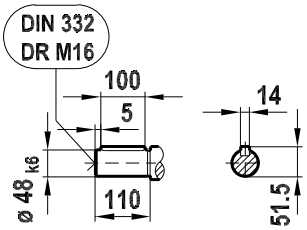


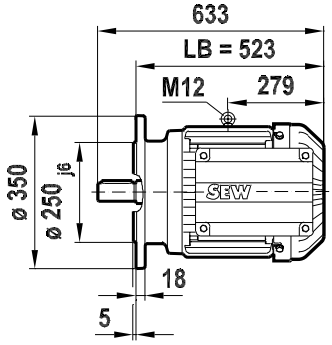


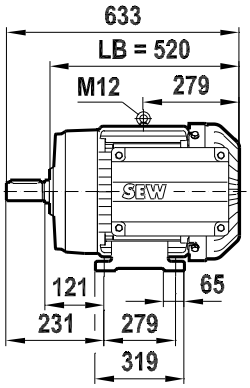


## DRE180M 4
## DRP180M 4

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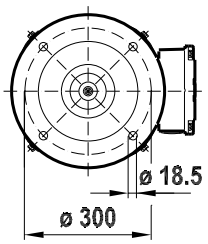


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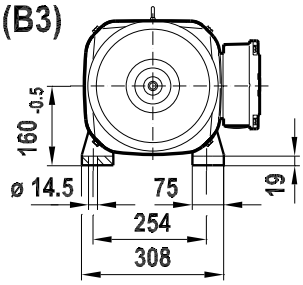


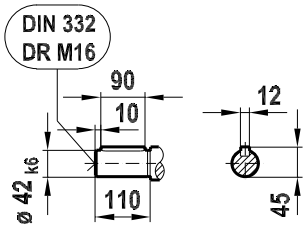


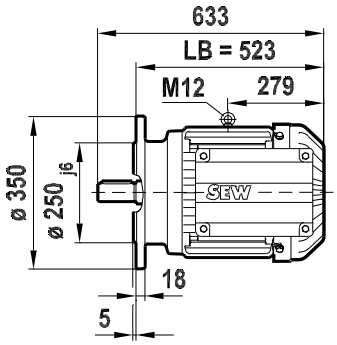


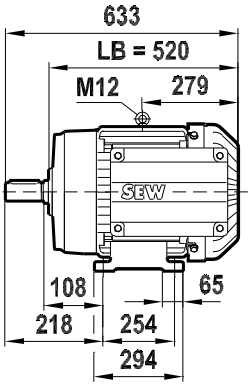


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## DR.180M

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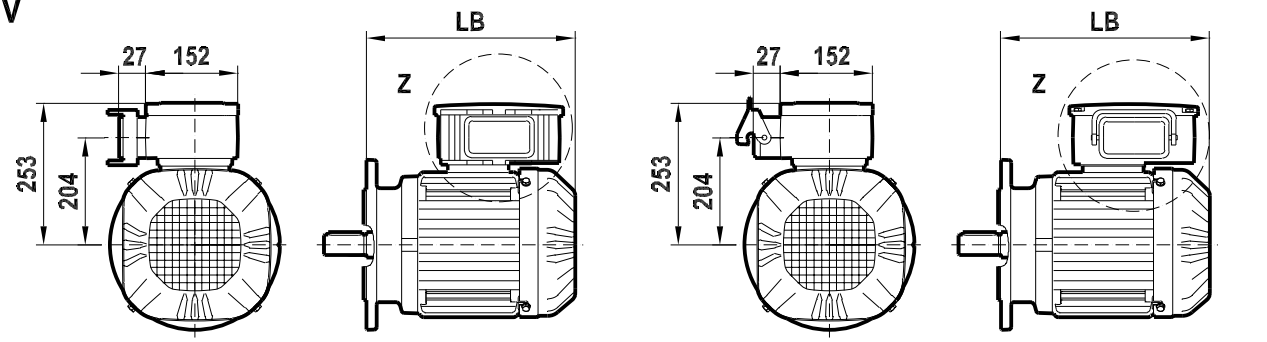


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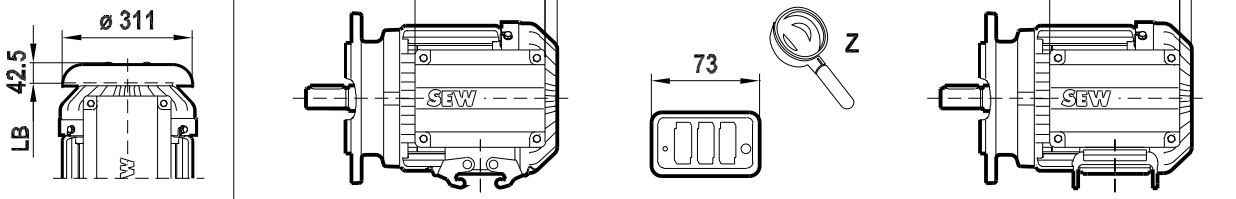


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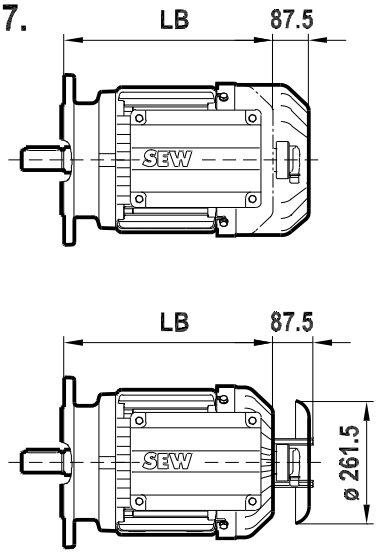


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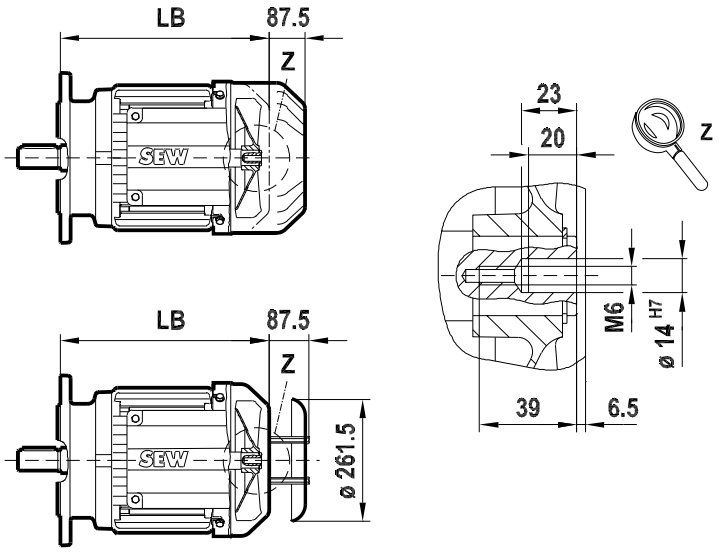


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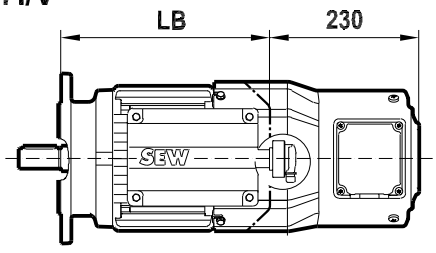


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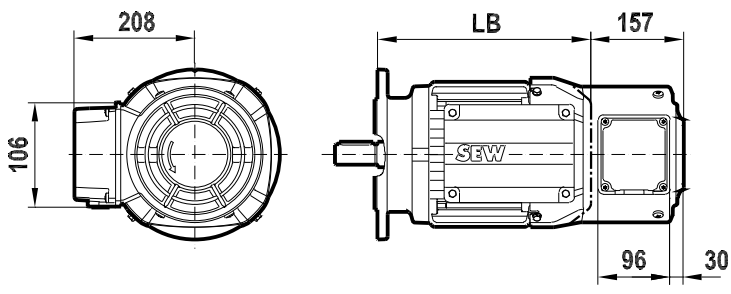


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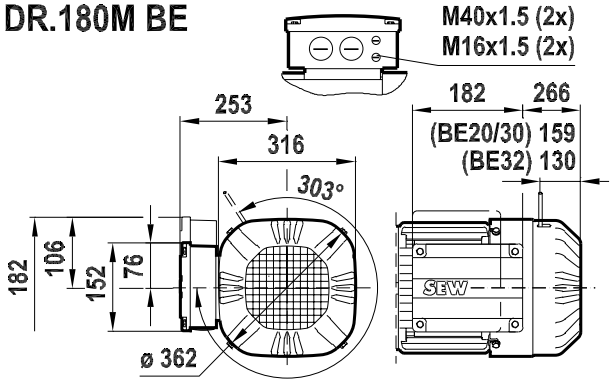
## DR.180M BE

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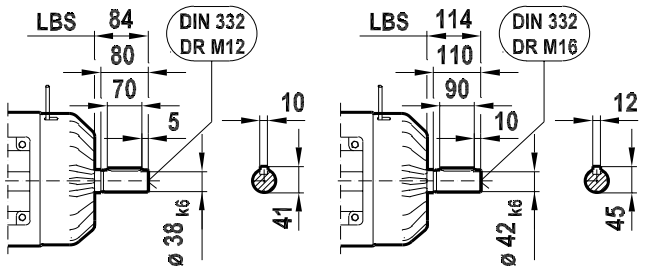


## DRS180M 4

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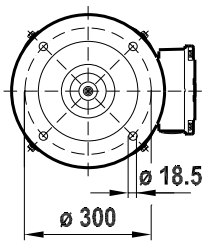
FF300

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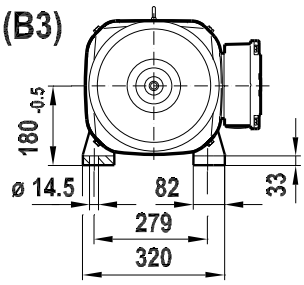


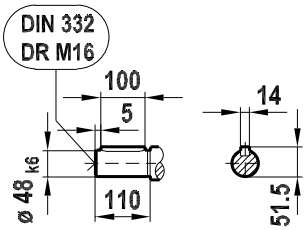


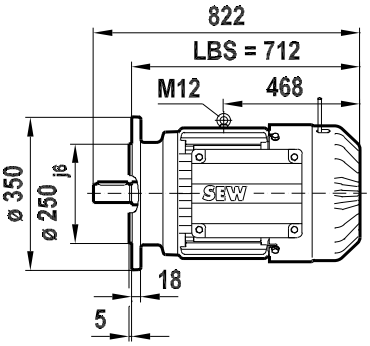


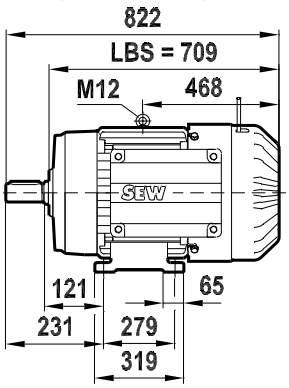


## DRE180M 4
## DRP180M 4

### /FF (B5)
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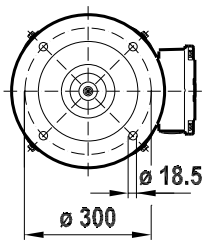


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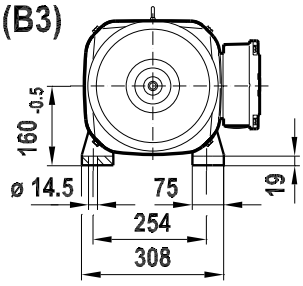


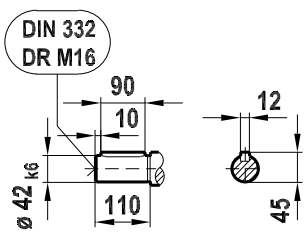


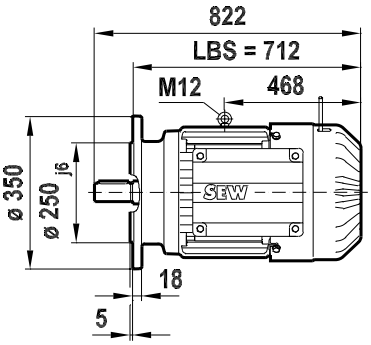


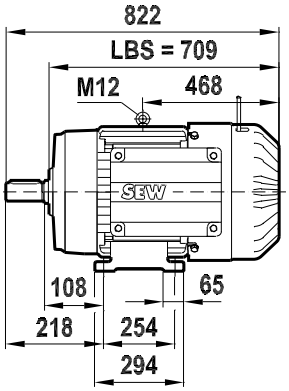


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## DR.180M BE

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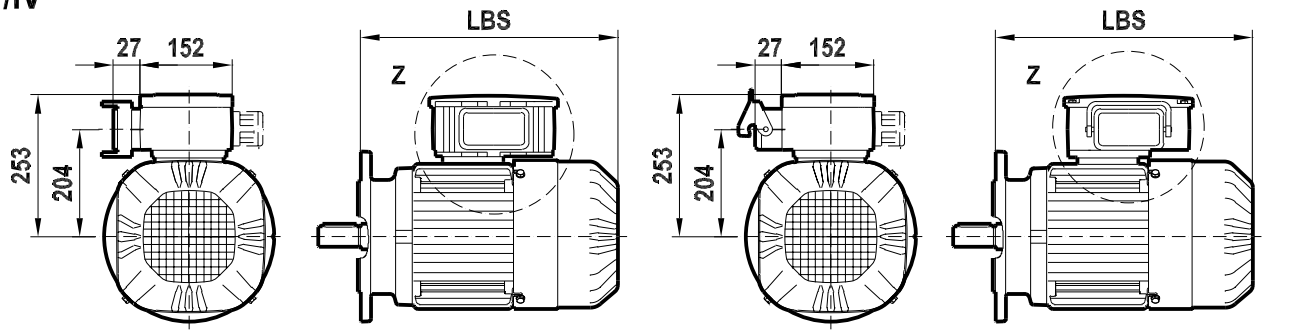
2 (2)

### /IV

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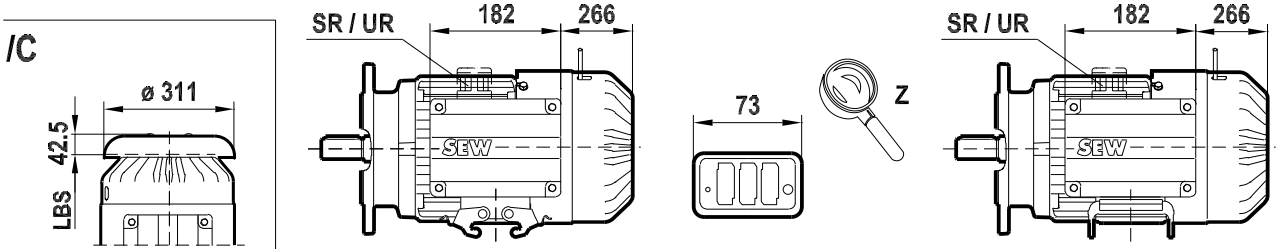


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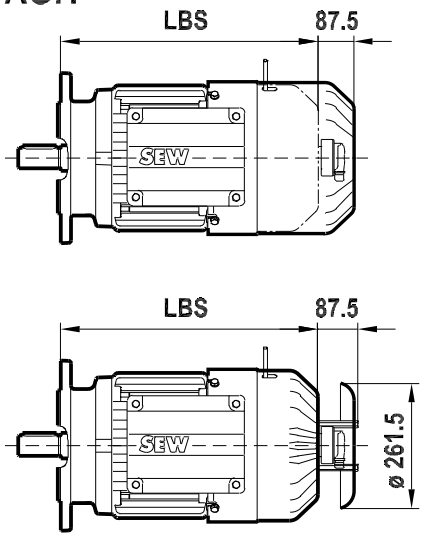
### /AG7.

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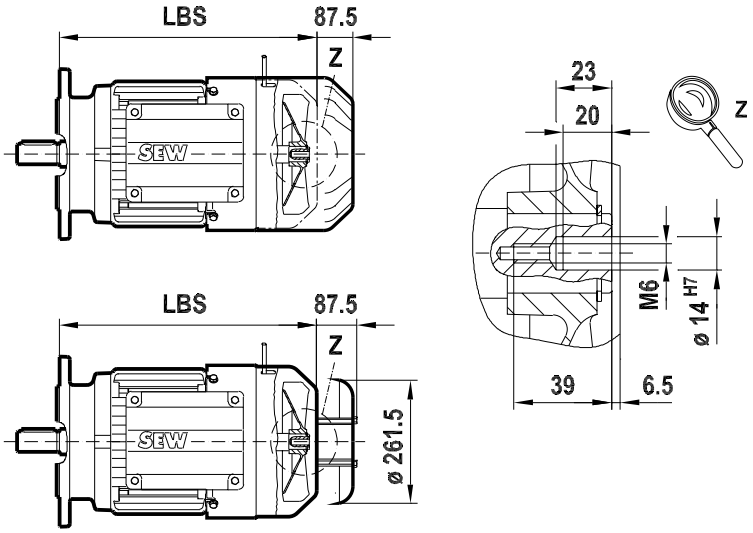


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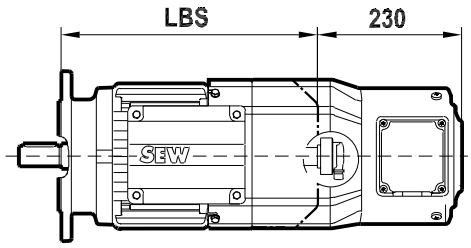
### /AG7./V

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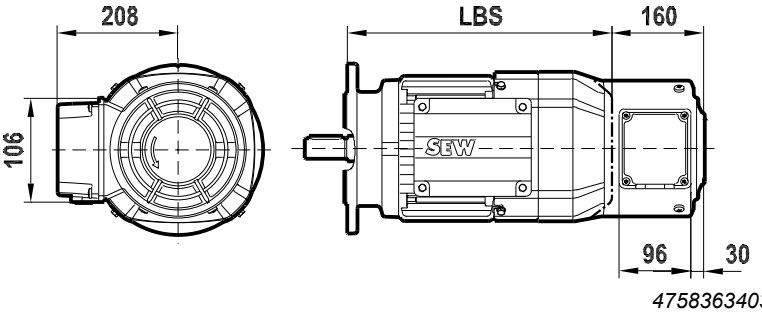


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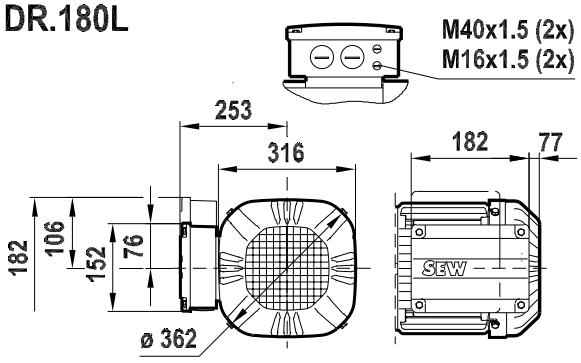
## DR.180L

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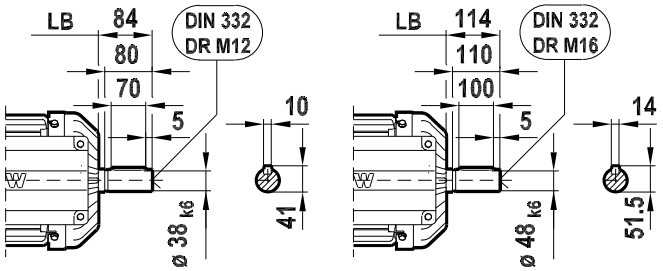
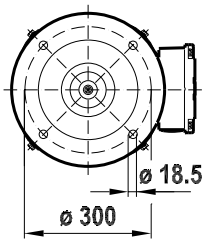
08 306 03 07
1 (2)




## DRS180L 4; 4/2; 8/4
## DRE180L 4

/FF (B5)
FF300

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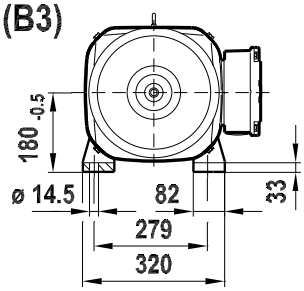
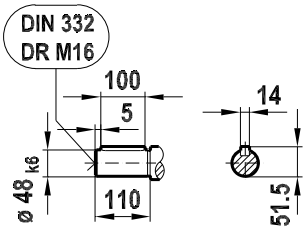
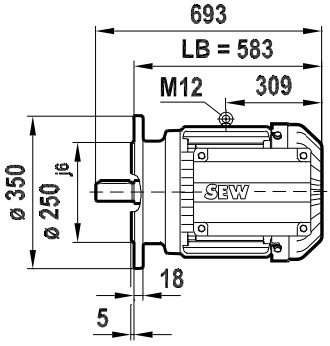
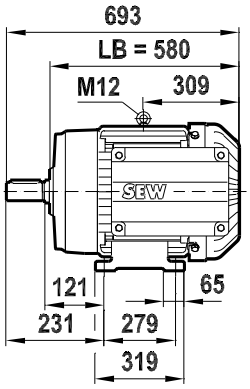


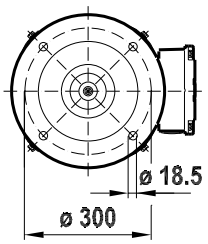



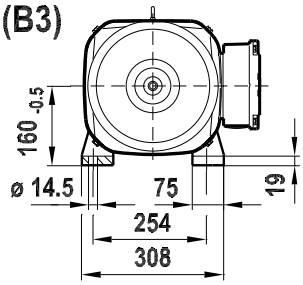



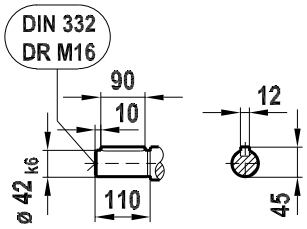

## DRP180L 4

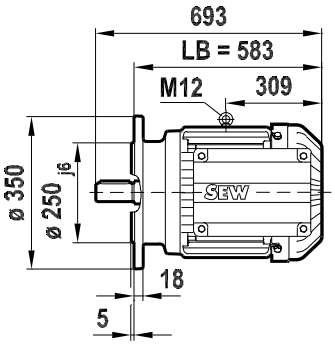
/FF (B5)
FF300

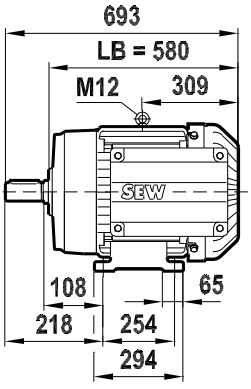



/FI.. (B3)

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## DR.180L

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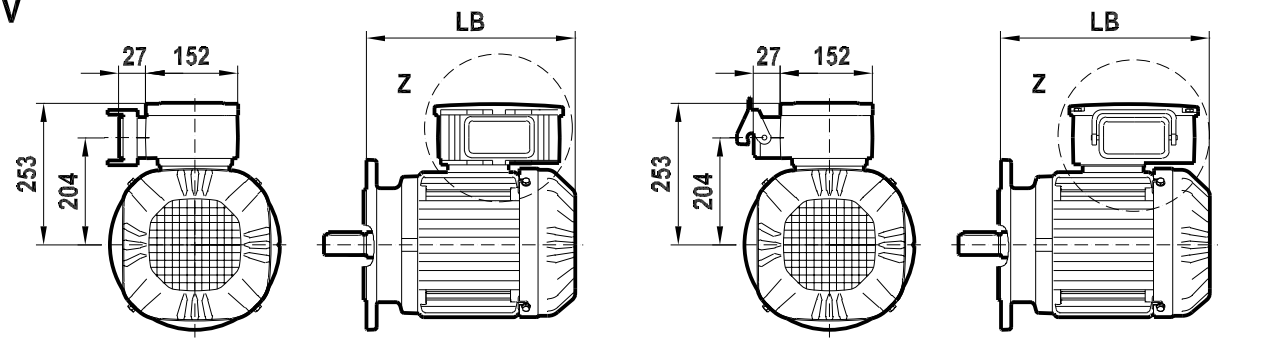
2 (2)

### /IV

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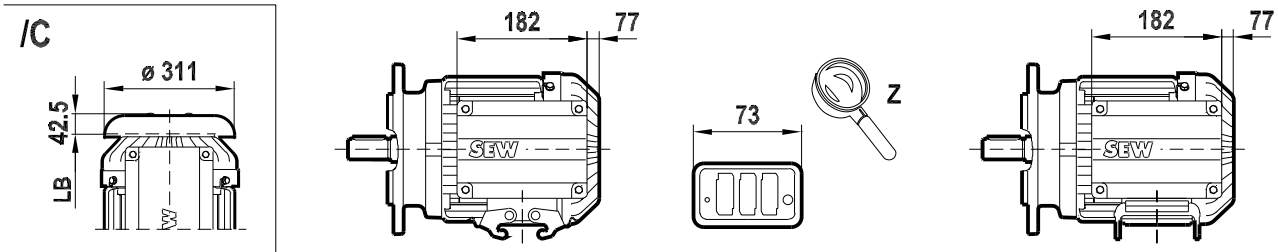


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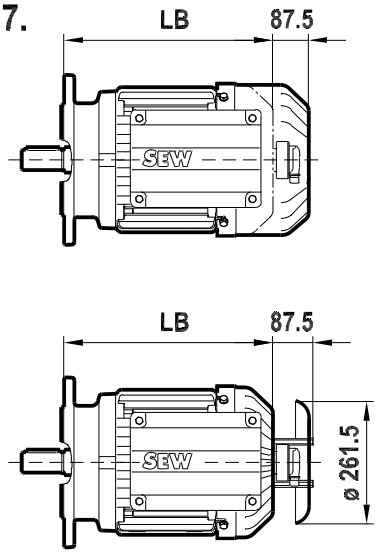
### /AG7.

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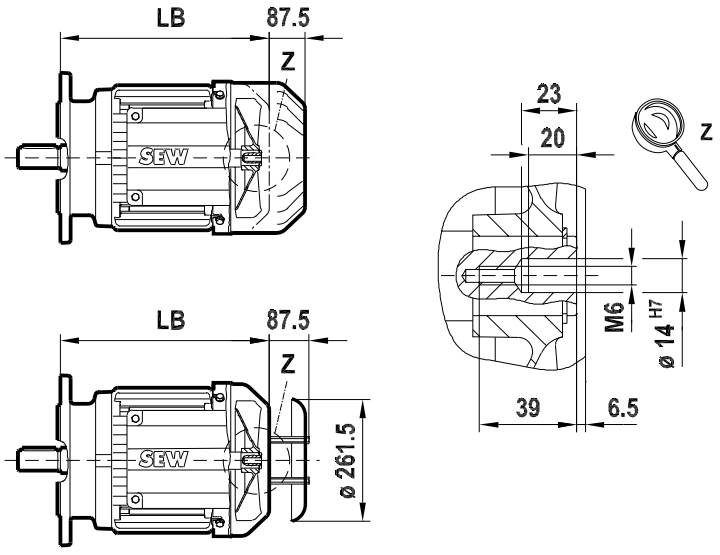
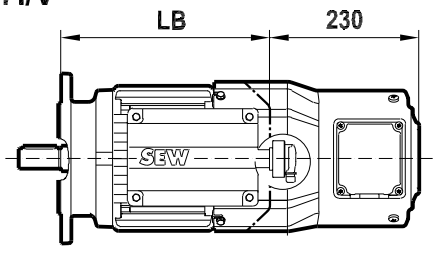



### /EG7./V
### /AG7./V

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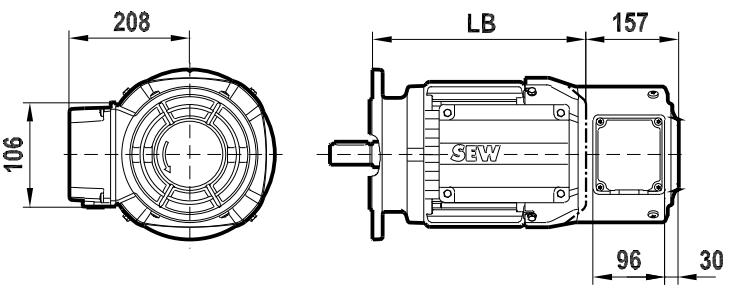


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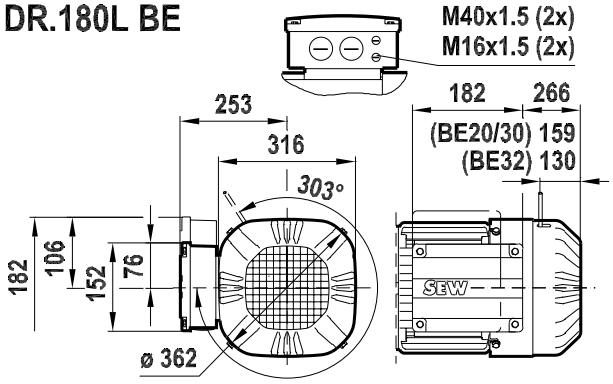
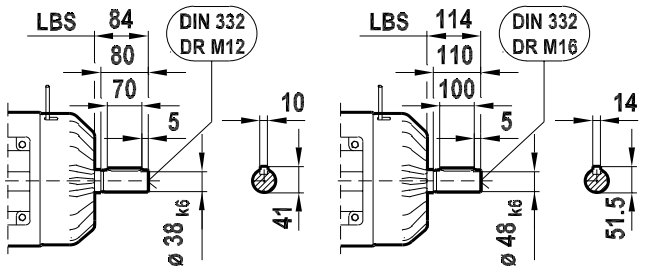
## DR.180L BE



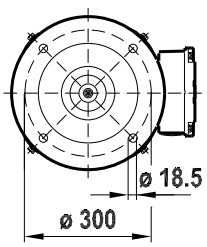

09 221 03 07
1 (2)

### /2W

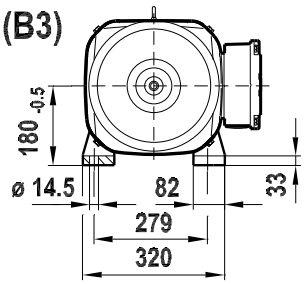


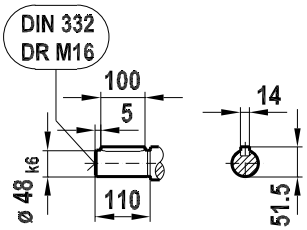

## DRS180L 4; 4/2; 8/4
## DRE180L 4

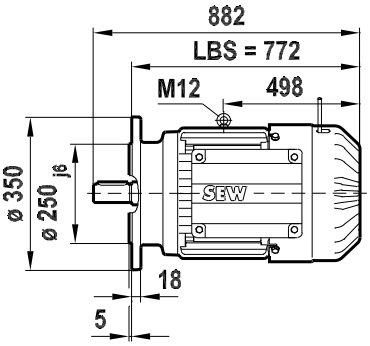
### /FF (B5)
FF300

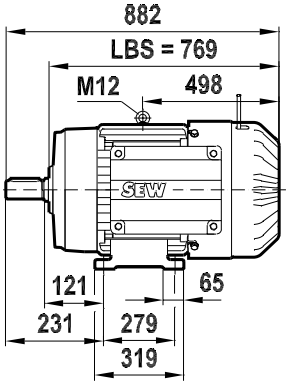



### /FI.. (B3)



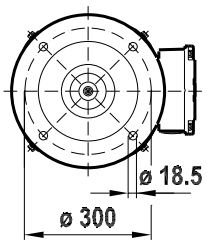




## DRP180L 4

### /FF (B5)
FF300

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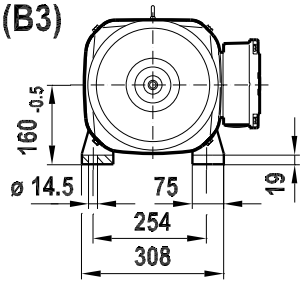


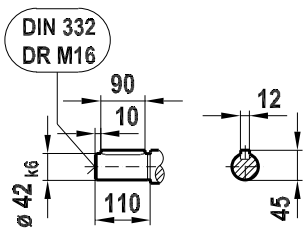


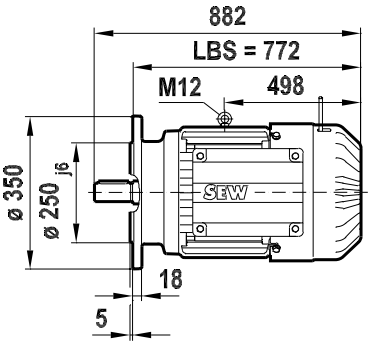


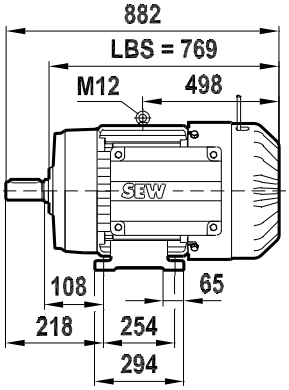


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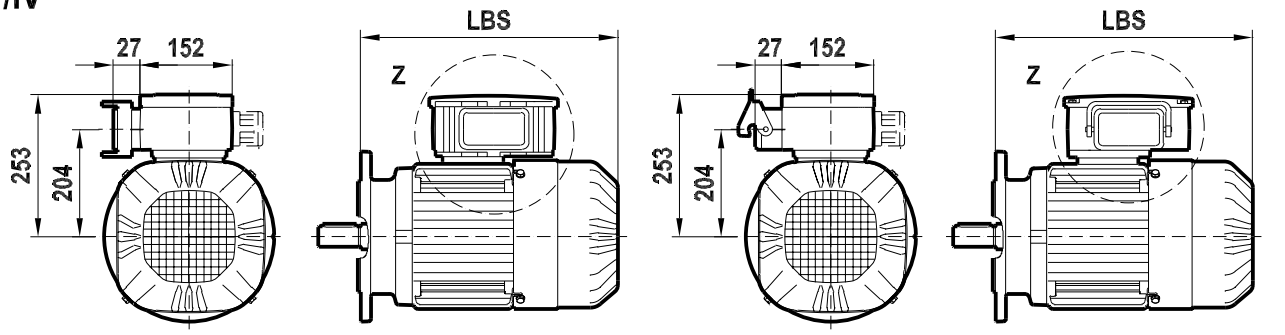
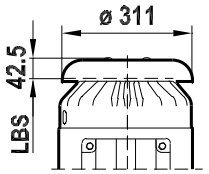
## DR.180L BE

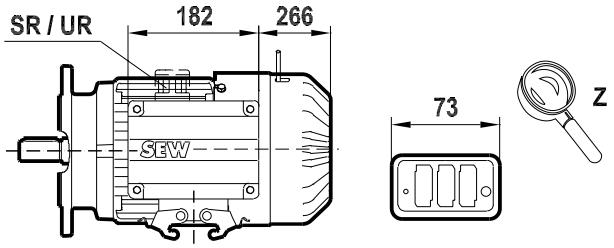
09 221 03 07
2 (2)

### /IV




### /C

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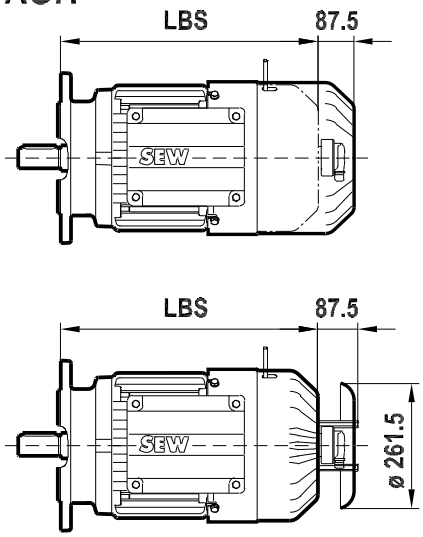
### /AG7.

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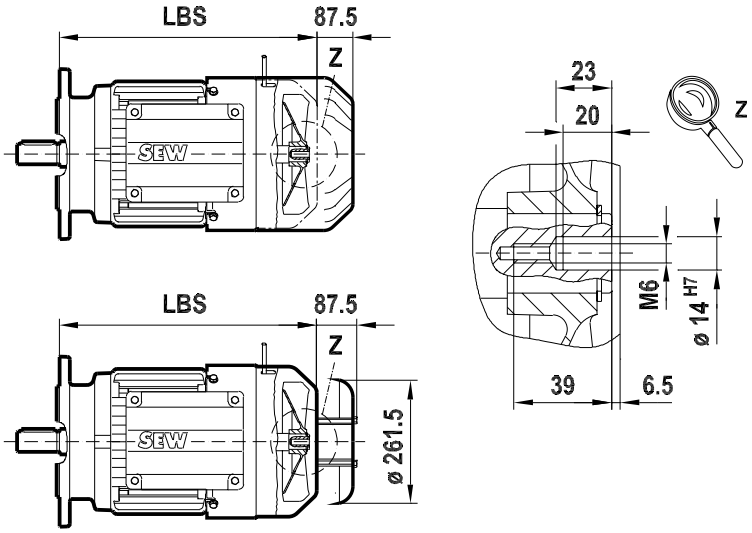
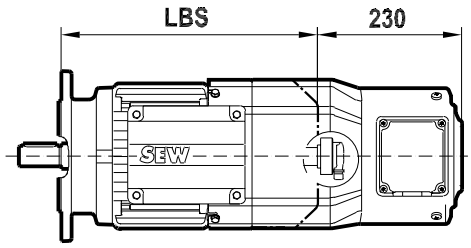



### /EG7./V
### /AG7./V

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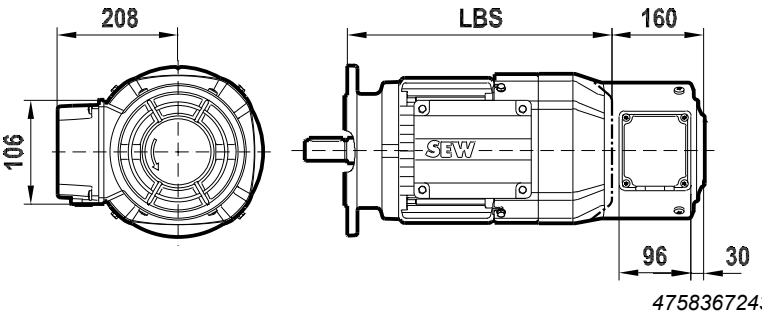


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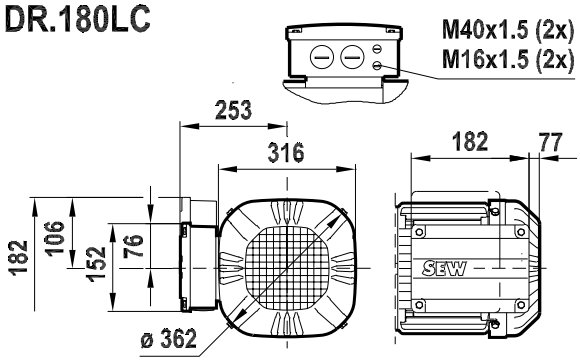
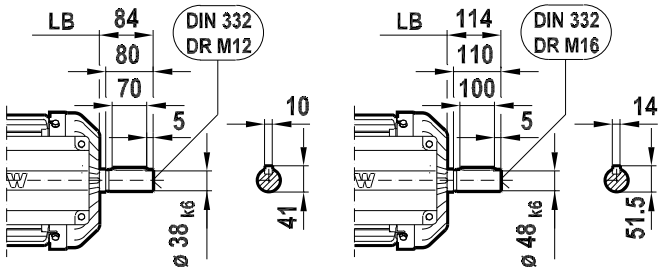
## DR.180LC



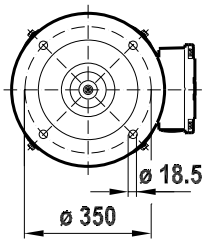

/2W

08 320 03 07
1 (2)

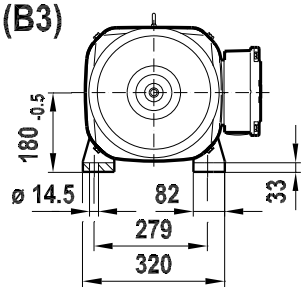


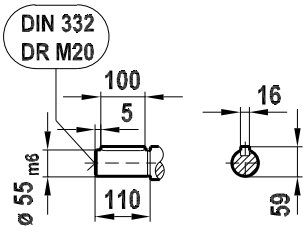

## DRS180LC 4

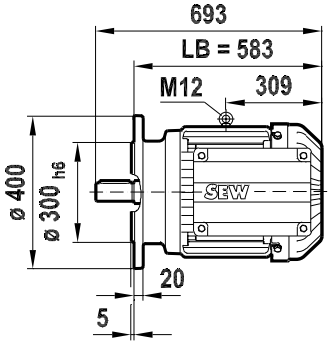
/FF (B5)
FF350

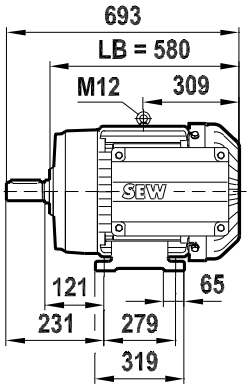



/FI.. (B3)



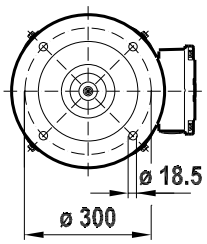




## DRE180LC 4
## DRP180LC 4

/FF (B5)
FF300

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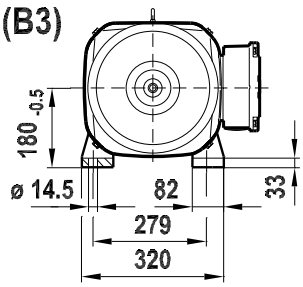


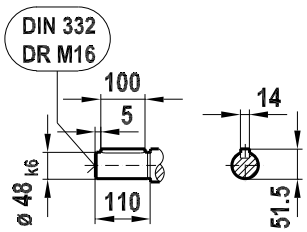


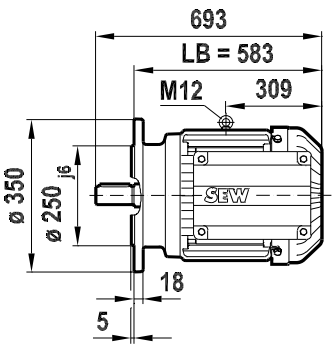


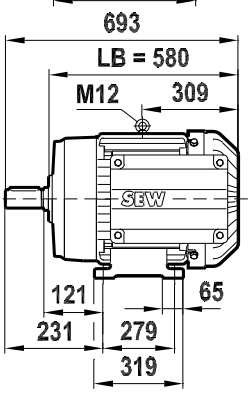


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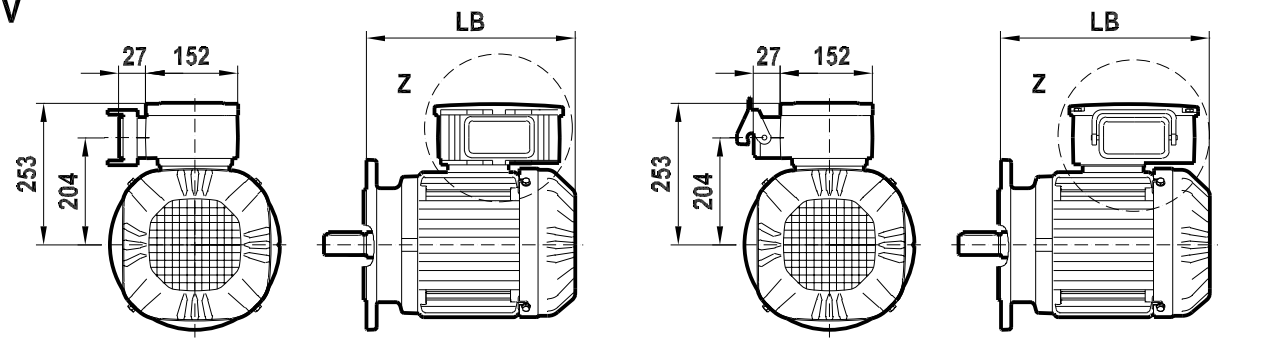
## DR.180LC

08 320 03 07
2 (2)

### /IV

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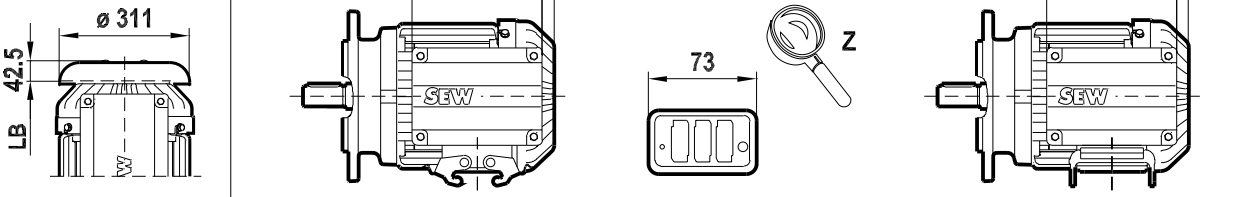


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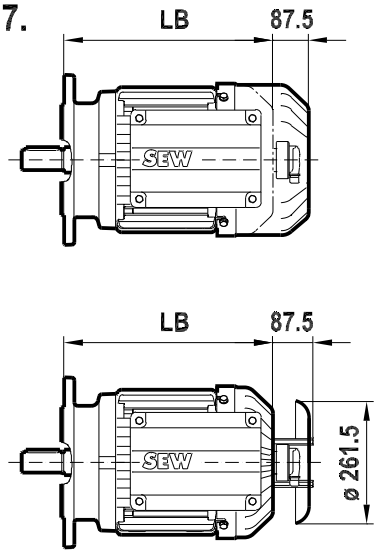
### /AG7.

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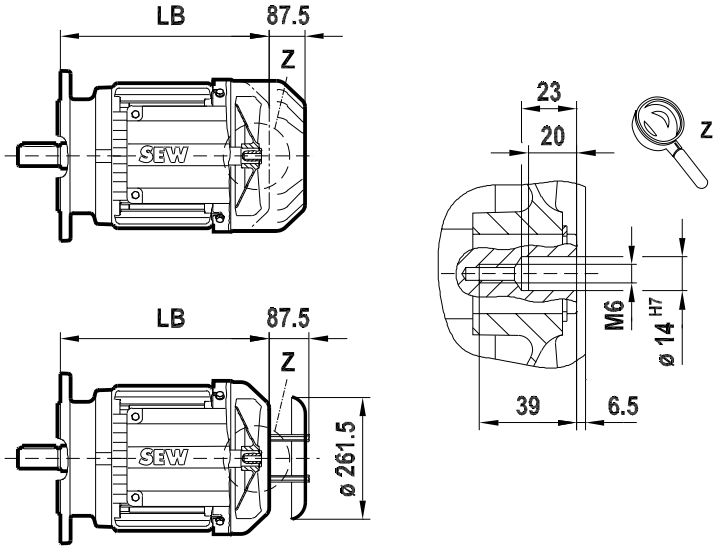


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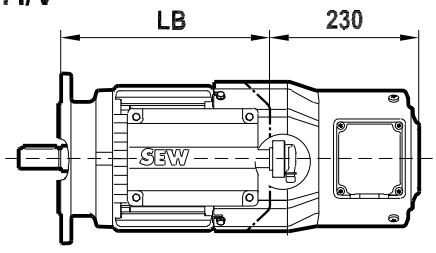
### /AG7./V

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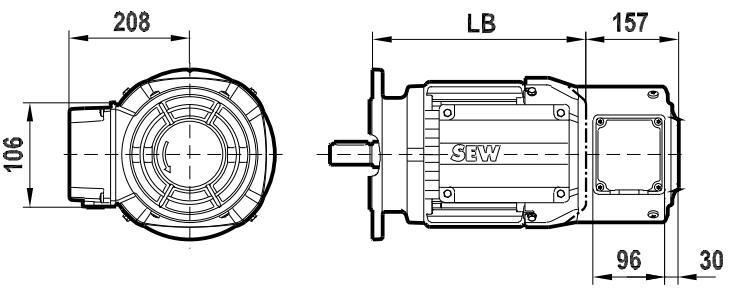


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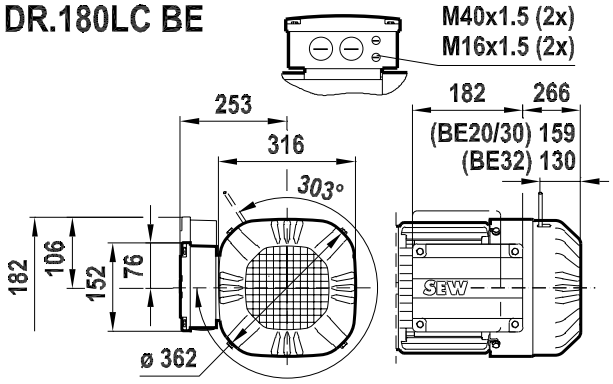
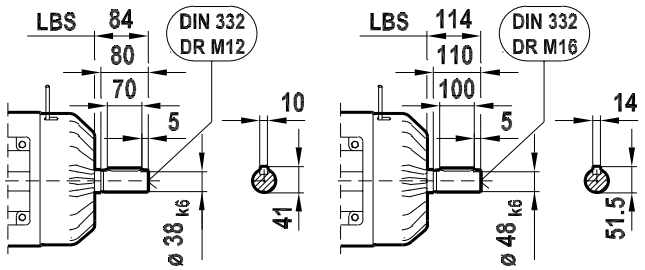
## DR.180LC BE



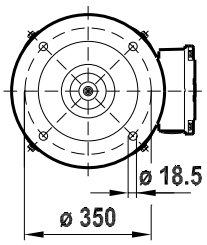

09 235 03 07
1 (2)

### /2W

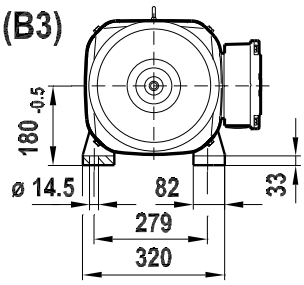


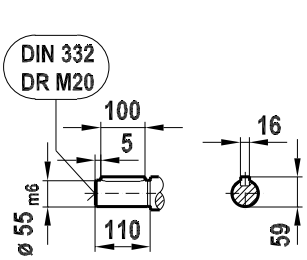

## DRS180LC 4

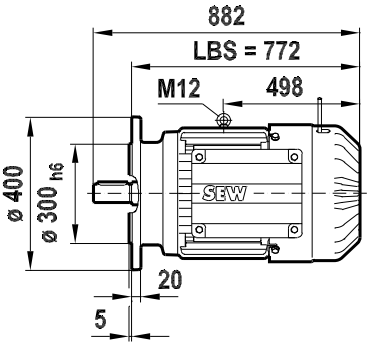
### /FF (B5)
FF350

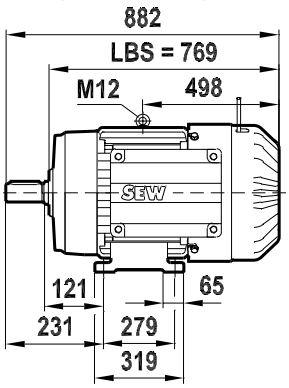



### /FI.. (B3)



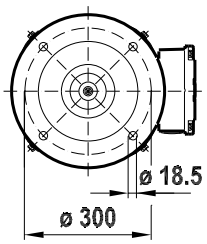




## DRE180LC 4
## DRP180LC 4

### /FF (B5)
FF300

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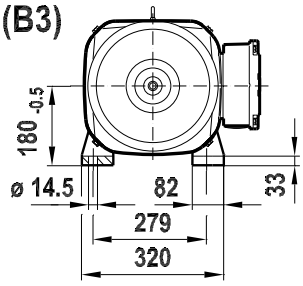


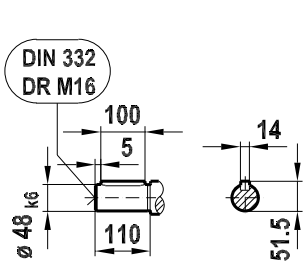


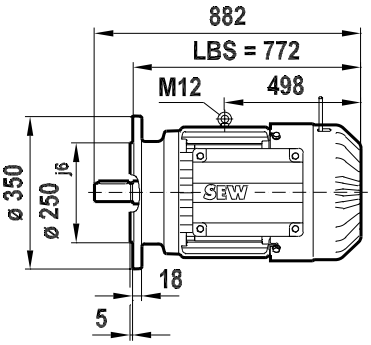


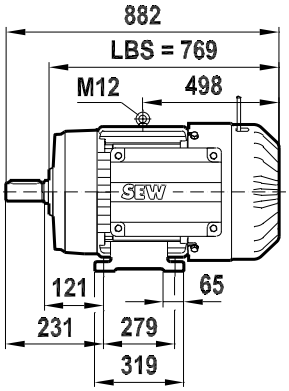


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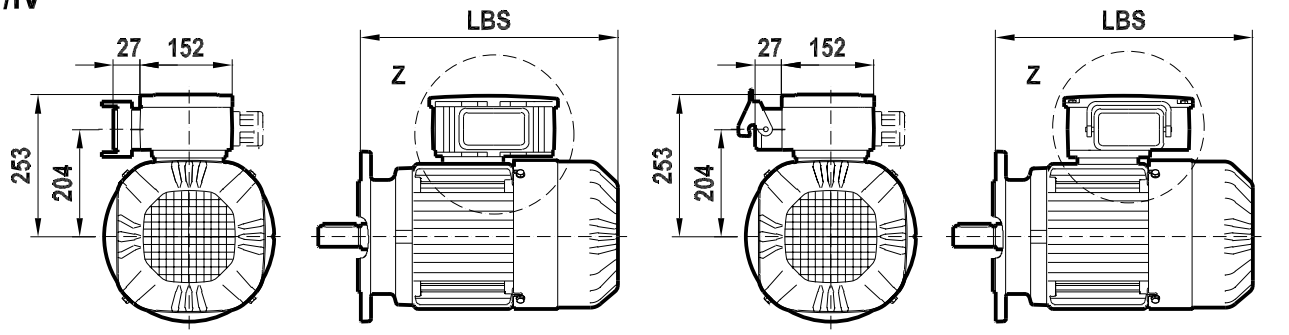
## DR.180LC BE

09 235 03 07
2 (2)

### /IV

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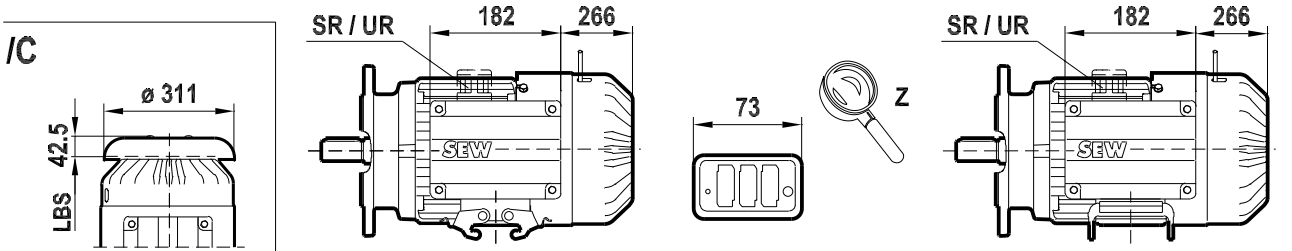


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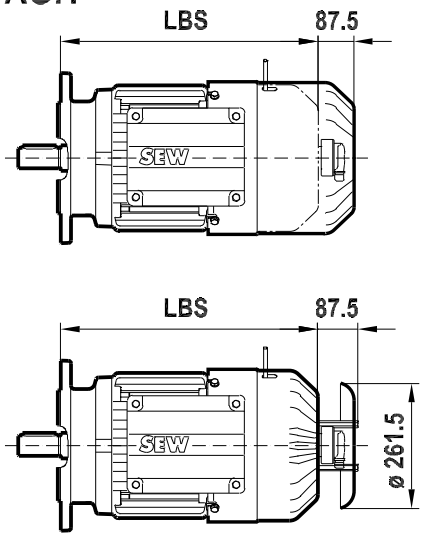
### /AG7.

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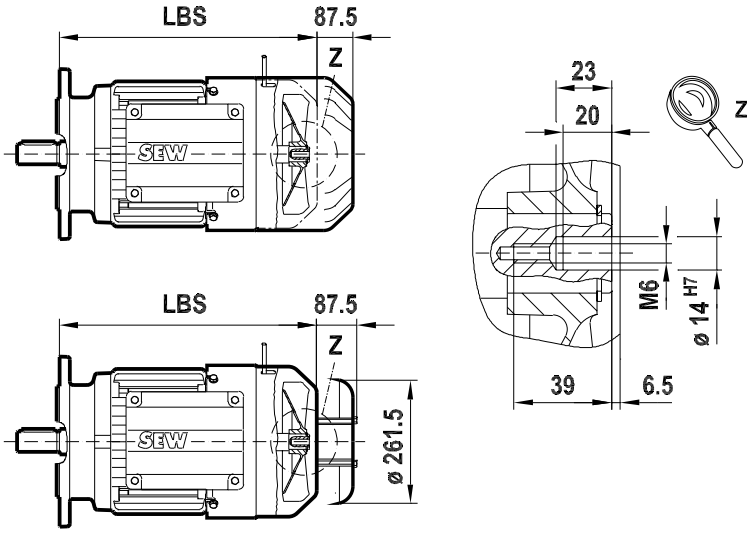


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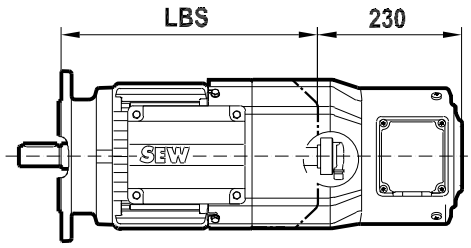
### /AG7./V

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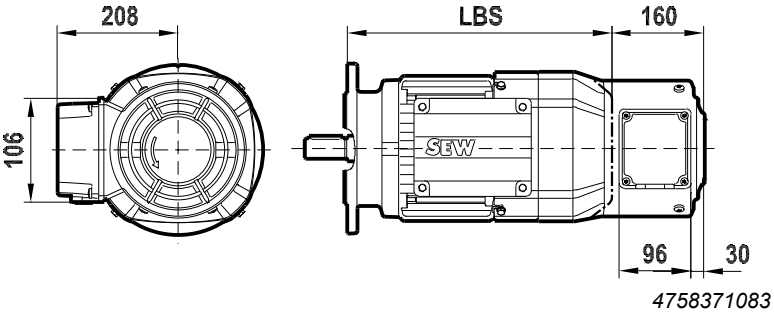


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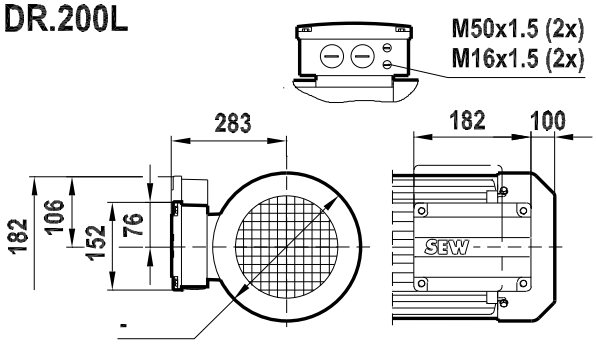
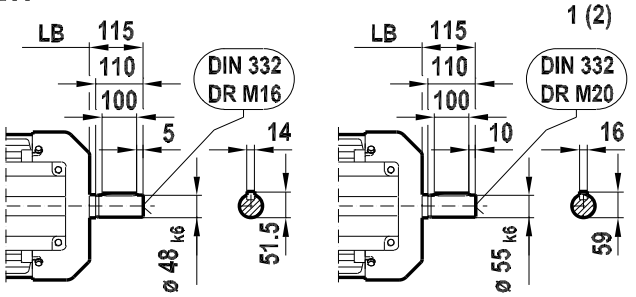
## DR.200L



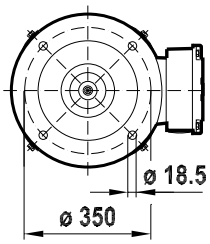

## /2W

08 321 03 07
1 (2)

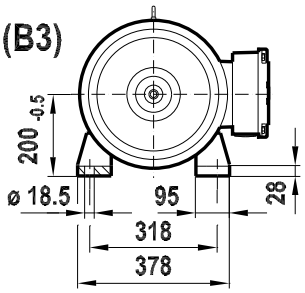


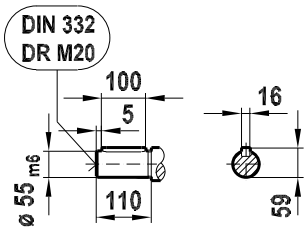

## DRS200L 4; 8/4
## DRE200L 4

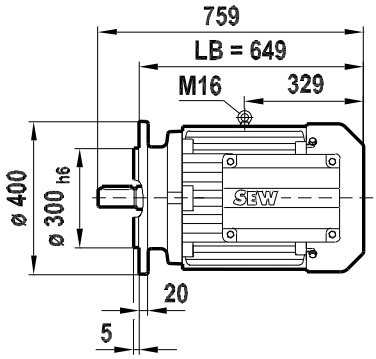
### /FF (B5)
FF350

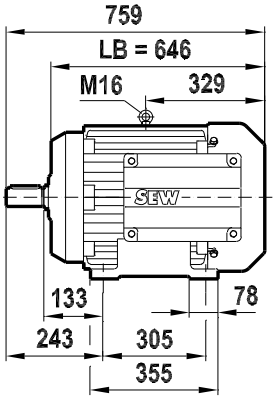



### /FI.. (B3)



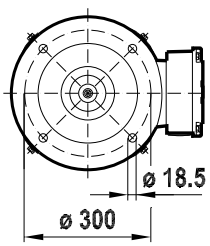




## DRP200L 4

### /FF (B5)
FF300

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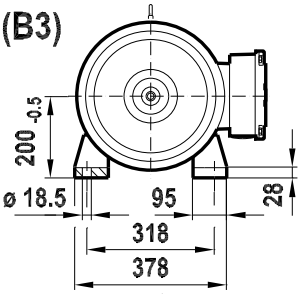


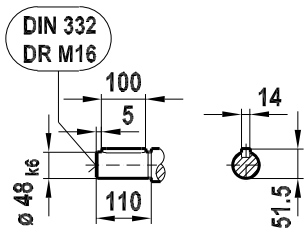


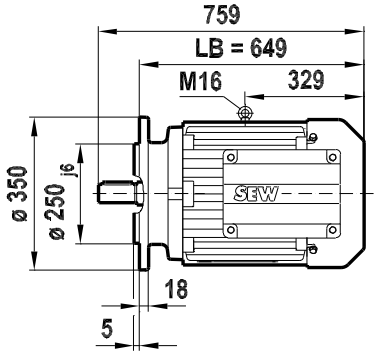


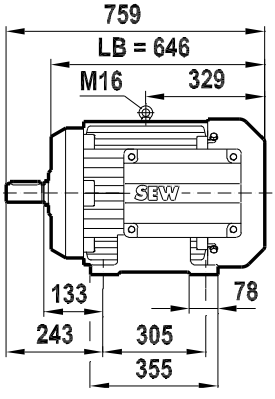


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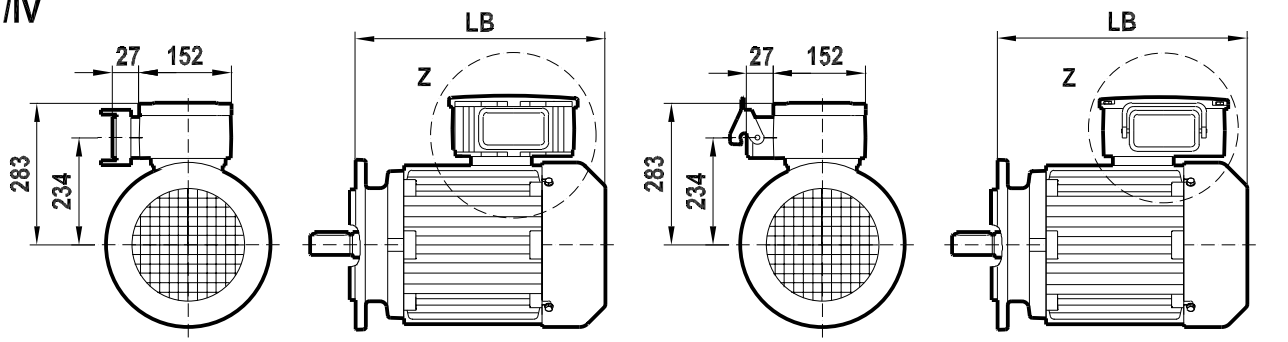
## DR.200L

08 321 03 07
2 (2)

### /IV

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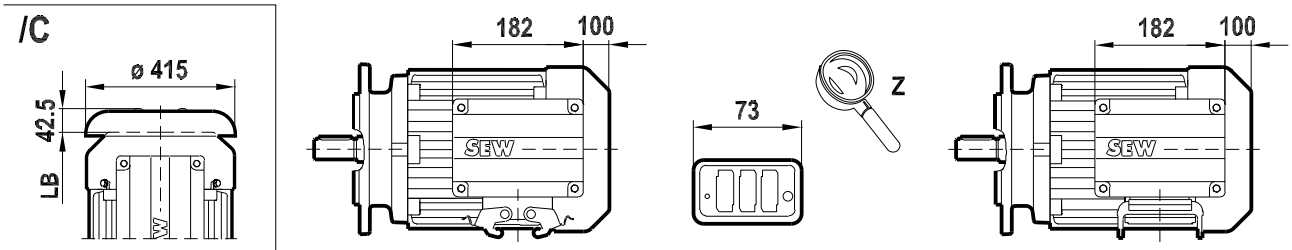


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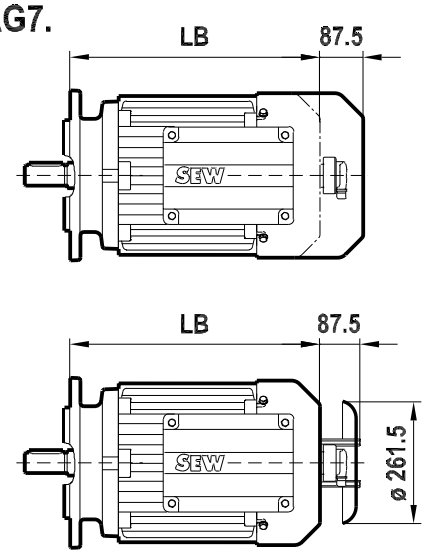
### /AG7.

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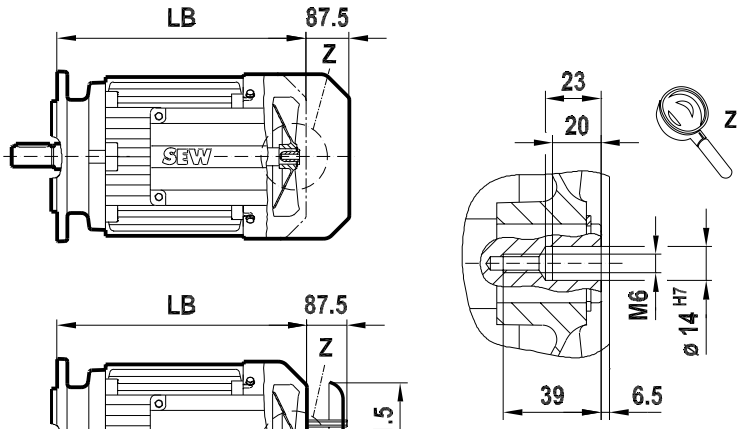
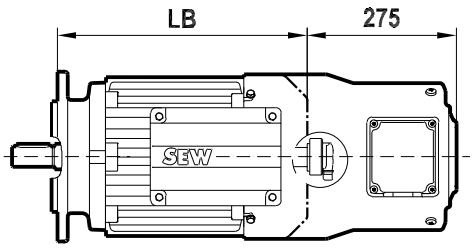
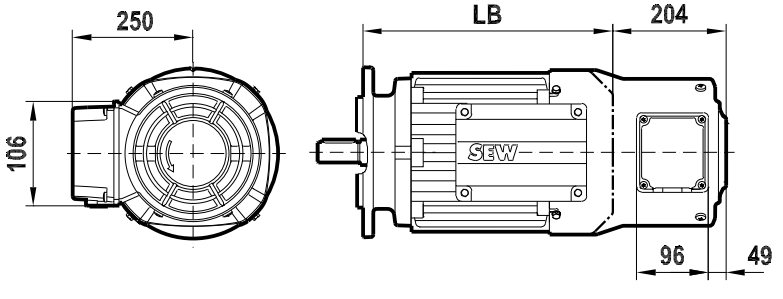



### /EG7./V
### /AG7./V




### /V

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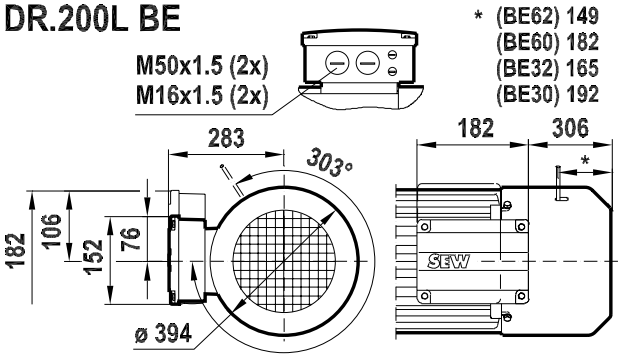
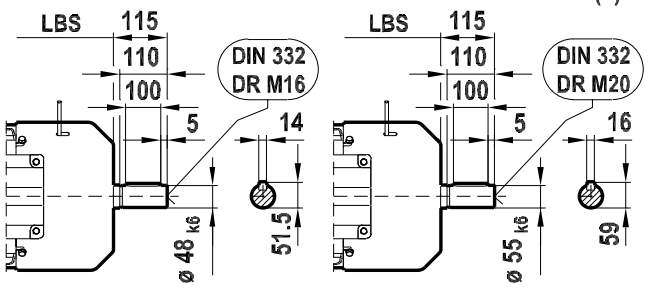
## DR.200L BE



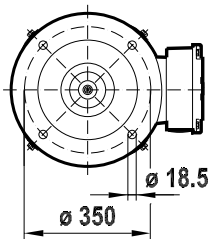

## /2W

09 236 03 07
1 (2)

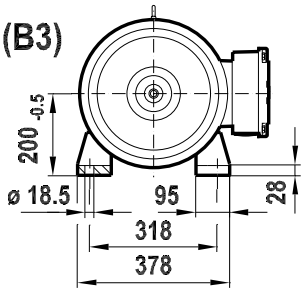


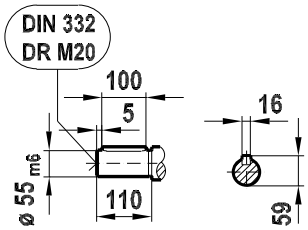

## DRS200L 4; 8/4
## DRE200L 4

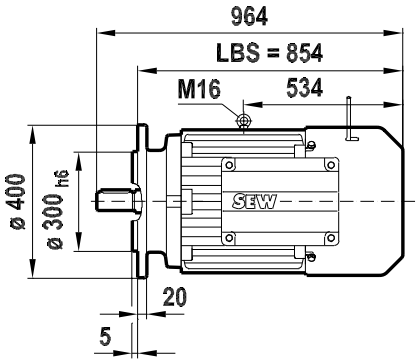
### /FF (B5)
FF350

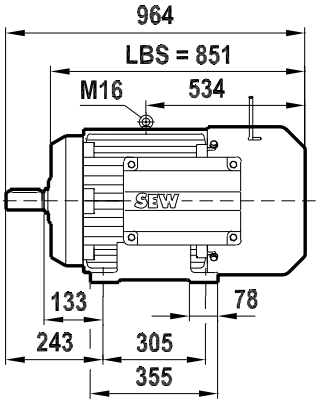



### /FI.. (B3)



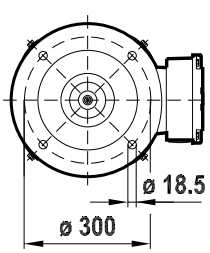




## DRP200L 4

### /FF (B5)
FF300

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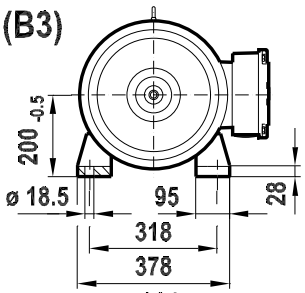


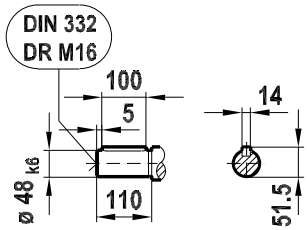


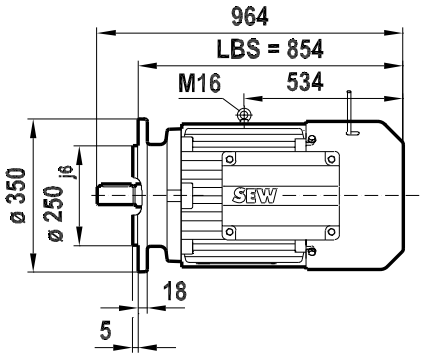


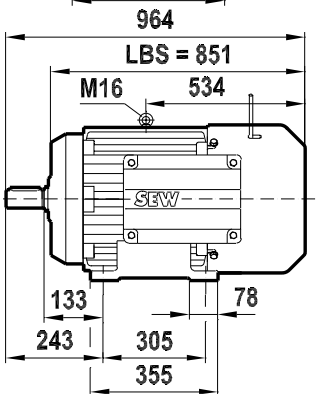


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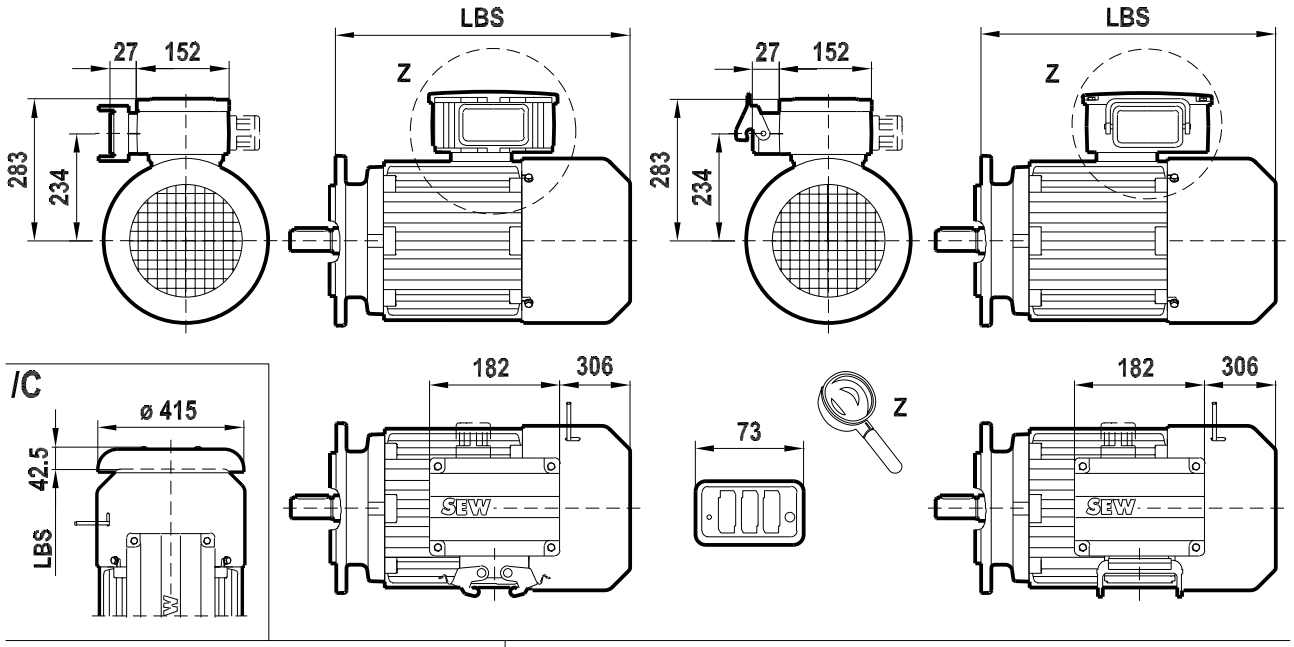
## DR.200L BE
## /IV

09 236 03 07
2 (2)

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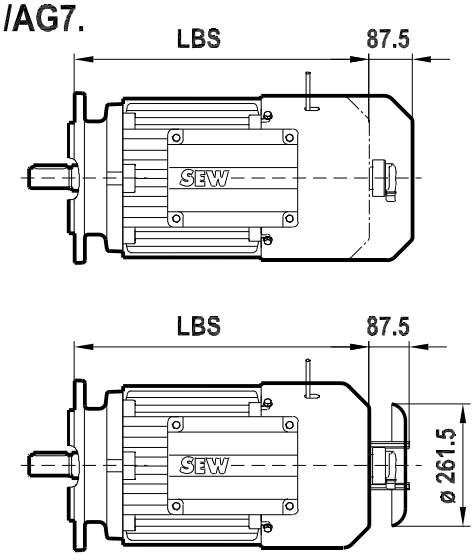
## /AG7.

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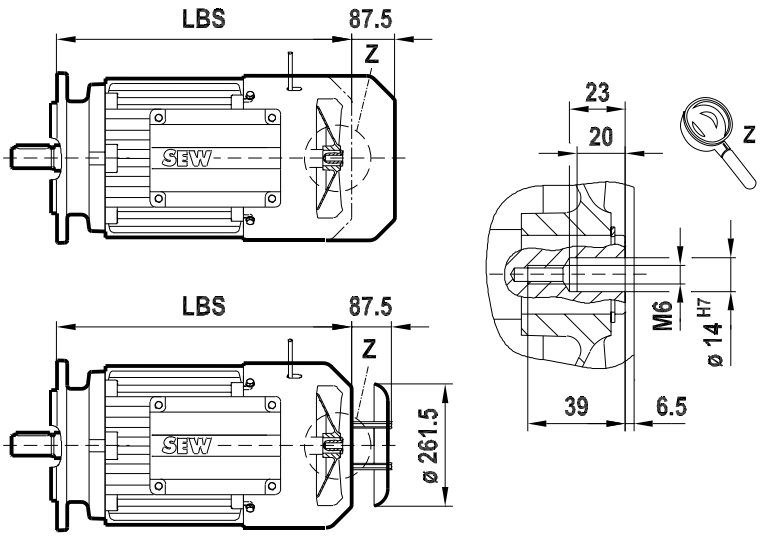


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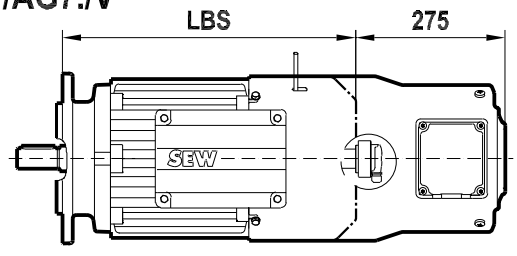
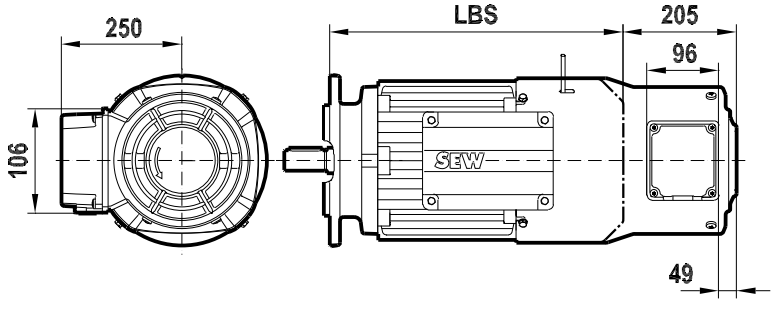
## /AG7./V




## /V

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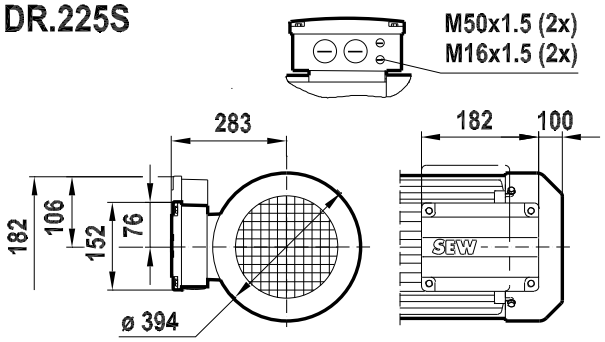
## DR.225S

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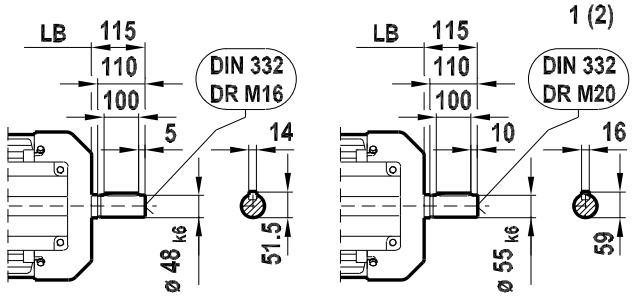
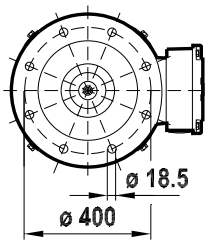
08 322 03 07
1 (2)

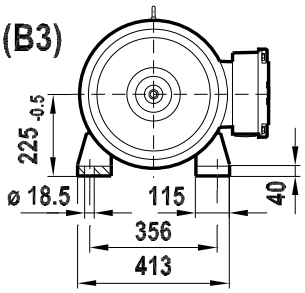


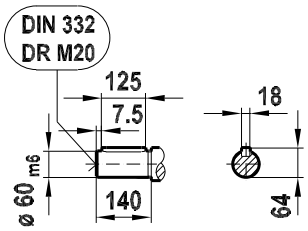

## DRS225S 4; 8/4
## DRE225S 4

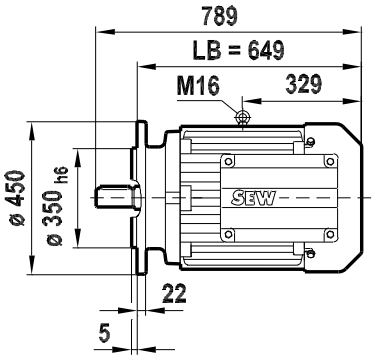
### /FF (B5)
FF400

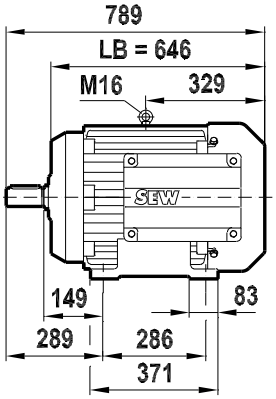



### /FI.. (B3)



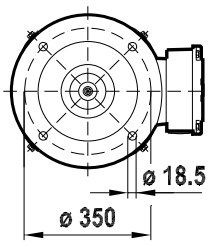




## DRP225S 4

### /FF (B5)
FF350

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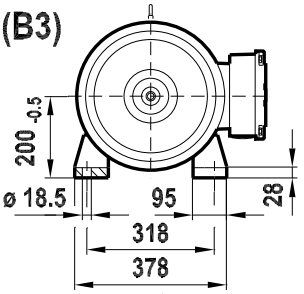


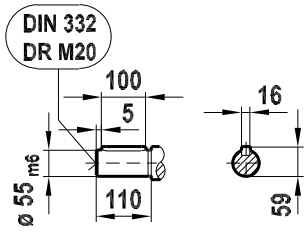


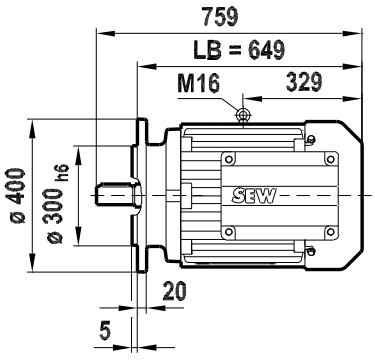


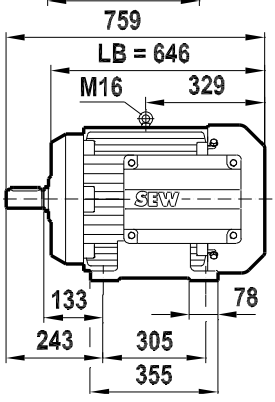


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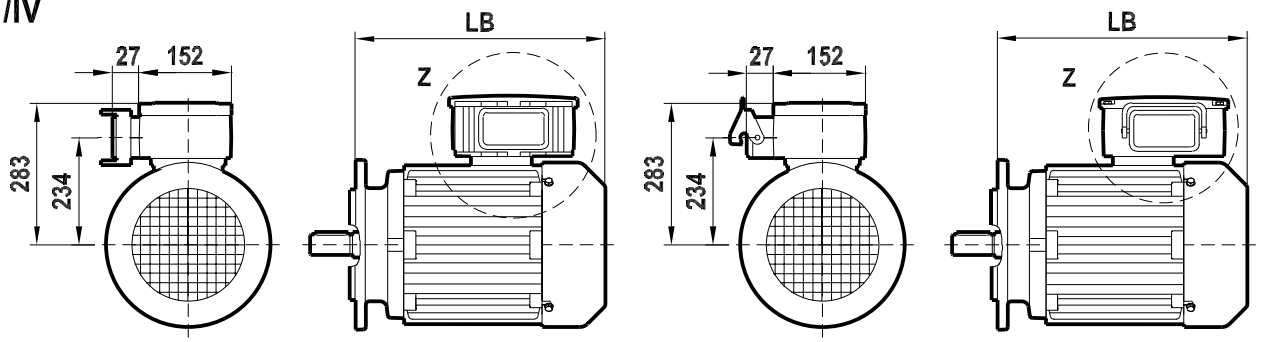
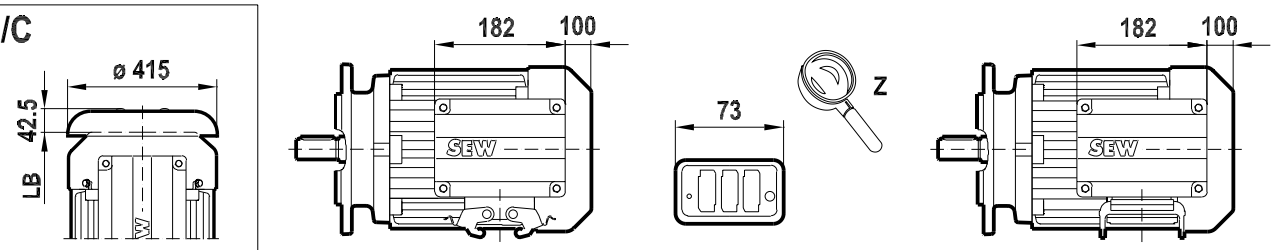
## DR.225S

08 322 03 07
2 (2)

### /IV




### /C

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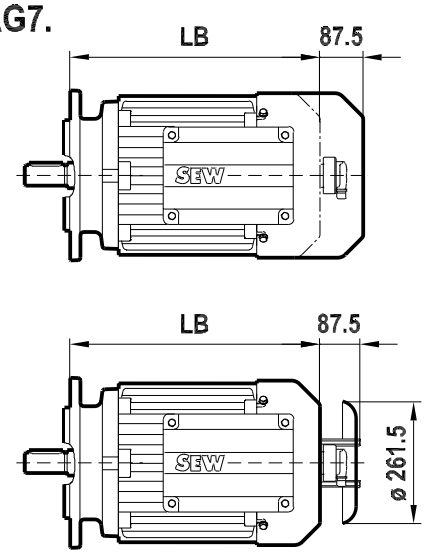
### /AG7.

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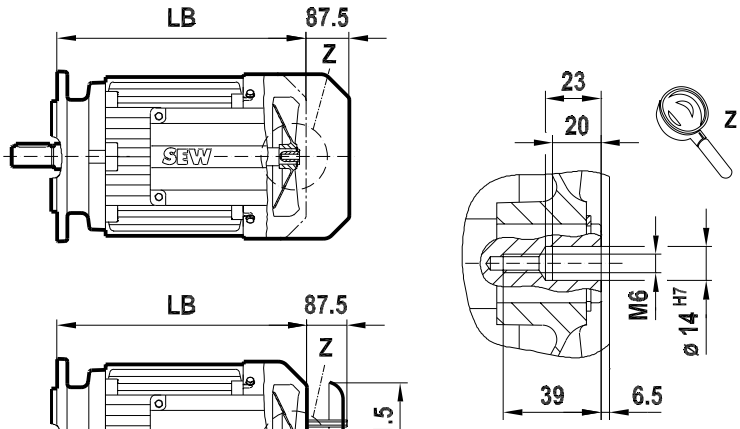
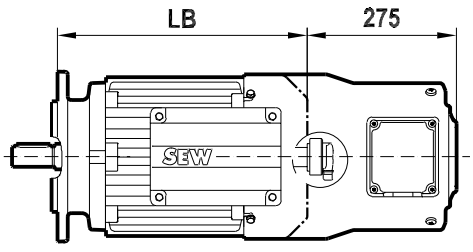
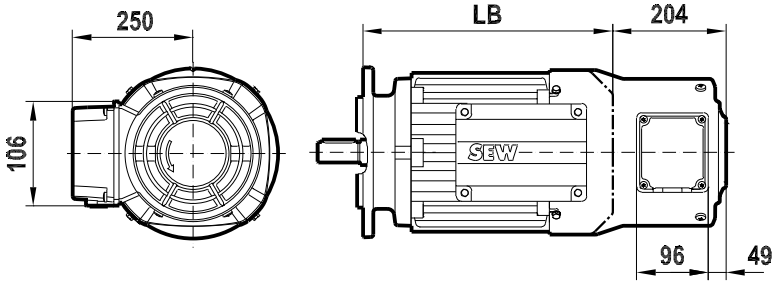



### /EG7./V
### /AG7./V




### /V

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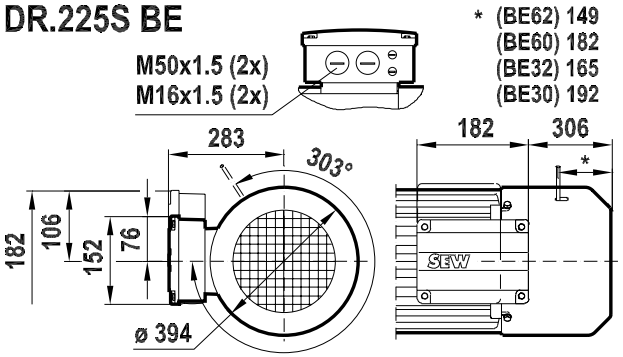
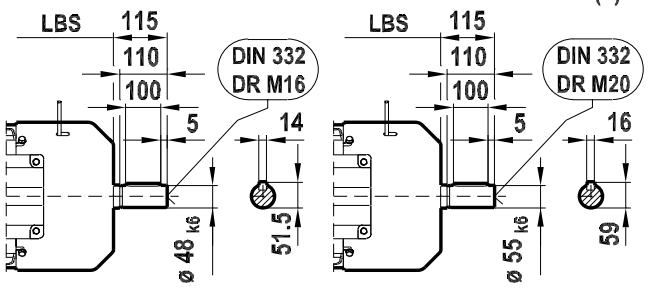
## DR.225S BE



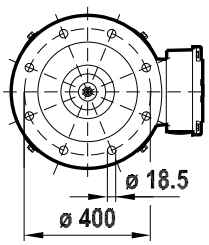

## /2W

09 237 03 07
1 (2)

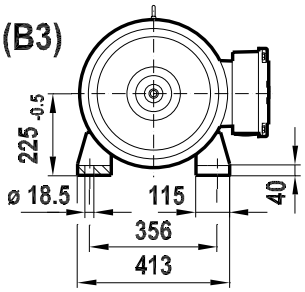


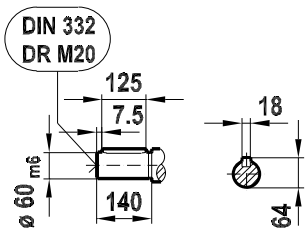

## DRS225S 4; 8/4
## DRE225S 4

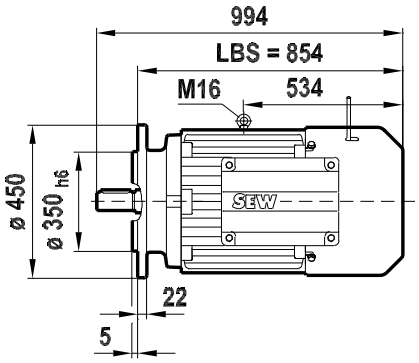
### /FF (B5)
FF400

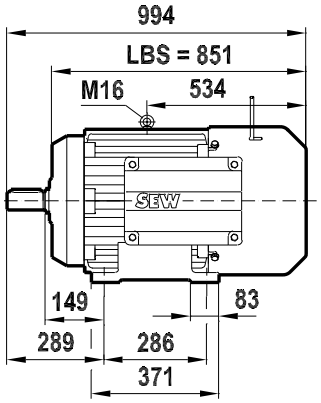



### /FI.. (B3)



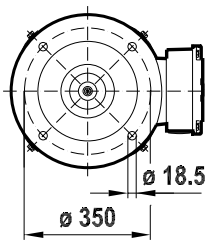




## DRP225S 4

### /FF (B5)
FF350

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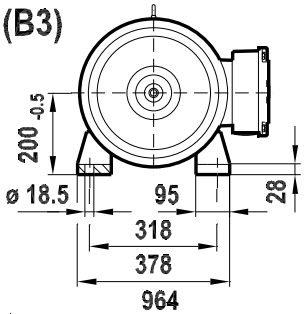


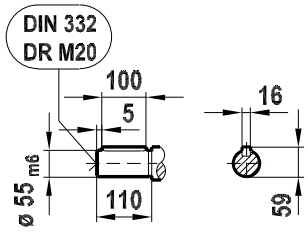


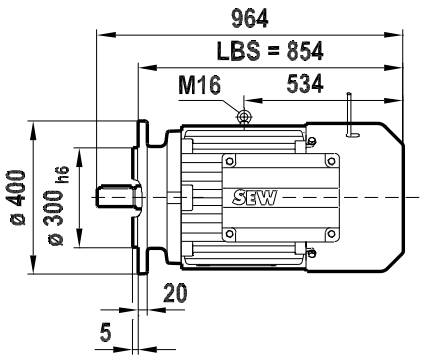


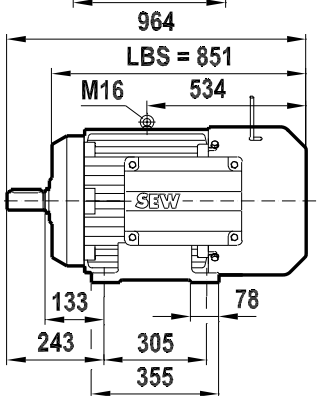


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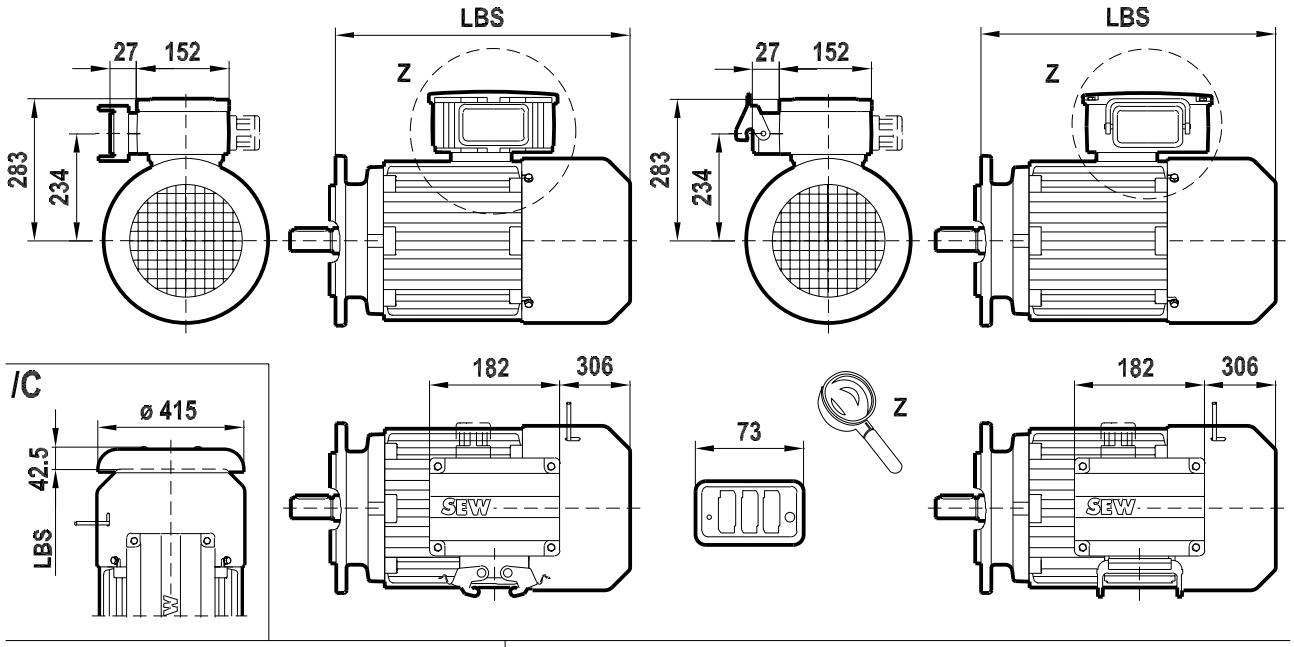
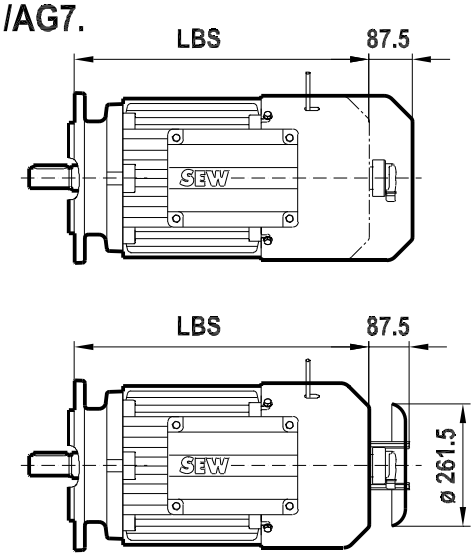
## DR.225S BE
## /IV

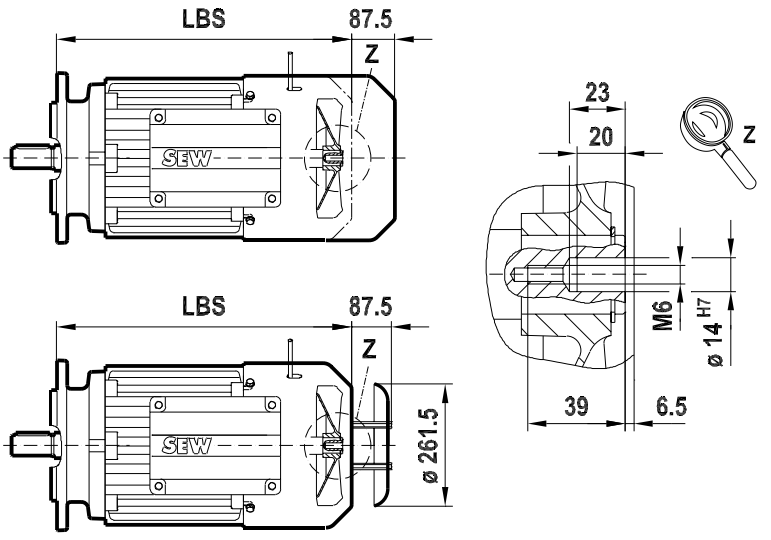
09 237 03 07
2 (2)



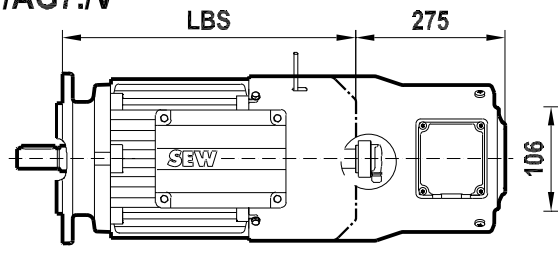

## /EG7.
## /AG7.



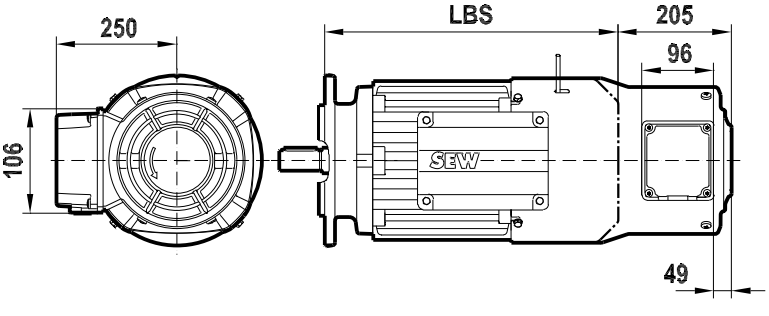

## /EG7A




## /EG7./V
## /AG7./V




## /V

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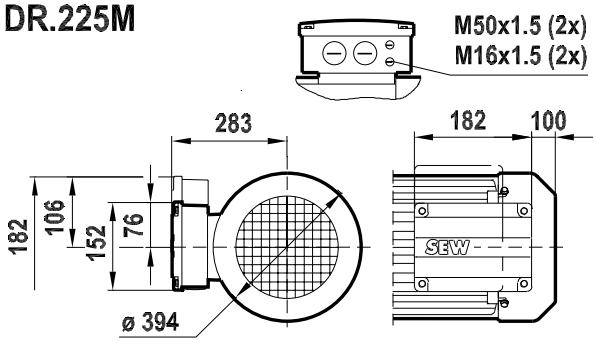
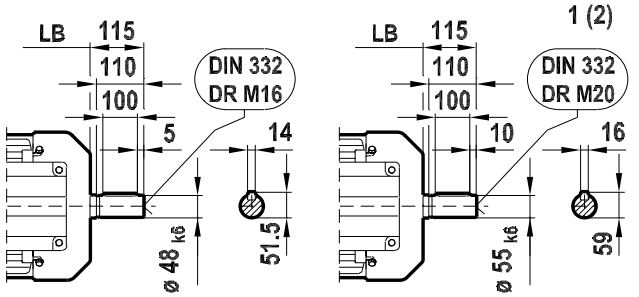
## DR.225M

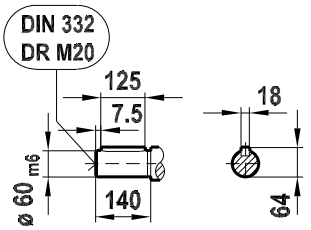



## /2W

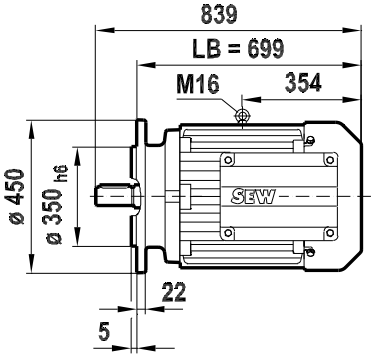
08 323 03 07
1 (2)



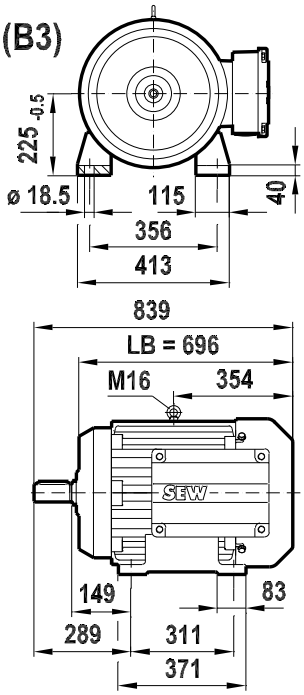

## DRS225M 4; 8/4
## DRE225M 4



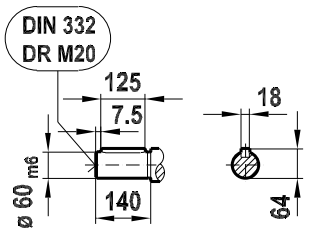

### /FF (B5)
FF400



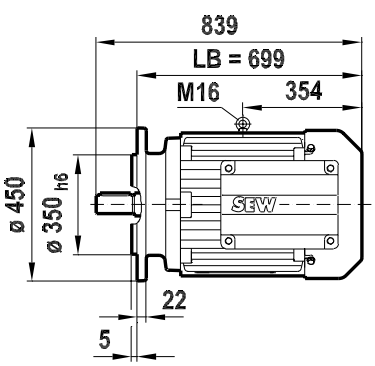

### /FI.. (B3)



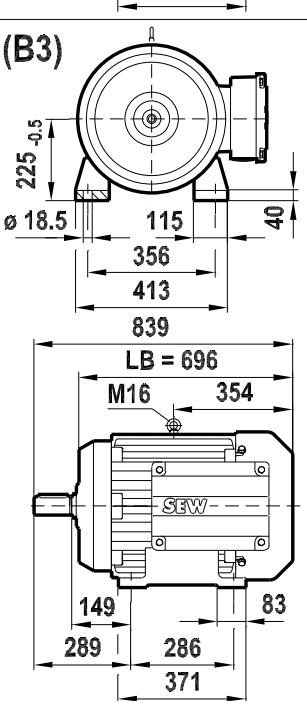

## DRP225M 4




### /FF (B5)
FF400




### /FI.. (B3)

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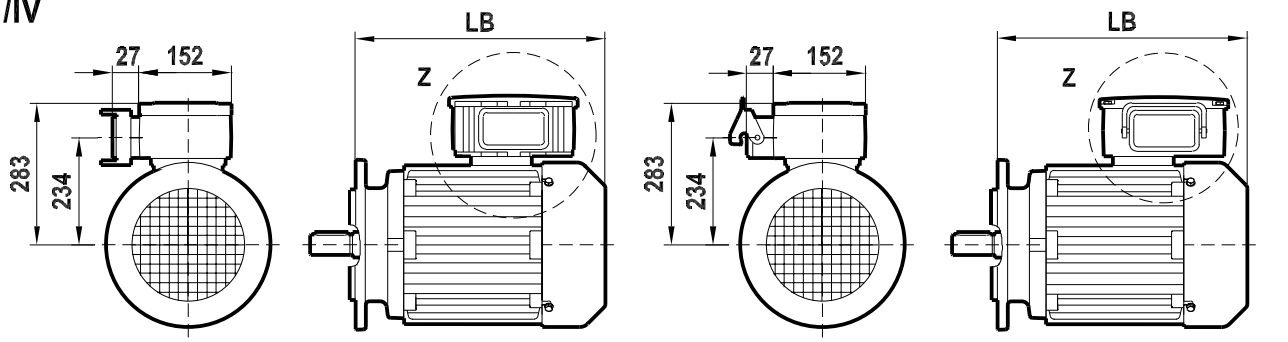
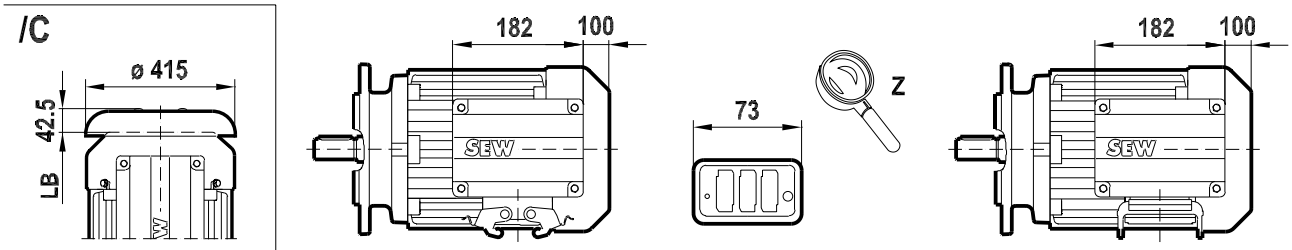
## DR.225M

08 323 03 07
2 (2)

### /IV




### /C

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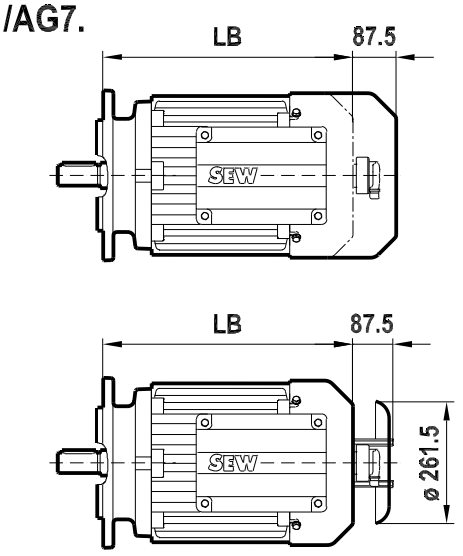
### /AG7.

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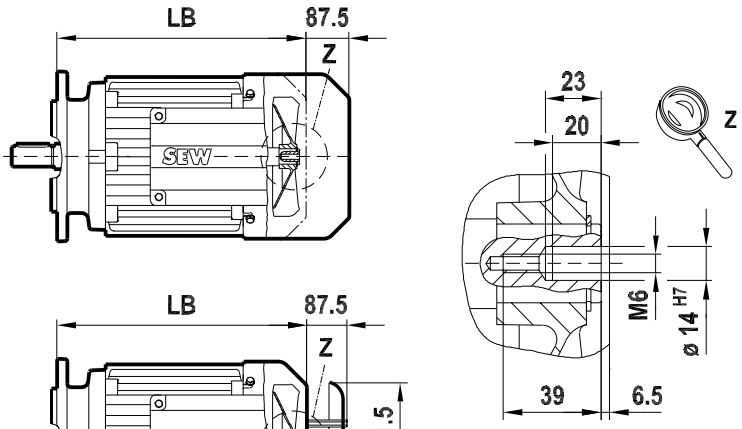


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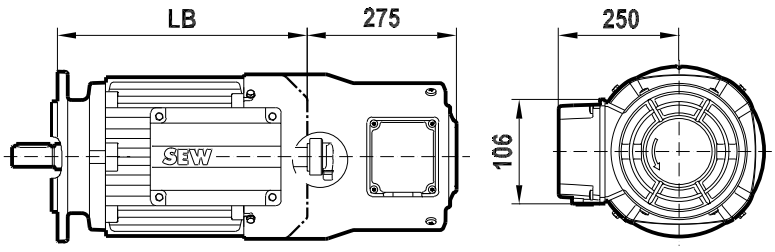


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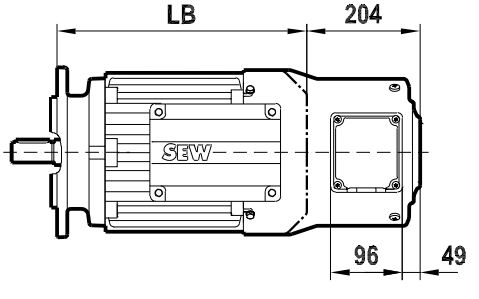


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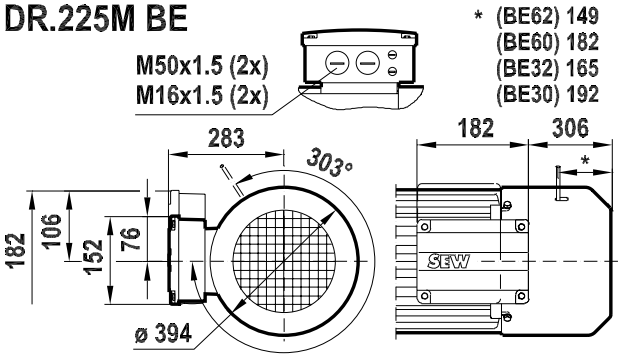
## DR.225M BE

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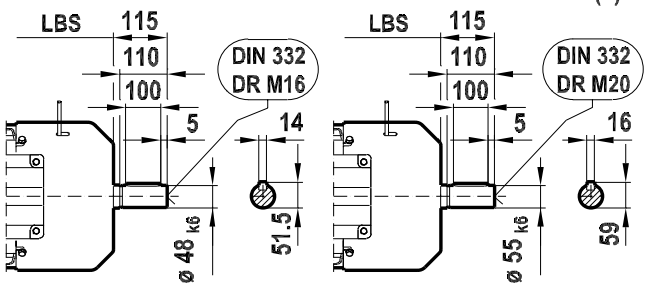
09 238 03 07
1 (2)




## DRS225M 4; 8/4
## DRE225M 4

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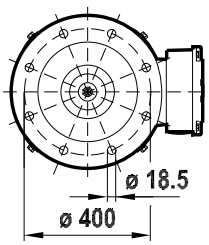


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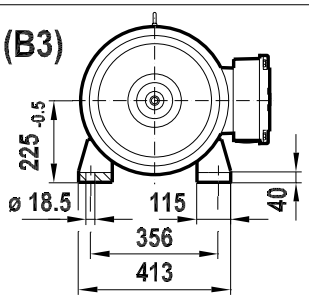


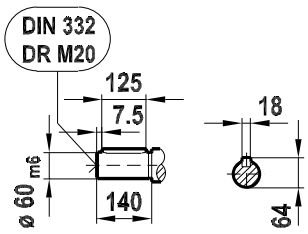


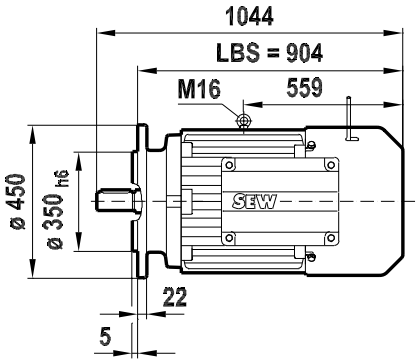


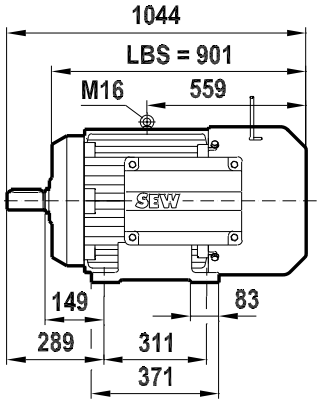


## DRP225M 4

### /FF (B5)
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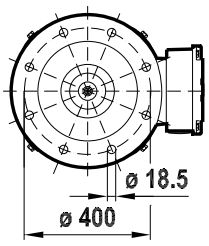


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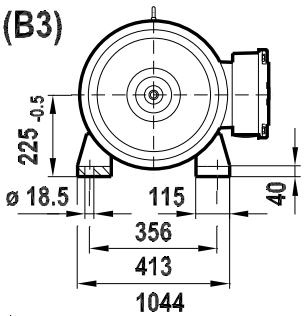


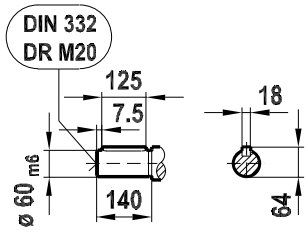


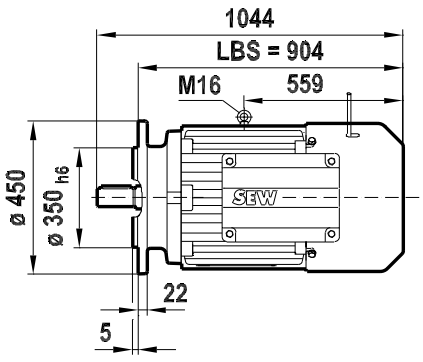


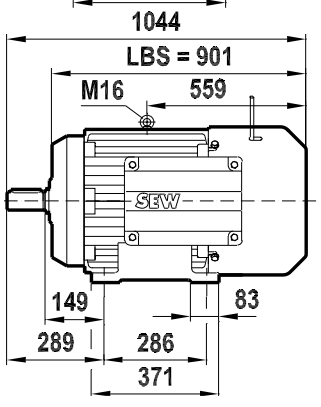


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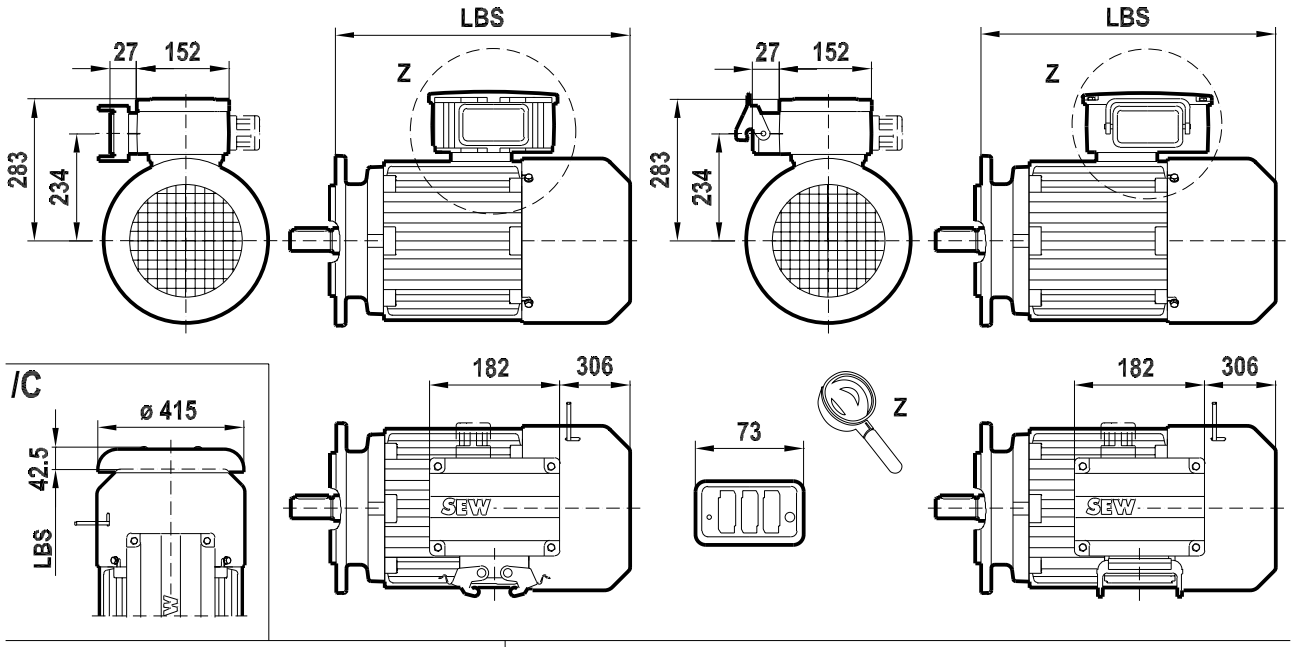
## DR.225M BE /IV

09 238 03 07
2 (2)

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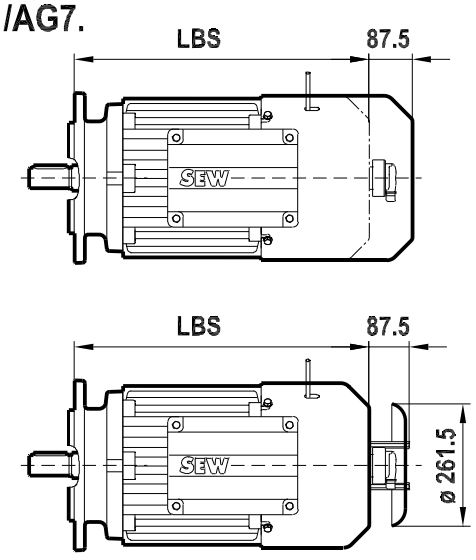


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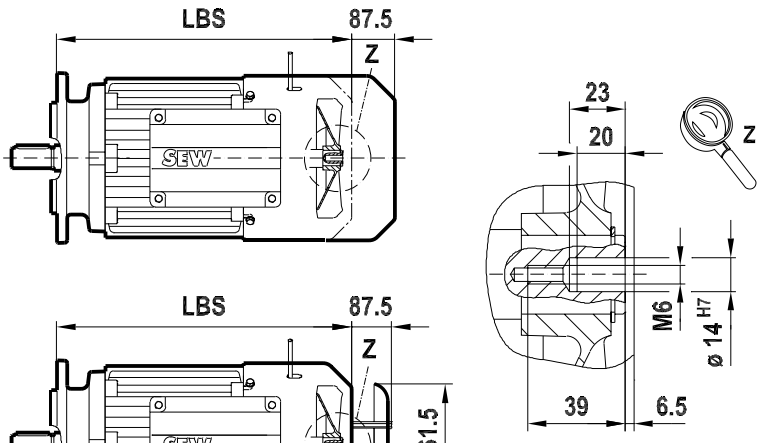


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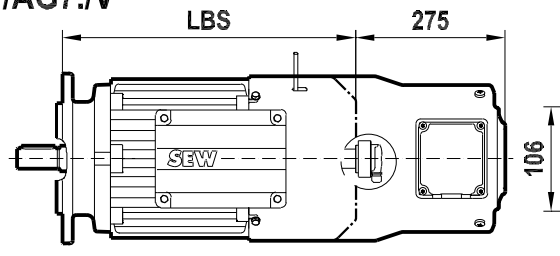


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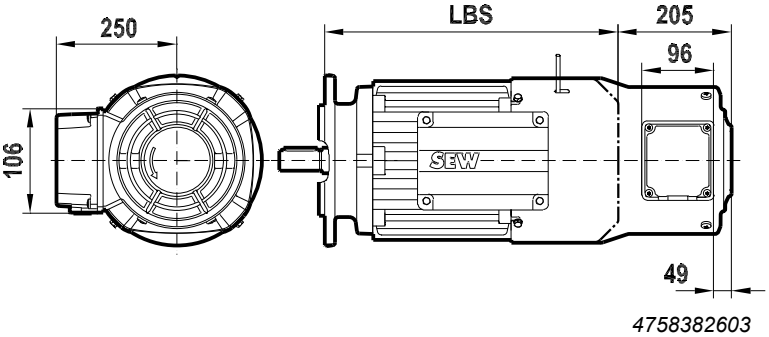


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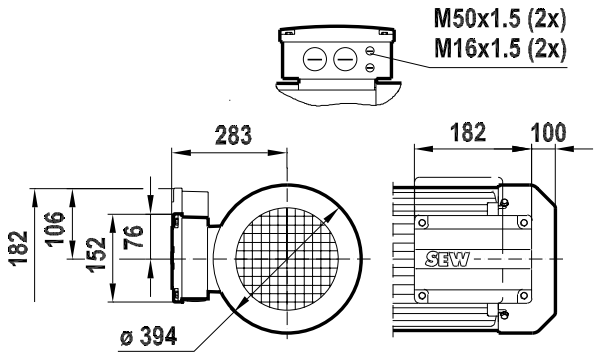
## DR.225MC

08 324 03 07
1 (2)

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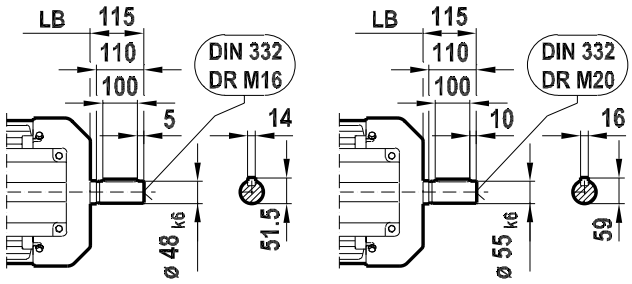


## DRS225MC 4

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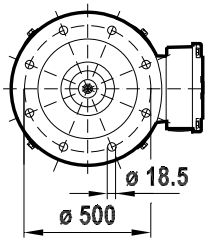


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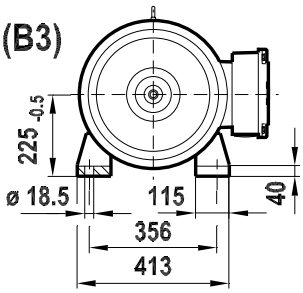


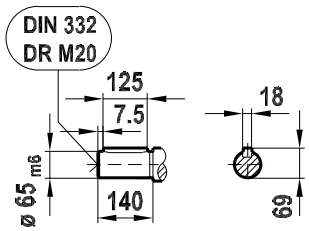


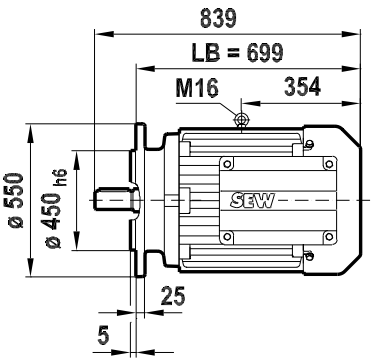


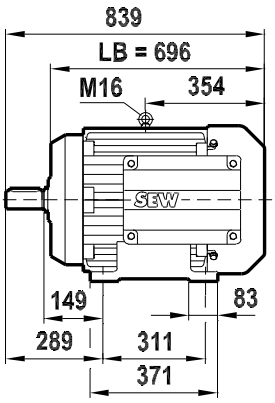


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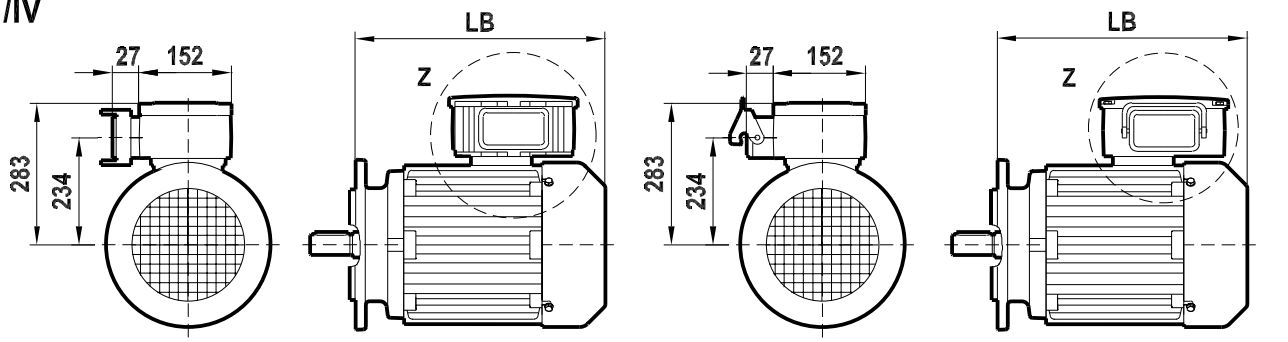
## DR.225MC

08 324 03 07
2 (2)

/IV

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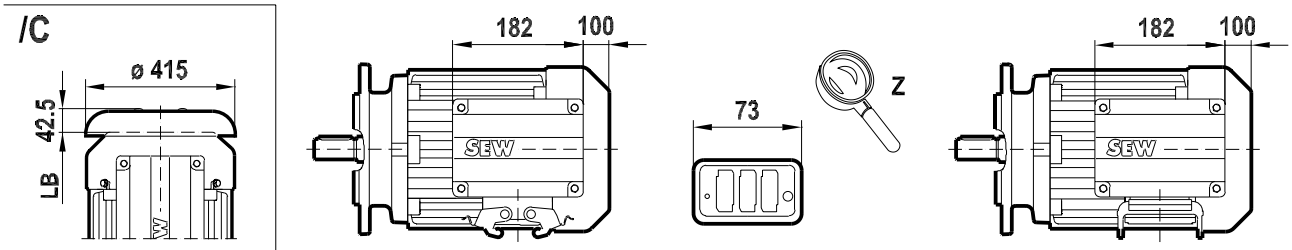


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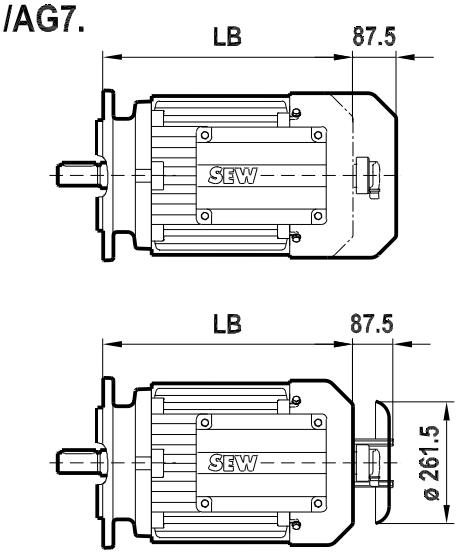


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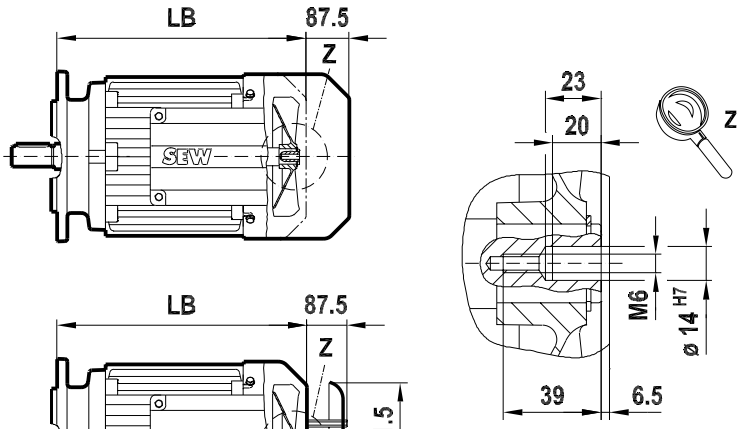


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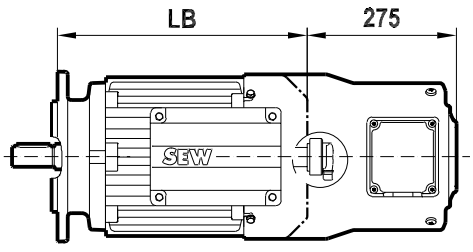
/AG7./V

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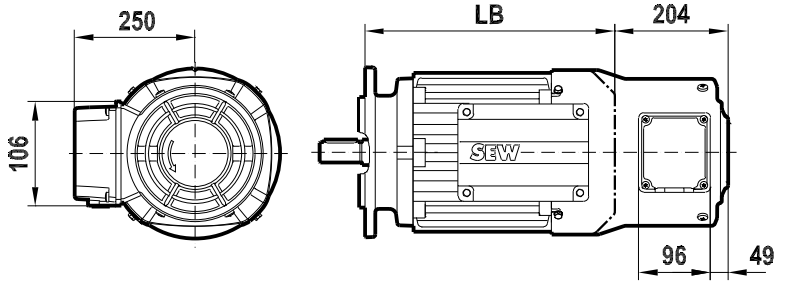


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## DR.225MC BE

09 239 03 07
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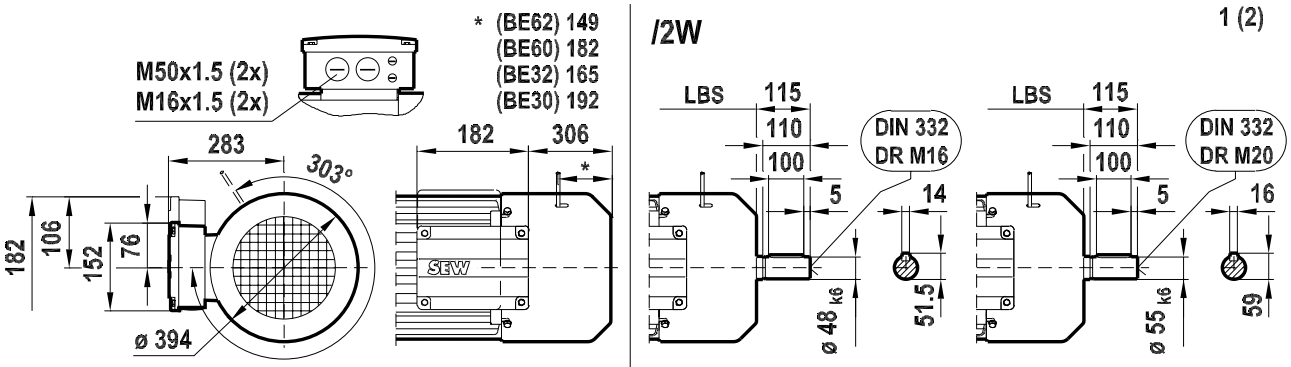
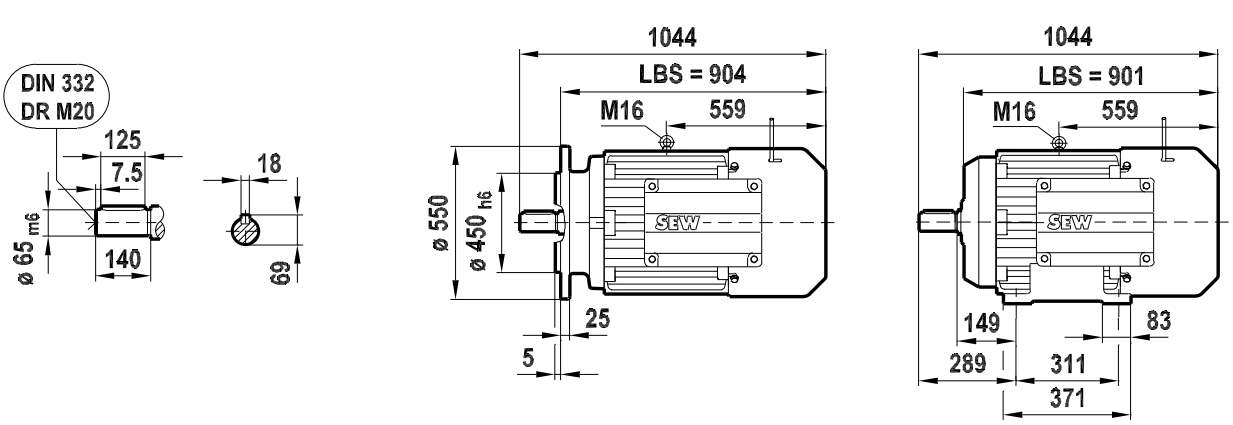



## DRS225MC 4

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## DR.225MC BE /IV

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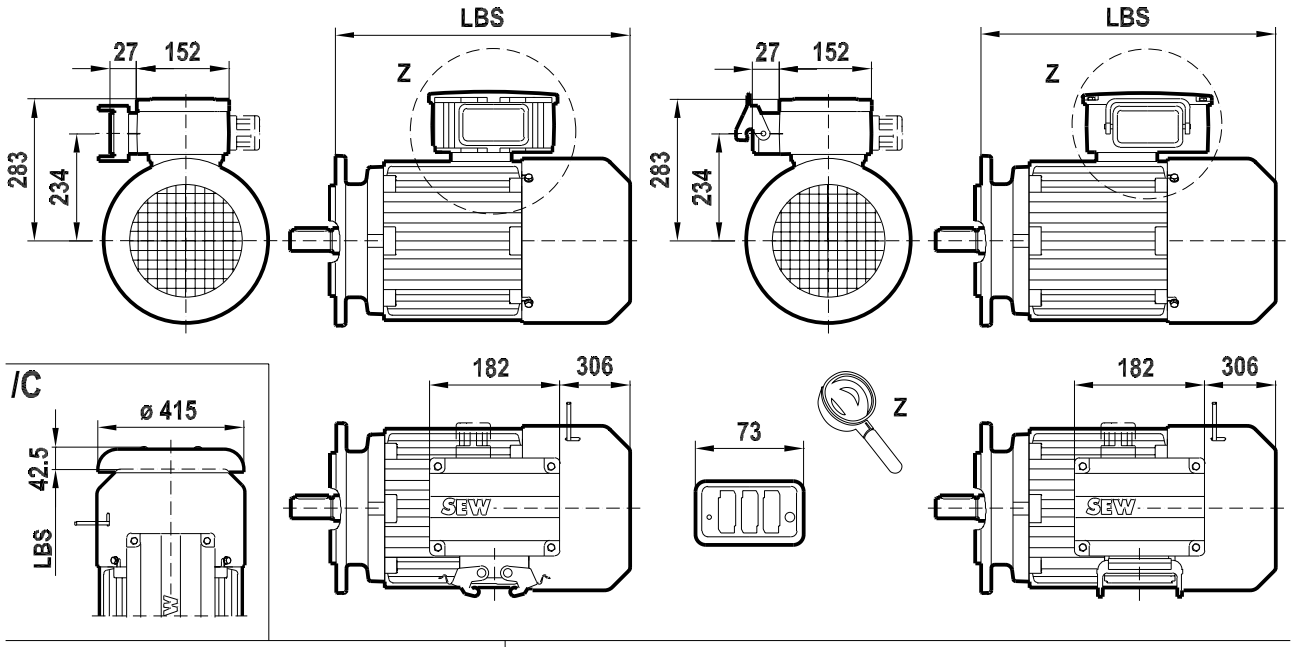
2 (2)

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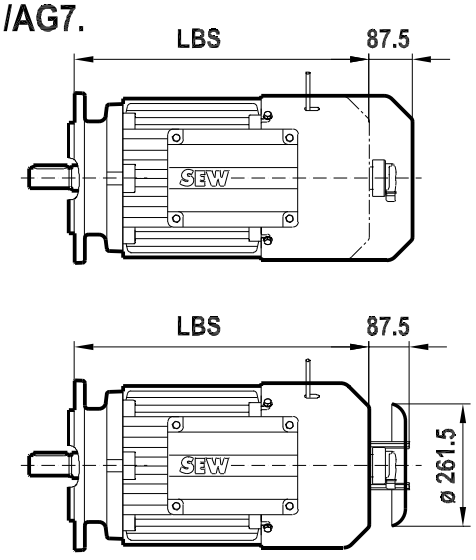


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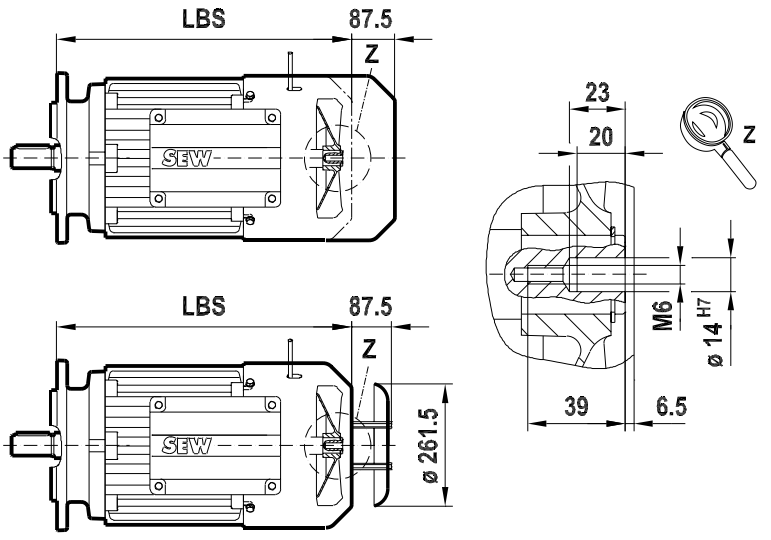


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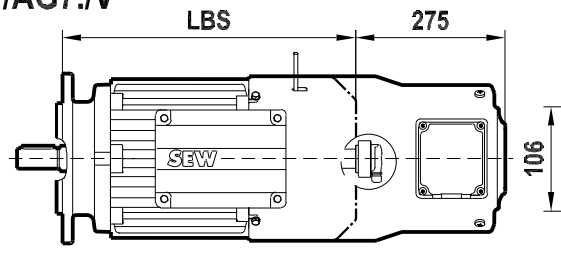


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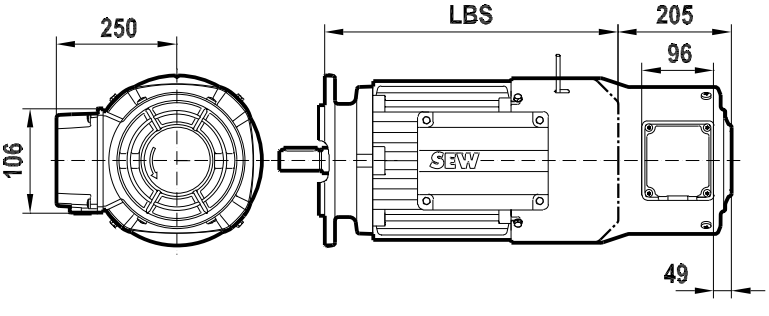


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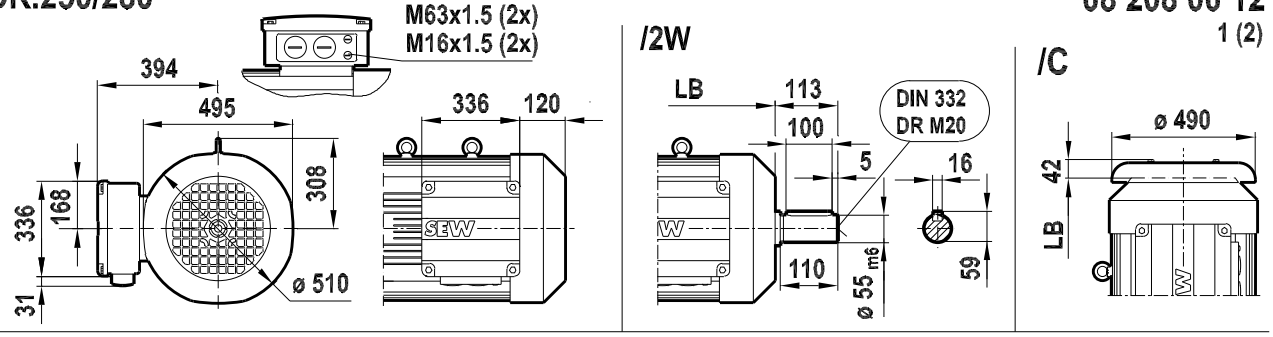
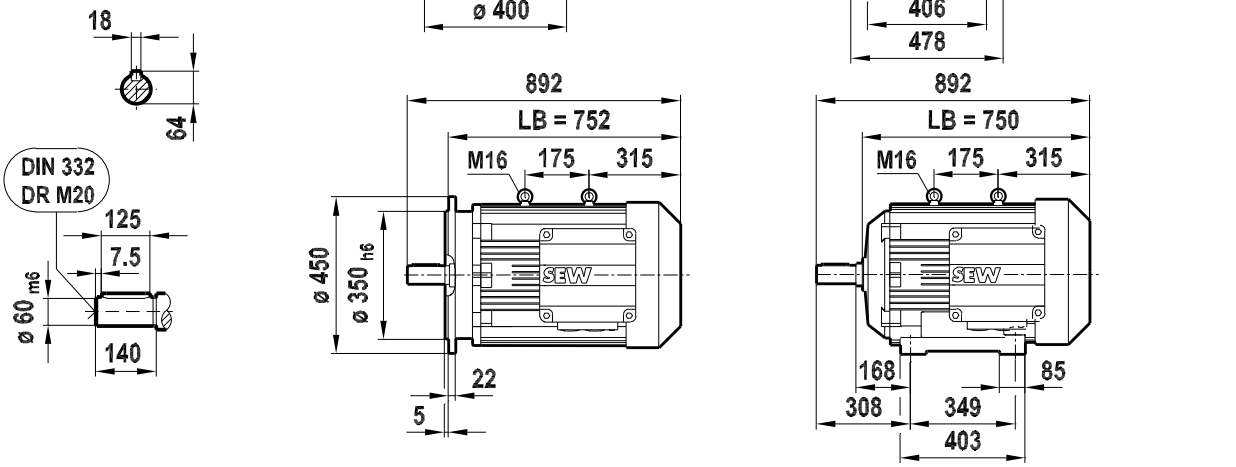
## DR.250/280

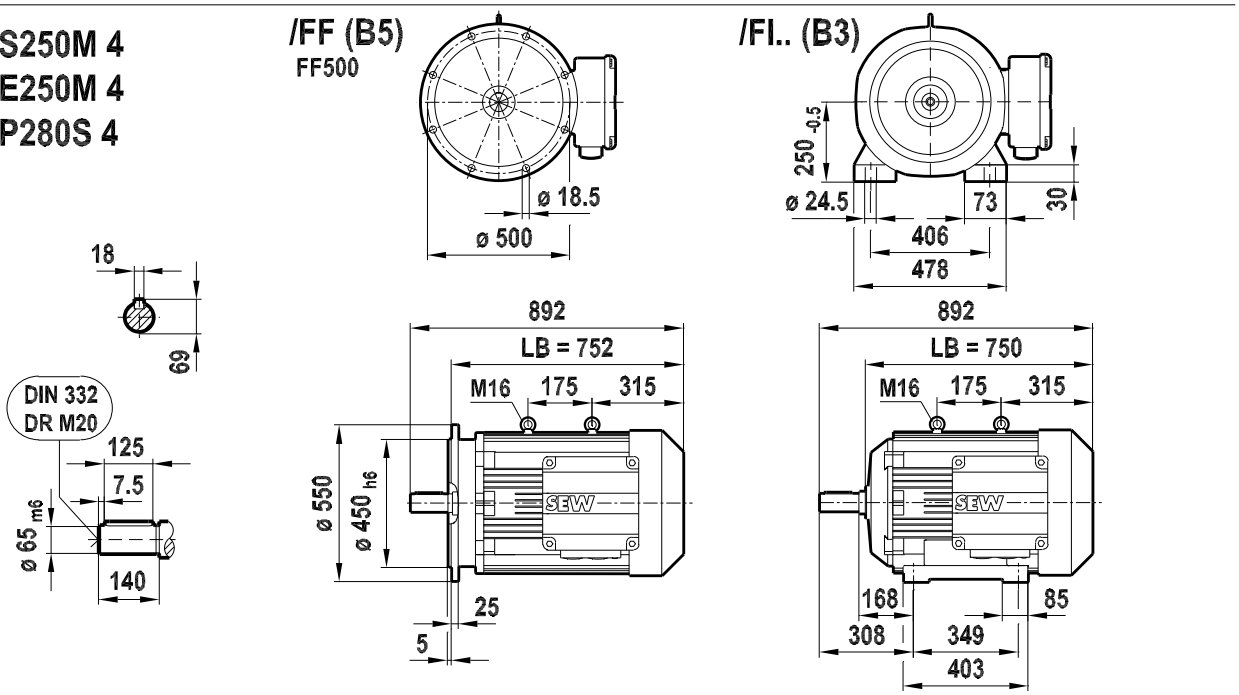
08 208 00 12
1 (2)




## DRP250M 4




## DRS250M 4
## DRE250M 4
## DRP280S 4

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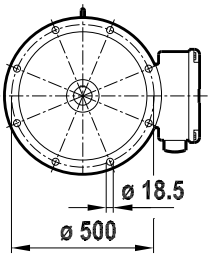
## DR.250/280

08 208 00 12
2 (2)

**DRS280S 4**
**DRE280S 4**
**DRS280M 4**
**DRE280M 4**
**DRP280M 4**

**/FF (B5)**
FF500

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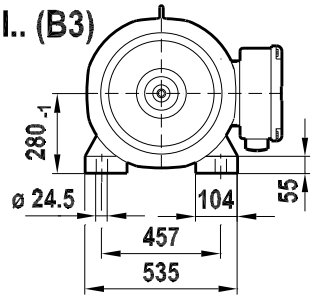


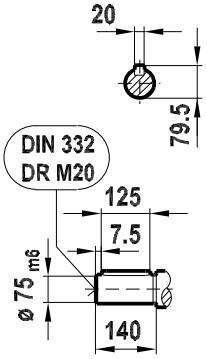


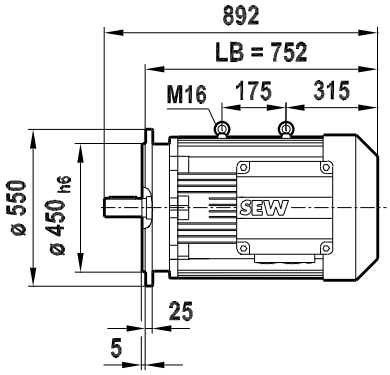


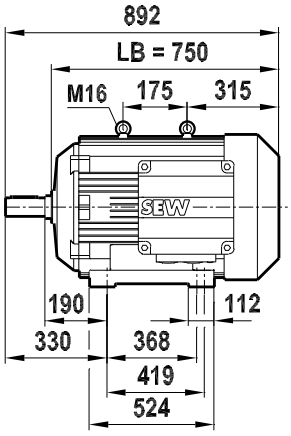


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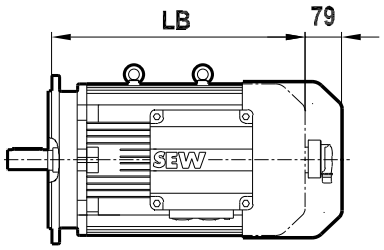


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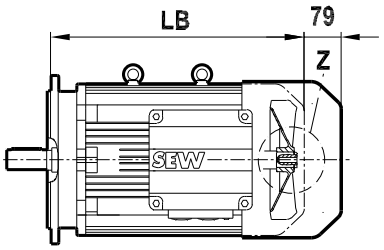
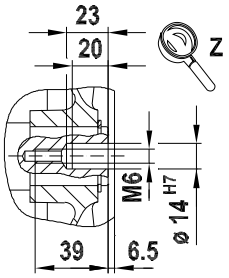
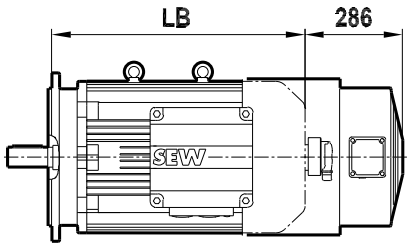
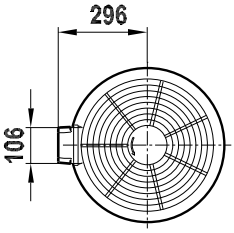


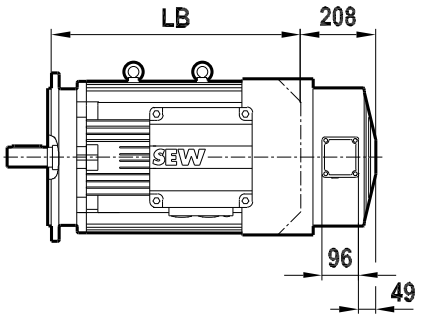




**/EG7./V**




**/V**

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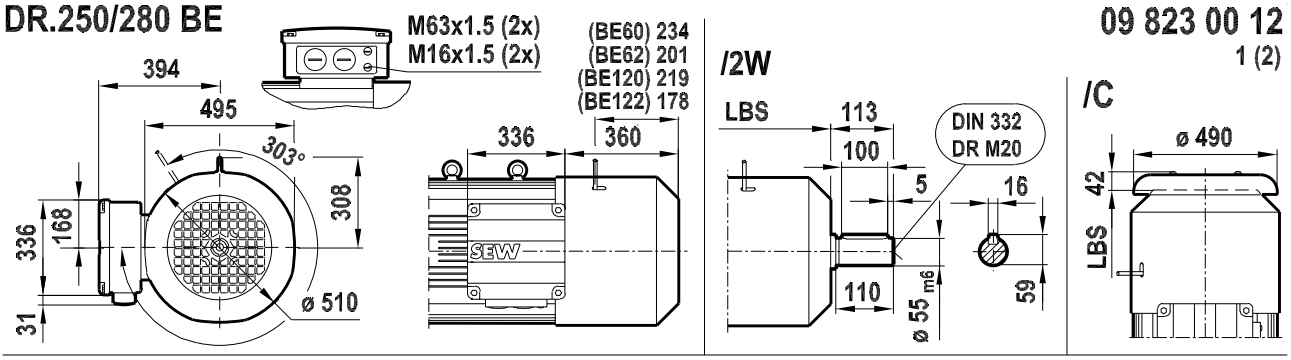
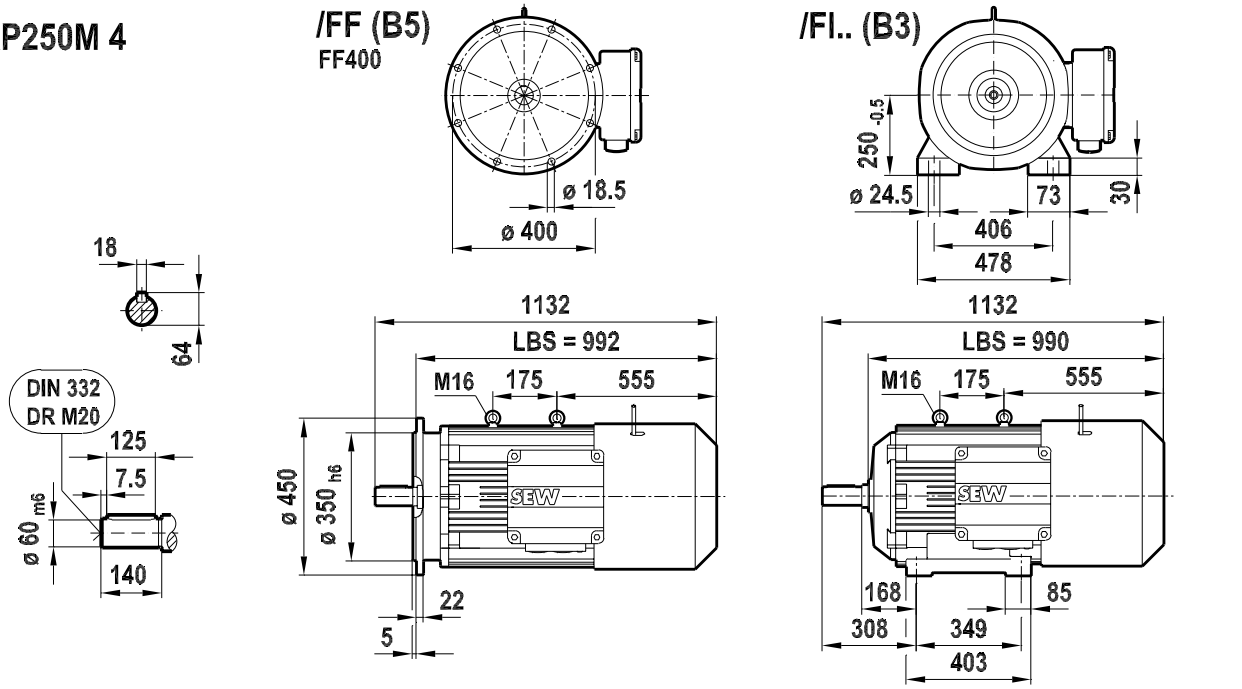
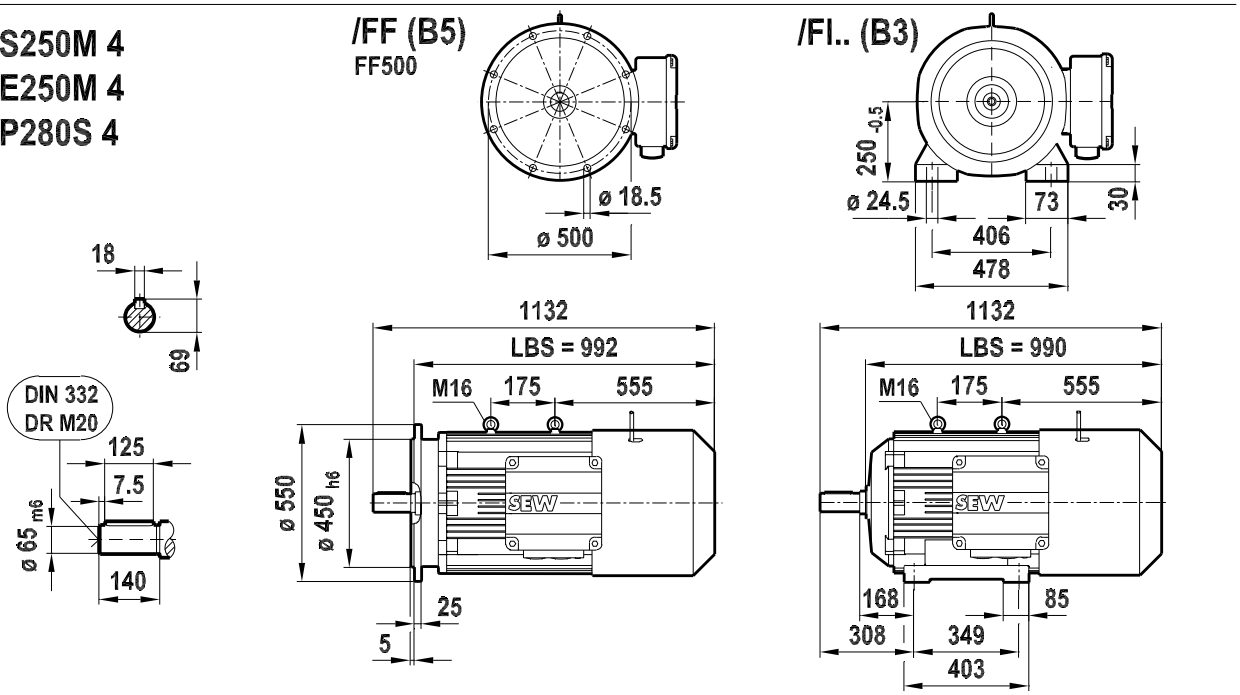
## DR.250/280 BE




## DRP250M 4




## DRS250M 4
## DRE250M 4
## DRP280S 4

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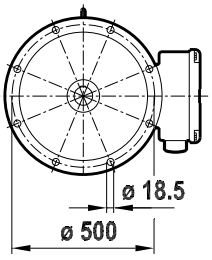
## DR.250/280 BE

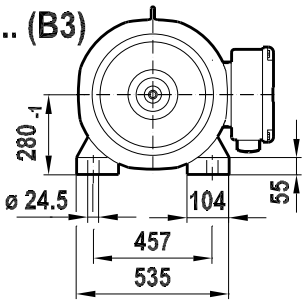
09 823 00 12
2 (2)

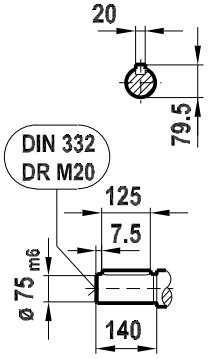
**DRS280S 4**
**DRE280S 4**
**DRS280M 4**
**DRE280M 4**
**DRP280M 4**

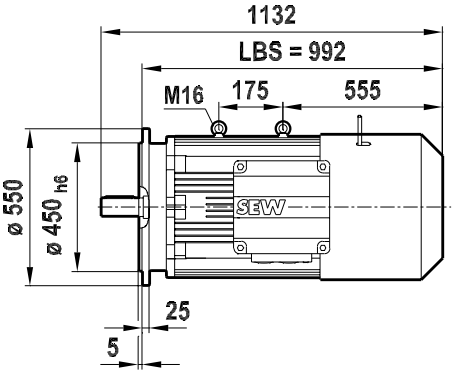
**/FF (B5)**
FF500

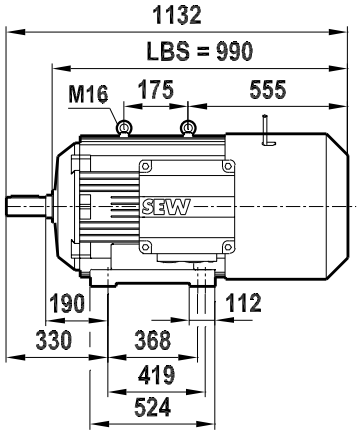



**/FI.. (B3)**

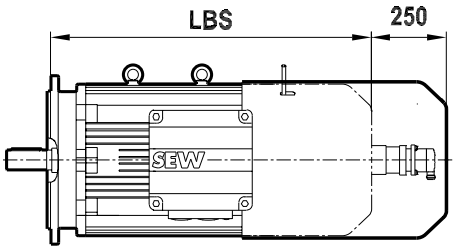



**/EV7.**
**/AV7.**

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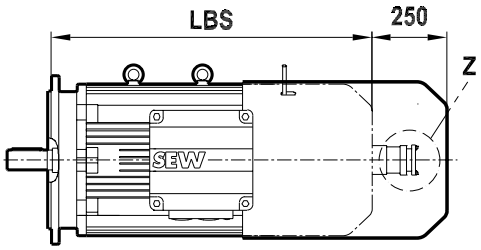
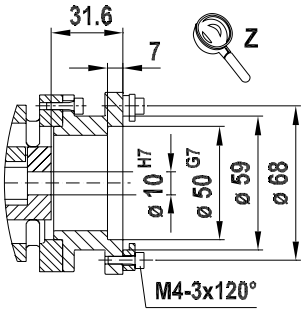
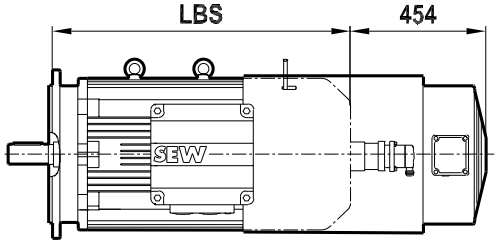
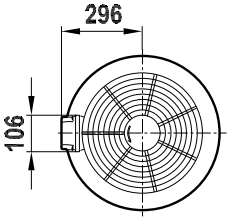


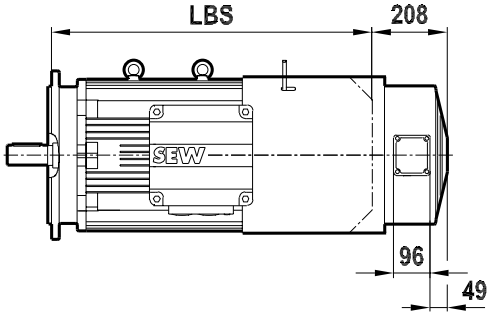




**/EV7./V**
**/AV7./V**




**/V**

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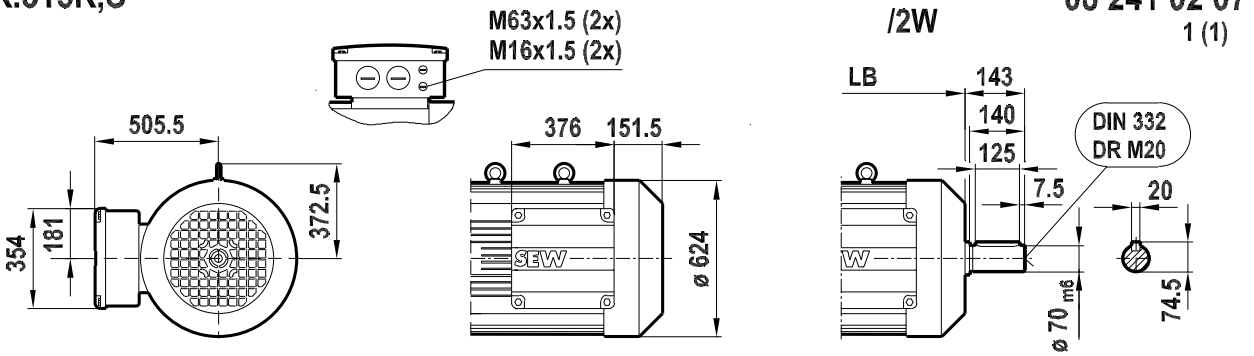
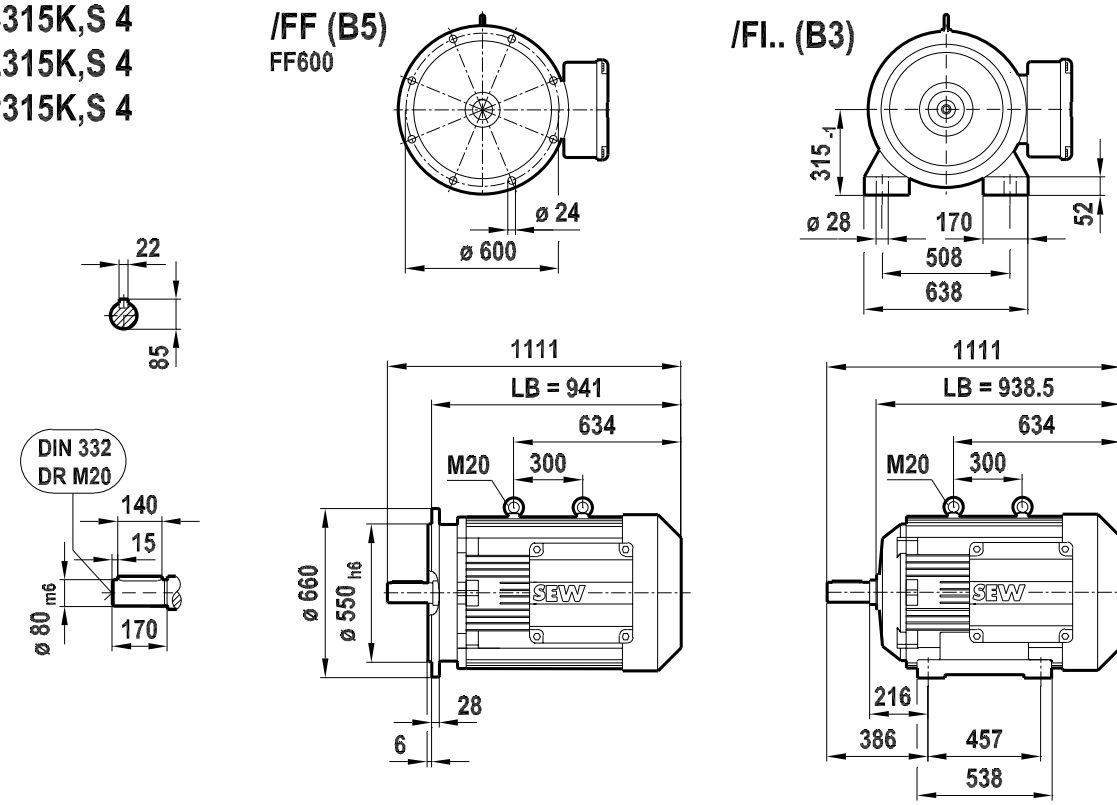
## DR.315K,S

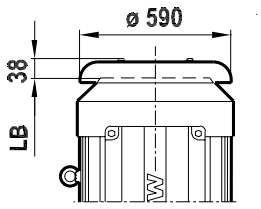
08 241 02 07
1 (1)




## DRS315K,S 4
## DRE315K,S 4
## DRP315K,S 4




## /C

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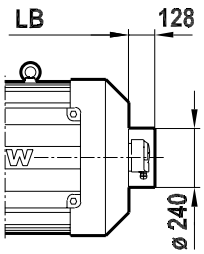
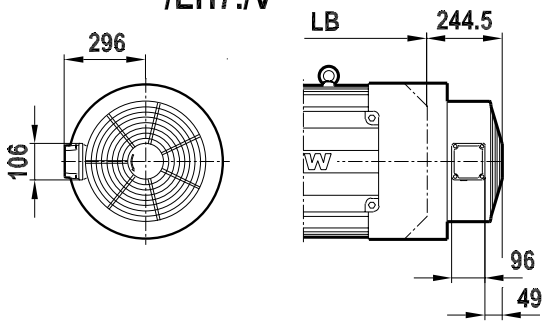
## /EH7.




## /V
## /AH7./V
## /EH7./V

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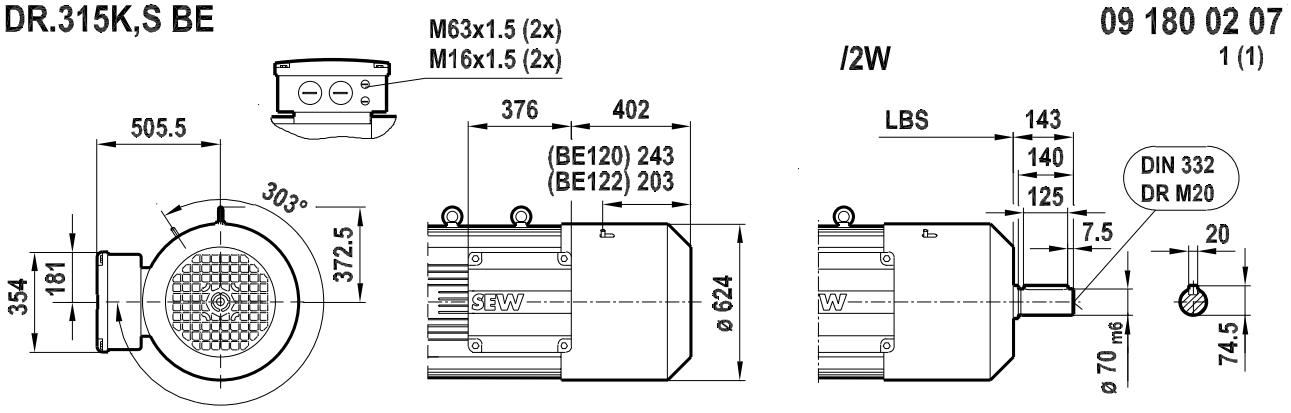
## DR.315K,S BE

09 180 02 07
1 (1)

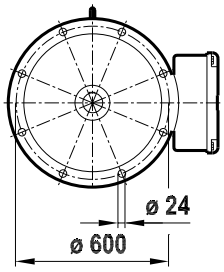



## /2W

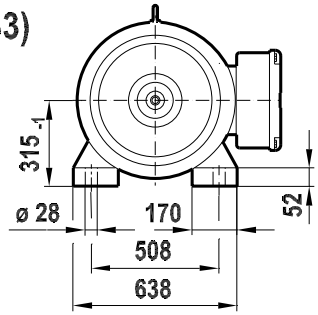


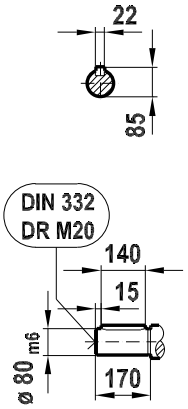

## DRS315K,S 4
## DRE315K,S 4
## DRP315K,S 4

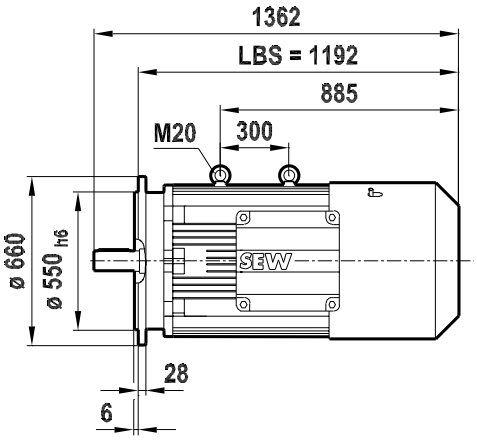
## /FF (B5)
FF600

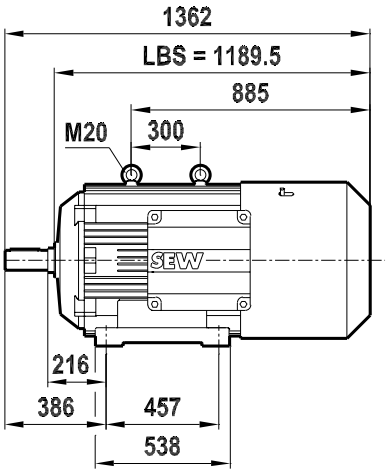



## /FI.. (B3)

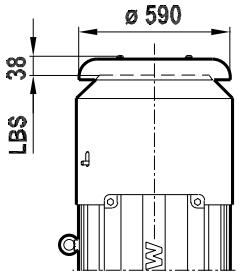



## /C

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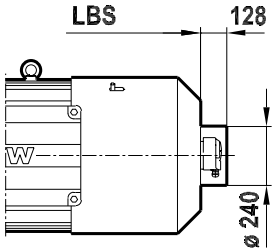
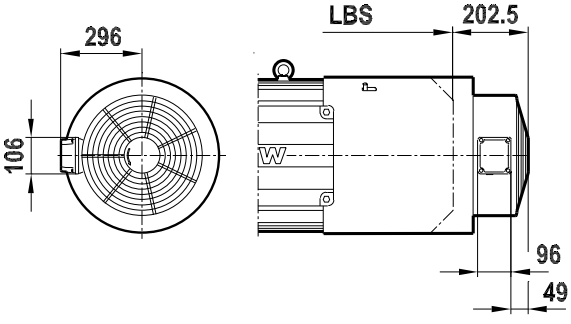
## /EH7.




## /V
## /AH7./V
## /EH7./V

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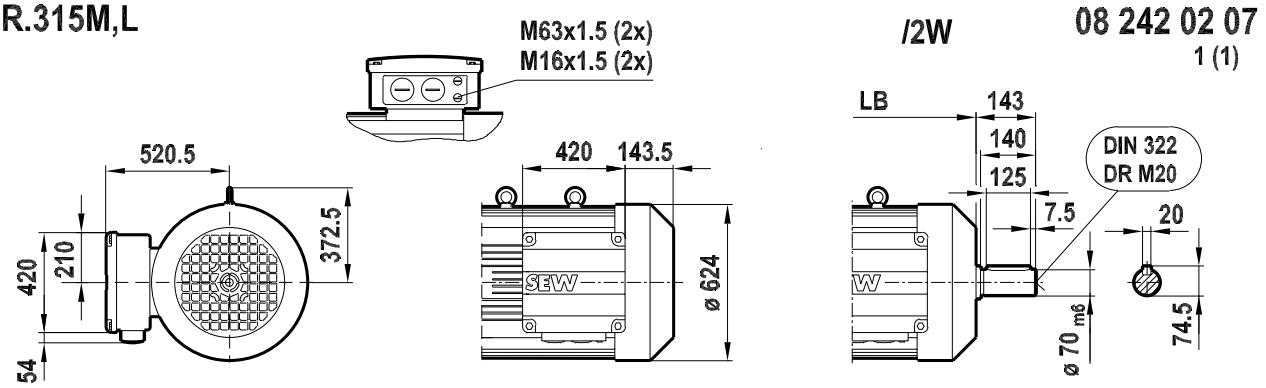
## DR.315M,L



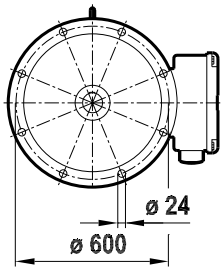

/2W

08 242 02 07
1 (1)

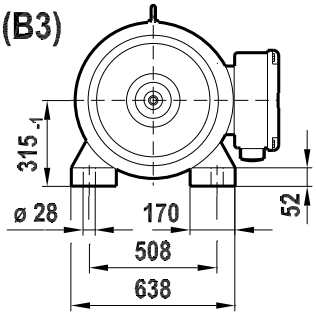


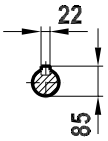

## DRS315M,L 4
## DRE315M,L 4
## DRP315M,L 4

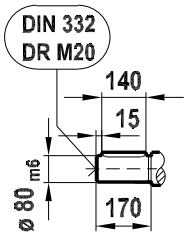
/FF (B5)
FF600

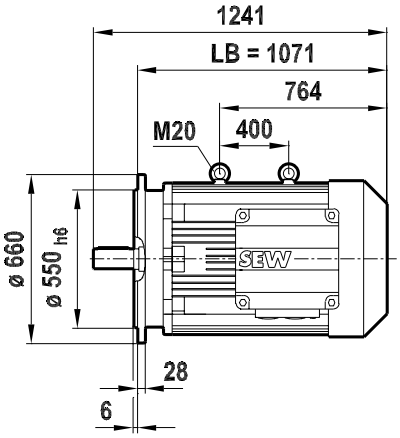


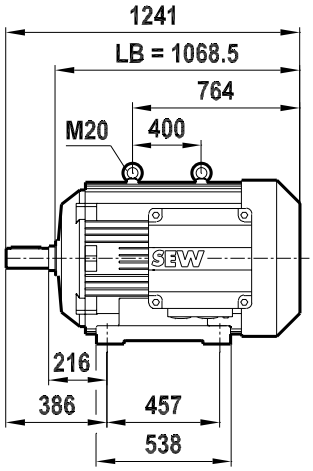

/FI.. (B3)



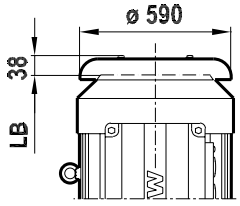




## /C

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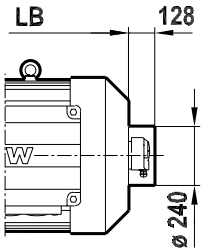
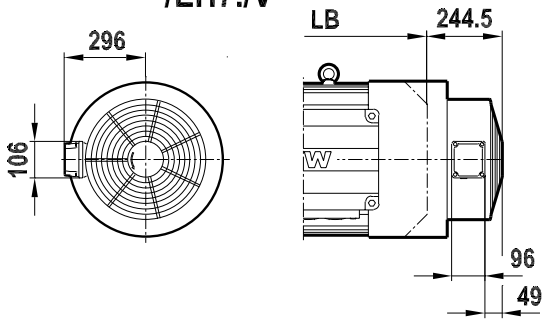
## /EH7.




## /V
## /AH7./V
## /EH7./V

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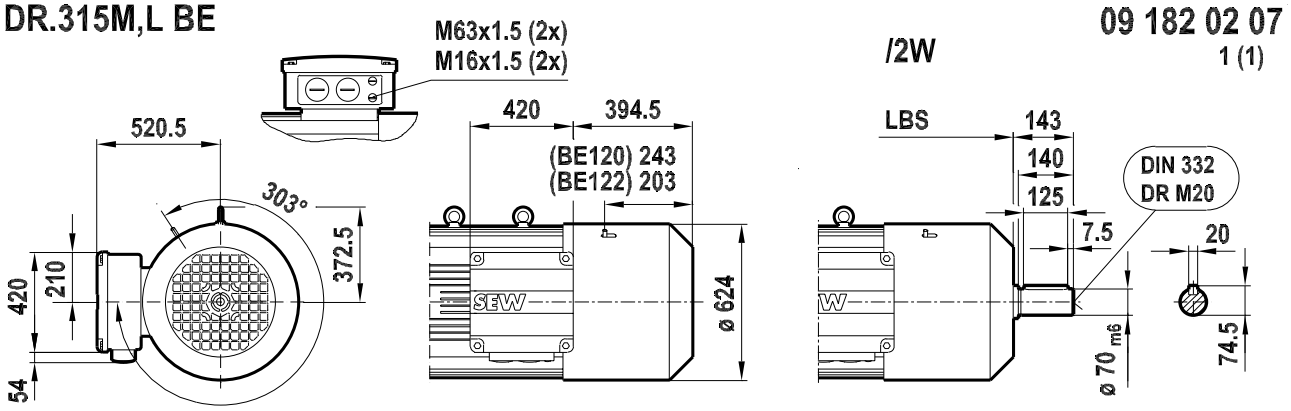
## DR.315M,L BE

09 182 02 07
1 (1)

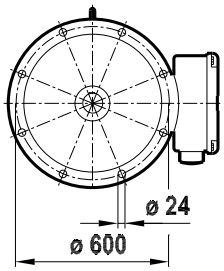



### /2W

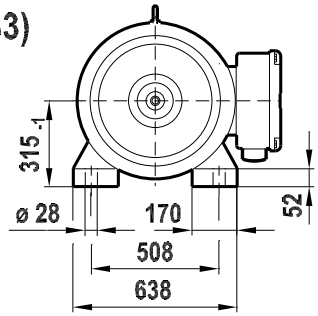


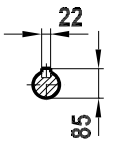

## DRS315M,L 4
## DRE315M,L 4
## DRP315M,L 4

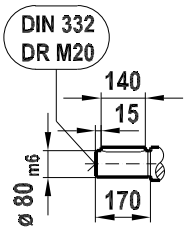
### /FF (B5)
FF600

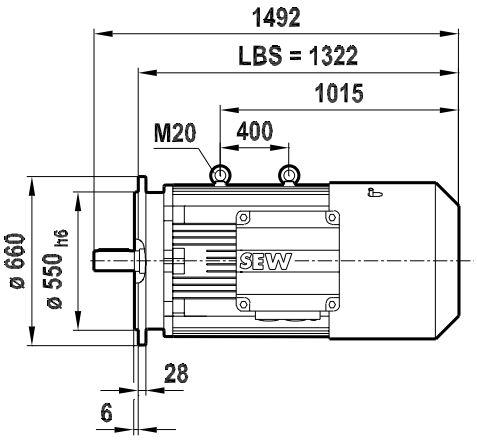


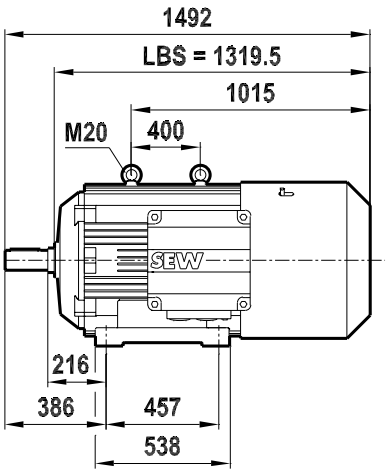

### /FI.. (B3)

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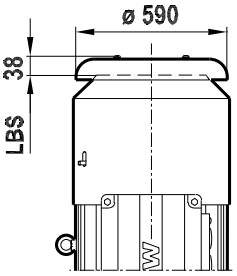


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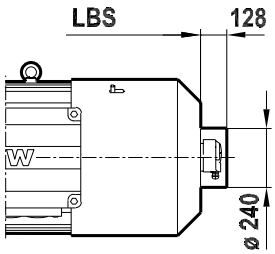
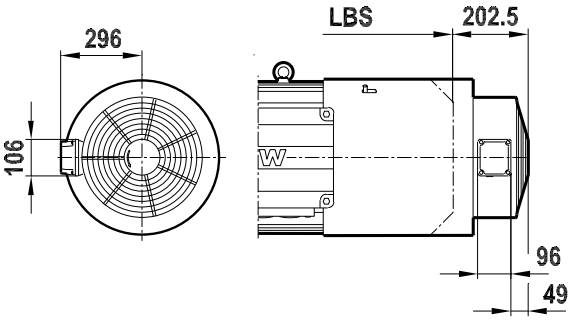
### /EH7.




### /V
### /AH7./V
### /EH7./V

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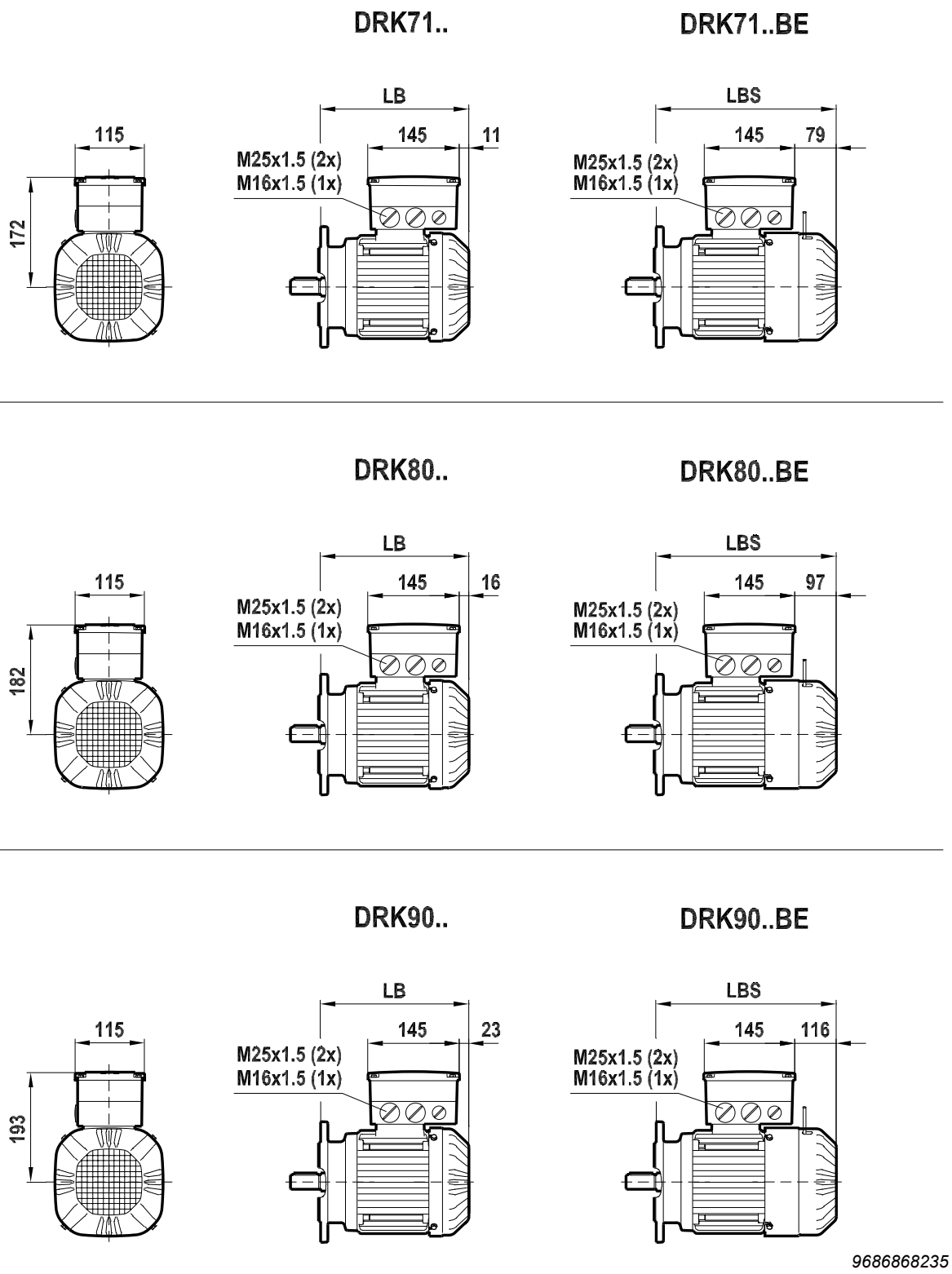
## 7.3 Dimension sheet for DRK.. motors/brakemotors

08 424 00 13
1 (1)

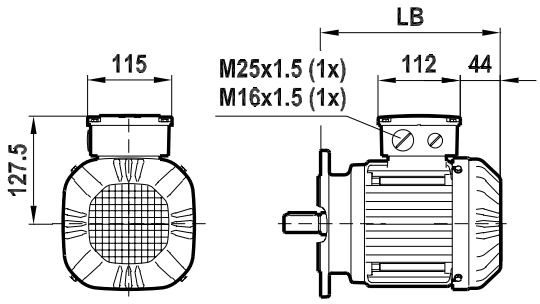



*9686868235*

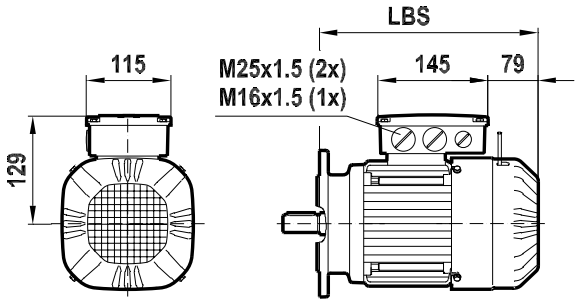
## 7.4 Dimension sheets for motors/brakemotors with KCC and KC1

08 415 01 08
1 (2)

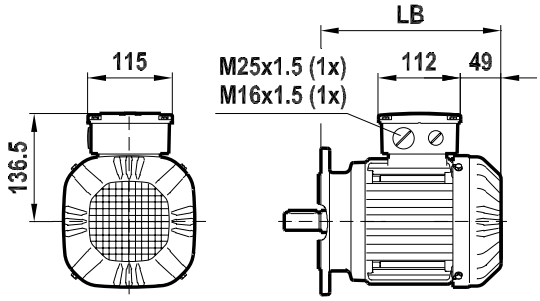
### DR.71.. KCC



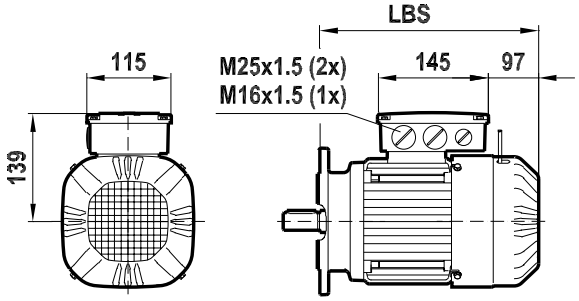

### DR.71..BE KCC



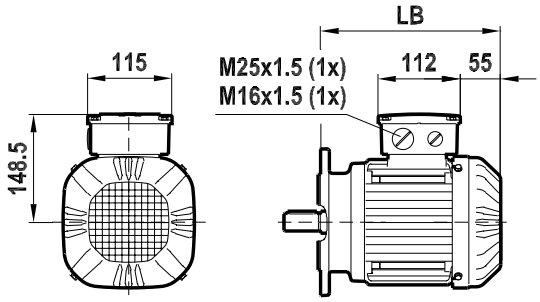

### DR.80.. KCC



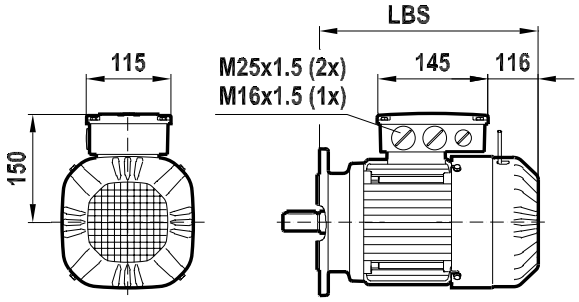

### DR.80..BE KCC




### DR.90.. KCC




### DR.90..BE KCC

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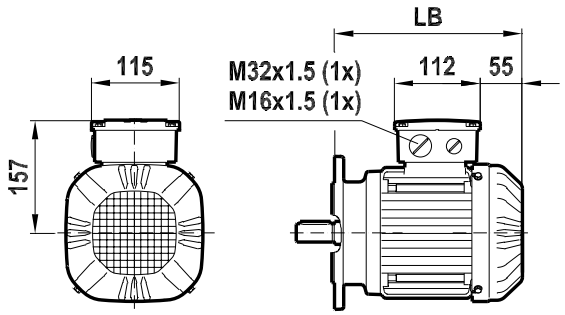
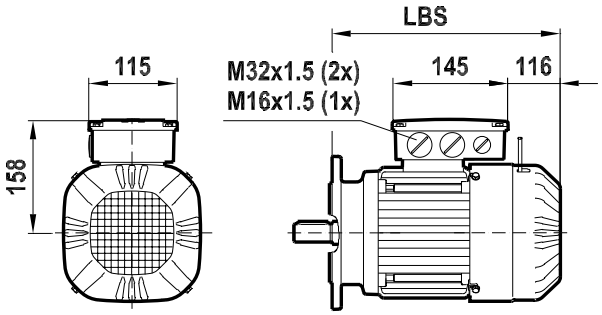
08 415 01 08
1 (2)

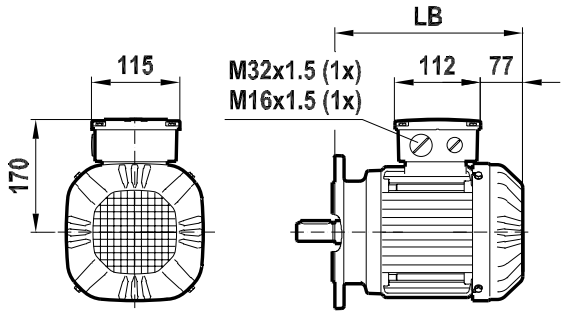
## DR.100.. KCC



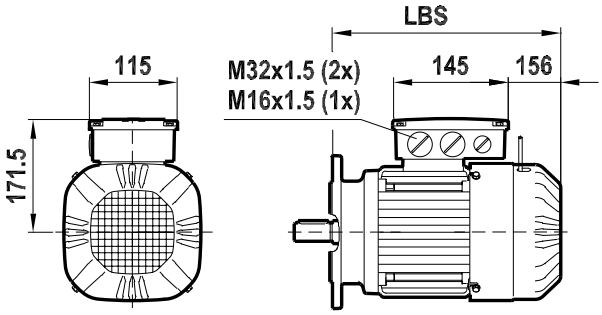

## DR.100..BE KCC



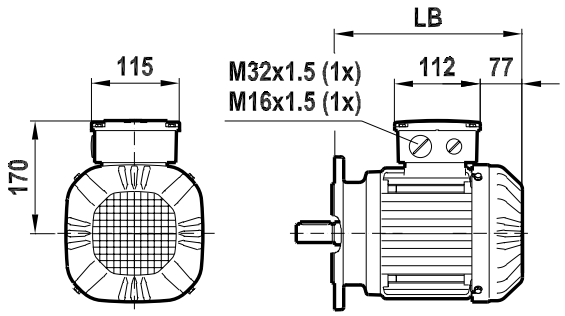

## DR.112.. KCC



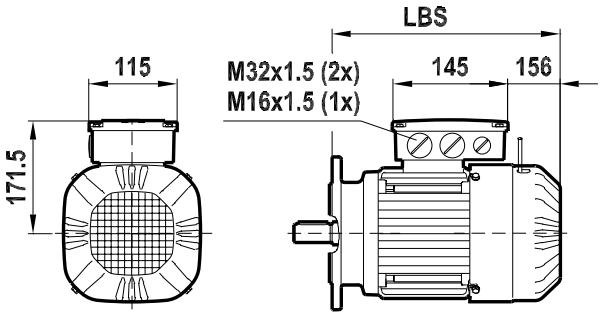

## DR.112..BE KCC




## DR.132.. KCC

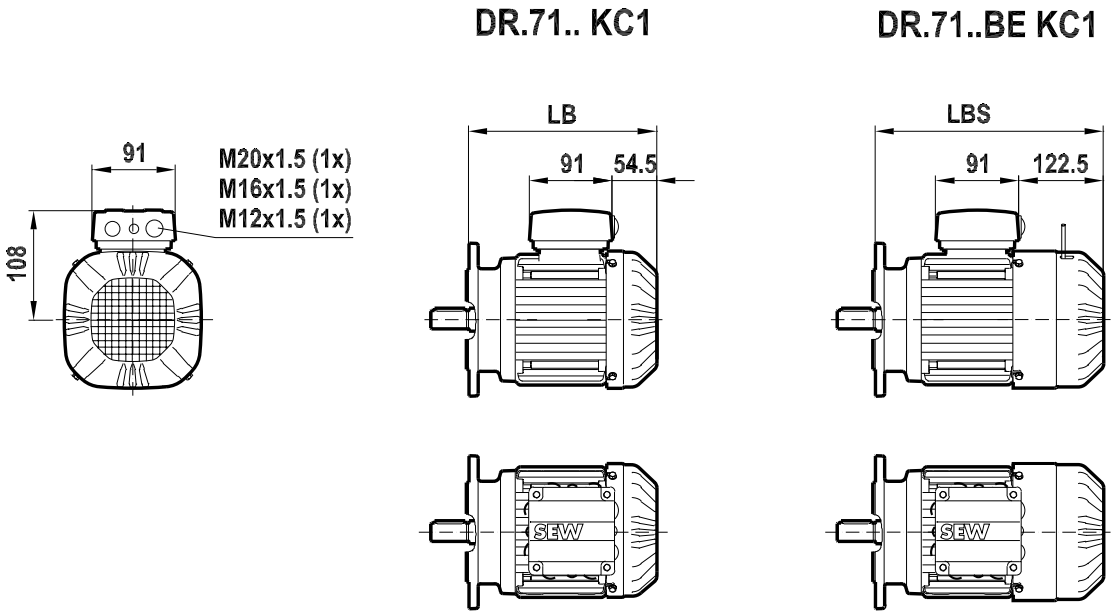


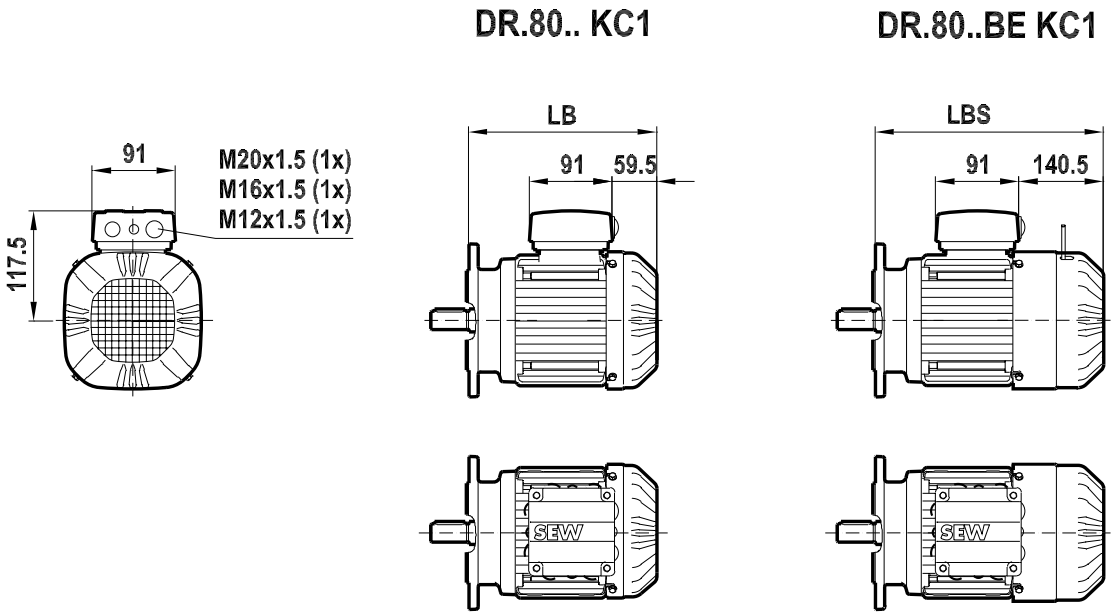

## DR.132..BE KCC




*4762528395*

08 463 01 08
1 (2)

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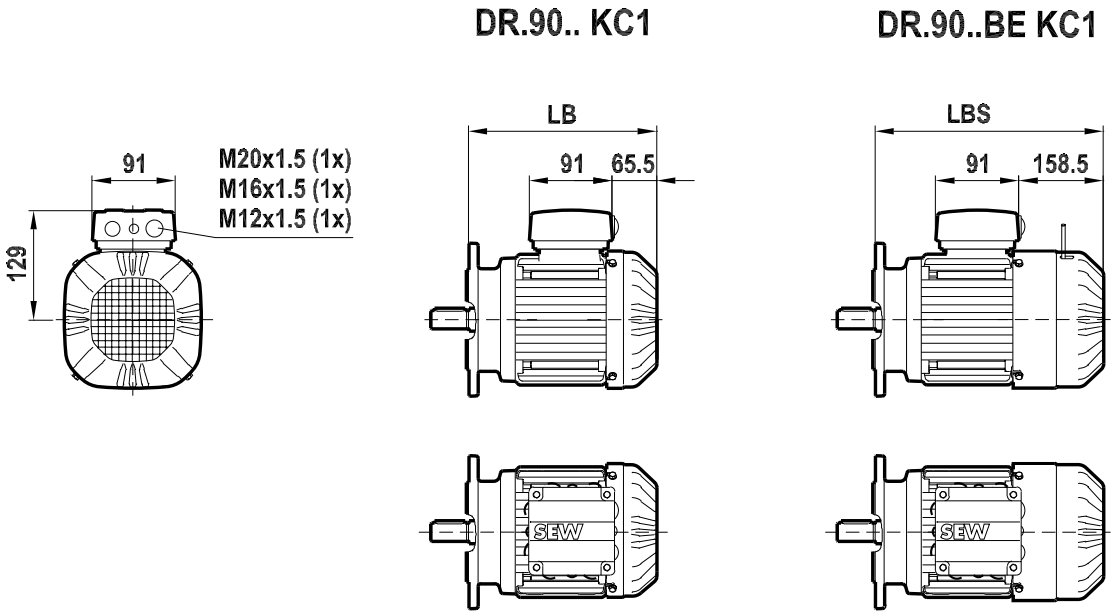
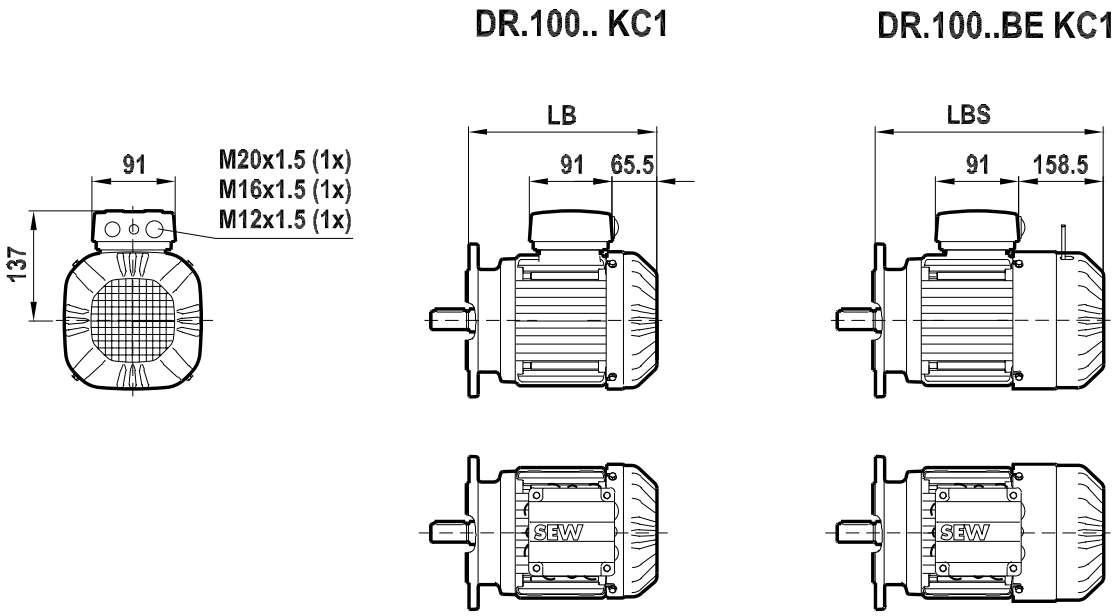
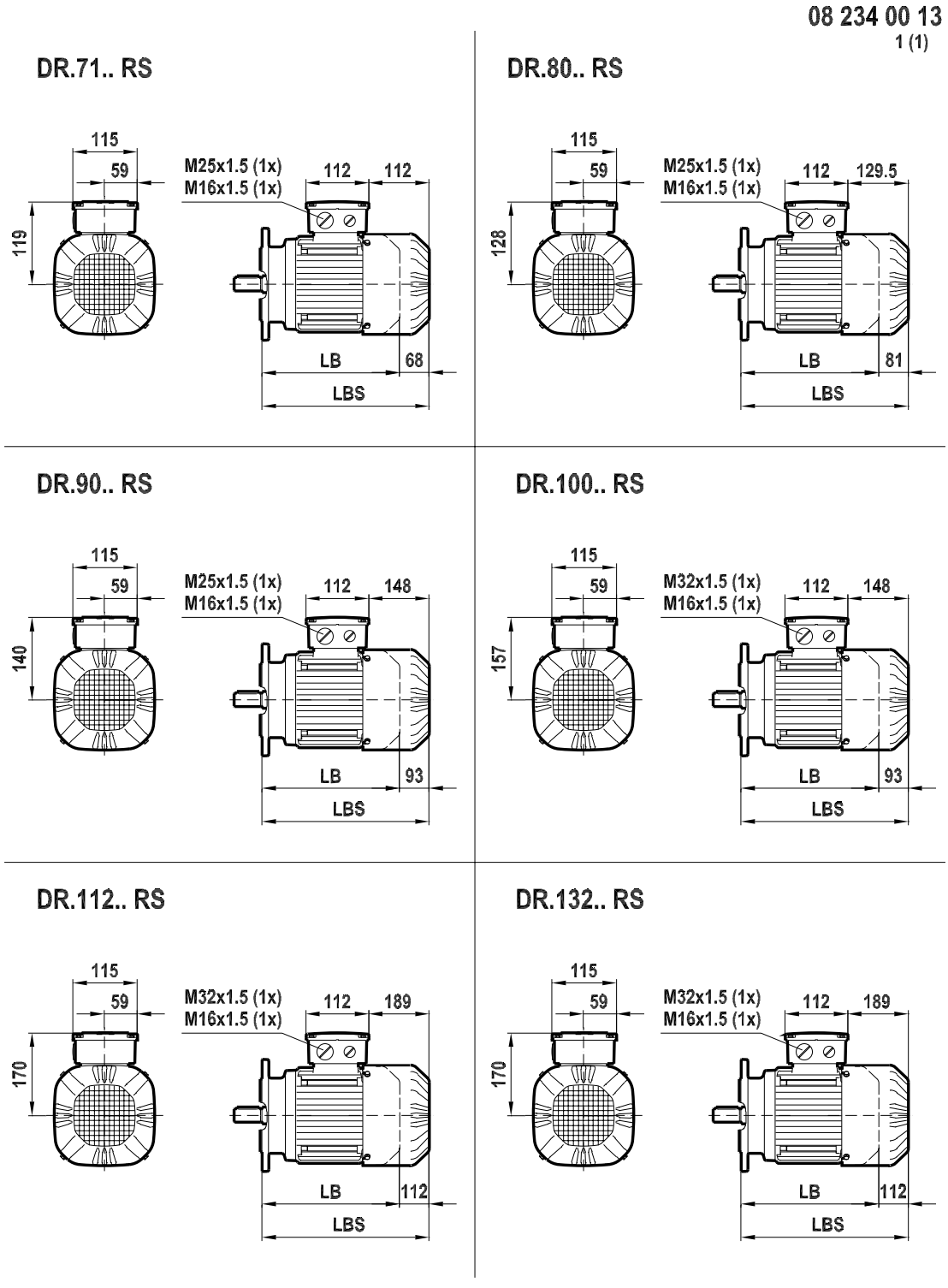
08 463 00 08
2 (2)




*6188256779*

## 7.5 Dimension sheet for motors with backstop RS

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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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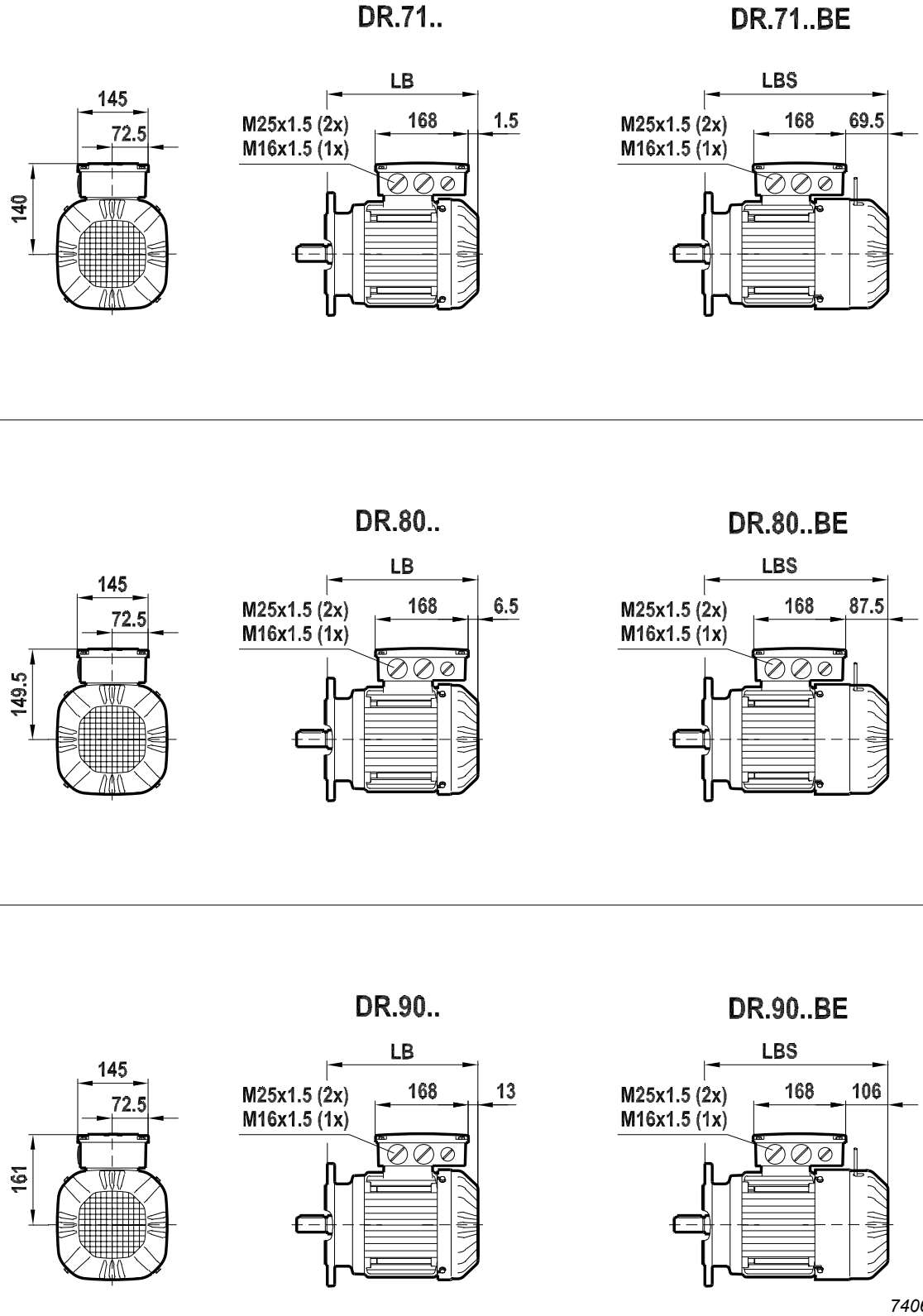
## 7.6 Dimension sheets for motors/brakemotors with gray cast iron terminal box

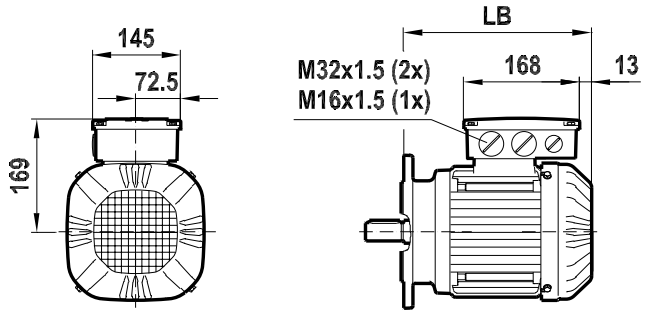
08 480 02 08
1 (4)



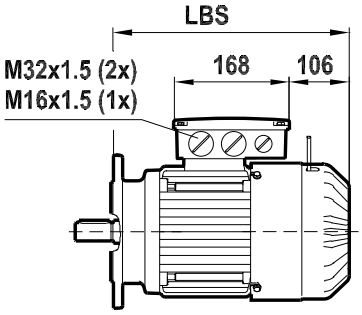

7406615563

08 480 02 08
2 (4)

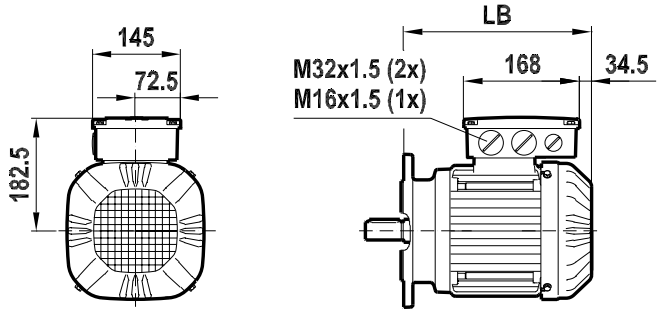
## DR.100..



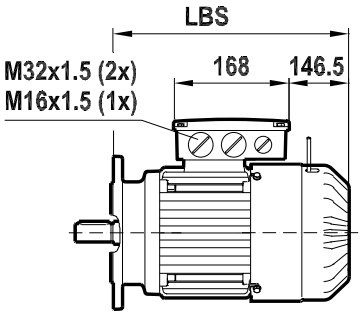

## DR.100..BE



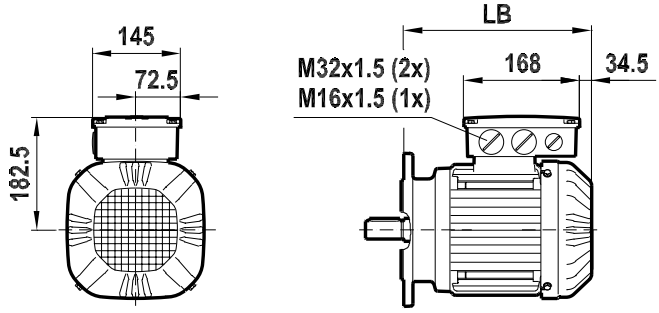

## DR.112..



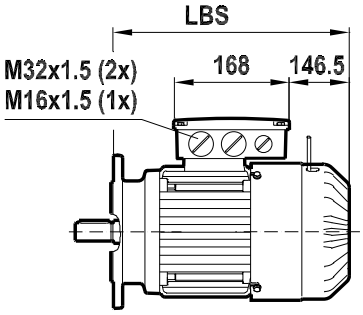

## DR.112..BE




## DR.132..




## DR.132..BE

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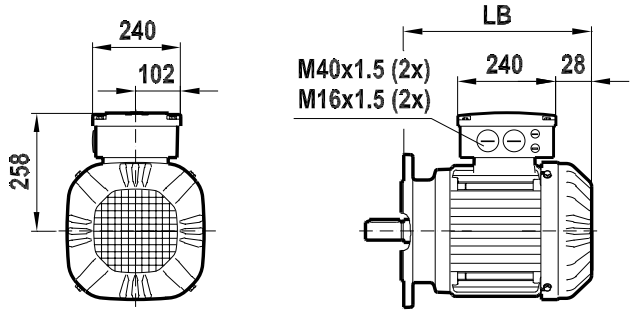
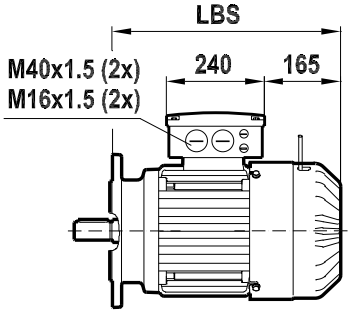
08 480 02 08
3 (4)

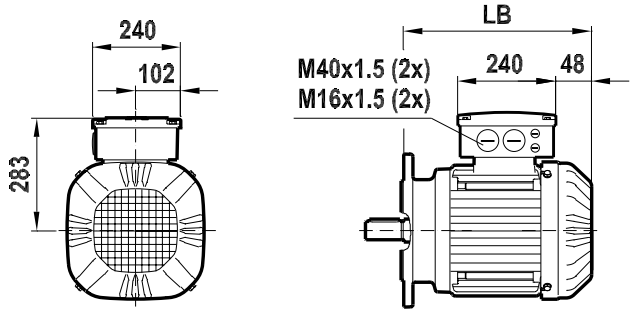
## DR.160..



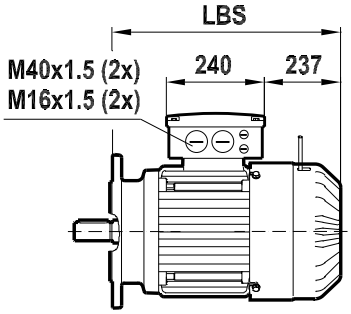

## DR.160..BE



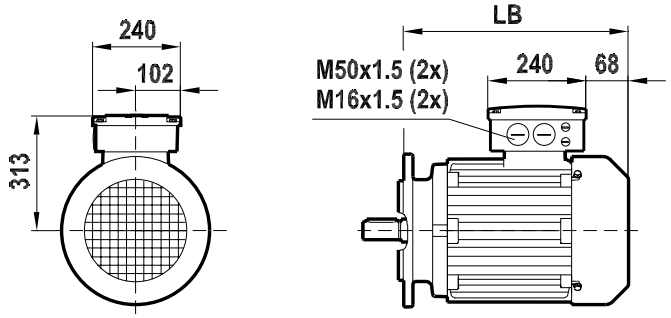

## DR.180..



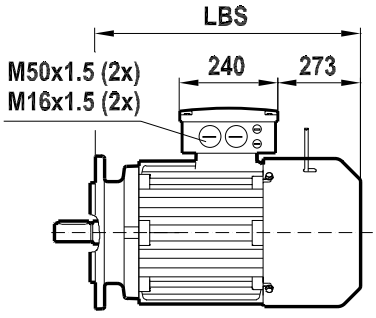

## DR.180..BE



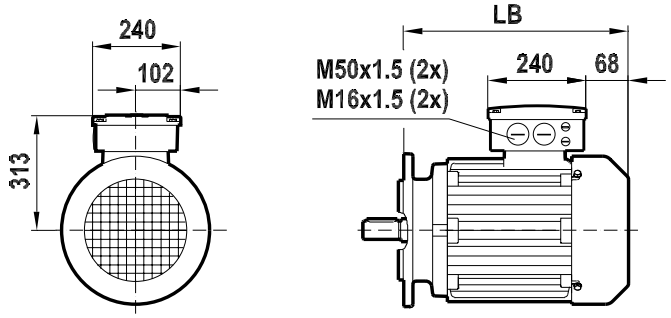

## DR.200..



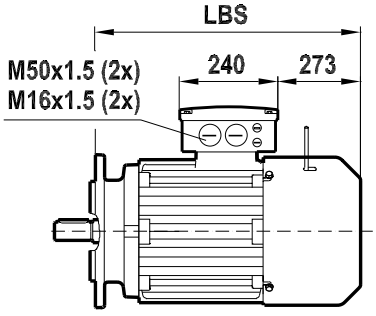

## DR.200..BE




## DR.225..




## DR.225..BE

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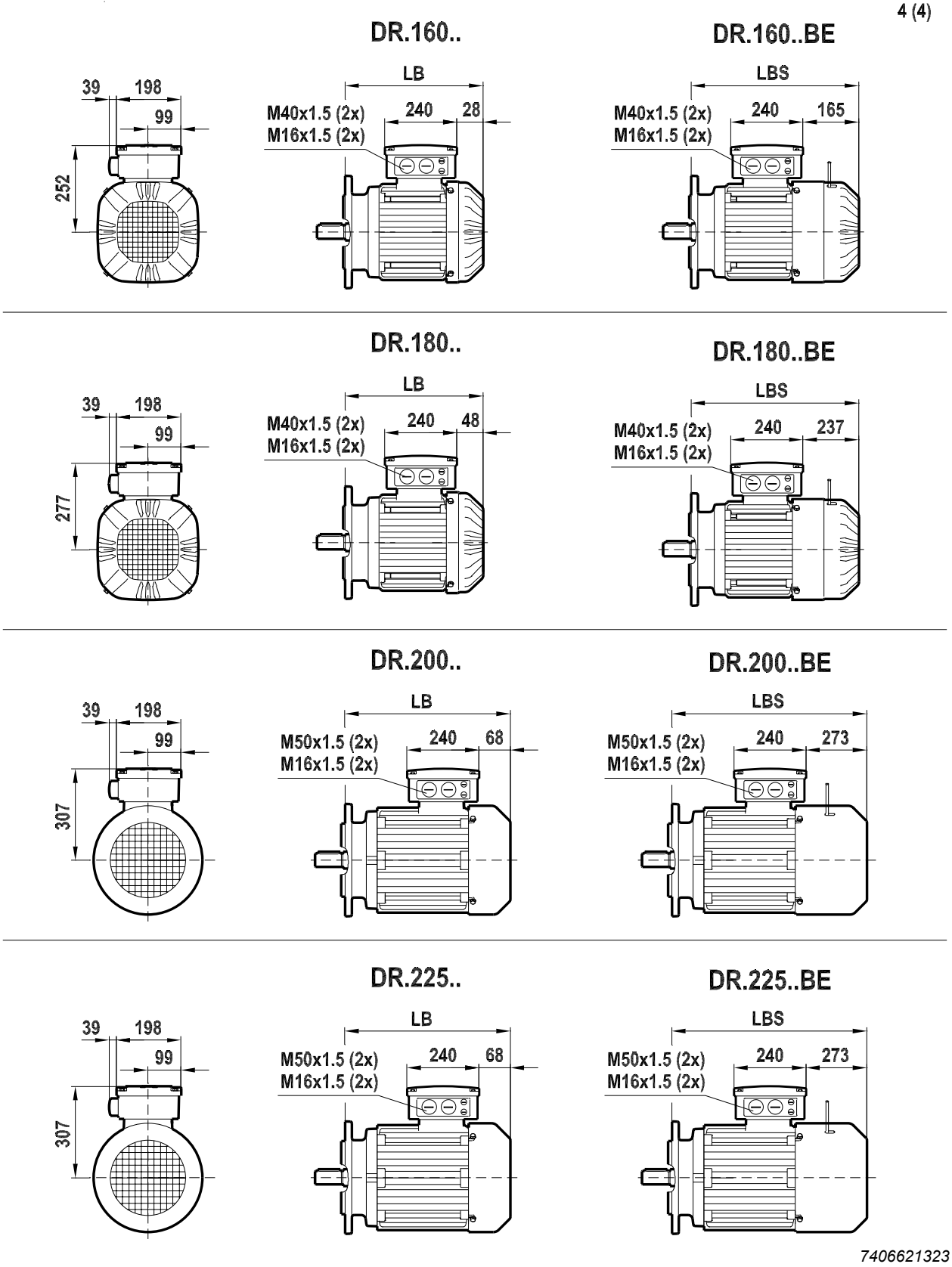
Design with connection piece.

08 480 02 08
4 (4)

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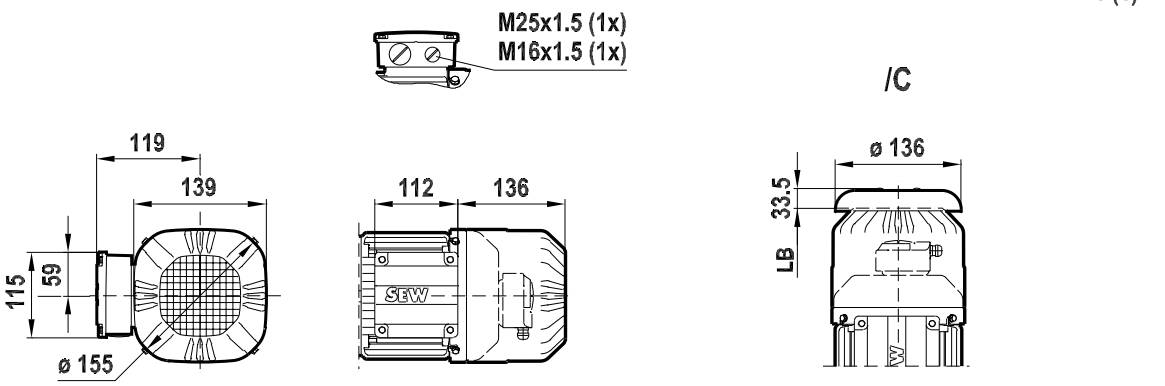
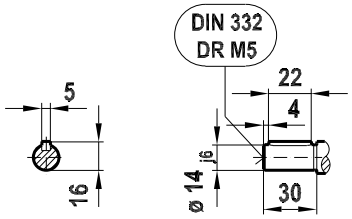
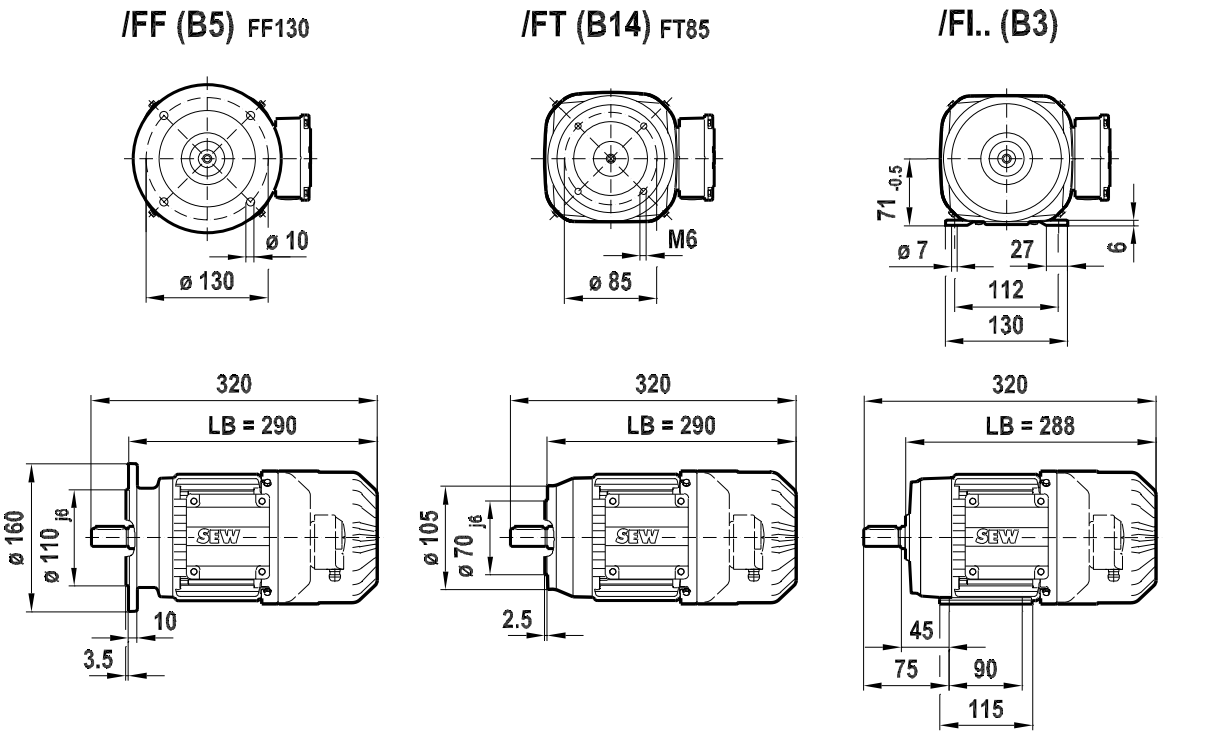
## 7.7 Dimension sheets for DRL.. servomotors/servo brakemotors

**DRL71S4**

**08 428 01 08**
1 (1)

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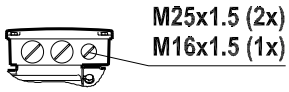
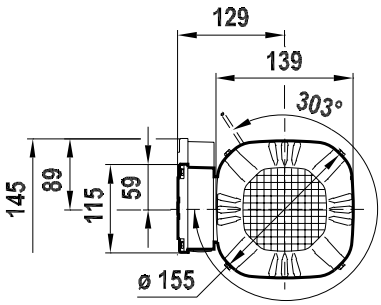
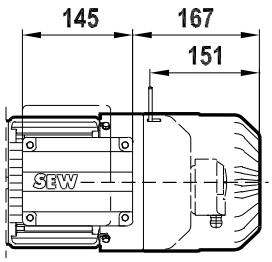
## DRL71S4 BE

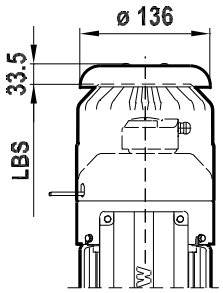
09 289 02 08
1 (1)

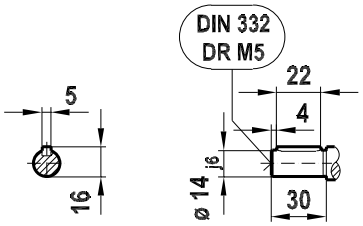



/C

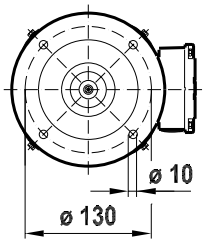


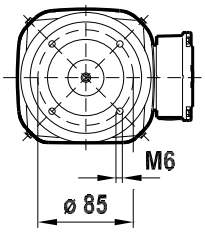



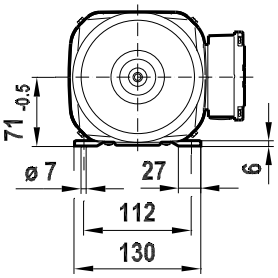

/FF (B5) FF130

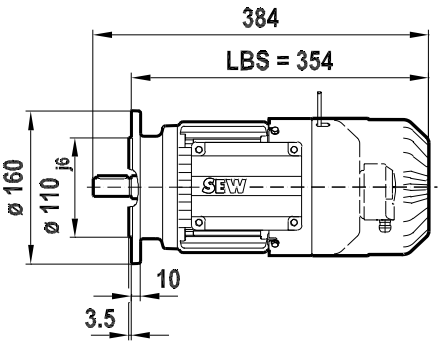


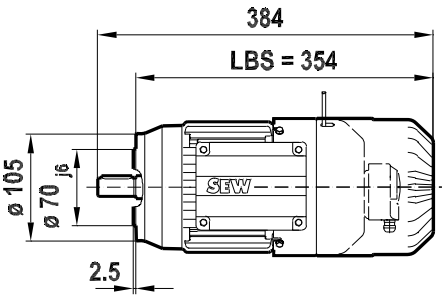

/FT (B14) FT85

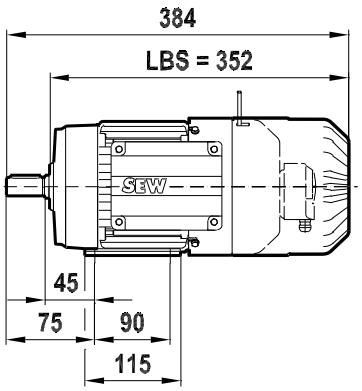



/FI.. (B3)

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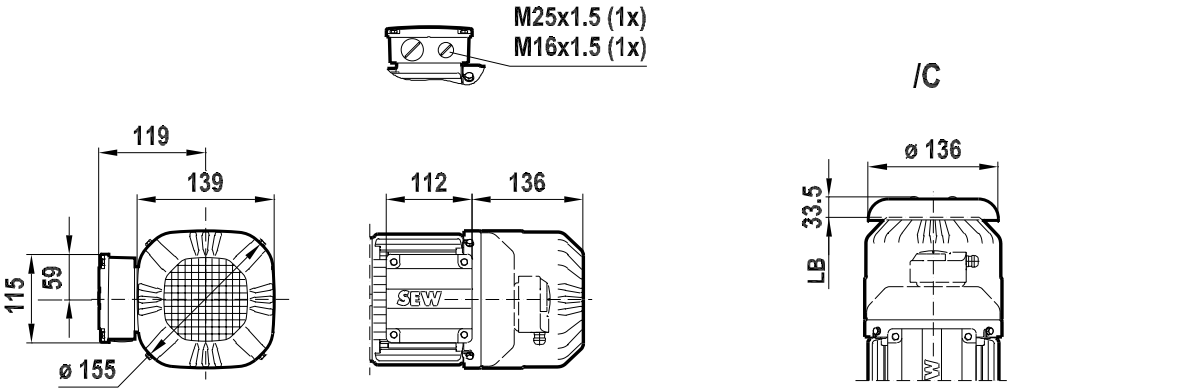
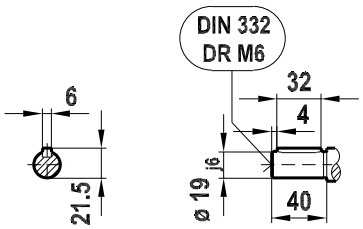
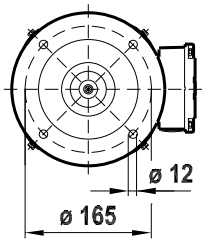
## DRL71M4

08 429 01 08
1 (1)




/FF (B5) FF165

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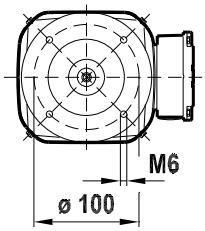


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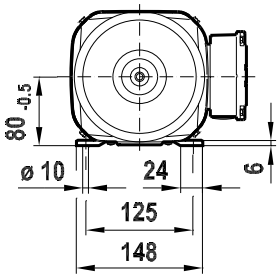


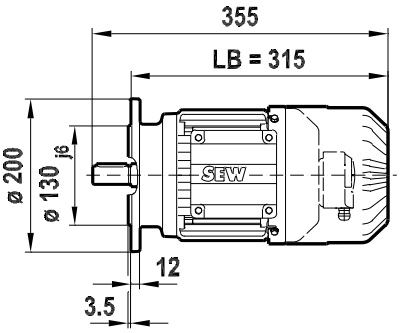


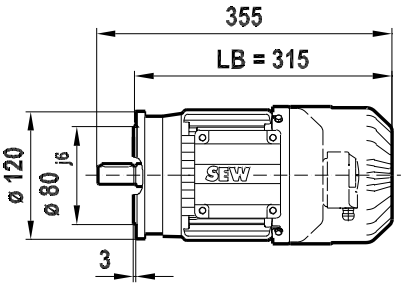


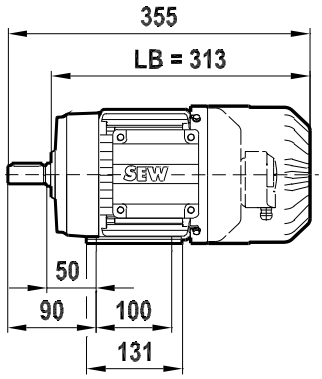


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## DRL71M4 BE

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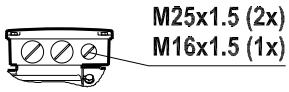


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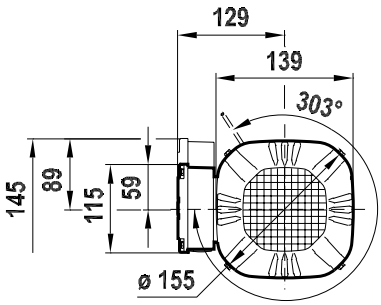


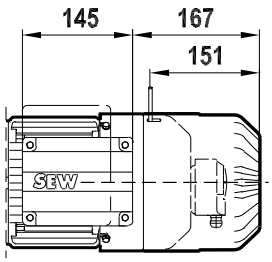


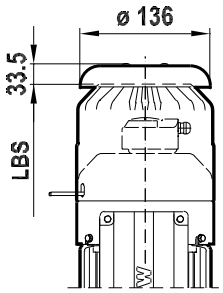


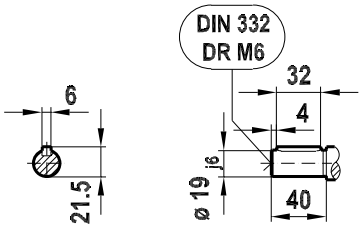


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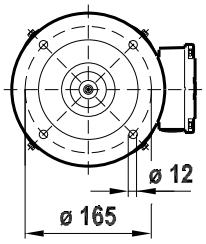


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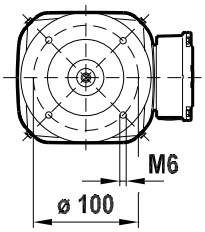


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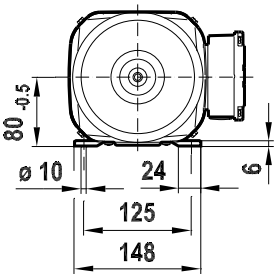


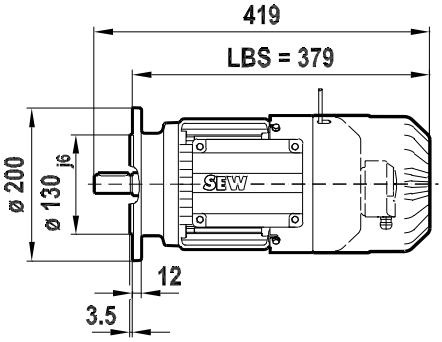


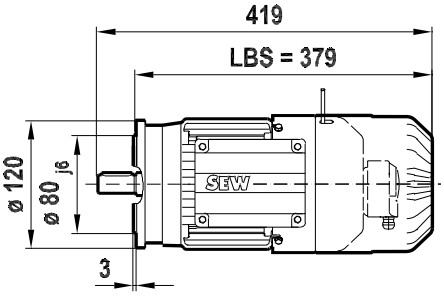


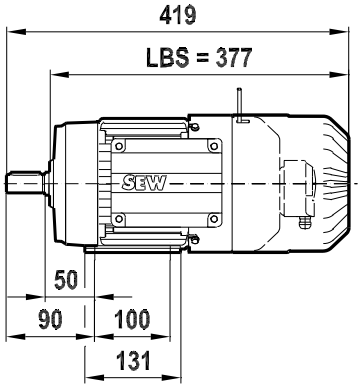


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## DRL80S4

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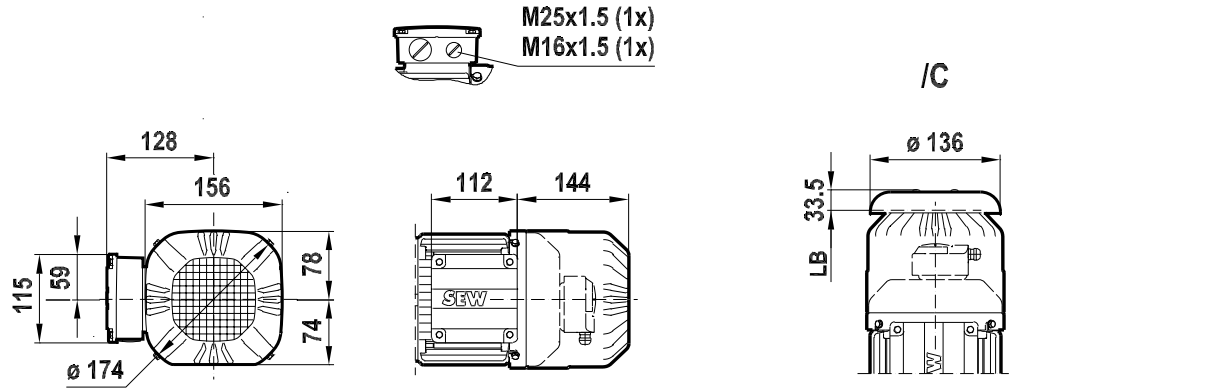


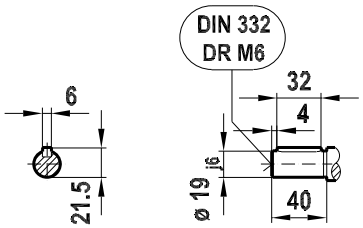


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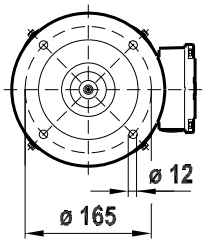


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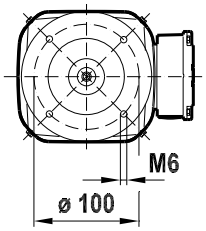


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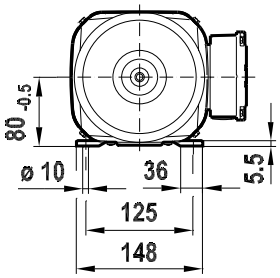


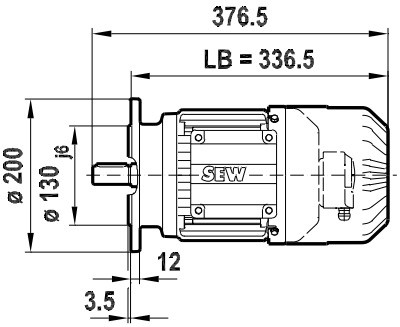


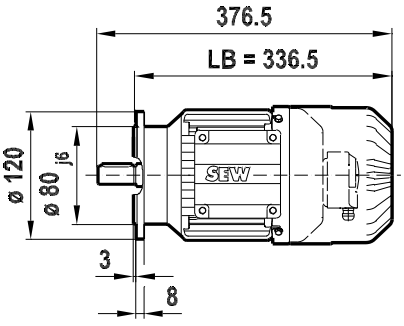


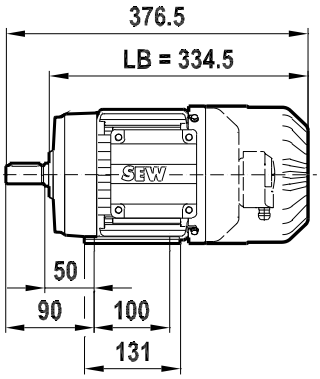


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## DRL80S4 BE

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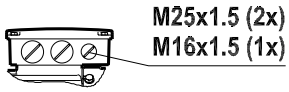


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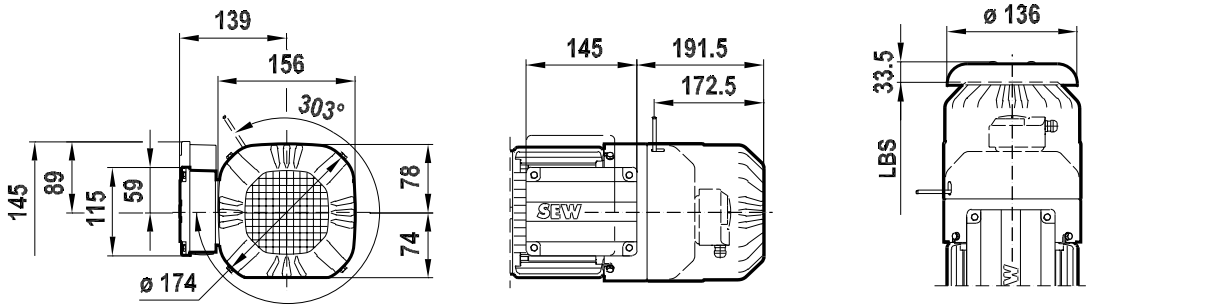


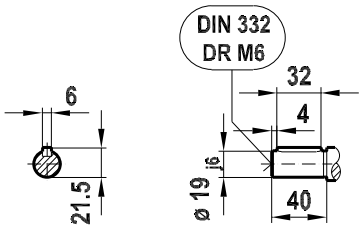


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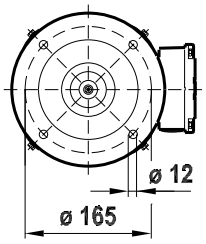


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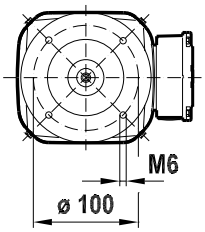


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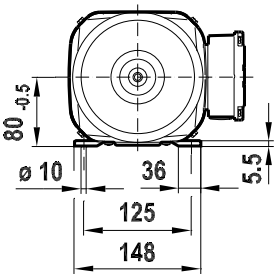


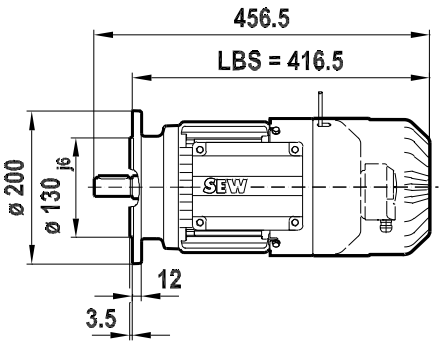


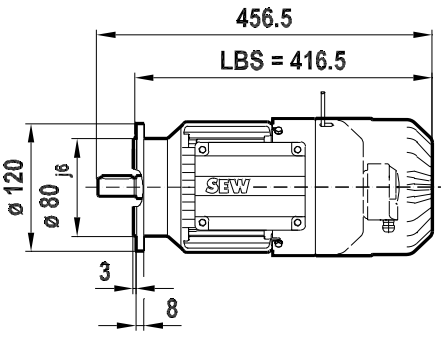


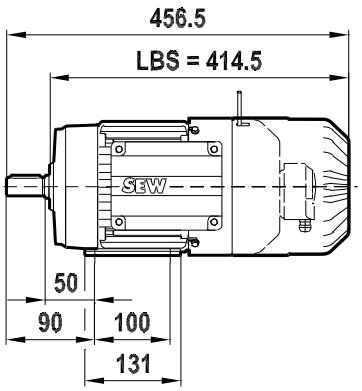


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## DRL80M4

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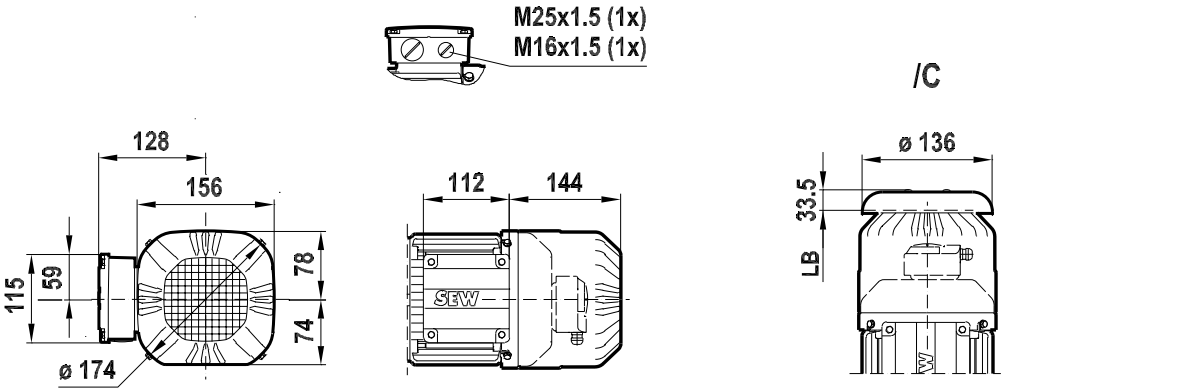


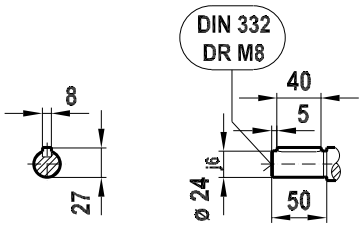


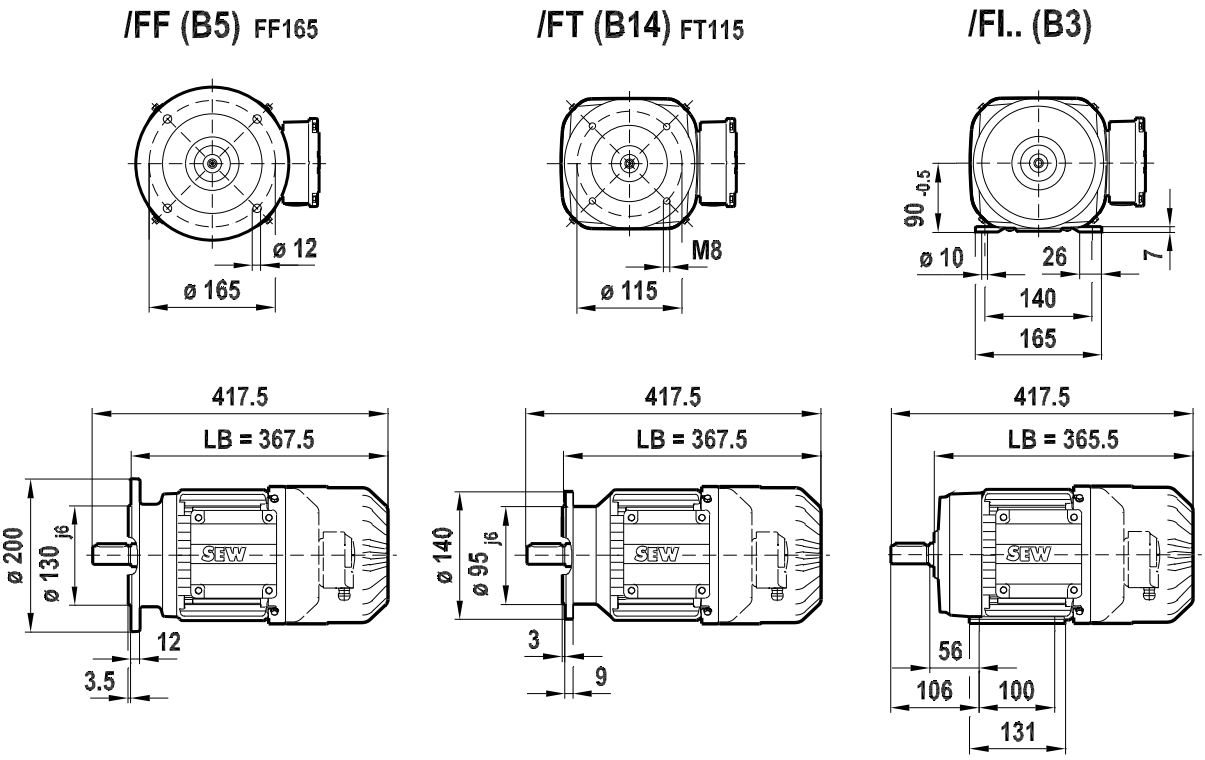


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## DRL80M4 BE

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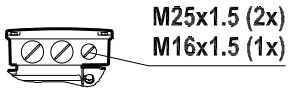


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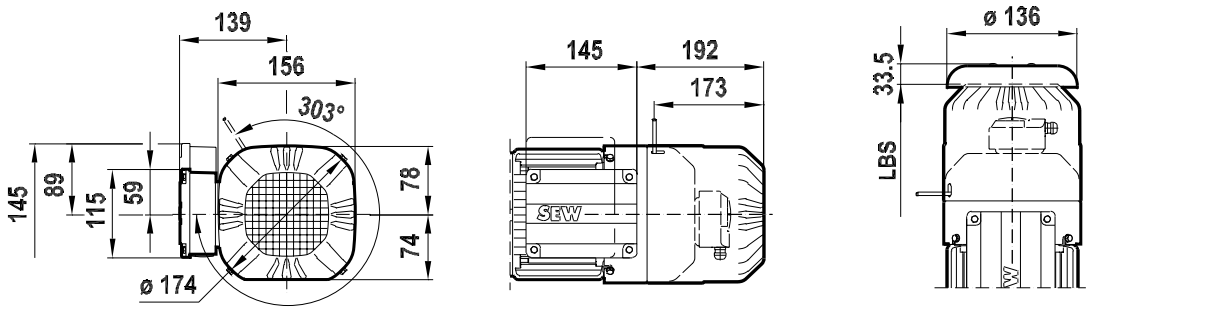


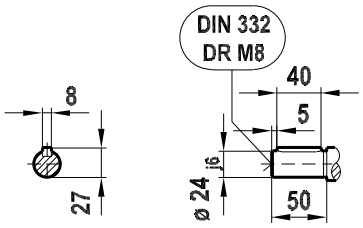


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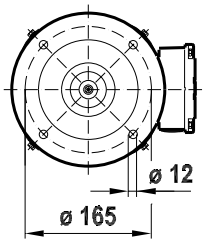


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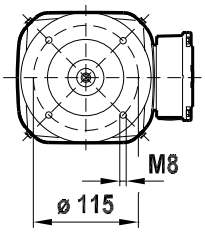


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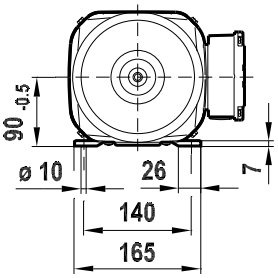


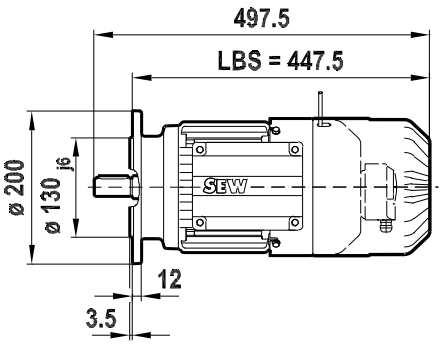


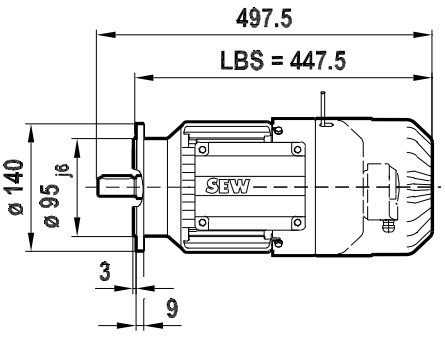


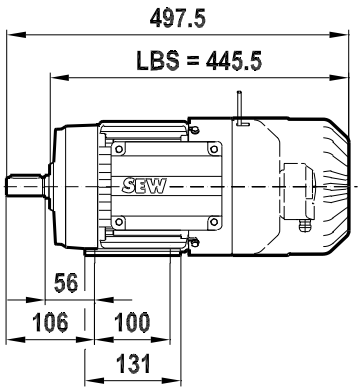


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## DRL90L4

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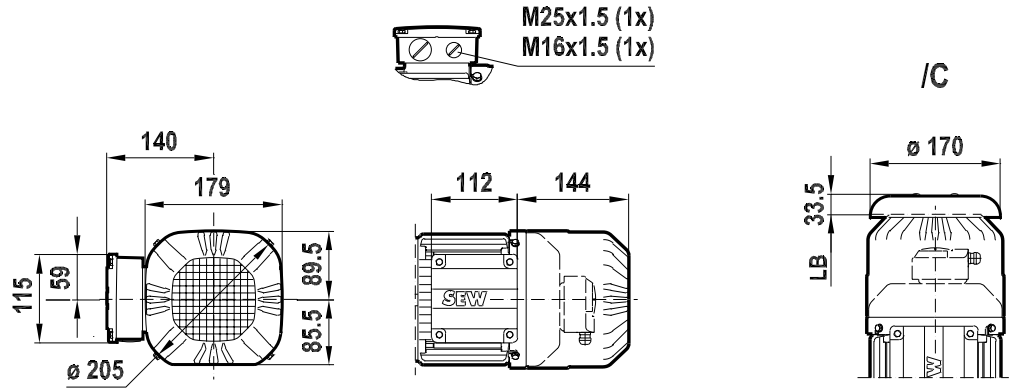


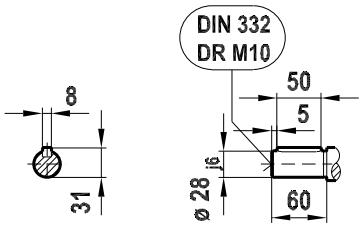


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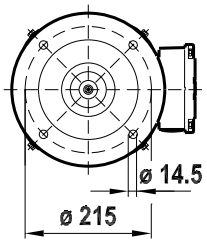


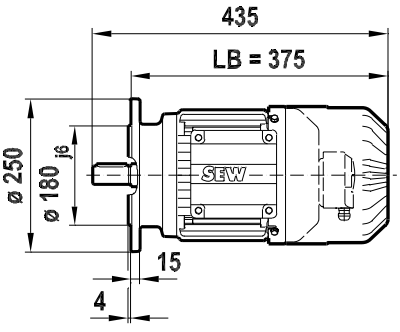


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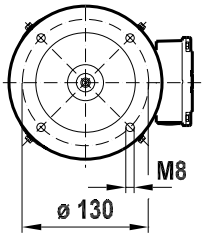


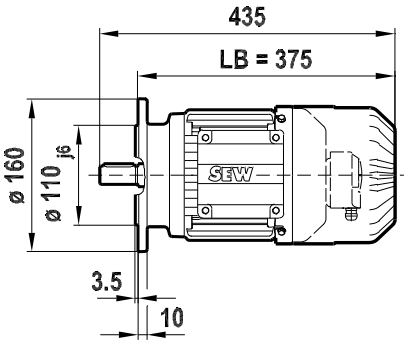


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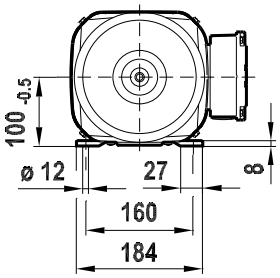


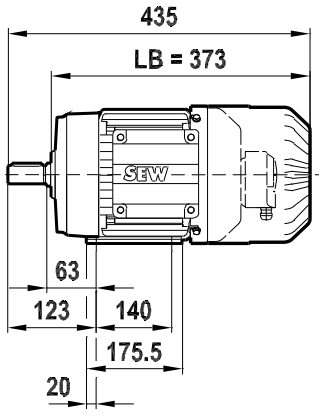


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## DRL90L4 BE

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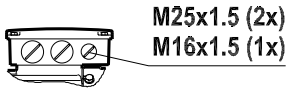


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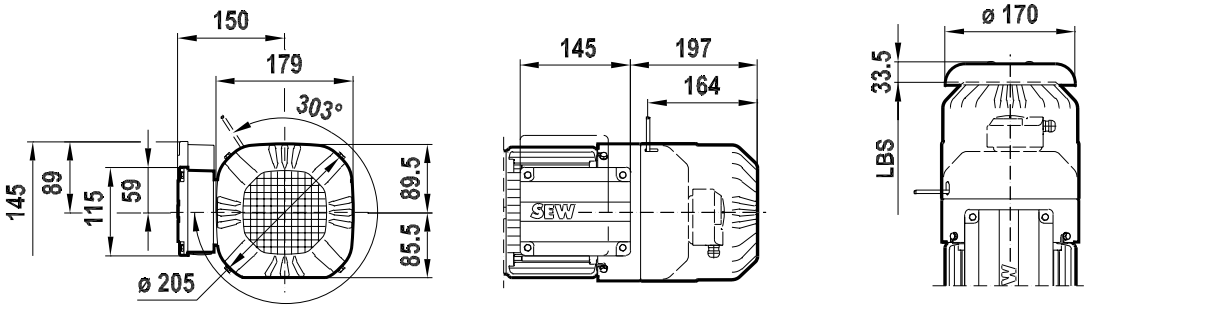


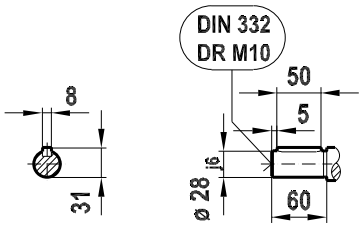


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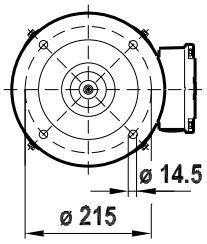


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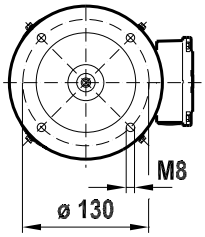


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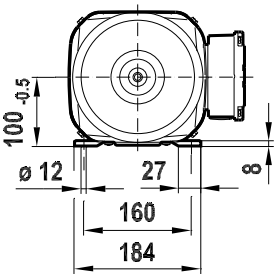


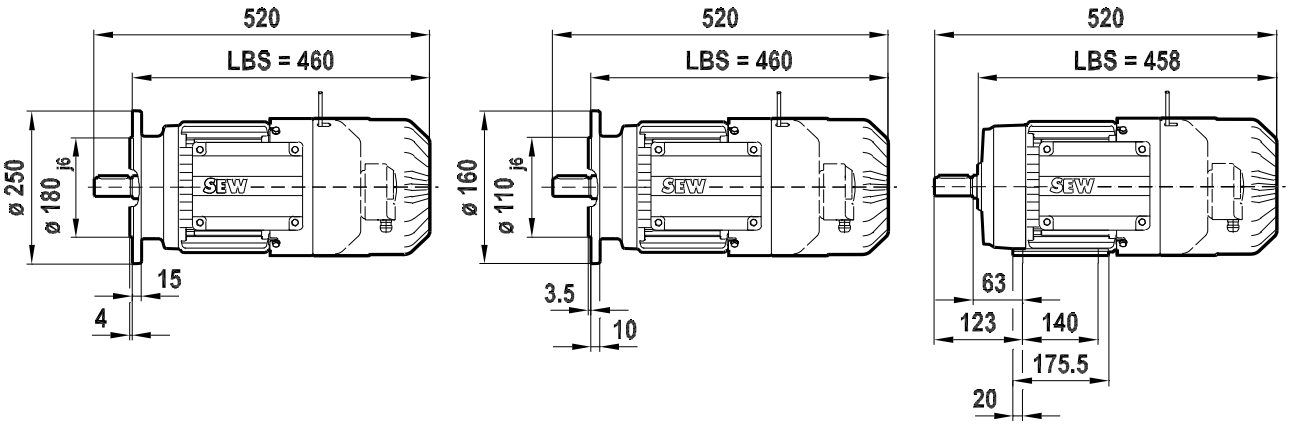


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## DRL100L4

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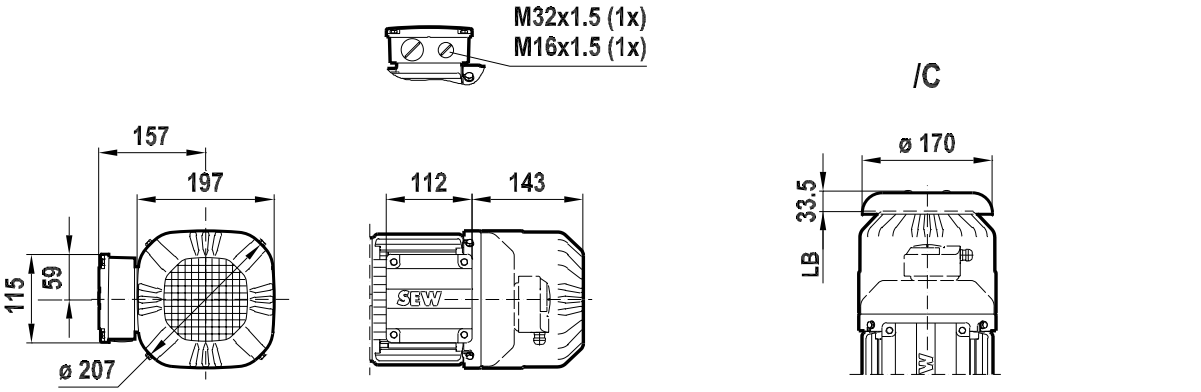
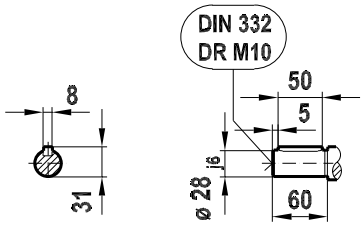
1 (1)

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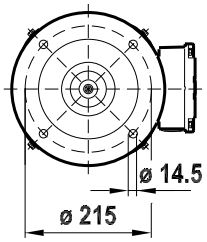


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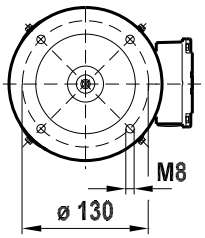


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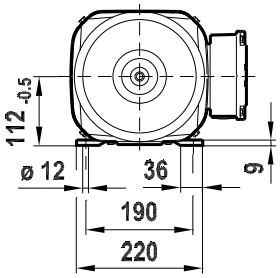


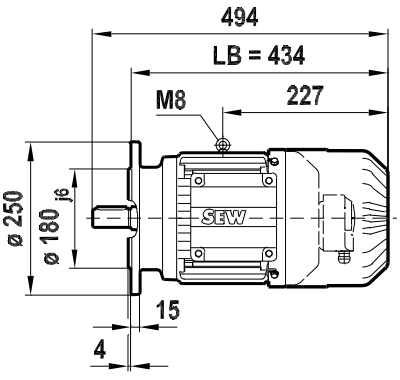


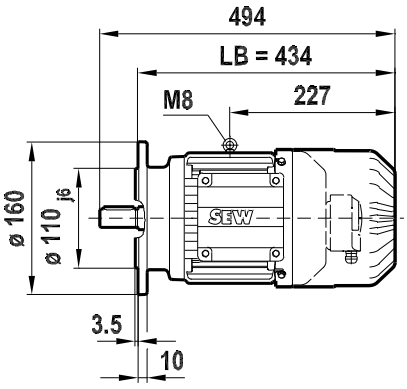


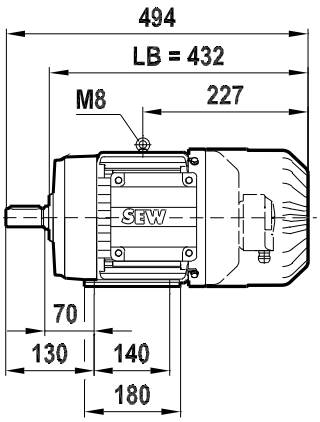


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## DRL100L4 BE

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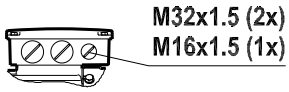


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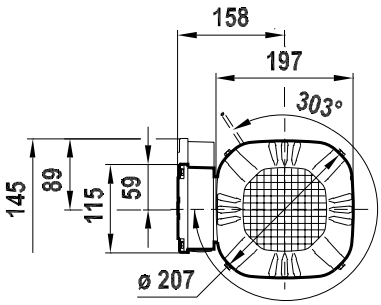


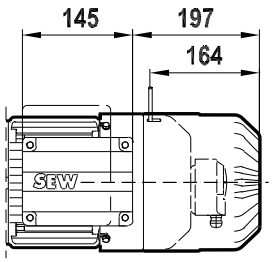


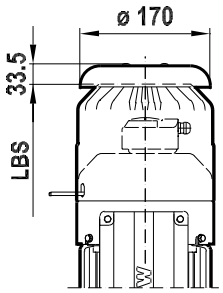


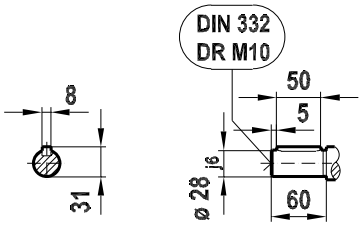


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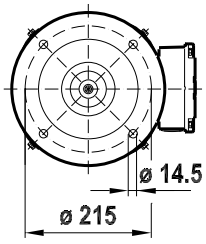


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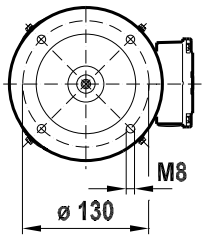


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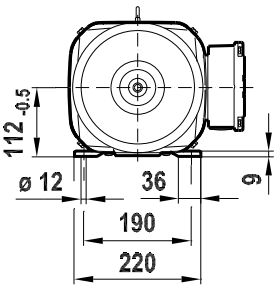


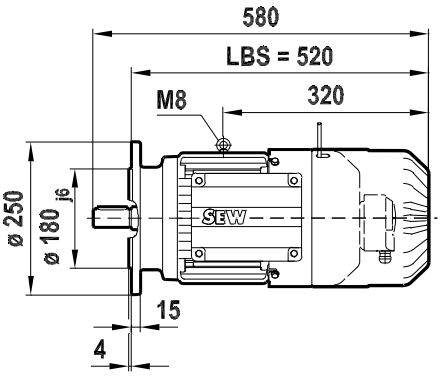


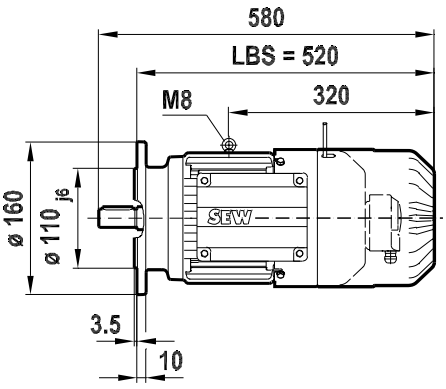


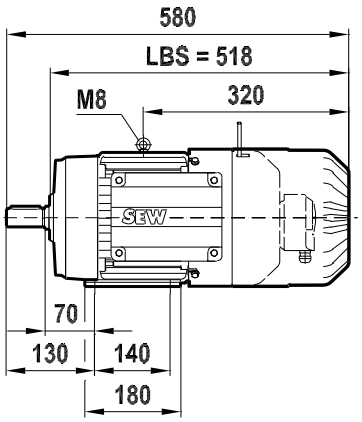


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## DRL132S4

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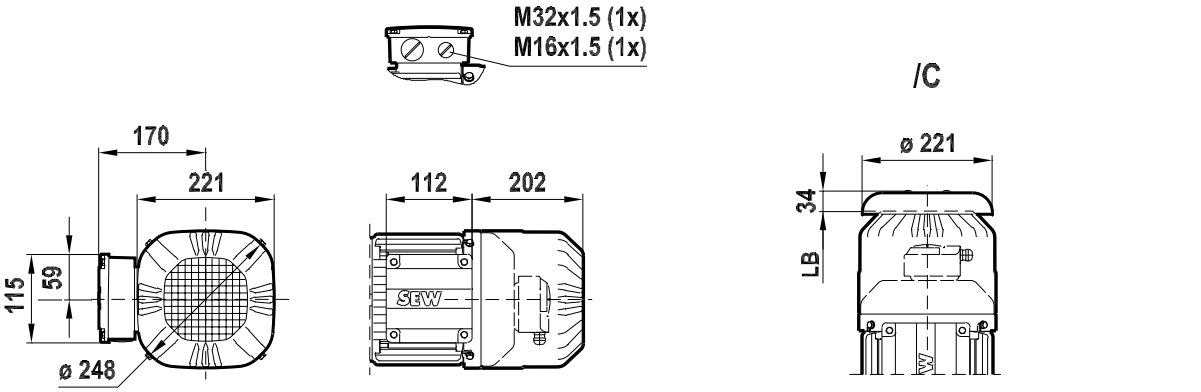
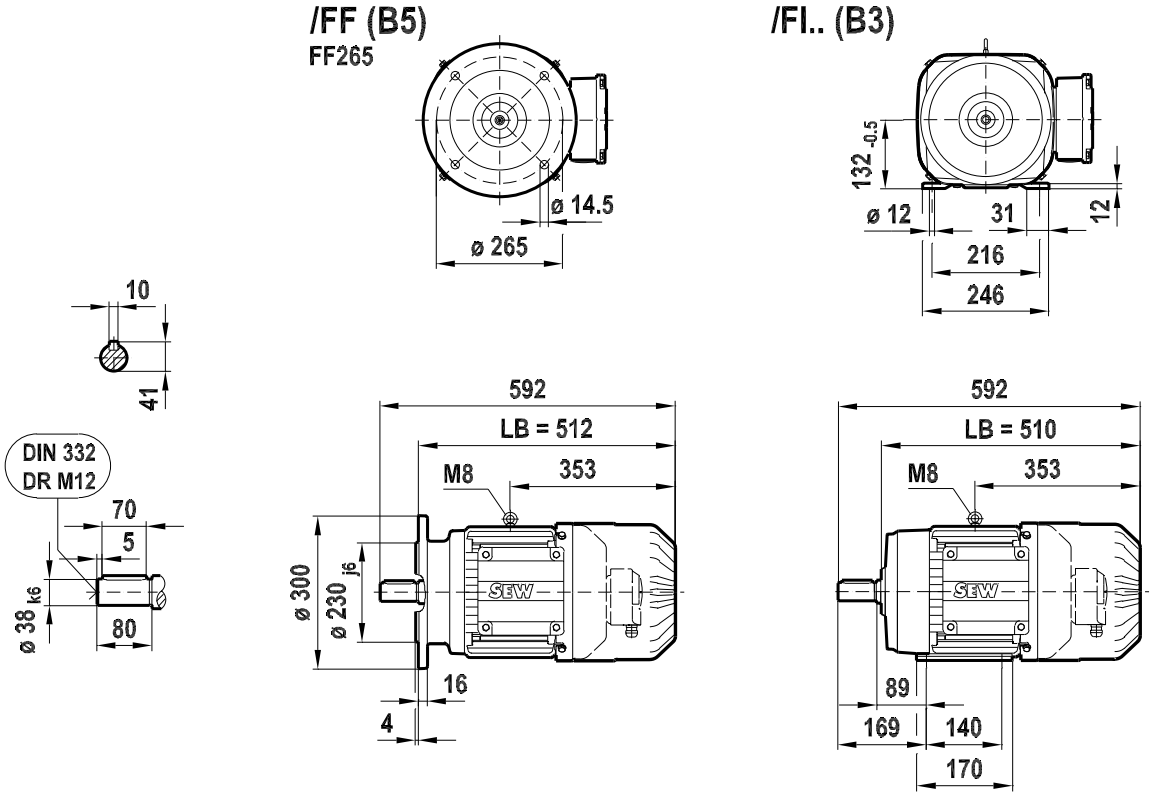
1 (1)

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## DRL132S4 BE

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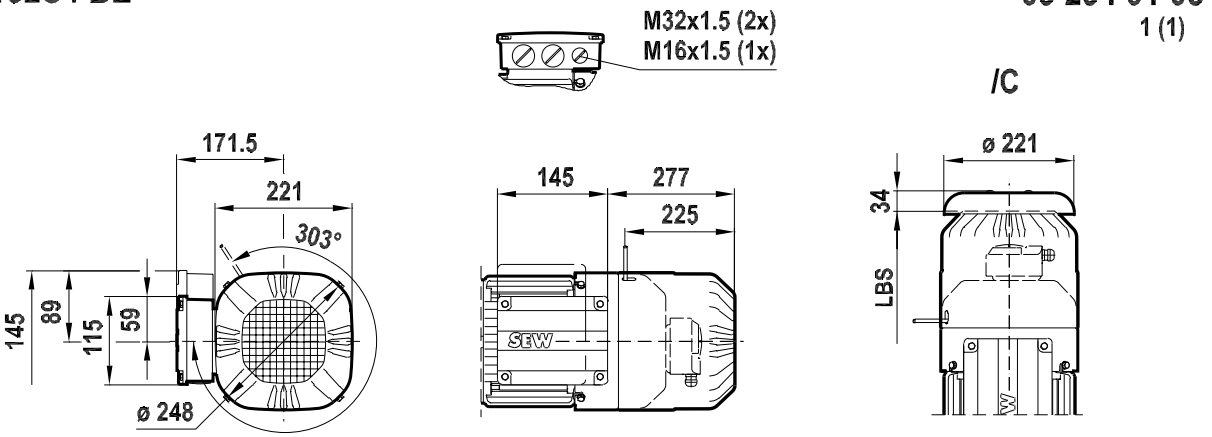


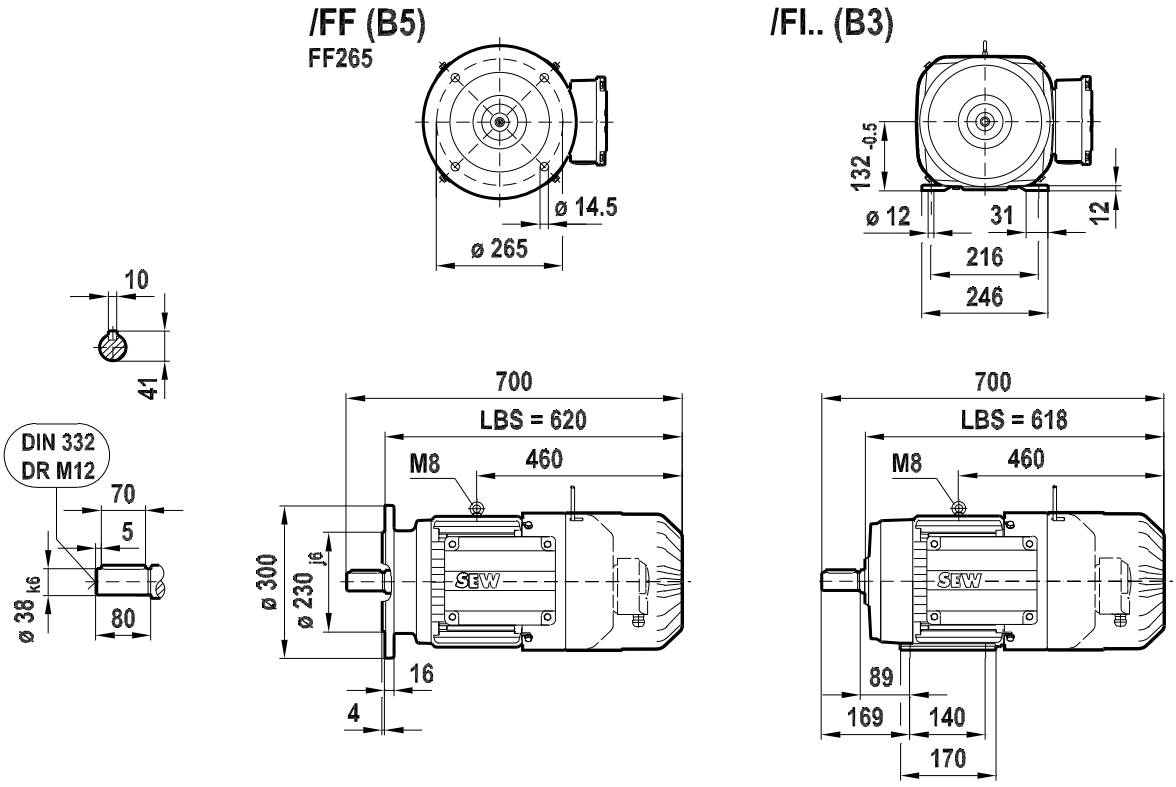


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## DRL132MC4

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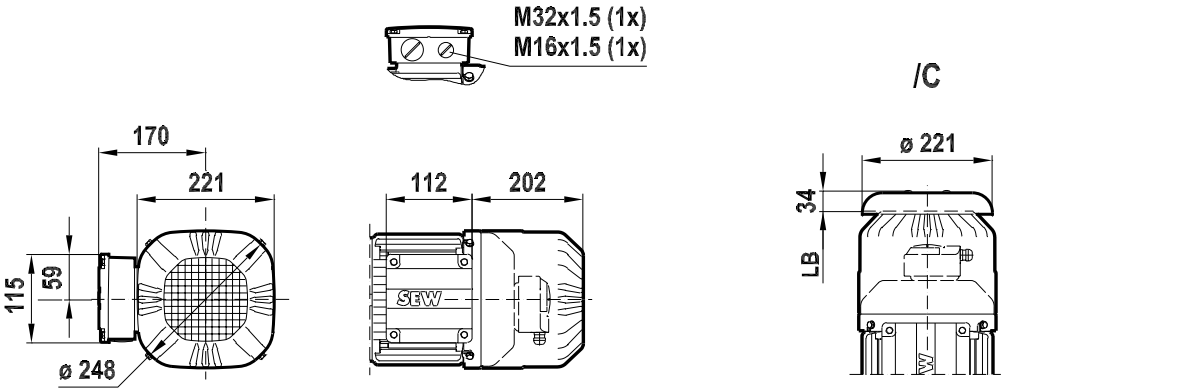


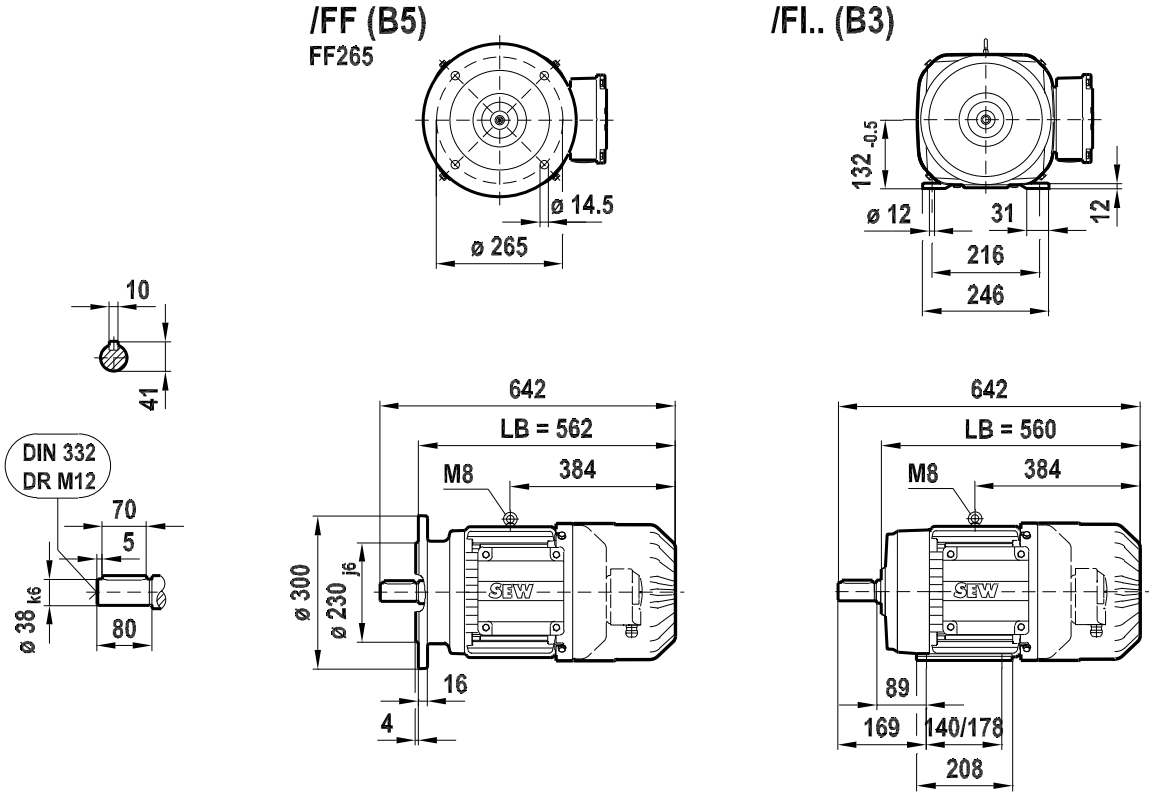


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## DRL132MC4 BE

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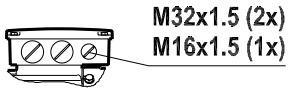


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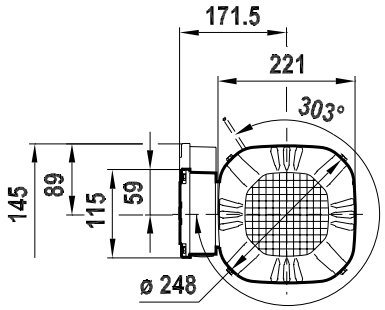


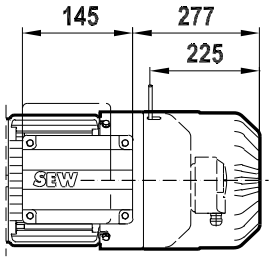


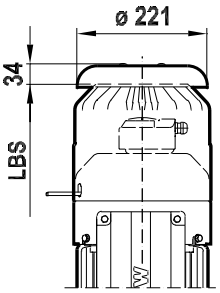


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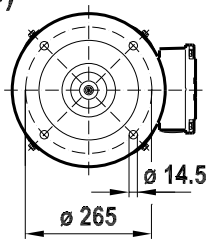


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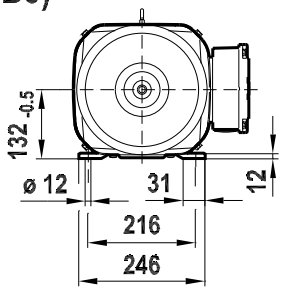


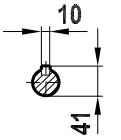


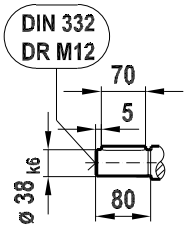


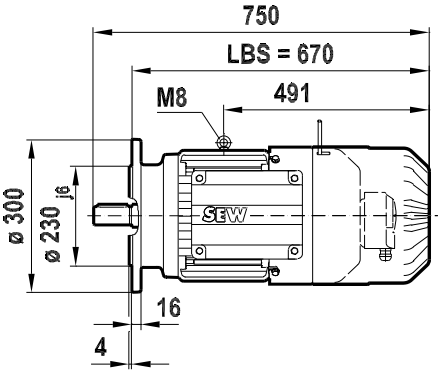


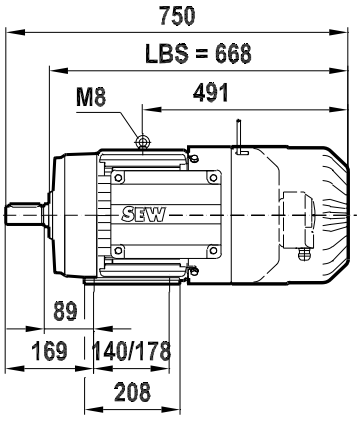


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## DRL160M4,MC4

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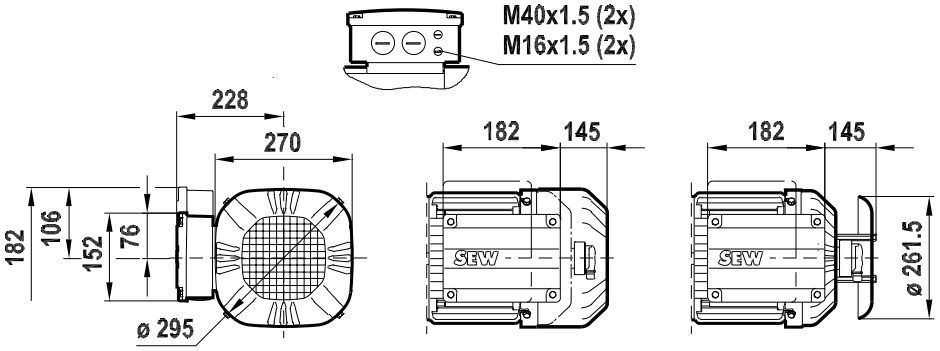


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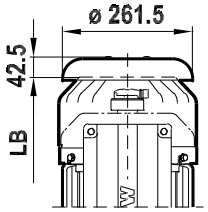


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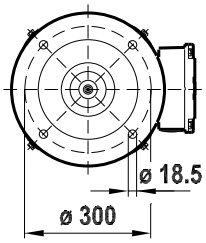


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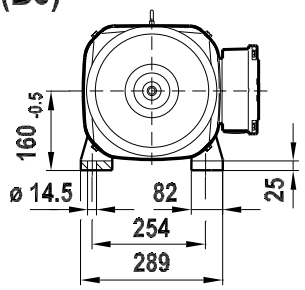


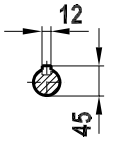


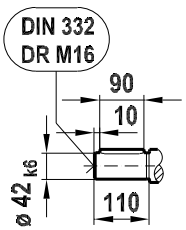


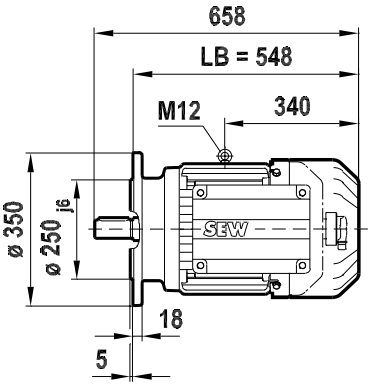


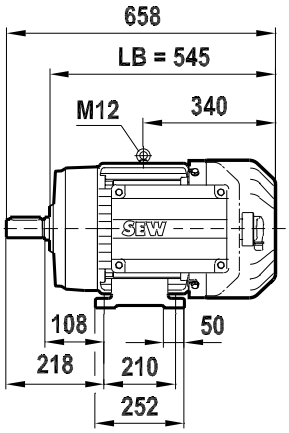


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## DRL160M4,MC4 BE

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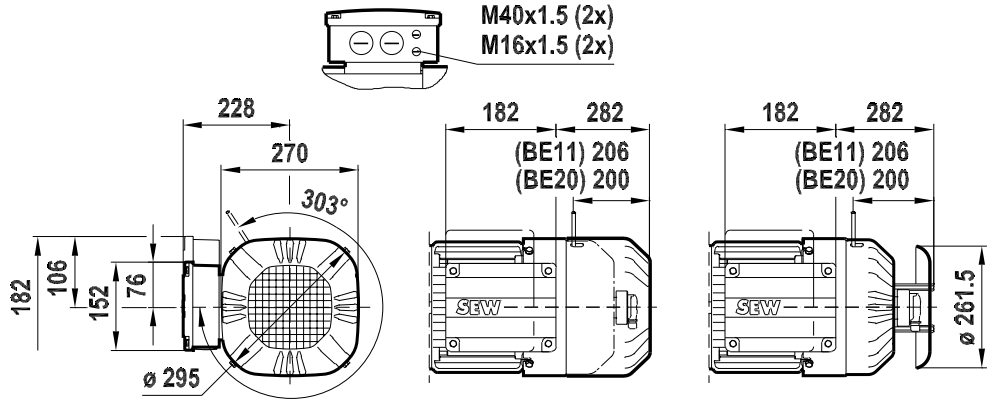


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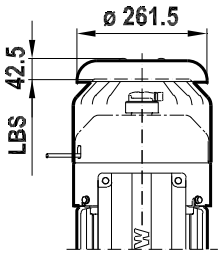


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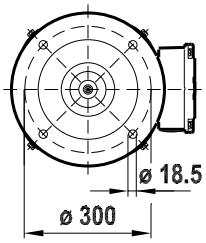


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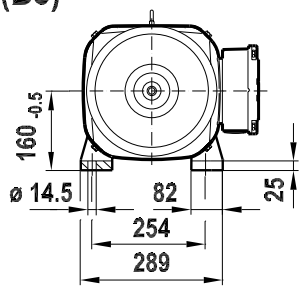


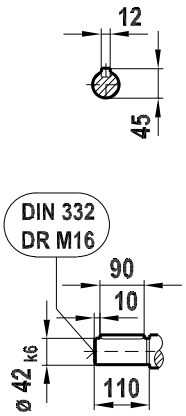


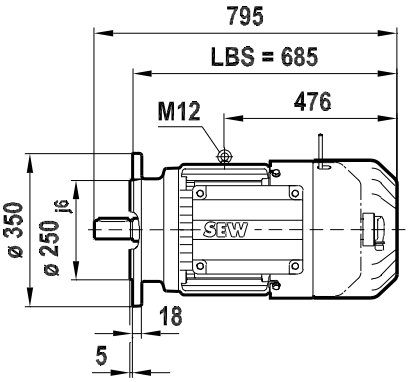


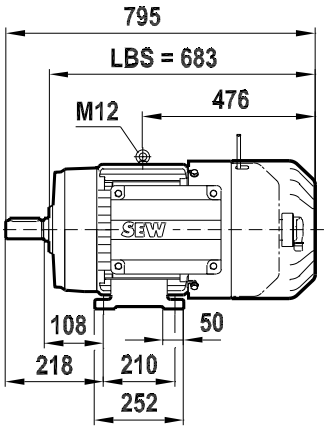


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## DRL180S4

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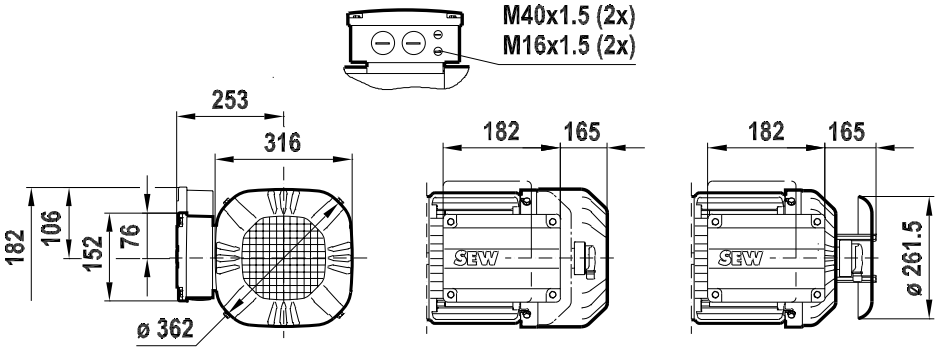


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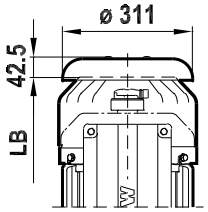


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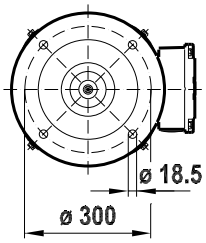


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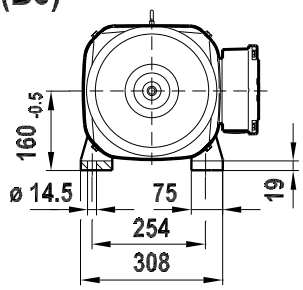


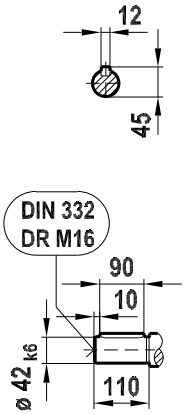


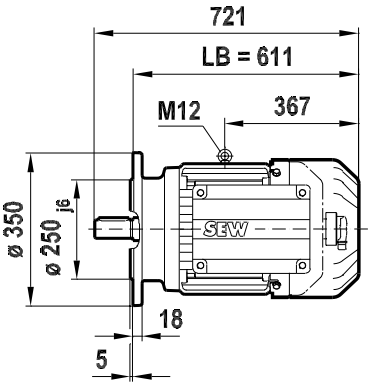


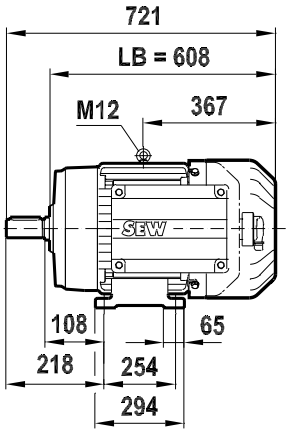


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## DRL180S4 BE

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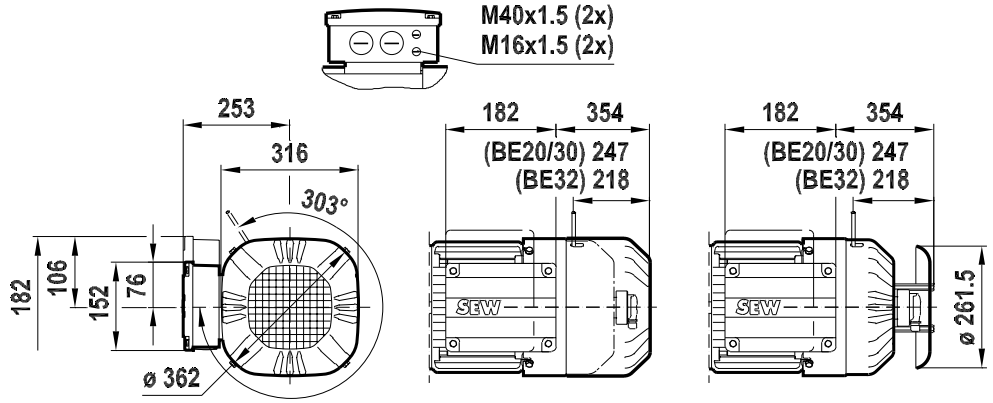


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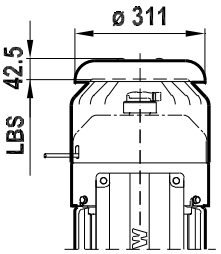


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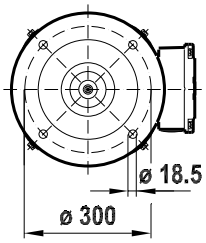


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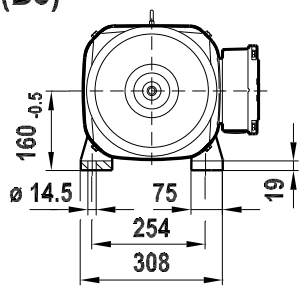


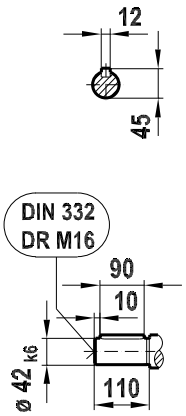


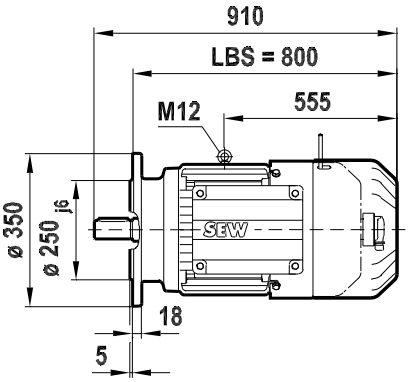


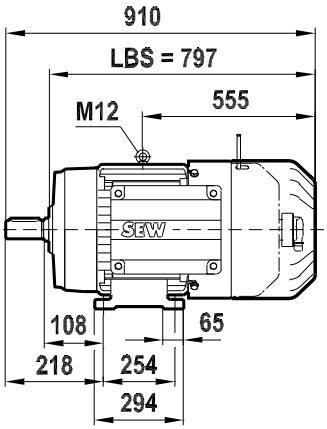


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## DRL180M4

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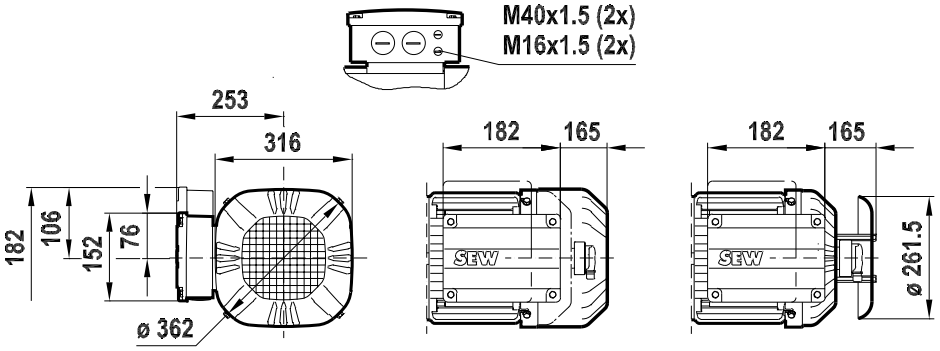


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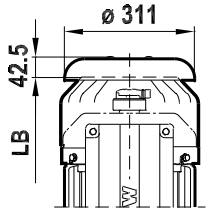


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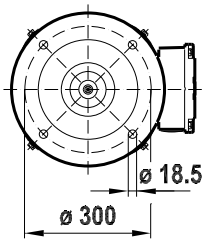


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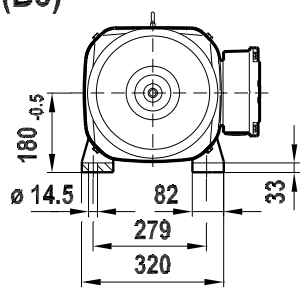


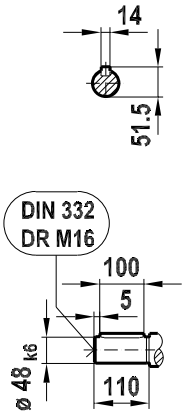


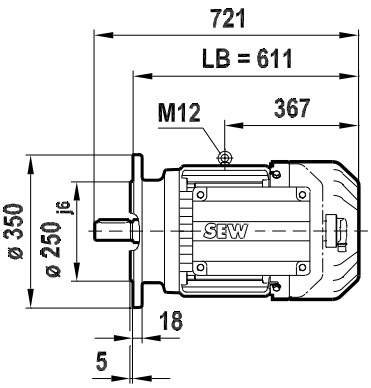


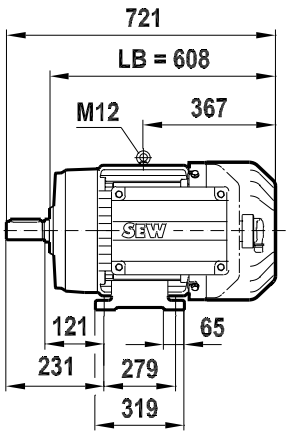


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## DRL180M4 BE

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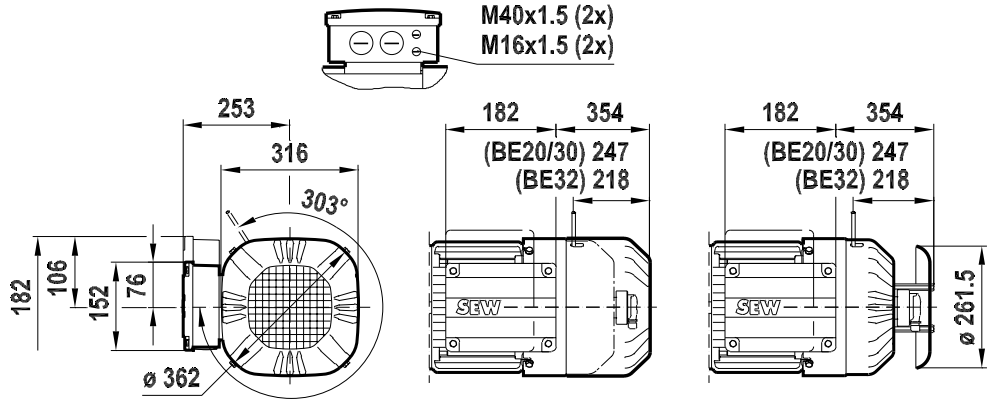


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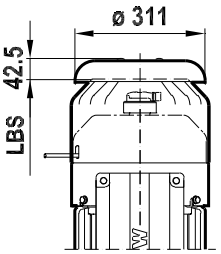


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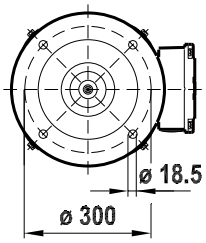


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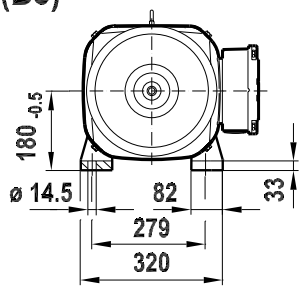


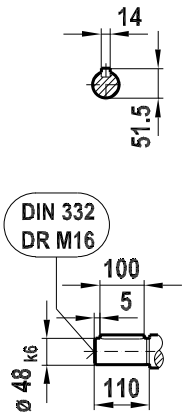


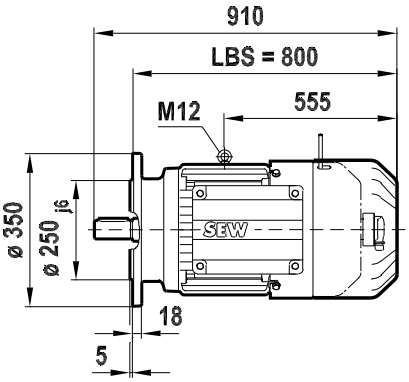


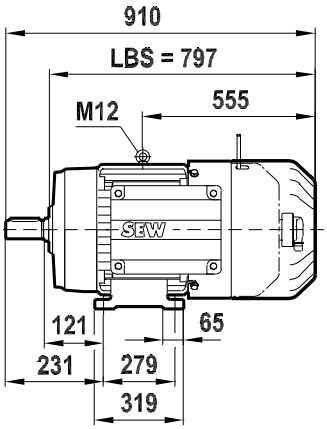


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## DRL180L4

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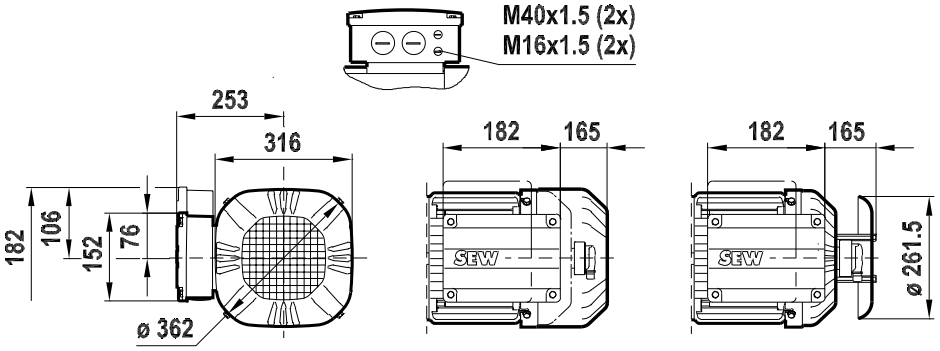


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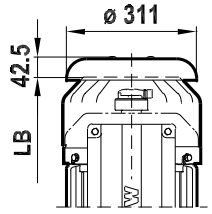


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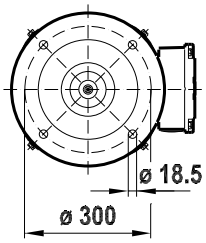


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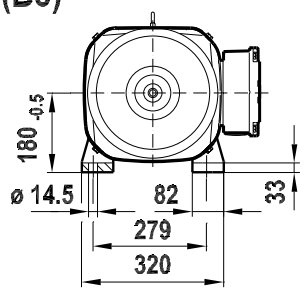


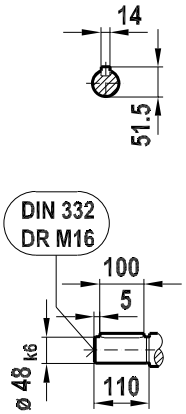


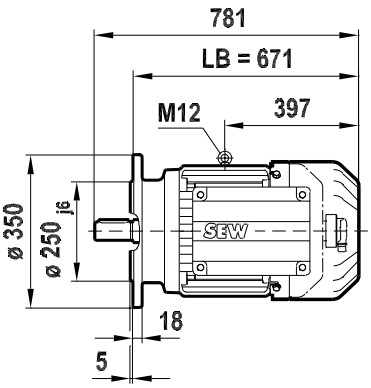


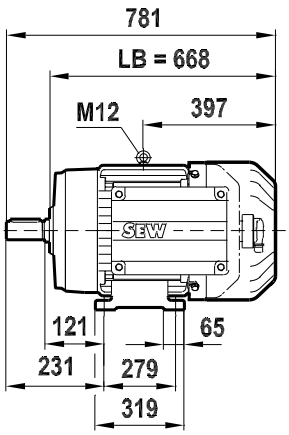


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## DRL180L4 BE

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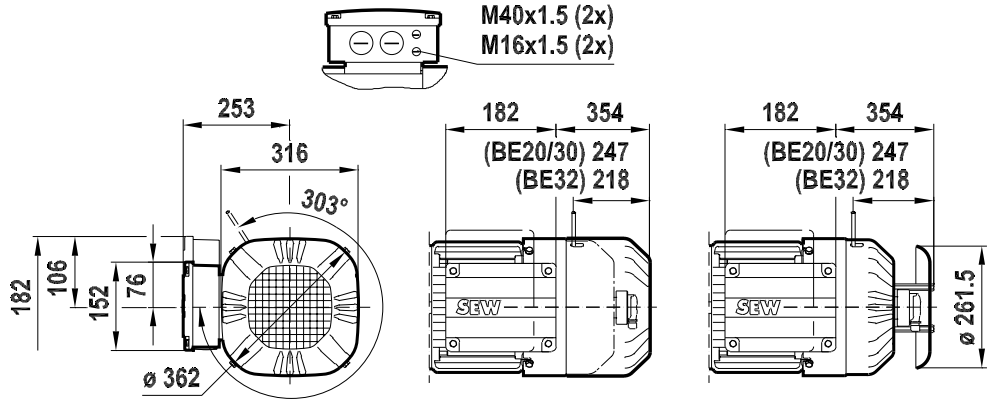


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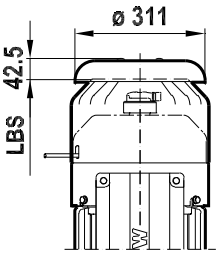


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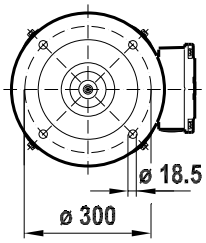


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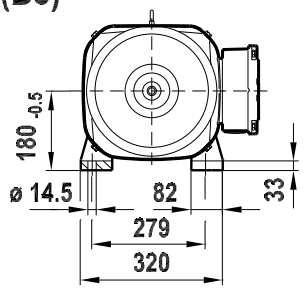


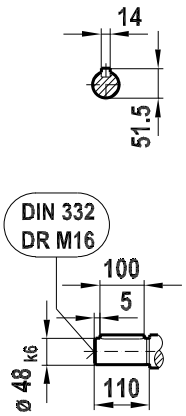


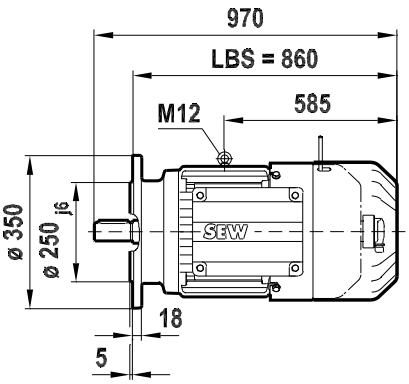


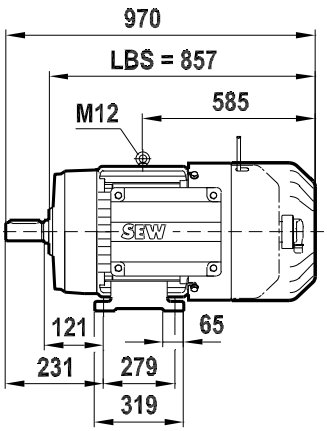


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## DRL180LC4

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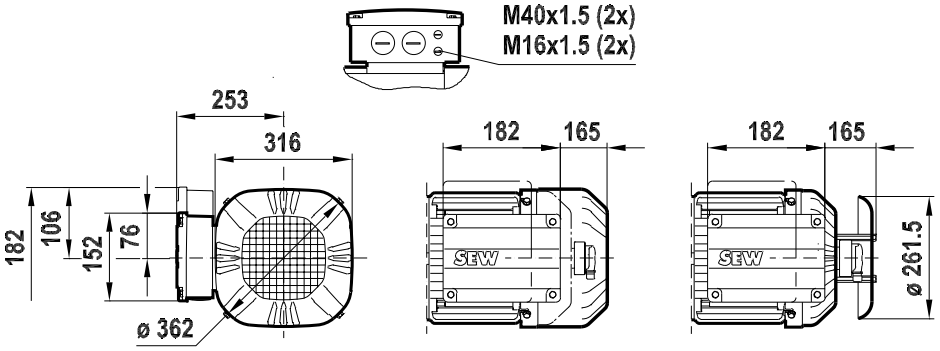


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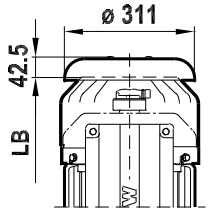


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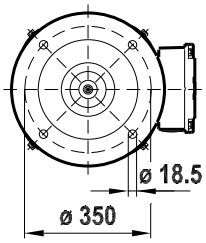


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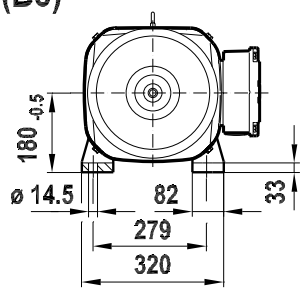


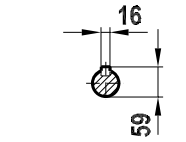


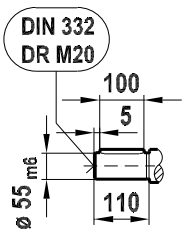


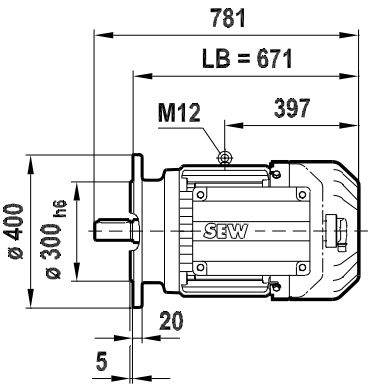


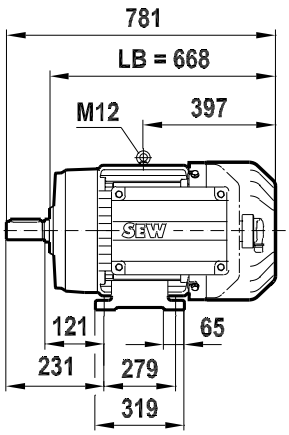


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## DRL180LC4 BE

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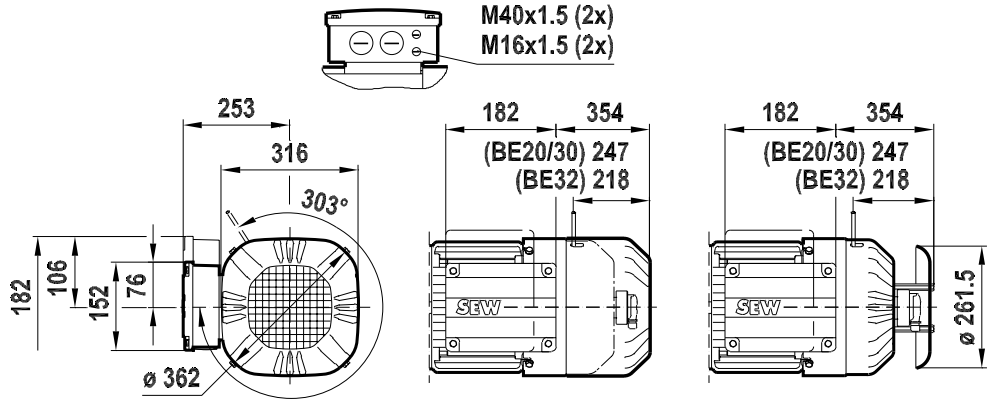


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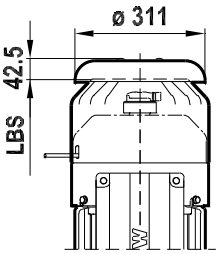


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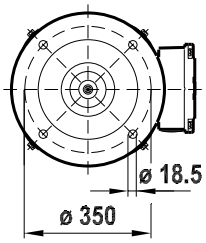


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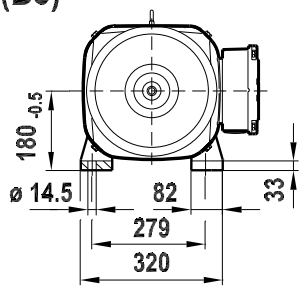


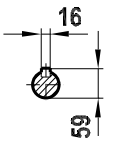


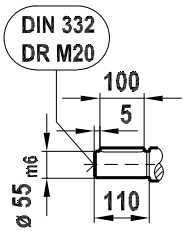


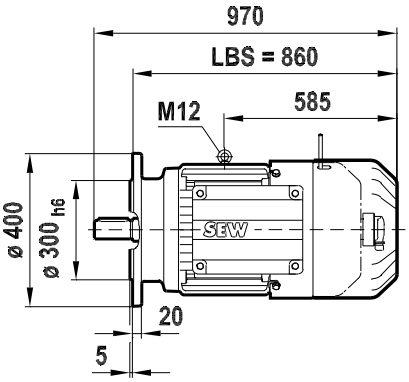


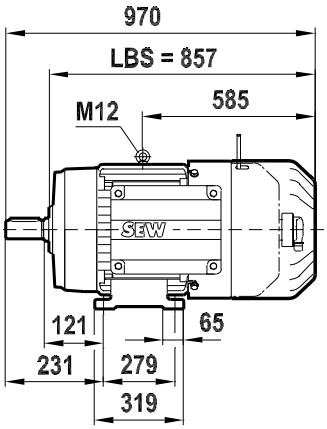


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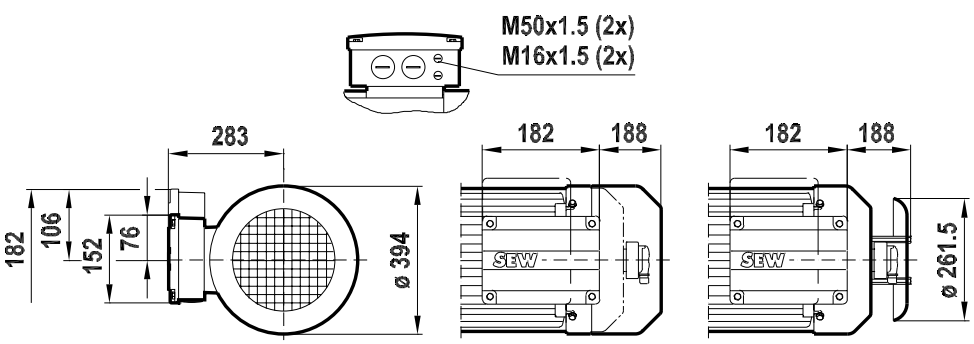


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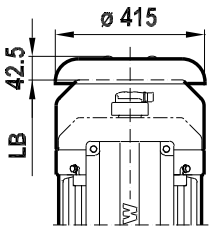


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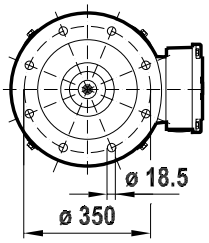


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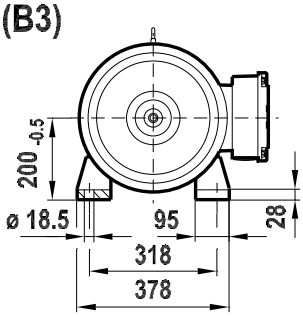


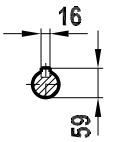


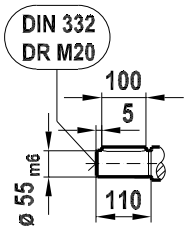


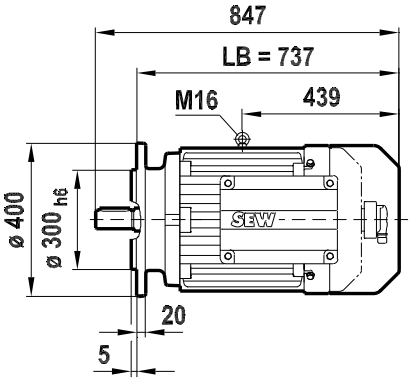


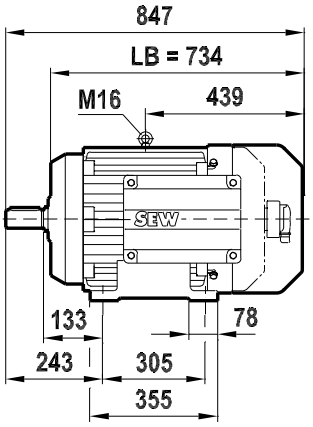


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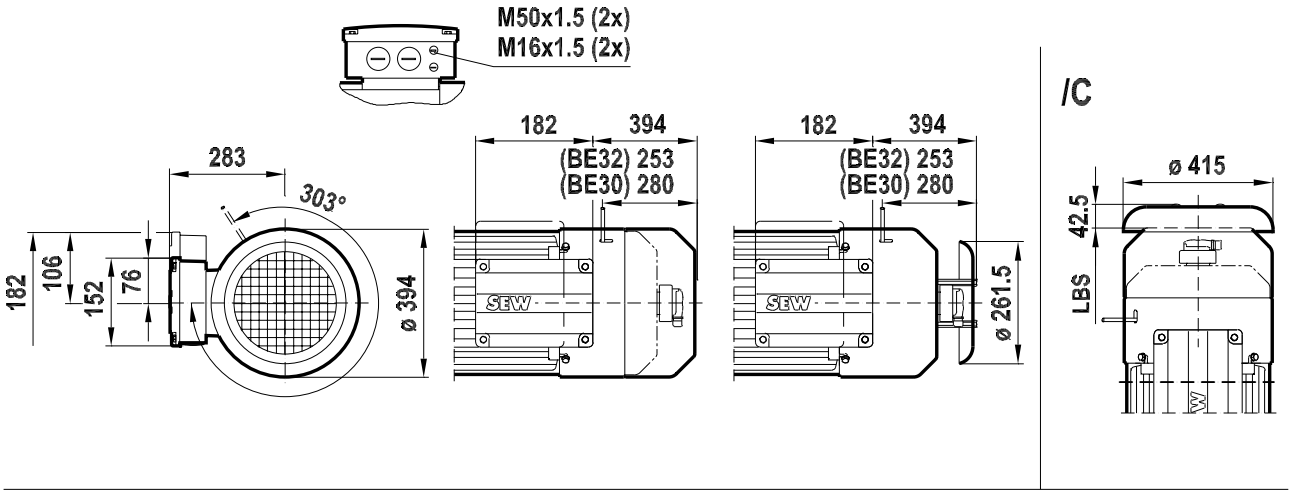


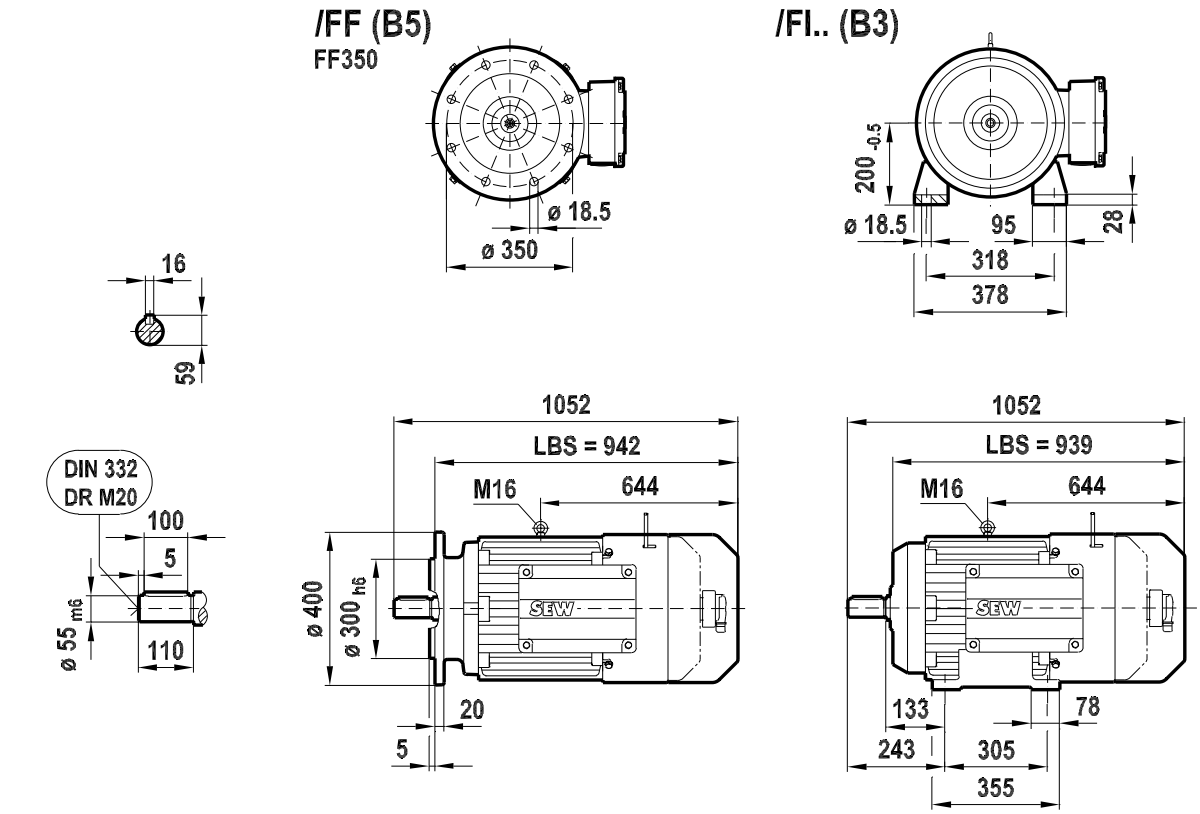


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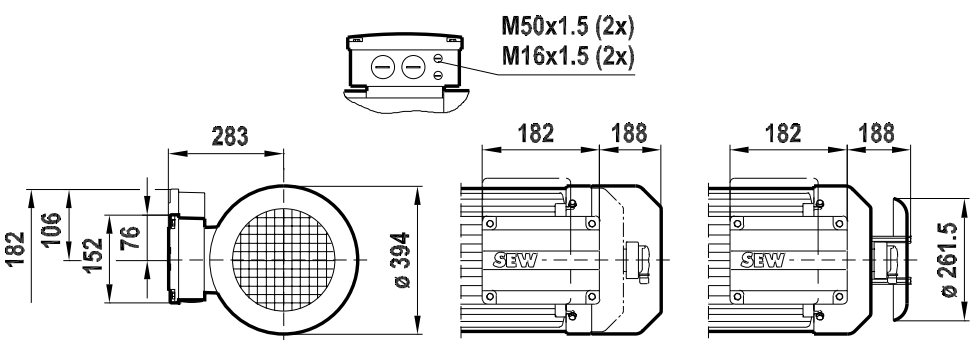


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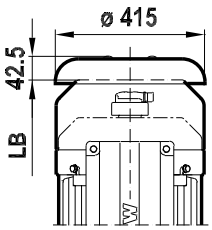


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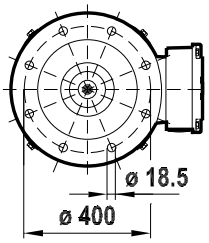


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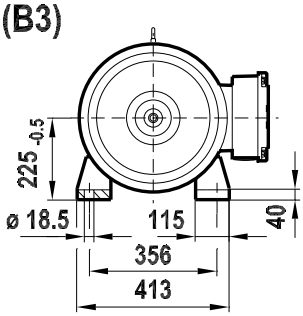


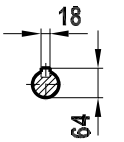


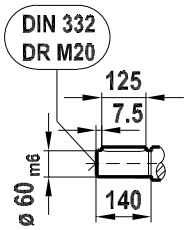


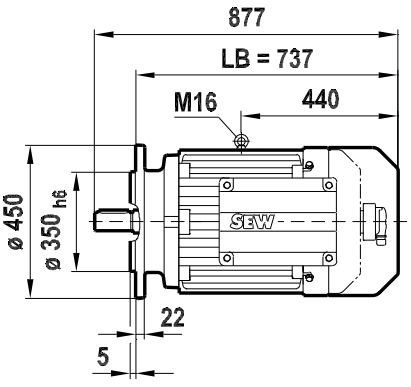


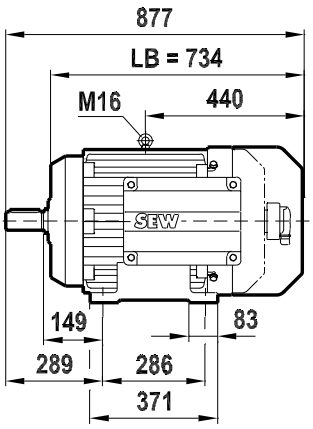


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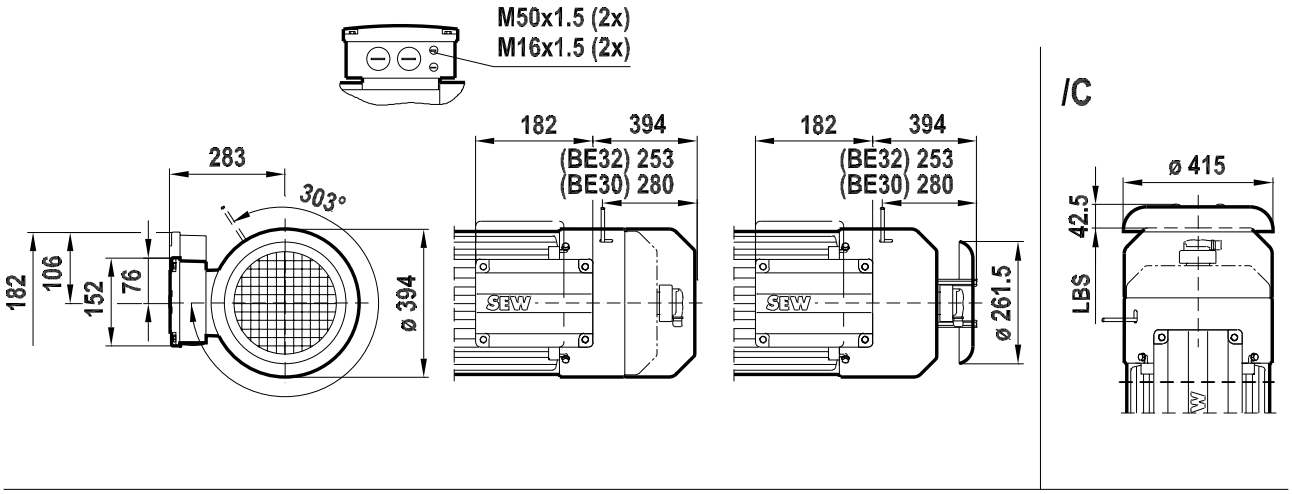


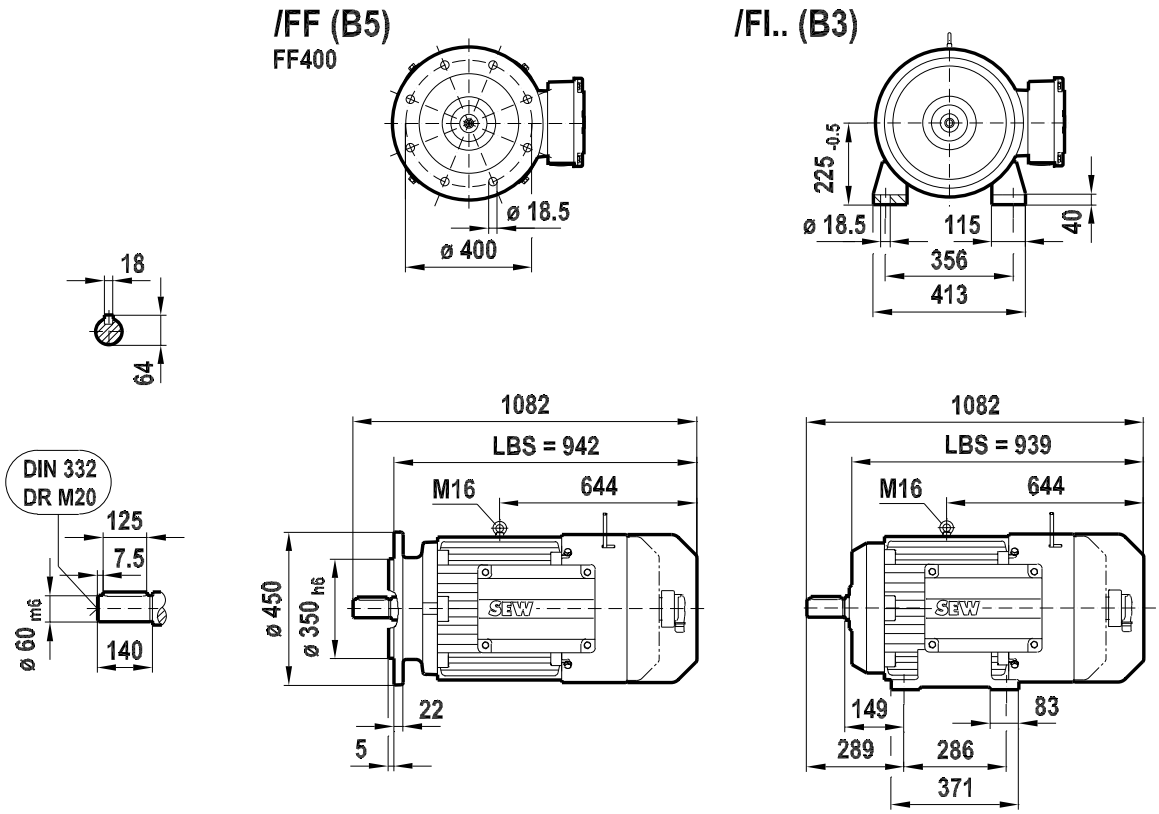


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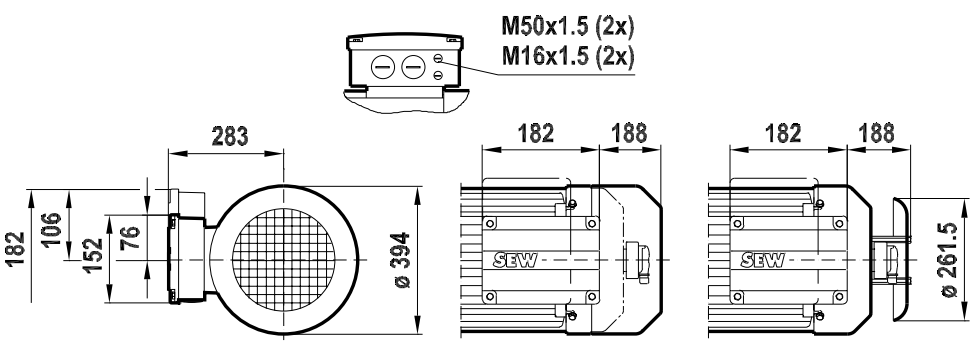


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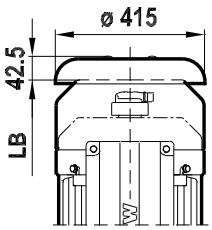


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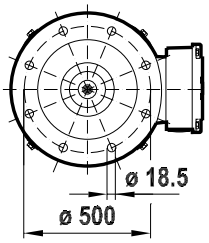


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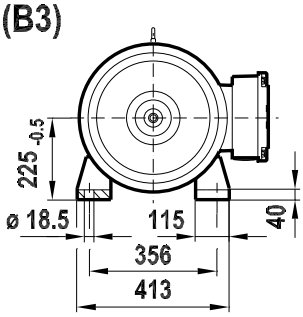


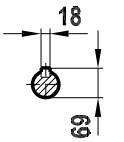


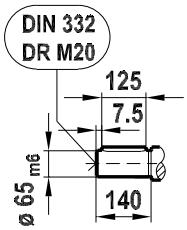


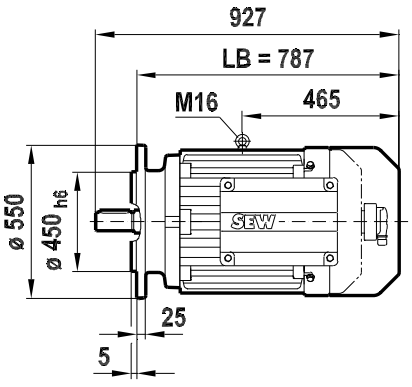


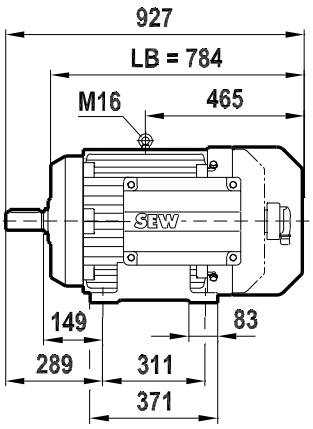


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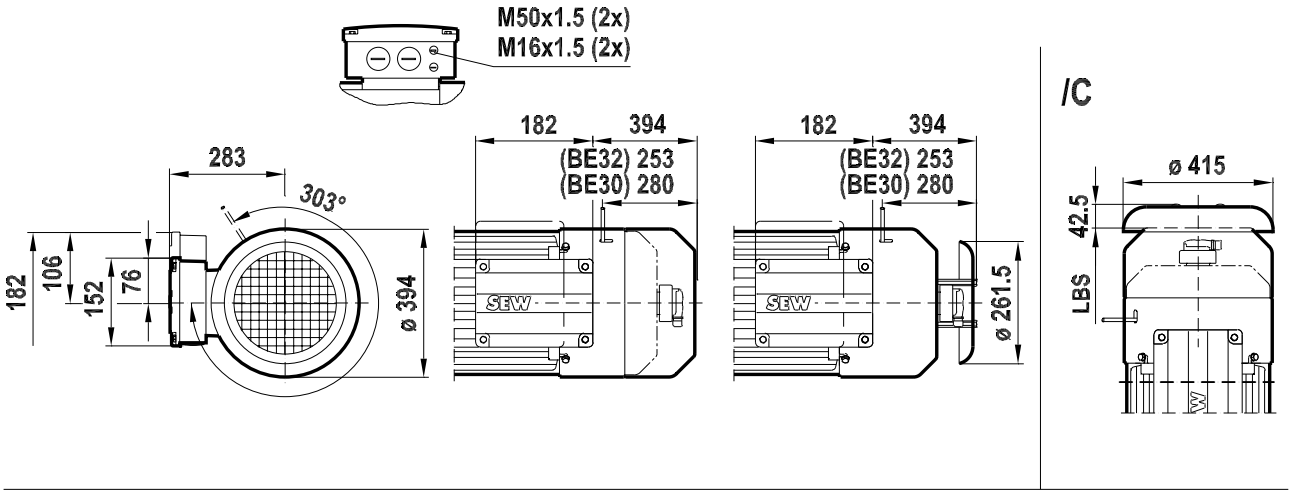


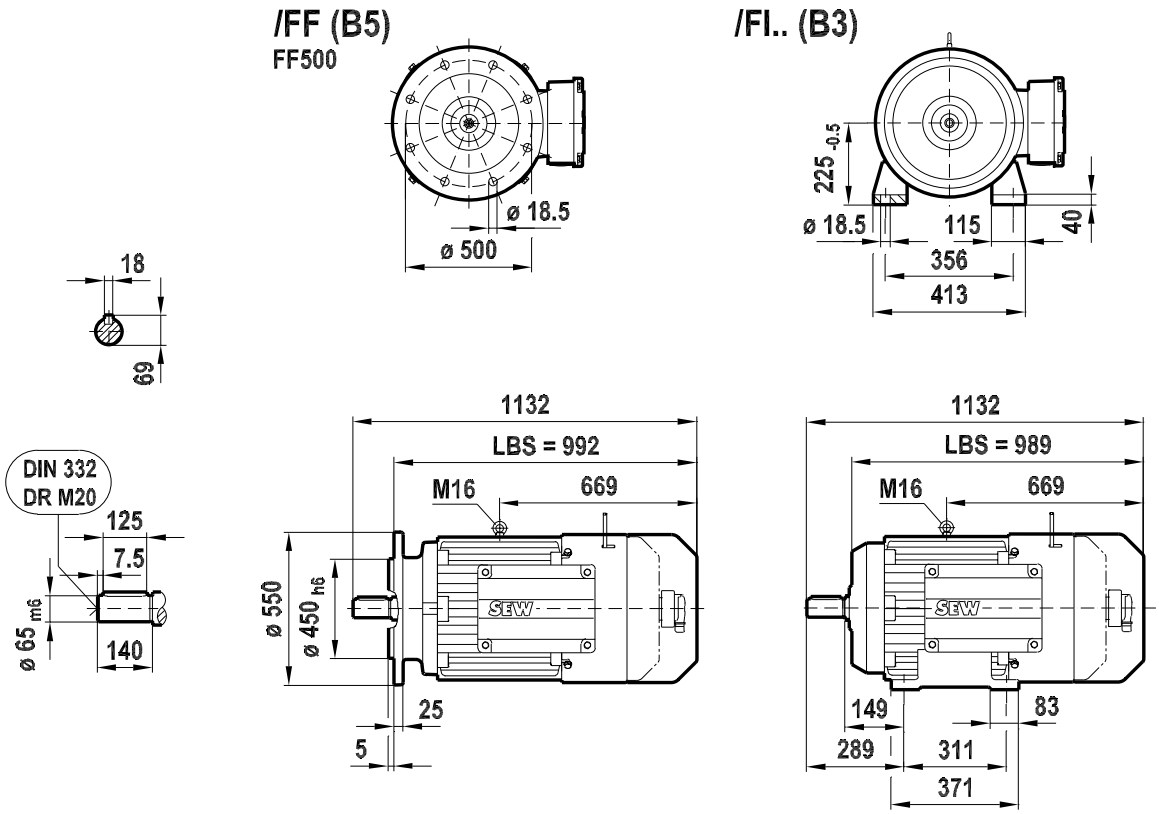


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# 8 BE brake

## 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

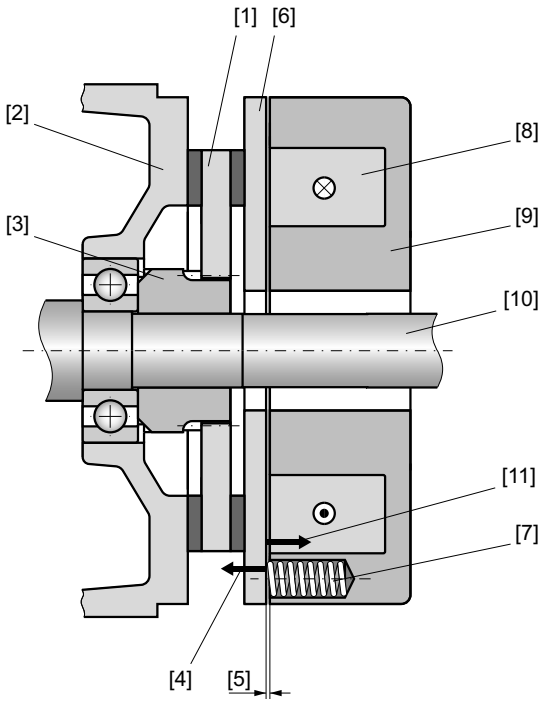
### 8.2.1 Basic design

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
[2] Brake endshield
[3] Driver
[4] Spring force
[5] Working air gap
[6] Pressure plate
[7] Brake spring
[8] Brake coil
[9] Magnet body
[10] Motor shaft
[11] Electromagnetic force

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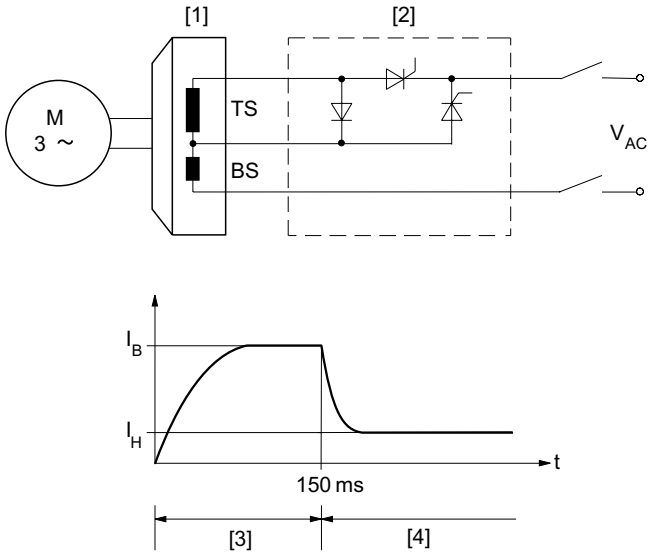
### 8.2.3 Particularly short response times at switch-on

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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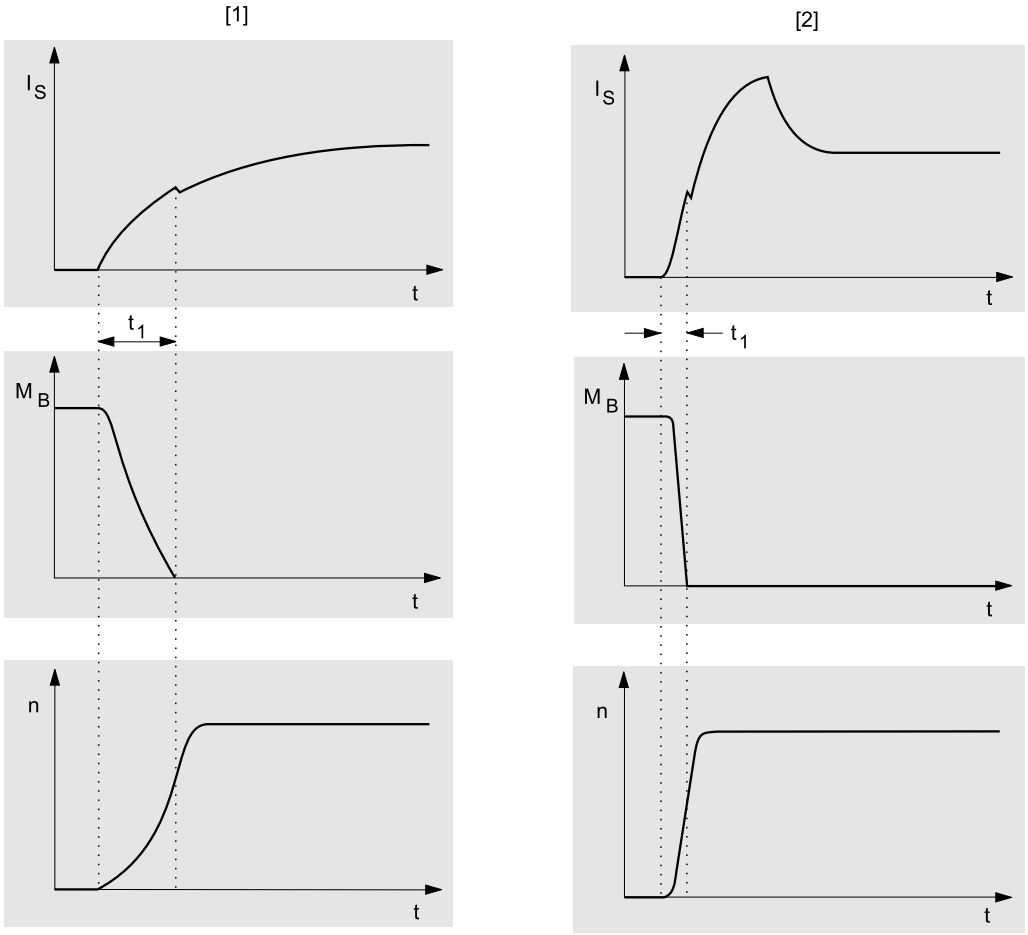
The particularly short response times of SEW brakes lead to faster motor startup time and minimal startup heating, which reduces energy consumption and brake wear during startup (see following figure). Benefits for the user: very high starting frequency and a long brake service life.




[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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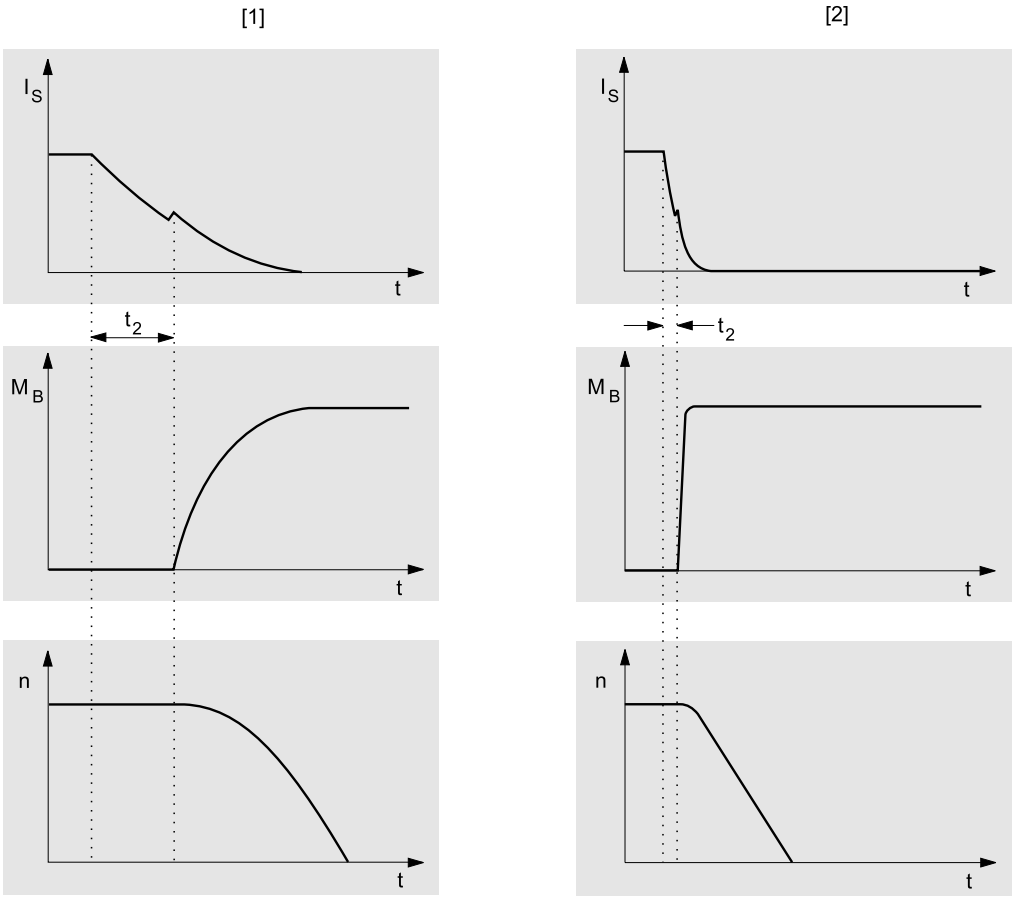
### 8.2.4 Particularly short response time at switch-off

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.

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[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

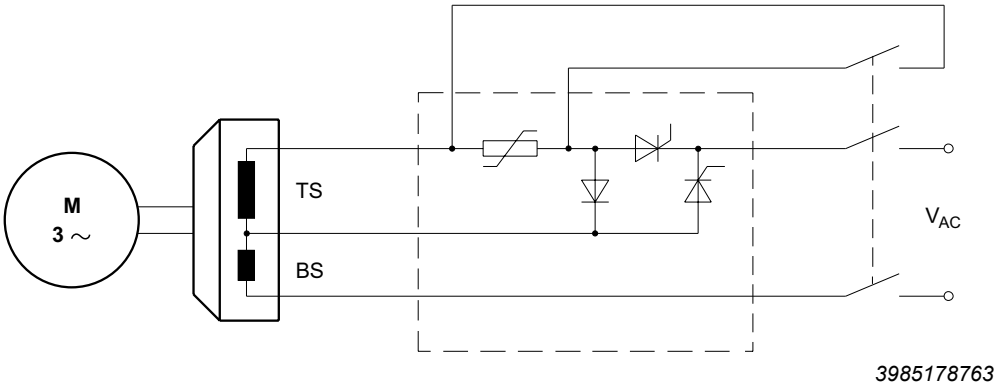
n Speed

$t_2$ 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.




### 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.

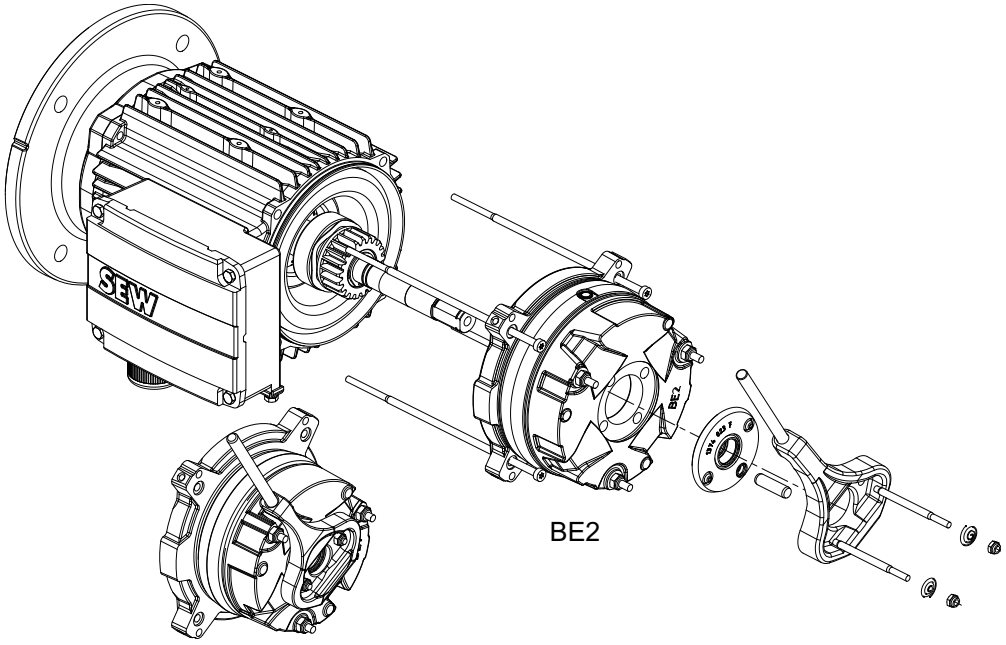
Main features of the brake:

- 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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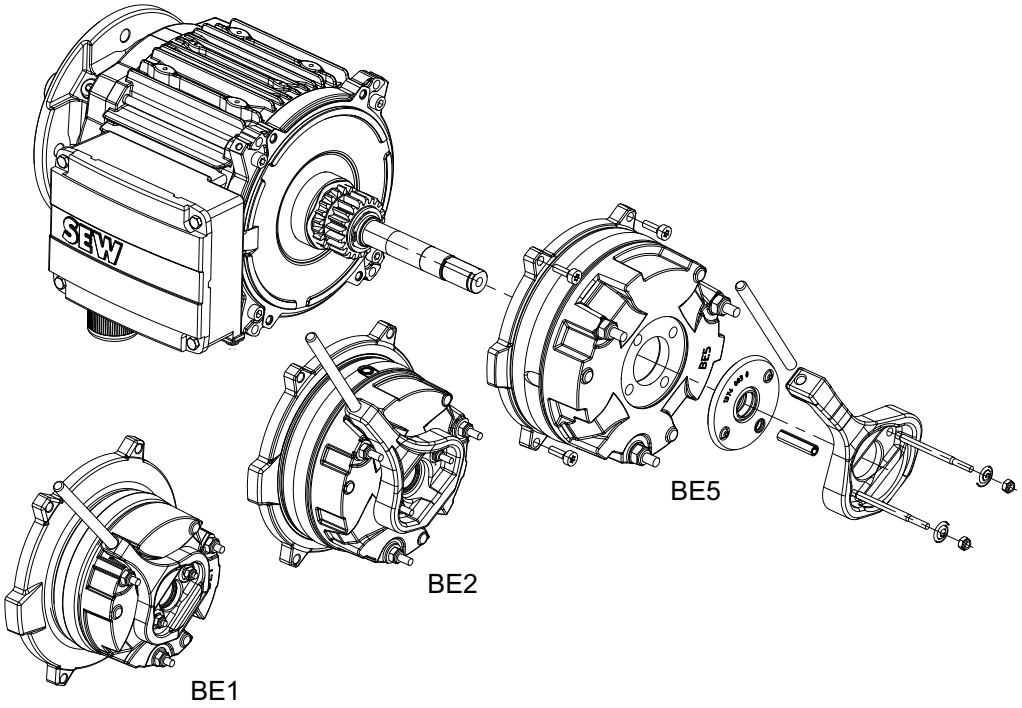
### Modular design

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 | Construction | 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 | Integrated | 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 | Modular | 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 | Construction | 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**<br>**Braking distance**<br>**Deceleration**<br>**Braking accuracy** | The required data can only be observed if the aforementioned parameters meet the requirements |
| **Braking work**<br>**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.

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## 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:

$$W_1 = \frac{J_{tot} \times n^2 \times M_B}{182.4 \times (M_B \pm M_L)}$$

*5463389579*

$W_1$ = 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:

$$NB = \frac{W_{insp}}{W_1}$$

*5463387659*

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<br>AC 380 – 420 V | |
| Nominal voltage | DC 24 V<br>AC 230 V<br>AC 400 V | -<br>AC 230 V<br>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<br>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.

<table>
<tr><th rowspan="2">Brake</th><th colspan="2">High starting frequency</th></tr>
<tr><th>Brake control for AC connection</th><th>Brake control for 24 V DC connection</th></tr>
<tr><td>BE05</td><td rowspan="10">BGE (BSR, BUR) in terminal box or BME (BMH, BMP, BMK) in control cabinet</td><td rowspan="6">BSG in terminal box<br>or<br>BMV and BSG in control cabinet</td></tr>
<tr><td>BE1</td></tr>
<tr><td>BE2</td></tr>
<tr><td>BE5</td></tr>
<tr><td>BE11</td></tr>
<tr><td>BE20</td></tr>
<tr><td>BE30</td><td rowspan="6">-</td></tr>
<tr><td>BE32</td></tr>
<tr><td>BE60</td><td rowspan="2">BGE in terminal box or BME in control cabinet</td></tr>
<tr><td>BE62</td></tr>
<tr><td>BE120</td><td rowspan="2">BMP3.1</td></tr>
<tr><td>BE122</td></tr>
</table>

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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 $t_2$II 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<br>BMS 1.5<br>BMS 3 | 71 – 100 / BE2 | 71 – 100 / BE2 | 71 – 100 / BE2 |
| BME | BME 1.4<br>BME 1.5<br>BME 3 | 71 – 225 / BE32<br>250, 280 /BE60/62 | 71 – 132 / BE11 | 71 – 225 / BE32 |
| BMP | BMP 1.4<br>BMP 1.5<br>BMP 3<br>BMP 3.1 | 71 – 225 / BE32<br>250, 280 / BE60/62 | 71 – 132 / BE11 | 71 – 225 / BE32 |
| BMK | BMK 1.4<br>BMK 1.5<br>BMK 3 | 71 – 225 / BE32 | 71 – 132 / BE11 | 71 – 225 / BE32 |
| BMH | BMH 1.4<br>BMH 1.5<br>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<br>BG1.5<br>BG3 | 71 – 100 / BE2 | 71 – 100 / BE2 | 71 – 100 / BE2 |
| BGE | BGE1.4<br>BGE1.5<br>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<br>0826760X | Red<br>- |
| | | | 1.0 | BGE 1.5 + SR 11 | 8253854<br>8267618 | Red<br>- |
| | | | 1.0 | BGE 1.5 + SR 15 | 8253854<br>8267626 | Red<br>- |
| | | | 1.0 | BGE 1.5 + SR 19 | 8253854<br>8262462 | Red<br>- |
| | | AC 42 – 150 V | 1.0 | BGE 3 + SR10 | 8253870<br>0826760X | Blue<br>- |
| | | | 1.0 | BGE 3 + SR11 | 8253870<br>8267618 | Blue<br>- |
| | | | 1.0 | BGE 3 + SR15 | 8253870<br>8267626 | Blue<br>- |
| | | | 1.0 | BGE 3 + SR19 | 8253870<br>8262462 | Blue<br>- |

| Type | Design | Standard terminal box | IS integrated plug connector | IV industrial plug connector[1] (AC.., AS.., AM.., AB.., AK.., AD..) |
|---|---|---|---|---|
| BSR | BGE1.5 + SR10<br>BGE1.5 + SR11<br>BGE1.5 + SR15<br>BGE1.5 + SR19<br>BGE3 + SR10<br>BGE3 + SR11<br>BGE3 + SR15<br>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 | | | | | | | | | | | | |
| BE1 | | | | | | | | | | | | |
| BE2 | | | | | | | | | | | | |
| BE5 | | | | | | | | | | | | |
| BE11 | | | | | | | | | | | | |
| BE20 | | | | | | | | | | | | |
| BE30 | | | | | | | | | | | | |
| BE32 | | | | | | | | | | | | |

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<br>8267596 | red<br>- |
| | | AC 42 – 150 V | 1.0 | BGE 3 + UR 11 | 8253870<br>8267588 | blue<br>- |

| Type | Design | Standard connection box | IS integrated plug connector | Industrial plug connector IV[1] (AC.., AS.., AM.., AB.., AK.., AD..) |
|---|---|---|---|---|
| BUR | BGE1.5 + UR15<br>BGE3 + UR11 | 71 – 225 / BE32 | 71 – 132 / BE11 | 71 – 225 / BE32 |

1) Note the permitted current strength of the relevant plug connector

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### 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 $t_2$l 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.

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## 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

<table>
<tr><th rowspan="2">Brakes</th><th colspan="6">Minimum cable cross section of the brake cables in mm² (AWG) for cable lengths ≤ 50 meters and brake voltage (AC V)</th></tr>
<tr><th>24</th><th>60<br>DC 24 V</th><th>120</th><th>184 - 208</th><th>230</th><th>254 - 575</th></tr>
<tr><td>BE05</td><td rowspan="3">10 (8)</td><td colspan="5" rowspan="2"></td></tr>
<tr><td>BE1</td></tr>
<tr><td>BE2</td><td>2.5 (12)</td><td colspan="4" rowspan="2">1.5 (16)</td></tr>
<tr><td>BE5</td><td>[1]</td><td>4 (10)</td></tr>
<tr><td>BE11</td><td rowspan="3"></td><td rowspan="2">10 (8)</td><td>2.5 (12)</td><td rowspan="3"></td><td rowspan="4"></td><td rowspan="4"></td></tr>
<tr><td>BE20</td><td rowspan="2"></td></tr>
<tr><td>BE30 / 32</td><td rowspan="2"></td></tr>
<tr><td>BE120/122</td><td colspan="2"></td></tr>
</table>

1) Not available

BE60 / 62, BR03

<table>
<tr><th rowspan="2">Brakes</th><th colspan="8">Minimum cable cross section of the brake cables in mm² (AWG) for cable lengths ≤ 50 meters and brake voltage (AC V)</th></tr>
<tr><th>42</th><th>48</th><th>56<br>DC 24 V</th><th>110</th><th>125-153</th><th>175-200</th><th>208-230</th><th>254-500</th></tr>
<tr><td>BR03</td><td colspan="7">1.5 (16)</td><td></td></tr>
<tr><td>BE60 / 62</td><td colspan="6">[1]</td><td>2.5 (14)</td><td></td></tr>
</table>

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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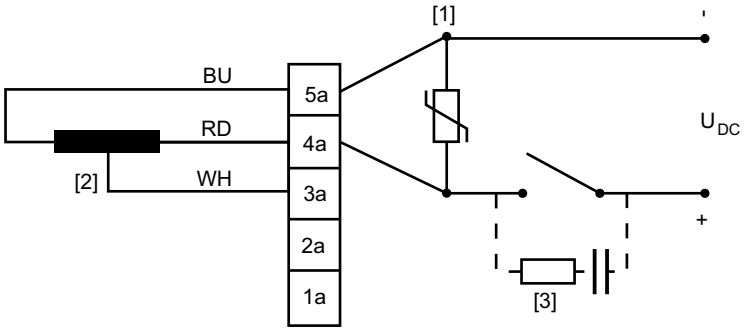
### 8.7.3 Varistor overvoltage protection with direct DC voltage supply

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.




*5463392779*

| | | | |
|---|---|---|---|
| [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.



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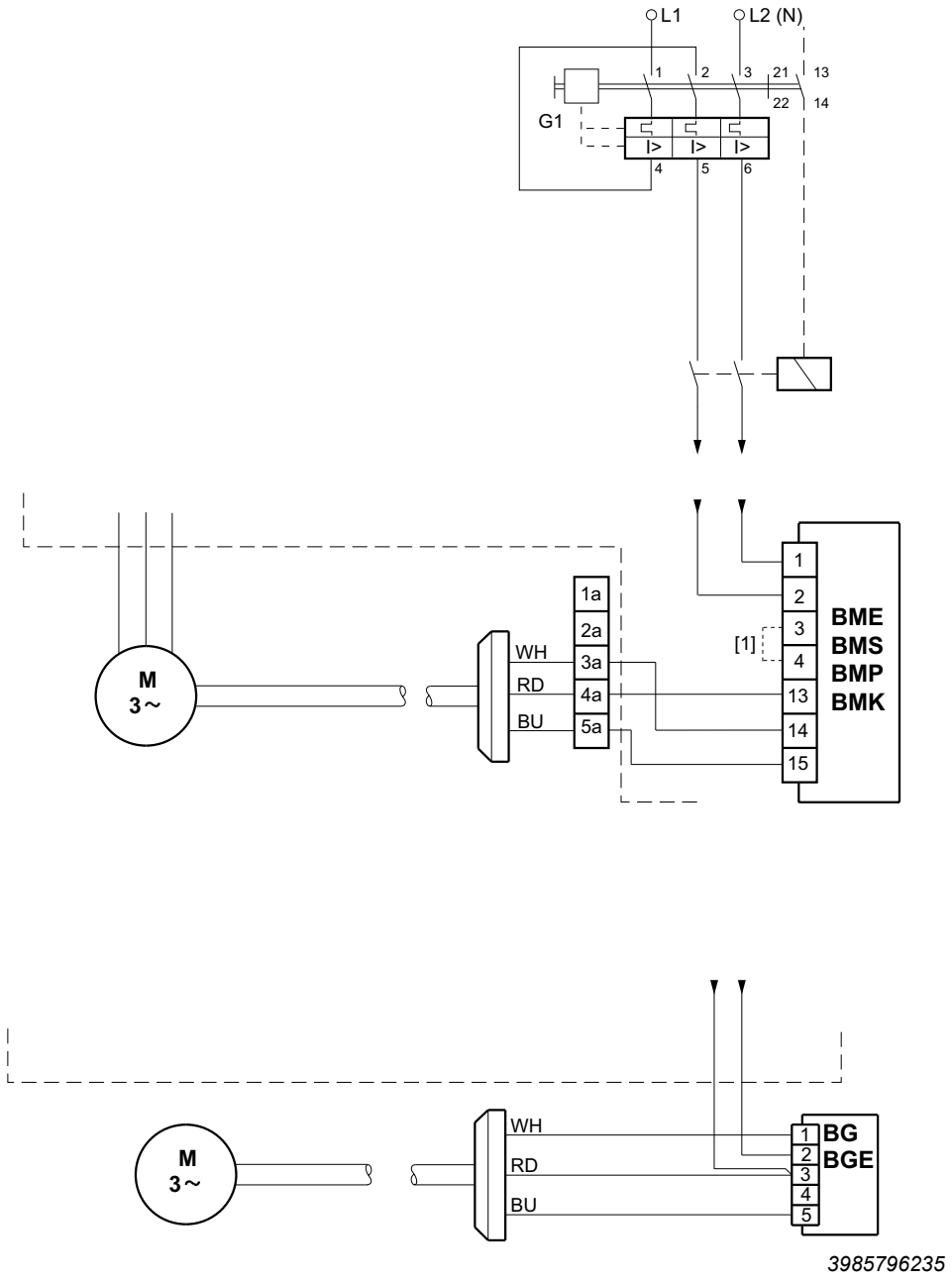
Advantage: Motor protection switches prevent the brake coil from being destroyed when a fault occurs in the brake rectifier or the brake coil is connected incorrectly.




[1] Customers must connect terminals 3 and 4 according to the relevant wiring diagram.

Key:

| | |
|---|---|
| **WH** | white |
| **RD** | red |
| **BU** | blue |

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## 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 $t_2$I 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)<br>3.5 (31)<br>2.5 (22)<br>1.8 (16) | 3<br>–<br>–<br>– | 4<br>6<br>3<br>– | –<br>–<br>–<br>– | 0135017X | 13741373 |
| BE1 | 120 | 0.25 | 0.6 | 9.0 | 13740563 | 10 (88.5)<br>7.0 (62)<br>5.0 (44) | 63<br>4<br>– | –<br>2<br>– | –<br>–<br>– | 0135017X | 13741373 |
| BE2 | 180 | 0.25 | 0.6 | 9.0 | 13740199 | 20 (177)<br>14 (124)<br>10 (88.5)<br>7.0 (62)<br>5.0 (44) | 6<br>2<br>2<br>–<br>– | –<br>4<br>2<br>4<br>3 | –<br>–<br>–<br>–<br>– | 13740245 | 13740520 |
| BE5 | 390 | 0.25 | 0.9 | 9.0 | 13740695 | 55 (487)<br>40 (354)<br>28 (248) | 6<br>2<br>2 | –<br>4<br>2 | –<br>–<br>– | 13740709 | 13740717 |
| | | | | | | 20 (177)<br>14 (124) | –<br>– | –<br>– | 6<br>4 | | 13747738 |
| BE11 | 640 | 0.3 | 1.2 | 10.0 | 13741713 | 110 (974)<br>80 (708)<br>55 (487)<br>40 (354) | 6<br>2<br>2<br>– | –<br>4<br>2<br>4 | –<br>–<br>–<br>– | 13741837 | 13741845 |
| | | | | | 13741713 + 13746995 | 28 (248) | – | 3 | – | | |
| | | | | | | 20 (177) | – | – | 4 | 13741837 | 13747789 |
| BE20 | 1000 | 0.3 | 1.2 | 10.0 | – | 200 (1770)<br>150 (1328)<br>110 (974)<br>80 (708)<br>55 (487) | 6<br>4<br>3<br>3<br>– | –<br>2<br>3<br>–<br>4 | –<br>–<br>–<br>–<br>– | 13743228 | 13742485 |
| | | | | | 13746758 | 40 (354) | – | 3 | – | | |

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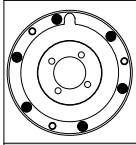
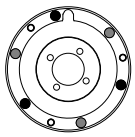
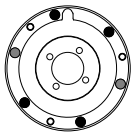
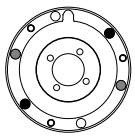
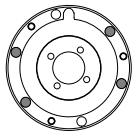
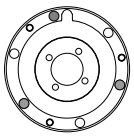
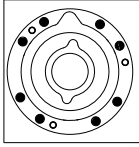
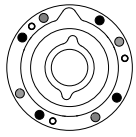
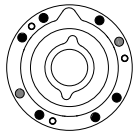
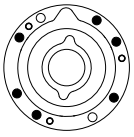
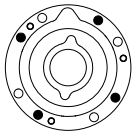
| Brakes | Braking work until maintenance | Working air gap | | Brake disk | Part number damping plate | Braking torque settings | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | mm | | mm | | Brake torque | Type and number of | | | Purchase order number for Brake springs | |
| | $10^6$ J | min.[1] | max. | min. | | Nm (lb-in) | Normal | blue | white | Normal | Blue/white |
| BE30 | 1500 | 0.3 | 1.2 | 10.0 | – | 300 (2655)<br>200 (1770)<br>150 (1328)<br>100 (885)<br>75 (667) | 8<br>4<br>4<br>–<br>– | –<br>4<br>–<br>8<br>6 | –<br>–<br>–<br>–<br>– | 01874551 | 13744356 |
| BE32 | 1500 | 0.4 | 1.2 | 10.0 | – | 600 (5310)<br>500 (4425)<br>400 (3540)<br>300 (2655)<br>200 (1770)<br>150 (1328) | 8<br>6<br>4<br>4<br>–<br>– | –<br>2<br>4<br>–<br>8<br>6 | –<br>–<br>–<br>–<br>–<br>– | 01874551 | 13744356 |
| | | | | | 13746731 | 100 (885) | – | 4 | – | | |
| BE60 | 2500 | 0.3 | 1.2 | 1.2 | – | 600 (5310)<br>500 (4425)<br>400 (3540)<br>300 (2655)<br>200 (1770) | 8<br>6<br>4<br>4<br>- | -<br>2<br>4<br>-<br>8 | -<br>-<br>-<br>-<br>- | 01868381 | 13745204 |
| BE62 | 2500 | 0.4 | 1.2 | 1.2 | – | 1200 (10621)<br>1000 (8851)<br>800 (7081)<br>600 (5310)<br>400 (3540) | 8<br>6<br>4<br>4<br>- | -<br>2<br>4<br>-<br>8 | -<br>-<br>-<br>-<br>- | 01868381 | 13745204 |
| BE120 | 390 | 0.6 | 1.2 | 12.0 | – | 1000 (8851)<br>800 (7081)<br>600 (5310)<br>400 (3540) | 8<br>6<br>4<br>4 | -<br>2<br>4<br>- | -<br>-<br>-<br>- | 13608770 | 13608312 |
| BE122 | 300 | 0.8 | 1.2 | 12.0 | – | 2000 (17701)<br>1600 (14161)<br>1200 (10621)<br>800 (7081) | 8<br>6<br>4<br>4 | -<br>2<br>4<br>- | -<br>-<br>-<br>- | 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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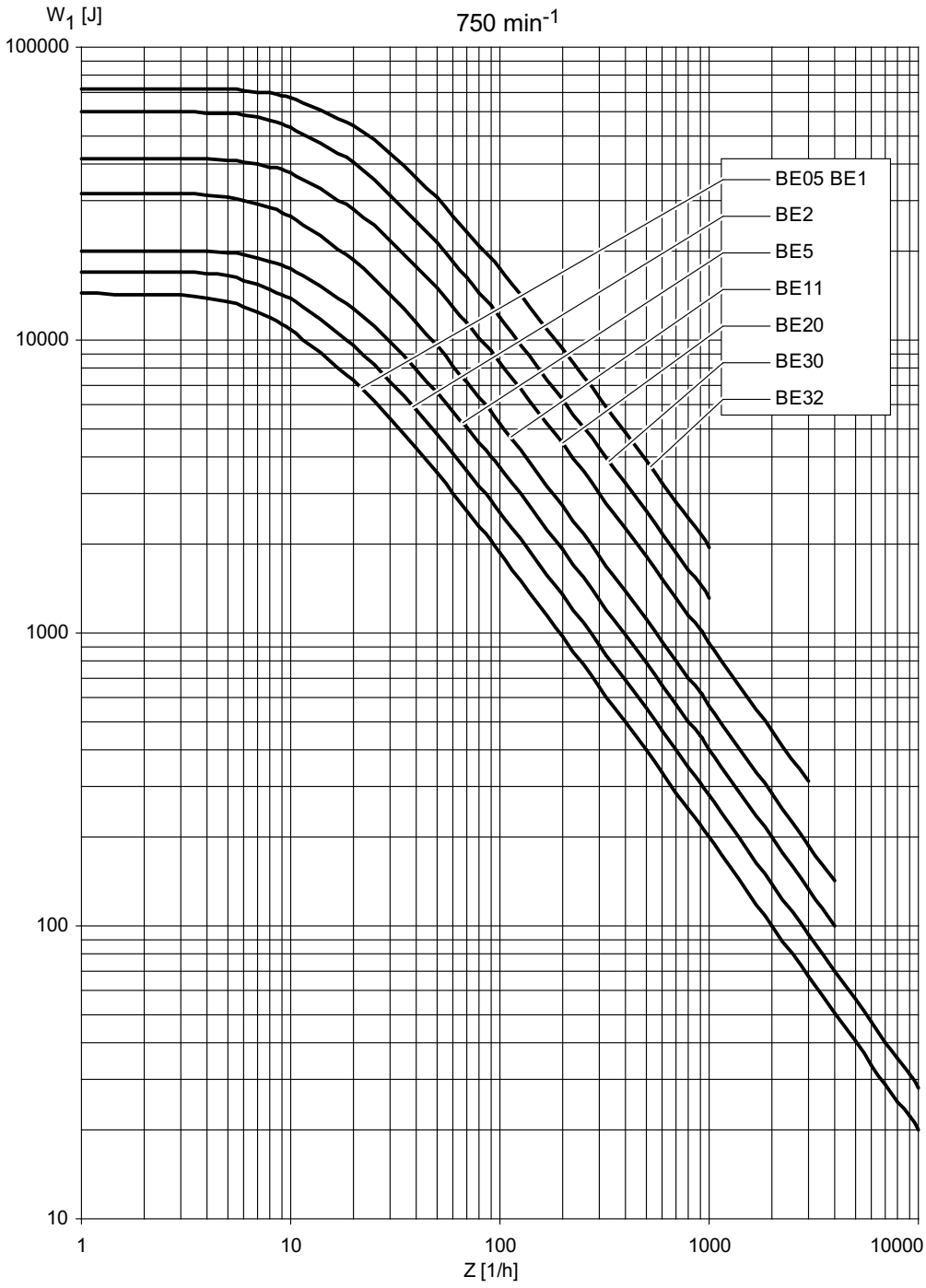
**BE05, BE1, BE2, BE5, BE11, BE20, BE30, BE32**




*9007203295423883*

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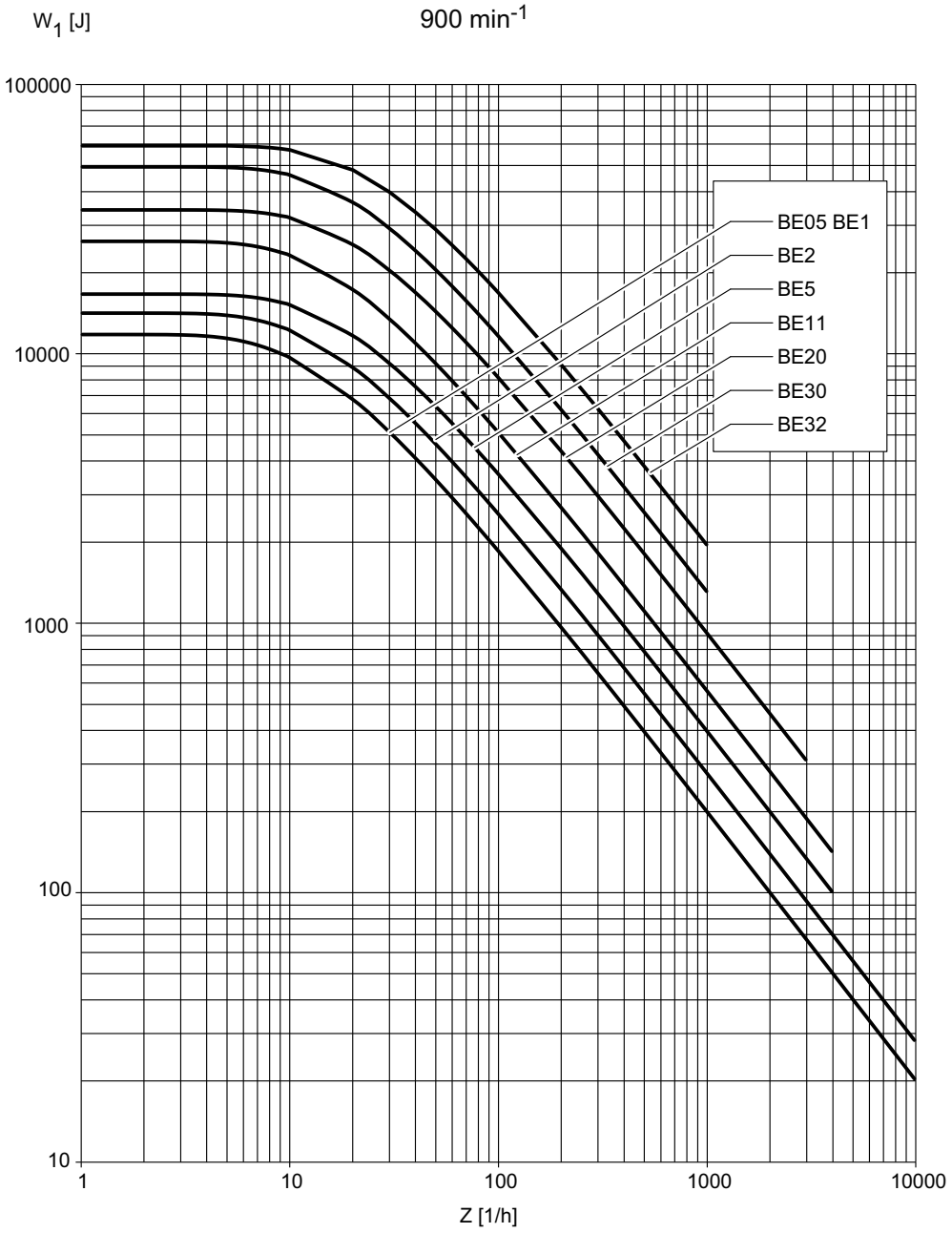
### BE05, BE1, BE2, BE5, BE11, BE20, BE30, BE32




*9007204858323083*

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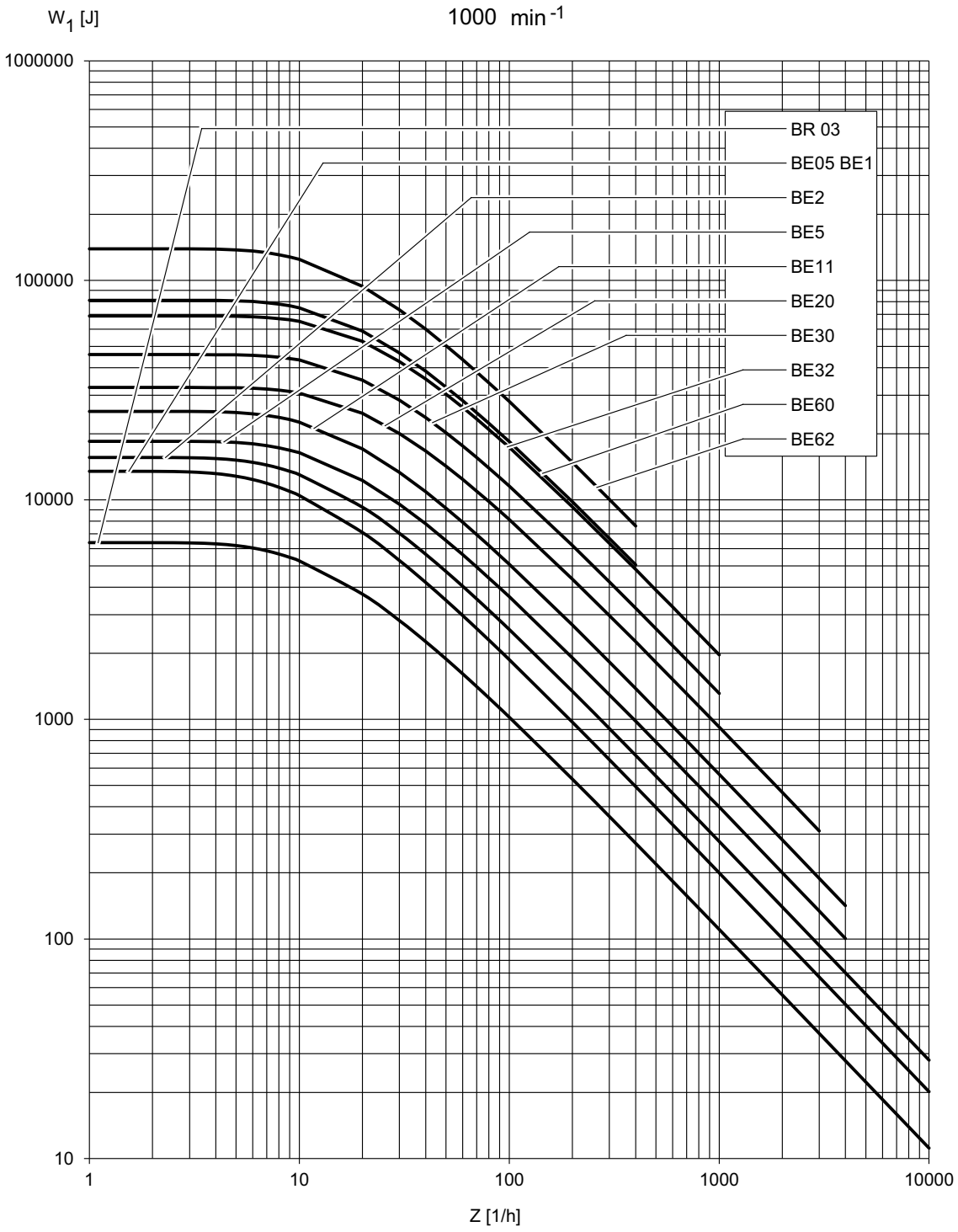
**BE05, BE1, BE2, BE5, BE11, BE20, BE30, BE32, BE60, BE62**




*9007203295421195*

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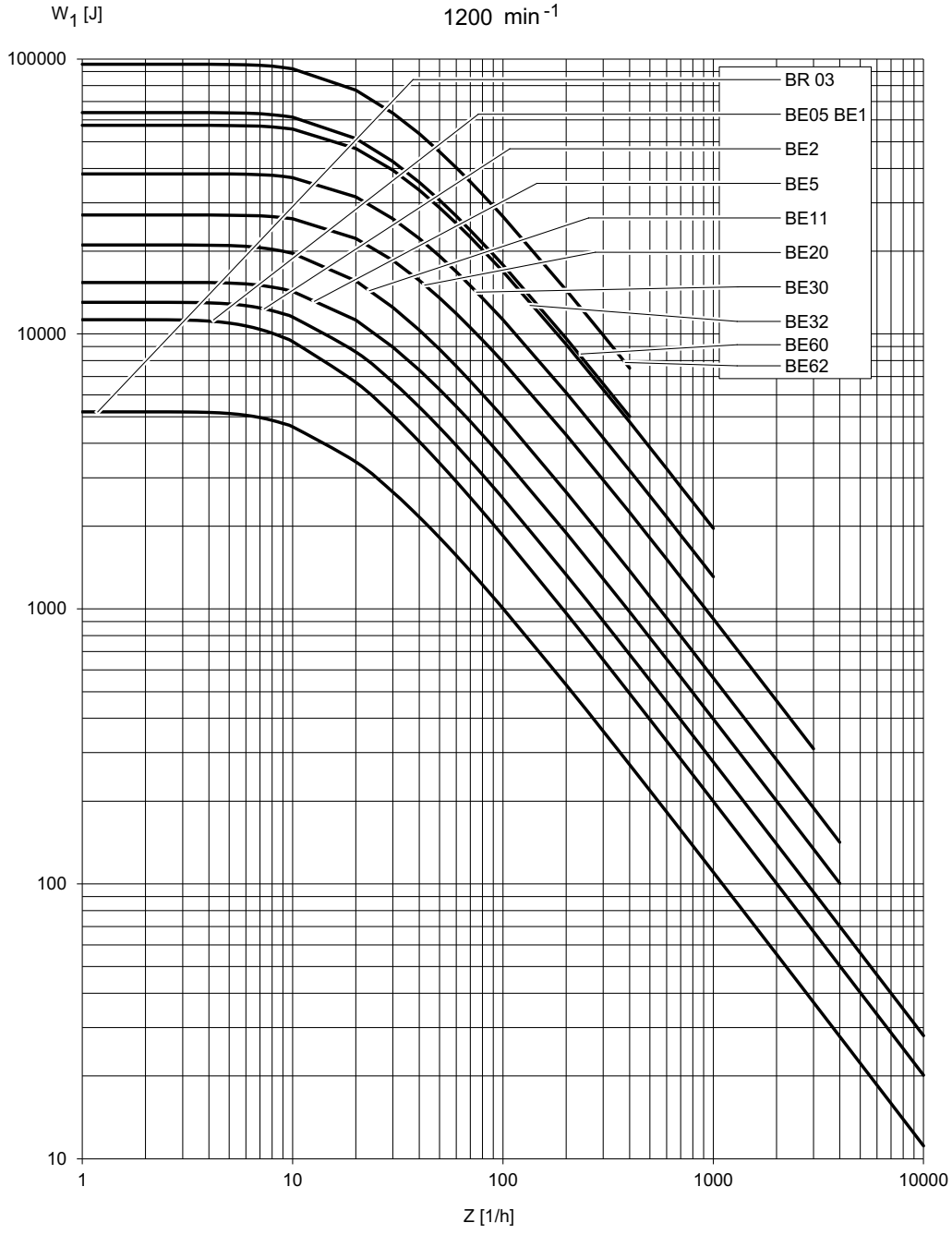
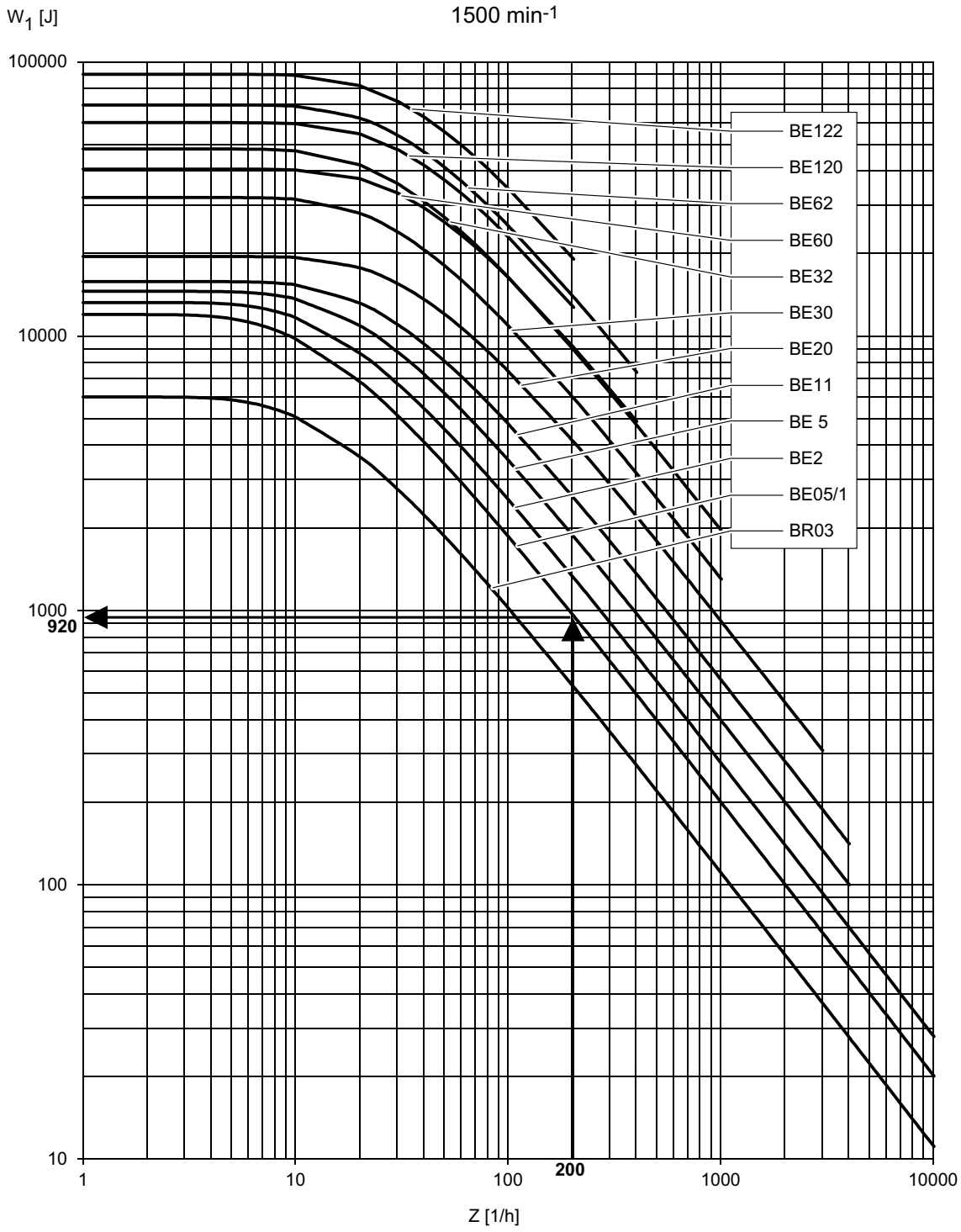
### BE05, BE1, BE2, BE5, BE11, BE20, BE30, BE32, BE60, BE62




*9007204859132171*

**BE05, BE1, BE2, BE5, BE11, BE20, BE30, BE32, BE60, BE62, BE120, BE122**




*9007203295418507*

**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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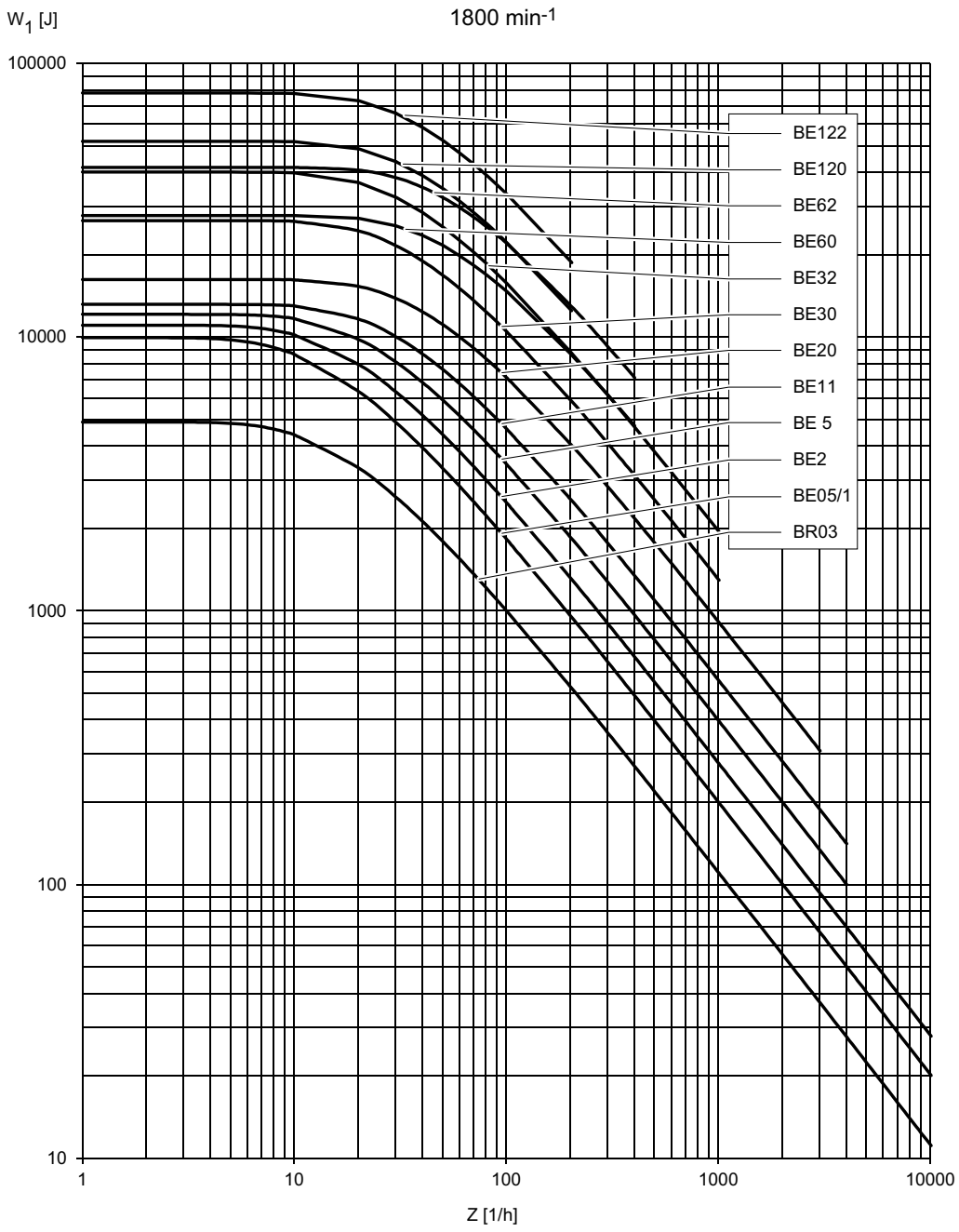
**BE05, BE1, BE2, BE5, BE11, BE20, BE30, BE32, BE60, BE62, BE120, BE122**

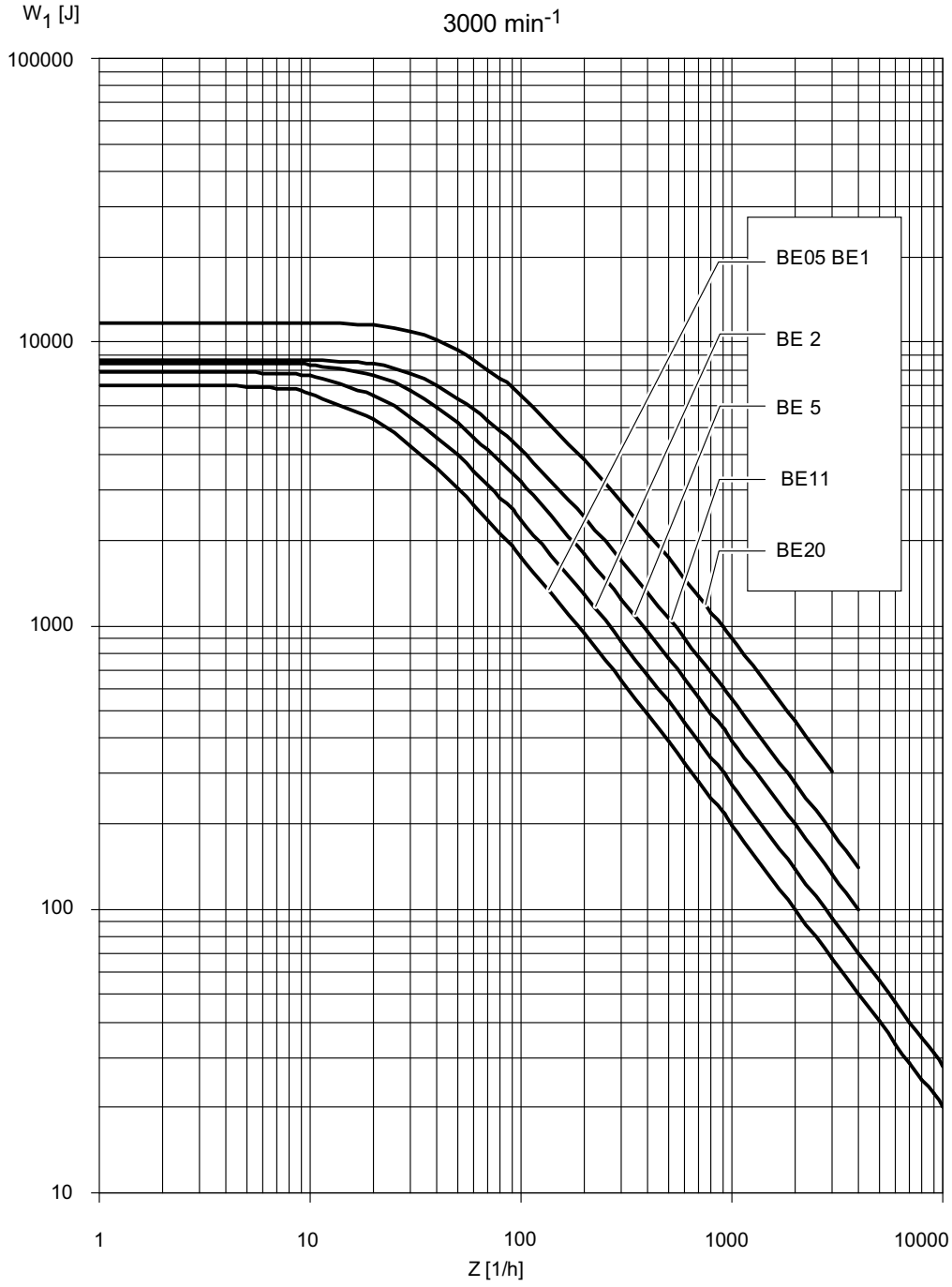



*9007204859134603*

## INFORMATION

Braking operations of speeds greater than 1800 1/min are not permitted for brakes BE30, BE32, BE60, BE62, BE120 and BE122.

### BE05, BE1, BE2, BE5, BE11, BE20




*9007203295415819*

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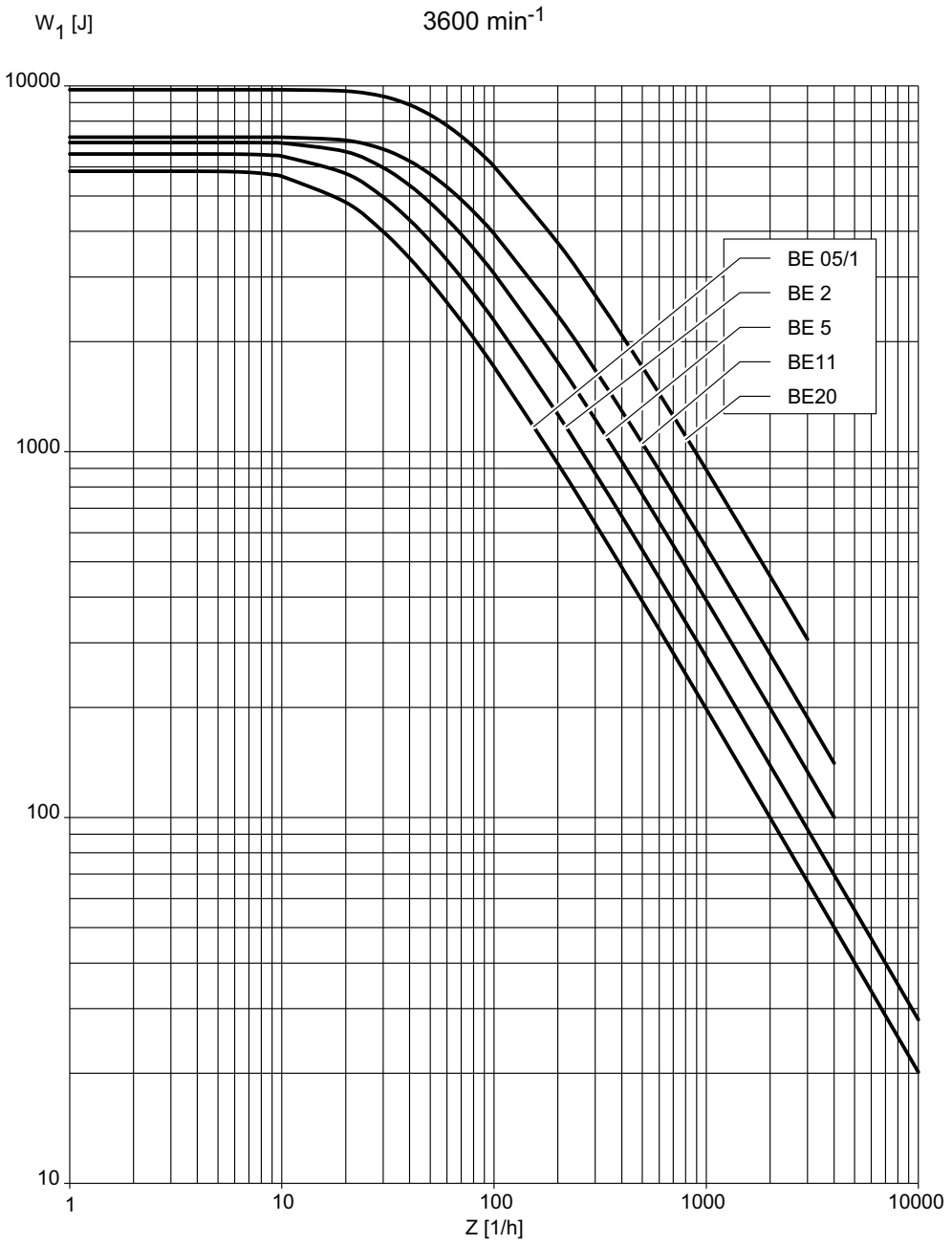
**BE05, BE1, BE2, BE5, BE11, BE20**




*9007204859137419*

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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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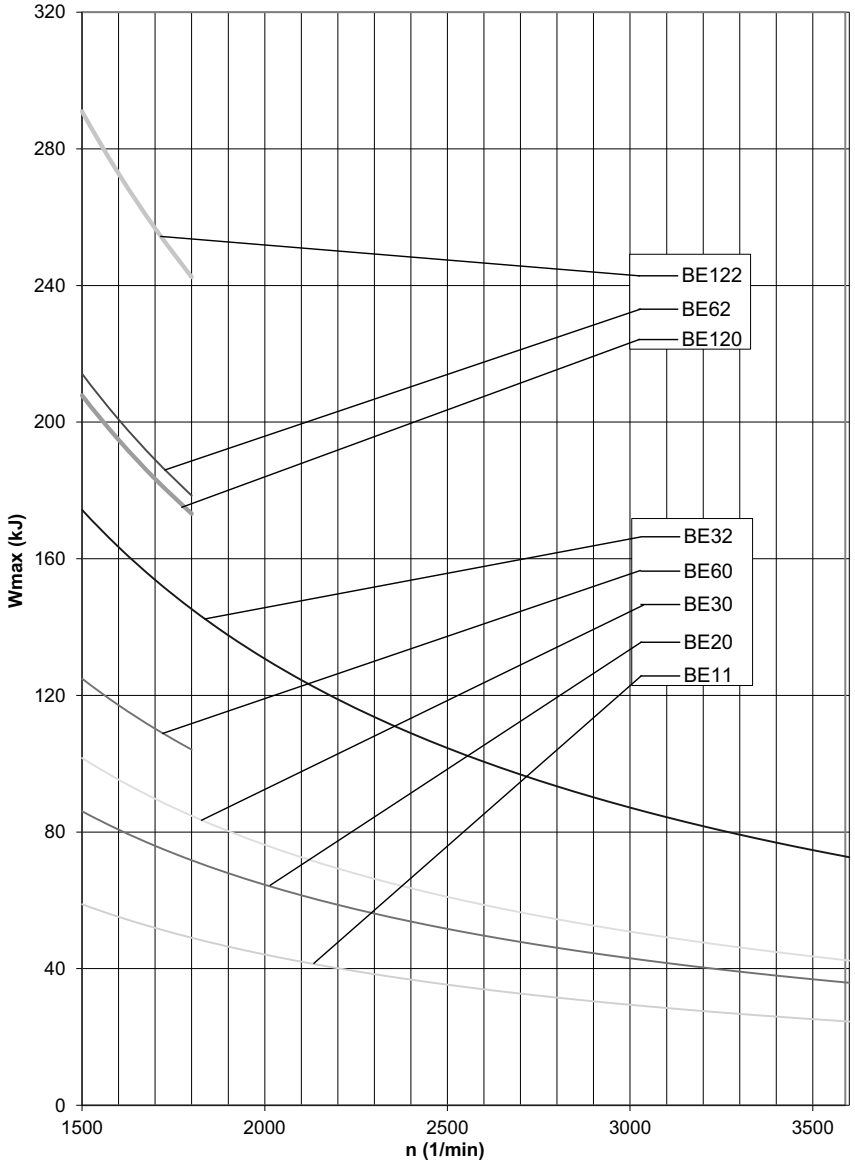
Diagram: Maximum braking work for emergency switching off for travel drives.




*5596208267*

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 |

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| | $W_{max}$ 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 ($t_2$I) and DC and AC circuits ($t_2$II).

| Brake type | $t_1$ in $10^{-3}$ s | | $t_2$ in $10^{-3}$ s | |
|---|---|---|---|---|
| | BG/BMS | BGE/BME | $t_2$II | $t_2$I |
| 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

$t_2$I = Brake application time for cut-off in the AC circuit

$t_2$II = 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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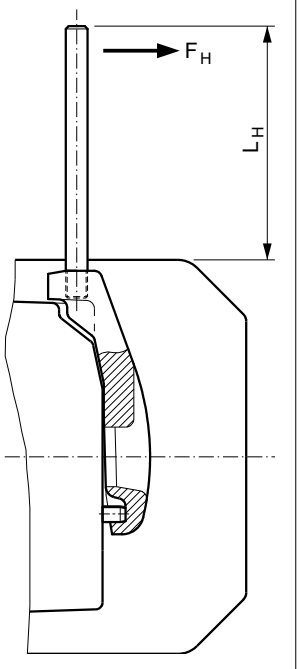
### 8.10.7 Actuating force for manual brake release

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 | |



1) Tolerance of operating force: -10 % to +30 %

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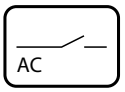
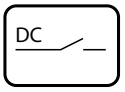
### 8.10.8 Brake control block diagrams

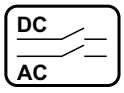
**Legend**



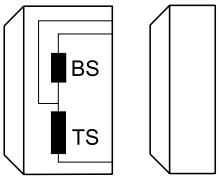

Cut-off in the AC circuit
(normal application of the brake)



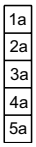

Cut-off in the DC circuit
(rapid application of the brake)




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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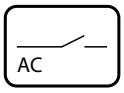
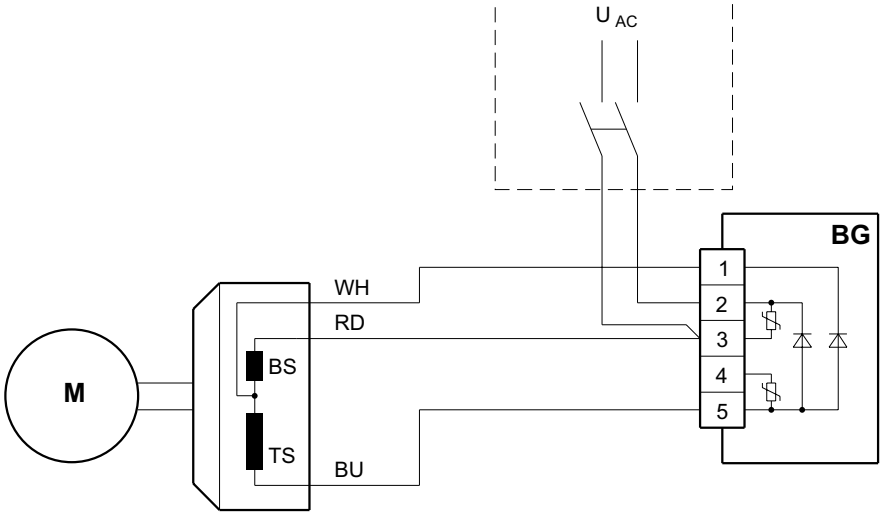
| | |
|---|---|
| **WH** | White |
| **RD** | red |
| **BU** | blue |
| **BN** | Brown |
| **BK** | Black |

### BG brake control

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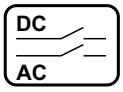


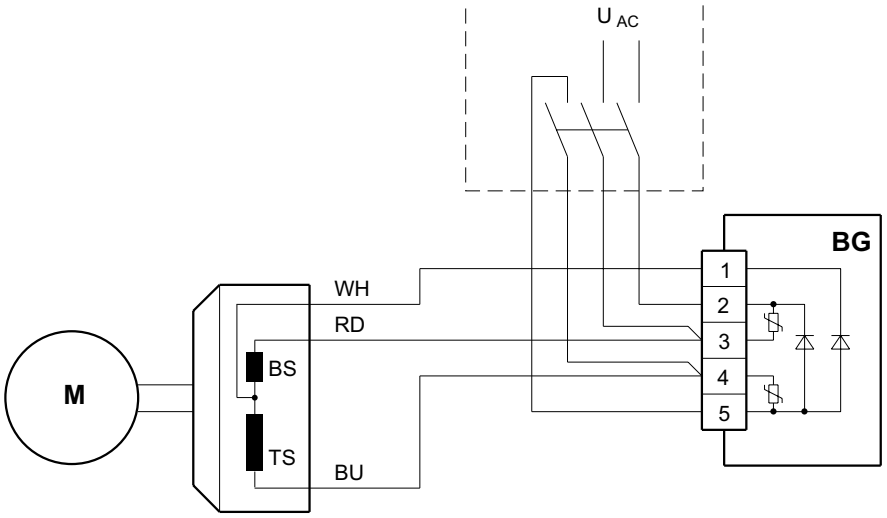


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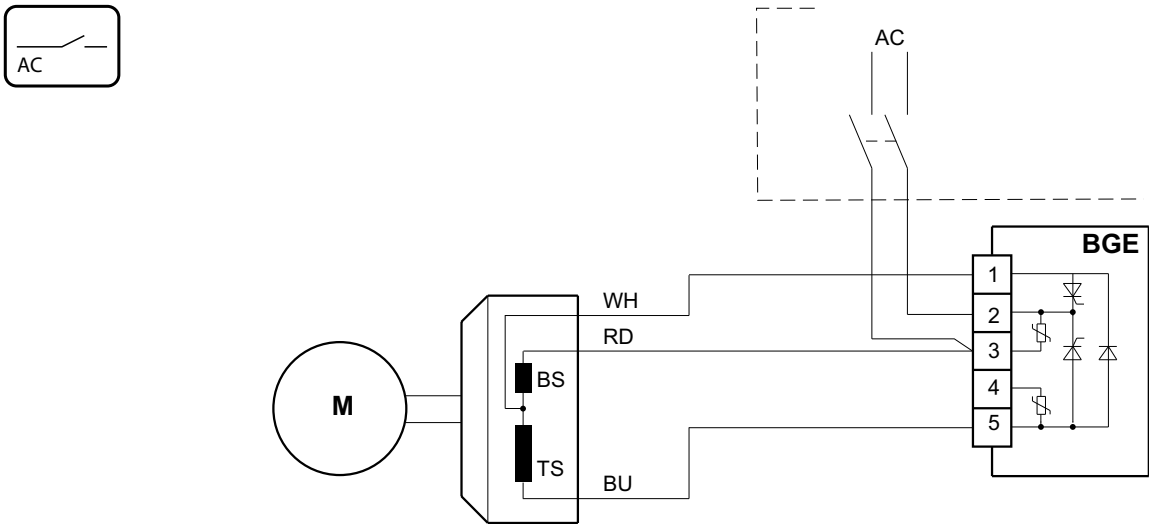
### BGE brake control

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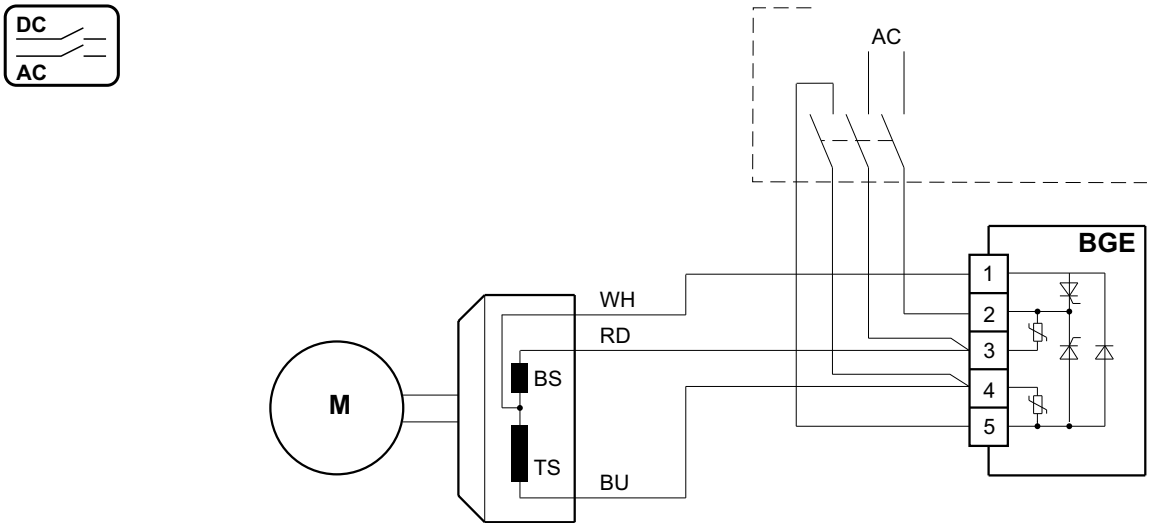


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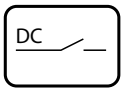
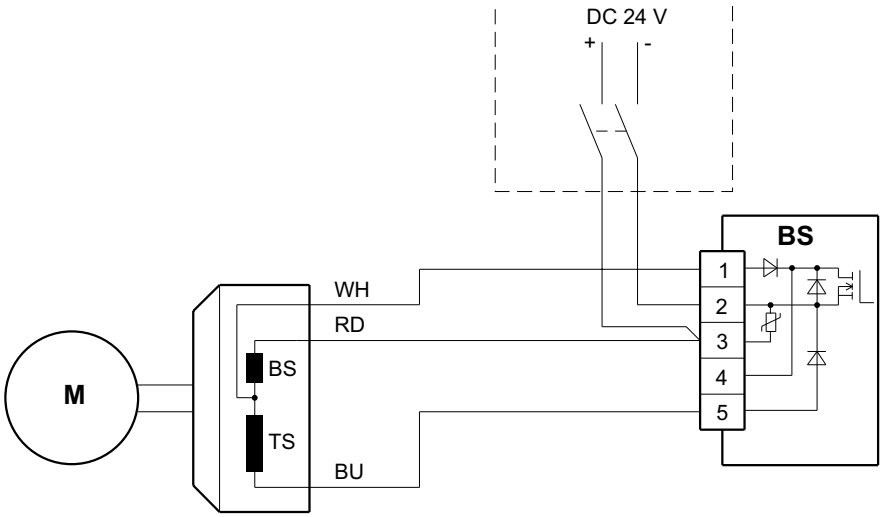
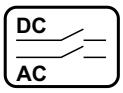
### BS brake control

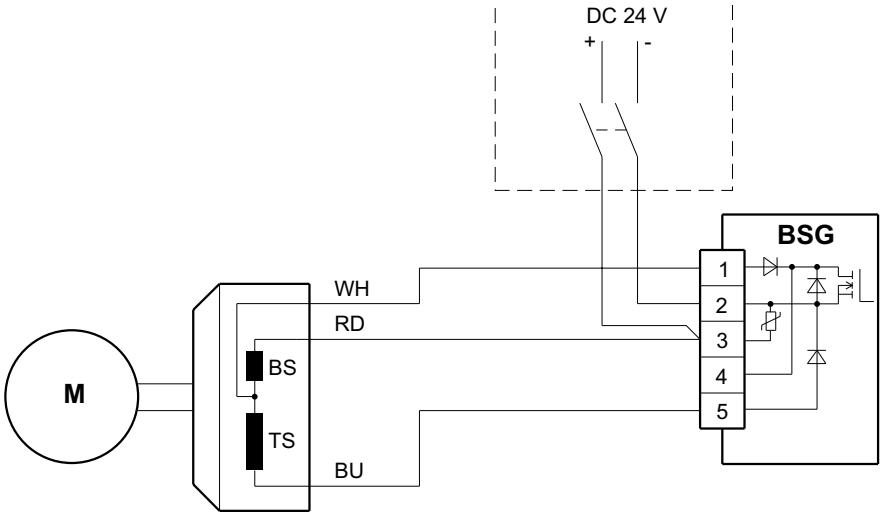



*5465000459*

### BSG brake control

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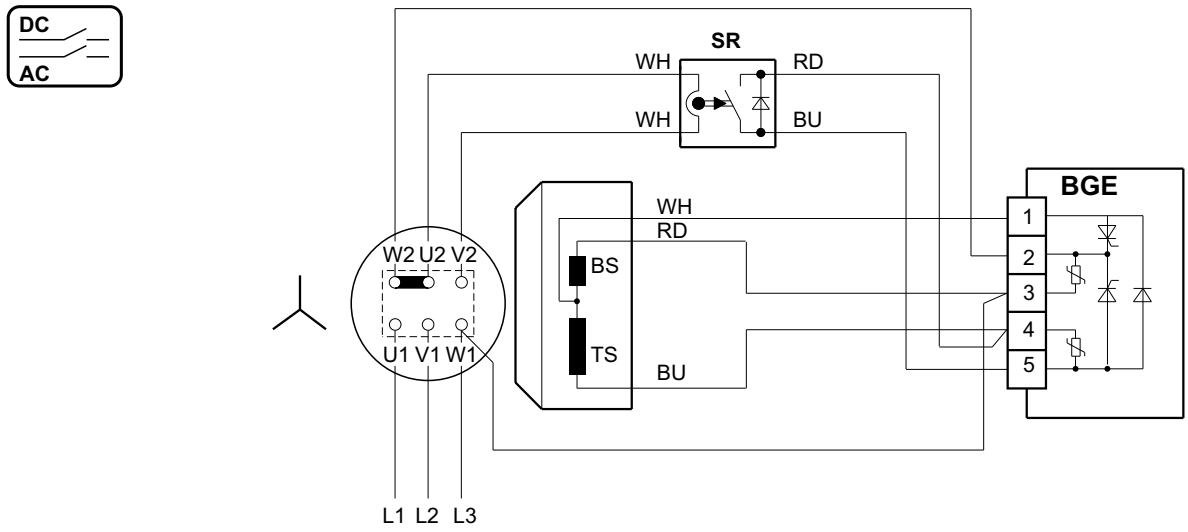
### BSR brake control

**Brake voltage = Phase voltage**

Example: Motor 230 V △ / 400 V 人, brake AC 230 V

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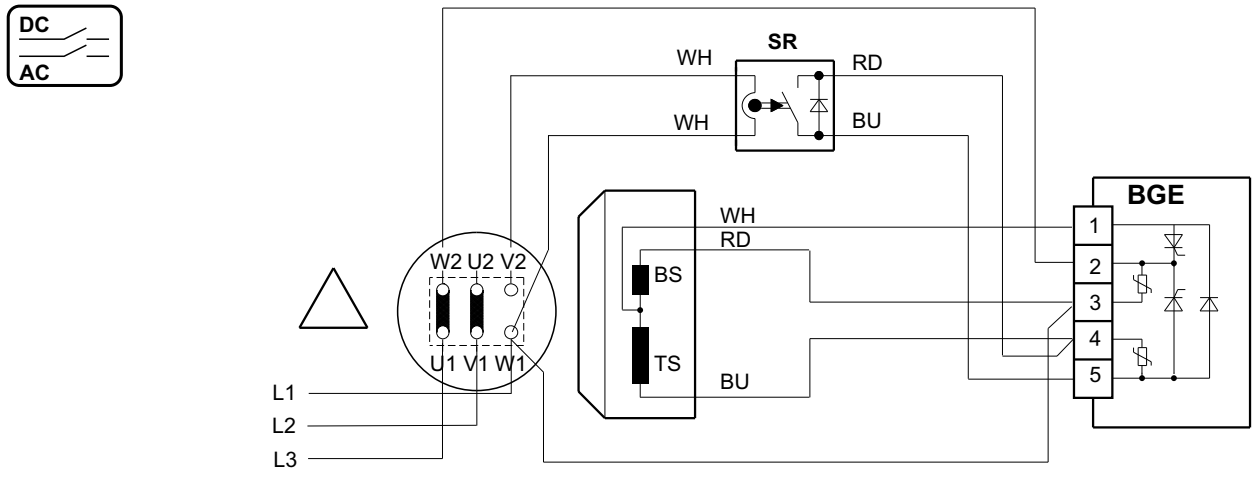
Example: Motor 400 V △ / 690 V 人, brake: AC 400 V

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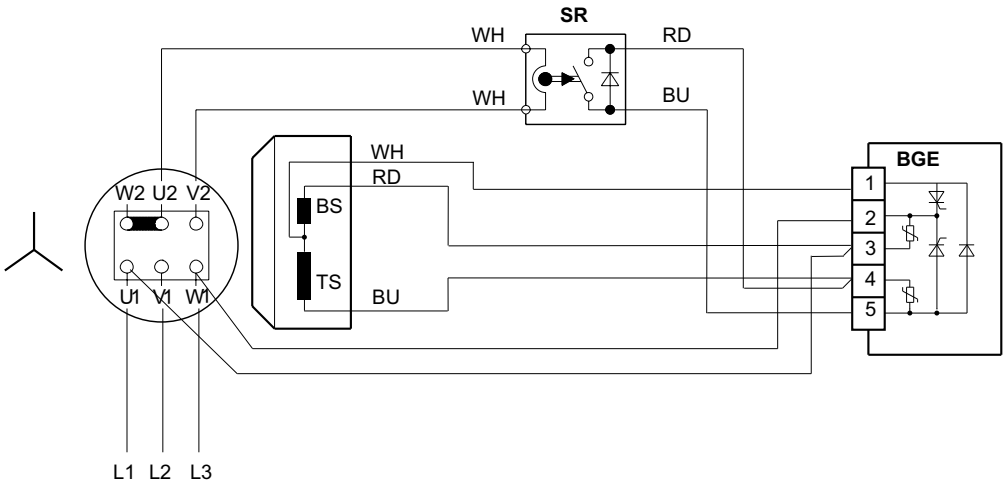
**Brake voltage = Phase-to-phase voltage**

The input voltage of the brake rectifier corresponds to the line voltage of the motor, e.g. motor: 400 V ⅄ , brake: AC 400 V

DC
AC

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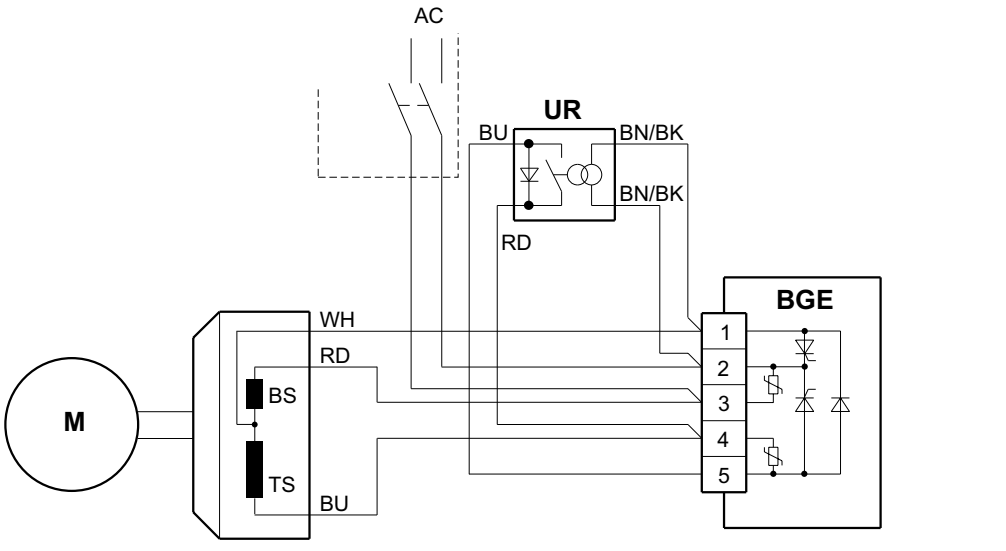
**BUR brake control**

DC
AC

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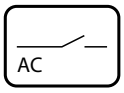
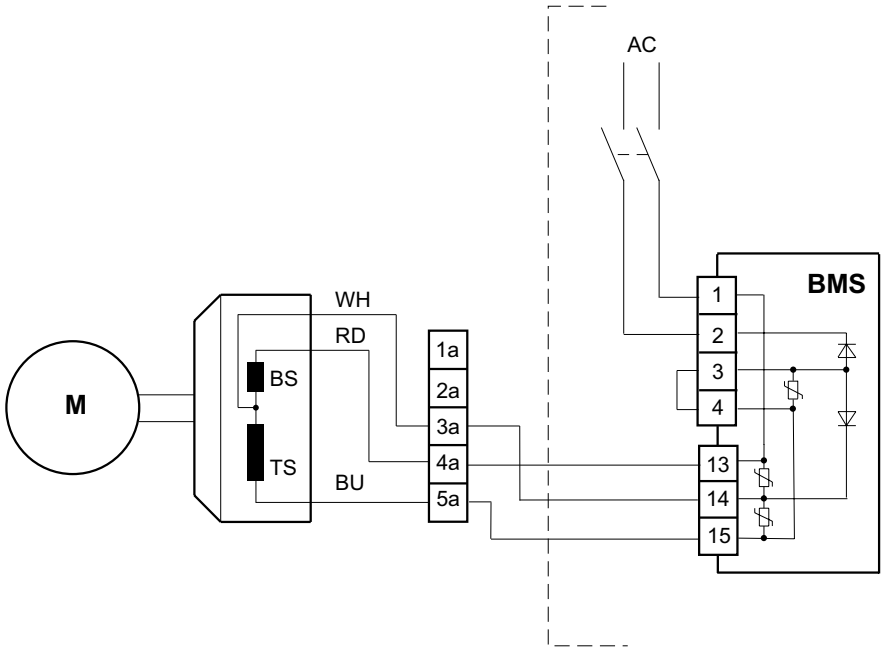
### BMS brake control

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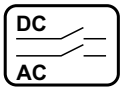


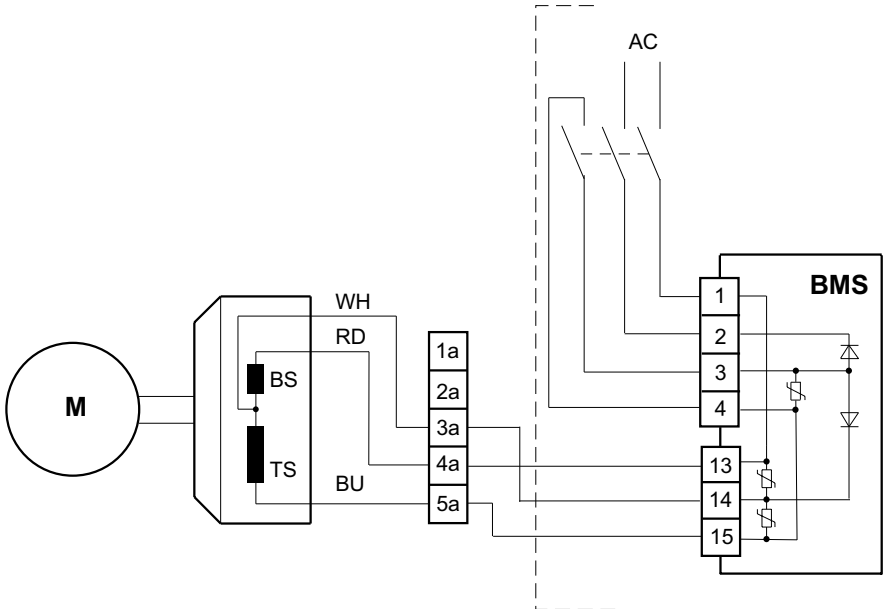


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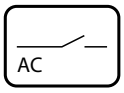
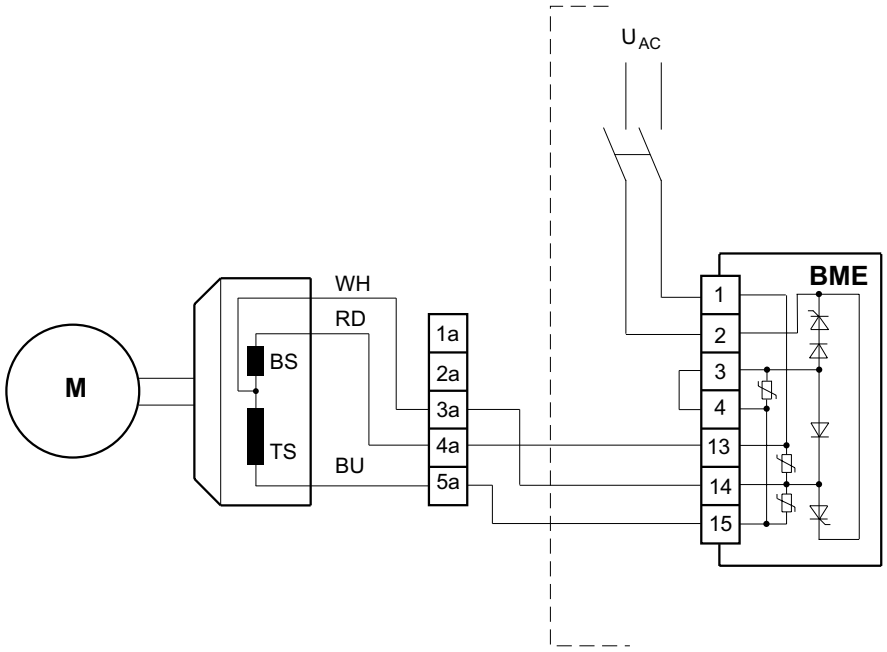
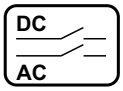
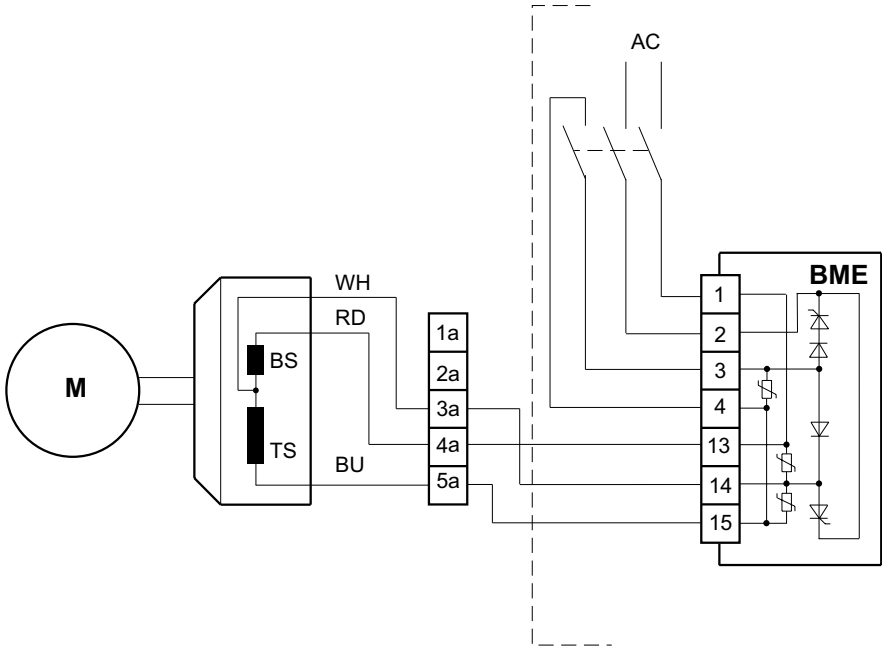
### BME brake control




3985855627

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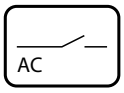
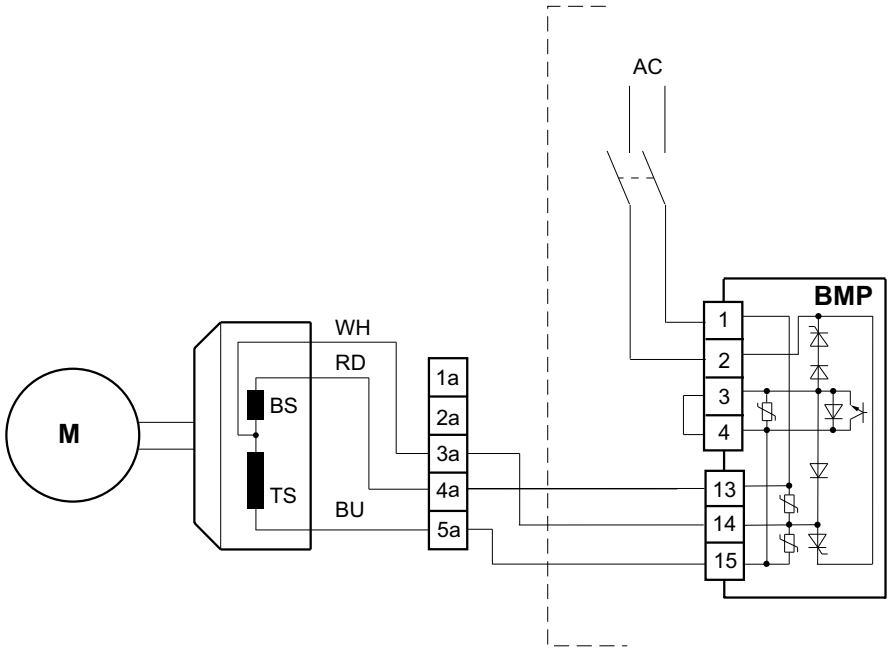
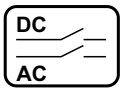
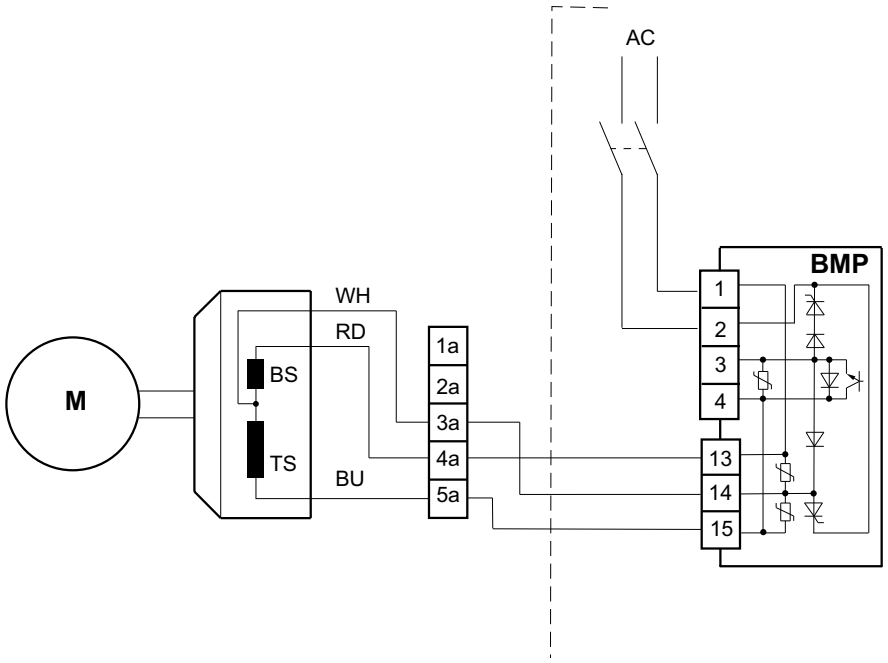
### BMP brake control




3985873291

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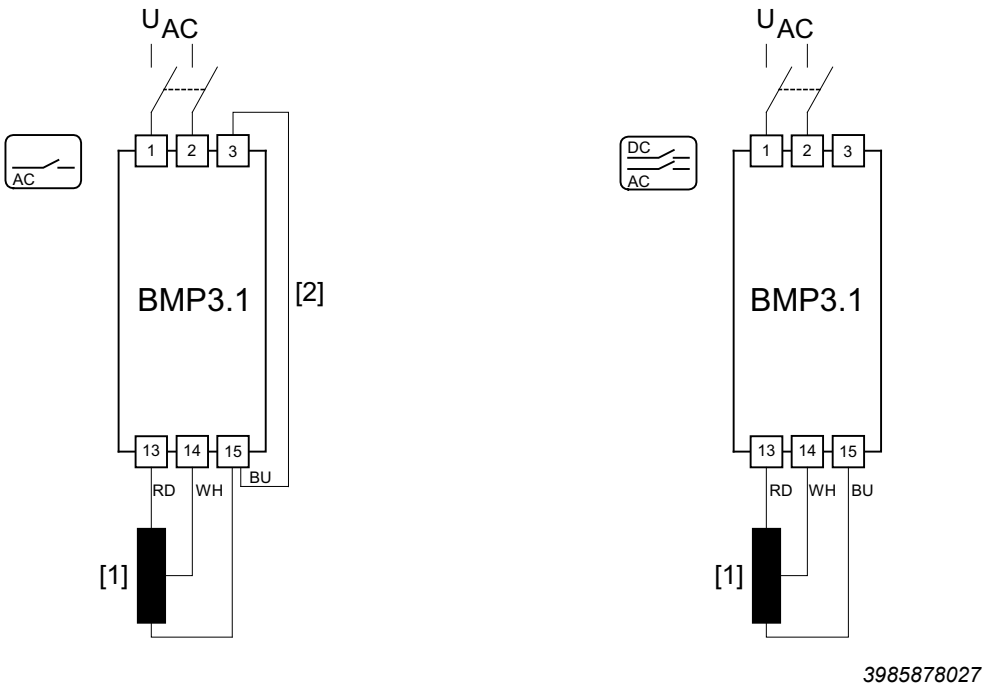
**BMP 3.1 brake control (motor)**




[1] Brake coil

[2] Jumper

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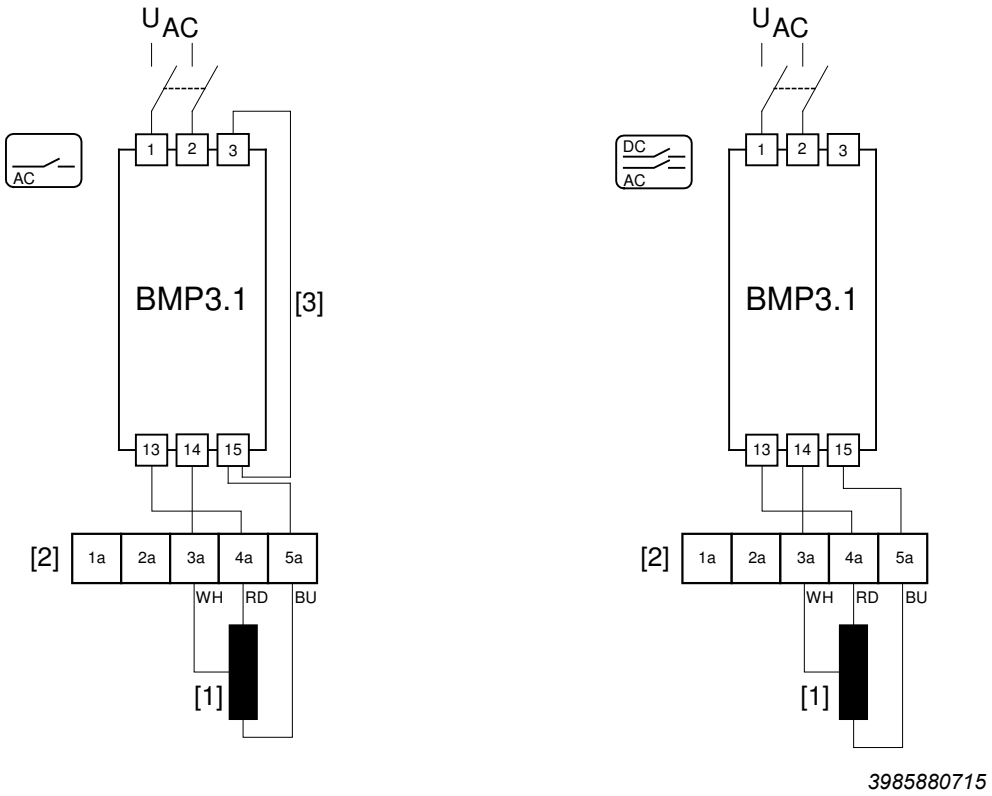
**BMP 3.1 brake control (control cabinet)**

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[1] Brake coil

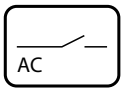
[2] Terminal strip

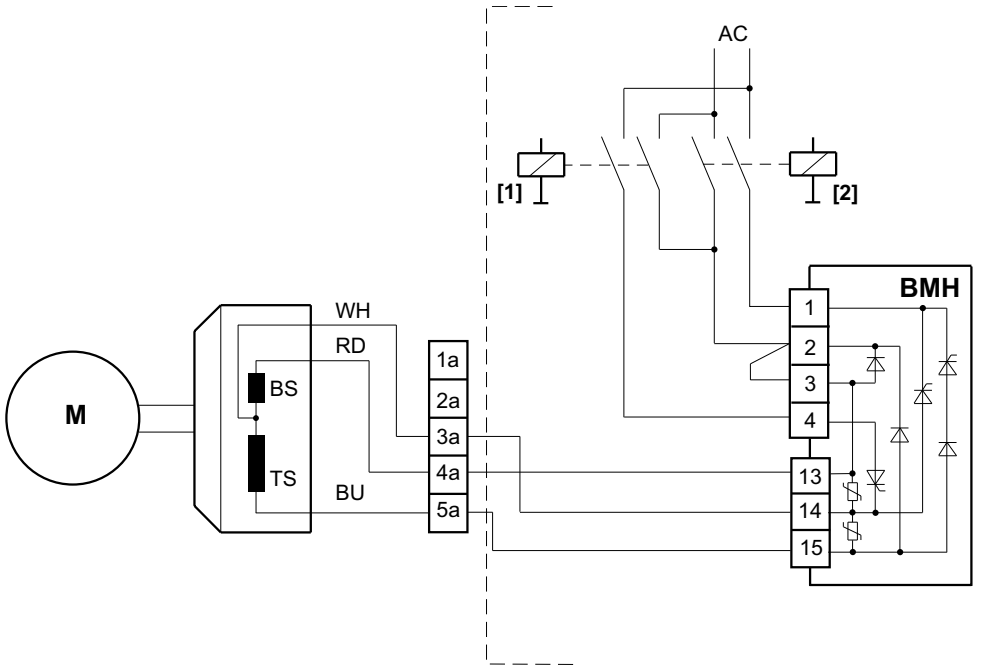
[3] Jumper

## INFORMATION

There is no need for the jumper in alternating current operation (AC) if connection 5a is wired directly to connection 3.

### BMH brake control

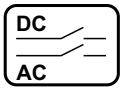


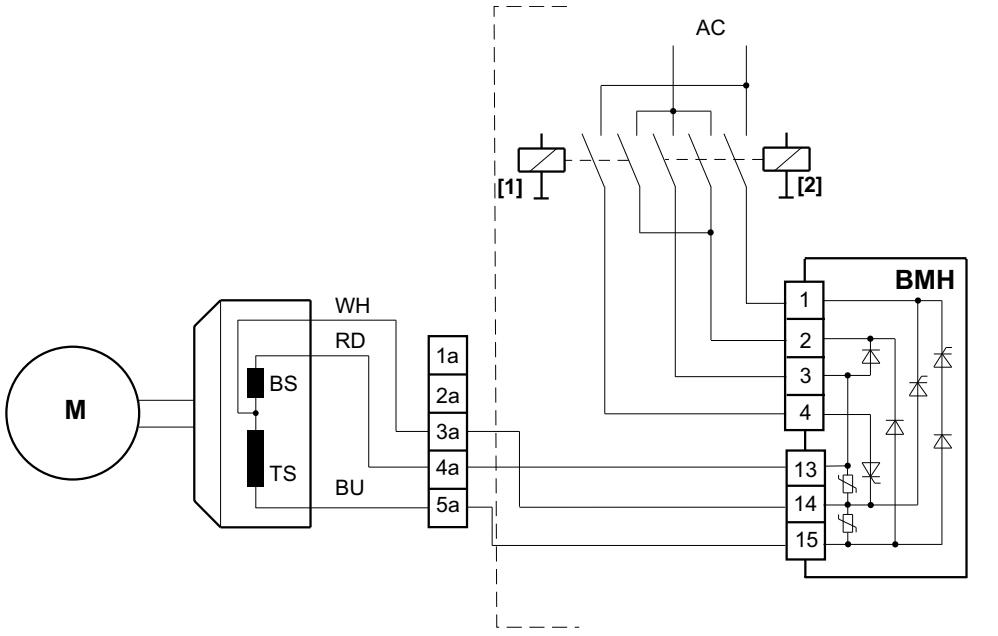




*3985883787*

[1] Heating

[2] Release

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[1] Heating

[2] Release

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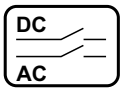
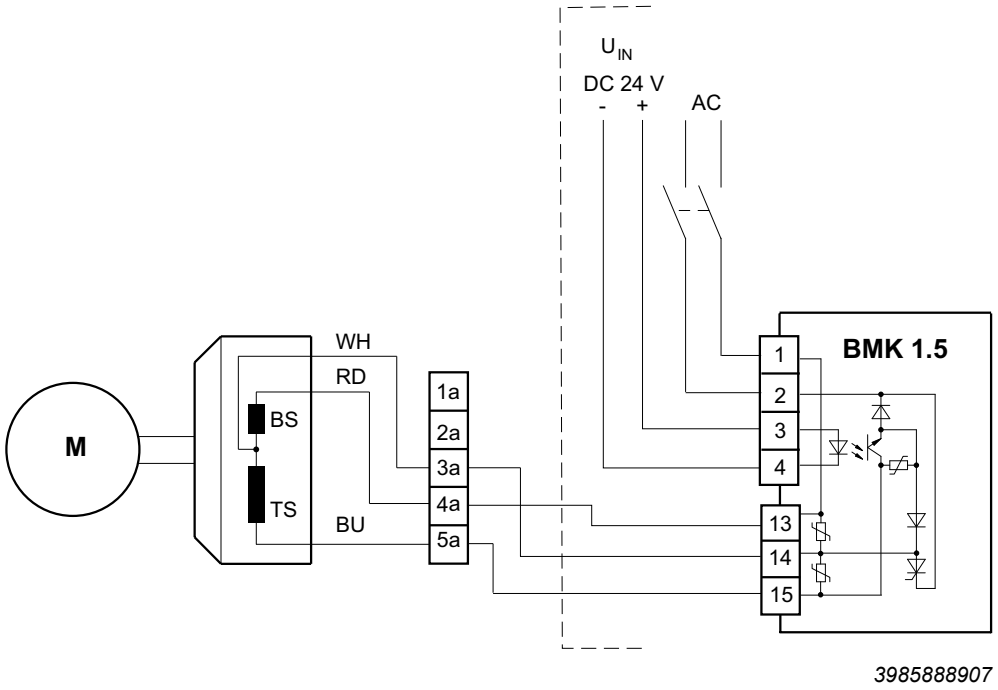
### BMK brake control

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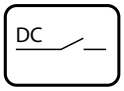
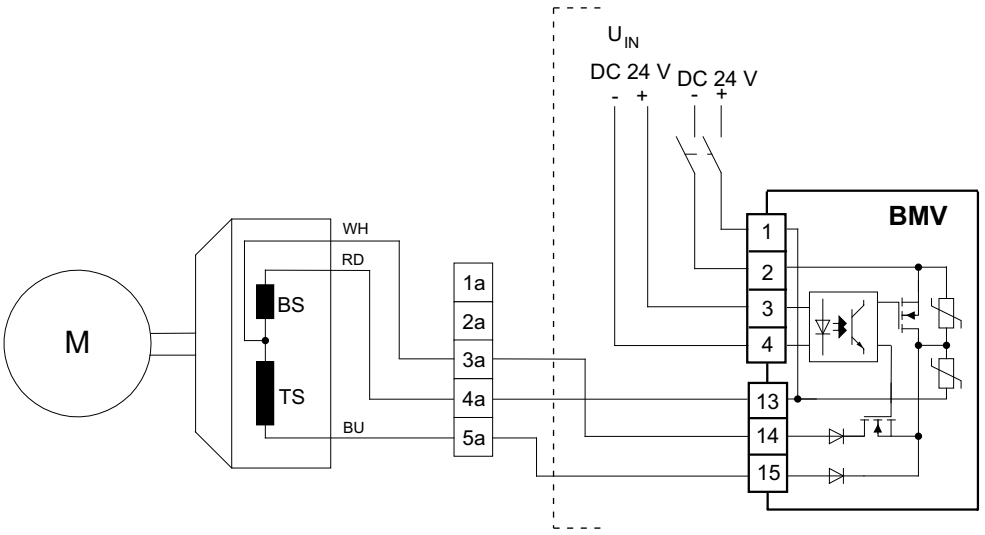
### BMV brake control

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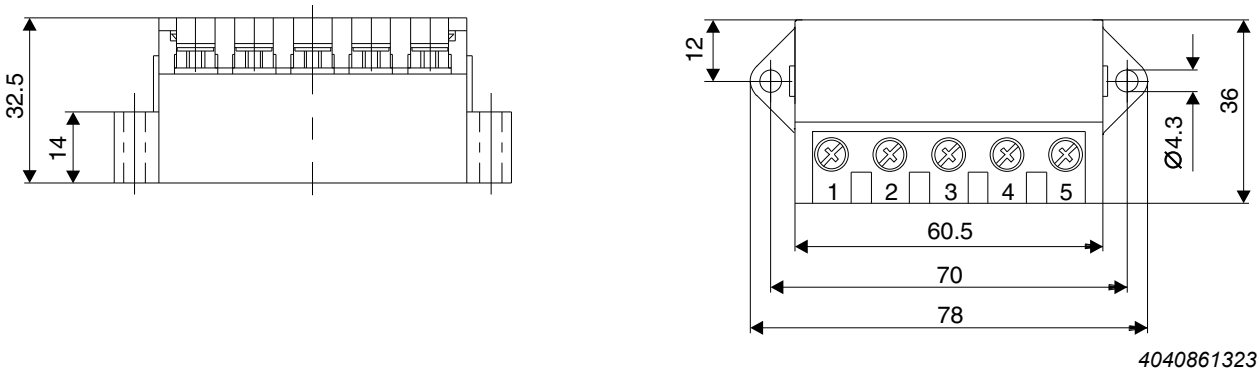
$V_{IN}$ = control signal

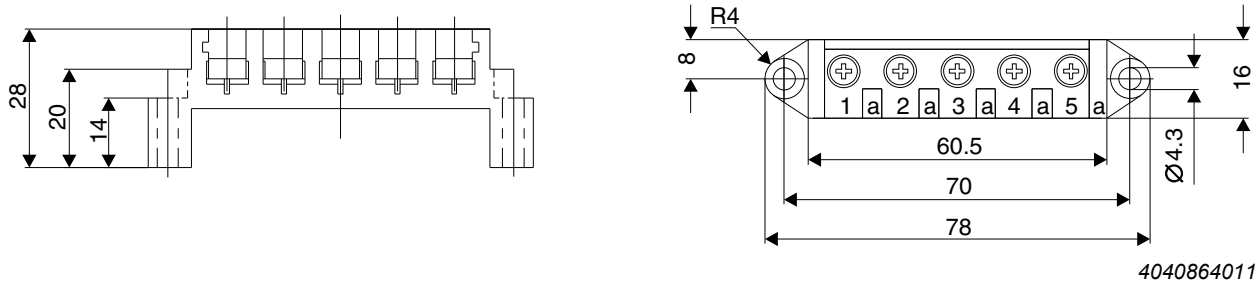
### 8.10.9 Dimension sheets brake controls

#### BG, BGE, BS, BSG

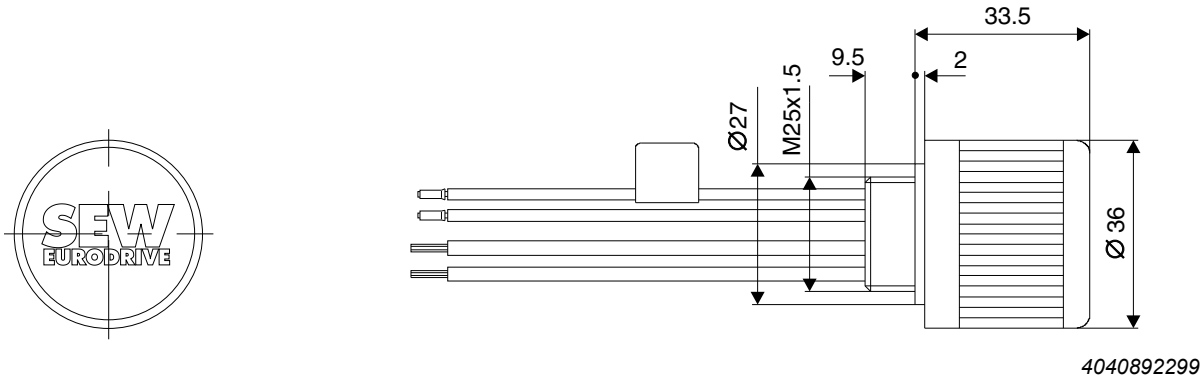



#### Auxiliary terminal strip

For connection of the brake coil or TF/TH and strip heaters in the wiring space of the motor




#### SR10, SR11, SR15, UR11, UR15

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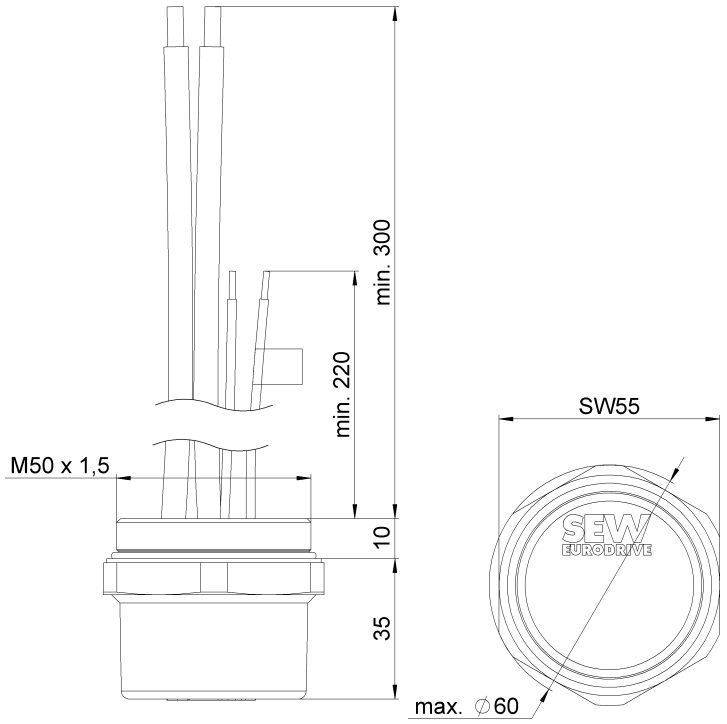
**SR19**

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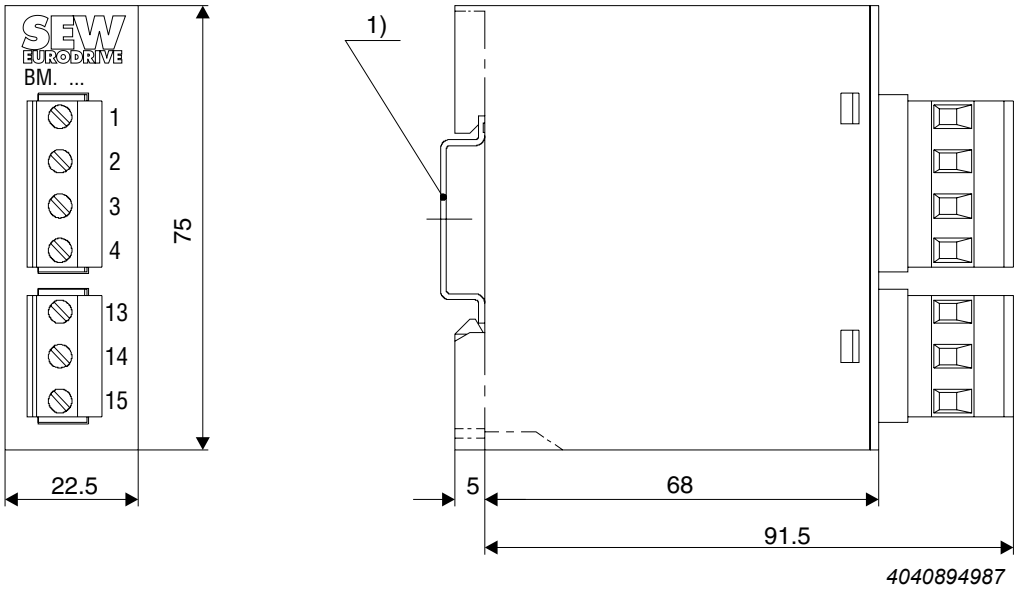
**BMS, BME, BMH, BMP, BMK, BMV**

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[1] Support rail mounting EN 50022-35-7.5

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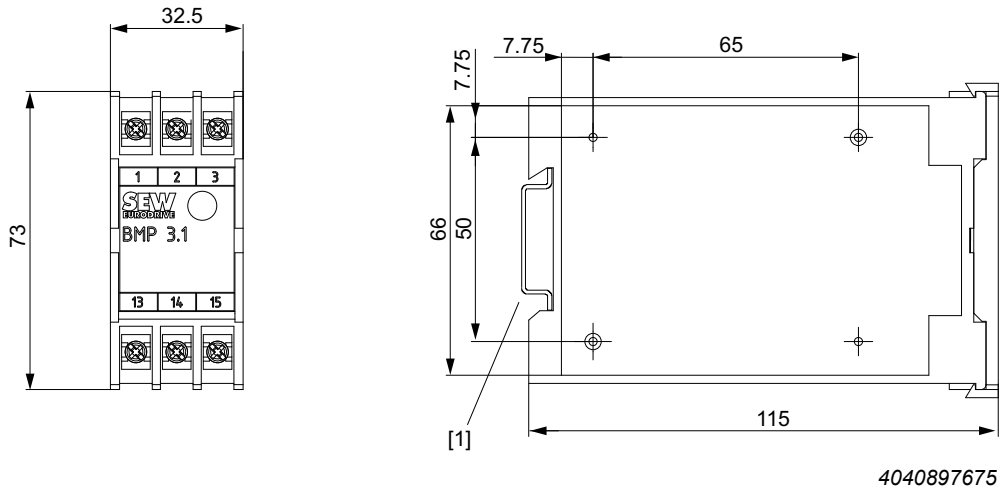
### BMP3.1

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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<br>HR: Yes | HF: No<br>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)<br>3.5 (31)<br>2.5 (22)<br>1.8 (16) |
| BE1 | 120 | 0.25 | 0.6 | 10 (88.5)<br>7.0 (62)<br>5.0 (44) |
| BE2 | 165 | 0.25 | 0.6 | 20 (177)<br>14 (124)<br>10 (88.5)<br>7.0 (62)<br>5.0 (44) |
| BE5 | 260 | 0.25 | 0.7 | 55 (487)<br>40 (354)<br>28 (248)<br>20 (177)<br>14 (124) |
| BE11 | 285 | 0.3 | 0.7 | 110 (974)<br>80 (708)<br>55 (487)<br>40 (354) |
| BE20 | 445 | 0.3 | 0.7 | 200 (1770)<br>150 (1328)<br>110 (974)<br>80 (708)<br>55 (487) |
| BE30 | 670 | 0.3 | 0.7 | 300 (2655)<br>200 (1770)<br>150 (1328)<br>100 (885)<br>75 (667) |
| BE32 | 670 | 0.4 | 0.8 | 600 (5310)<br>500 (4425)<br>400 (3540)<br>300 (2655)<br>200 (1770)<br>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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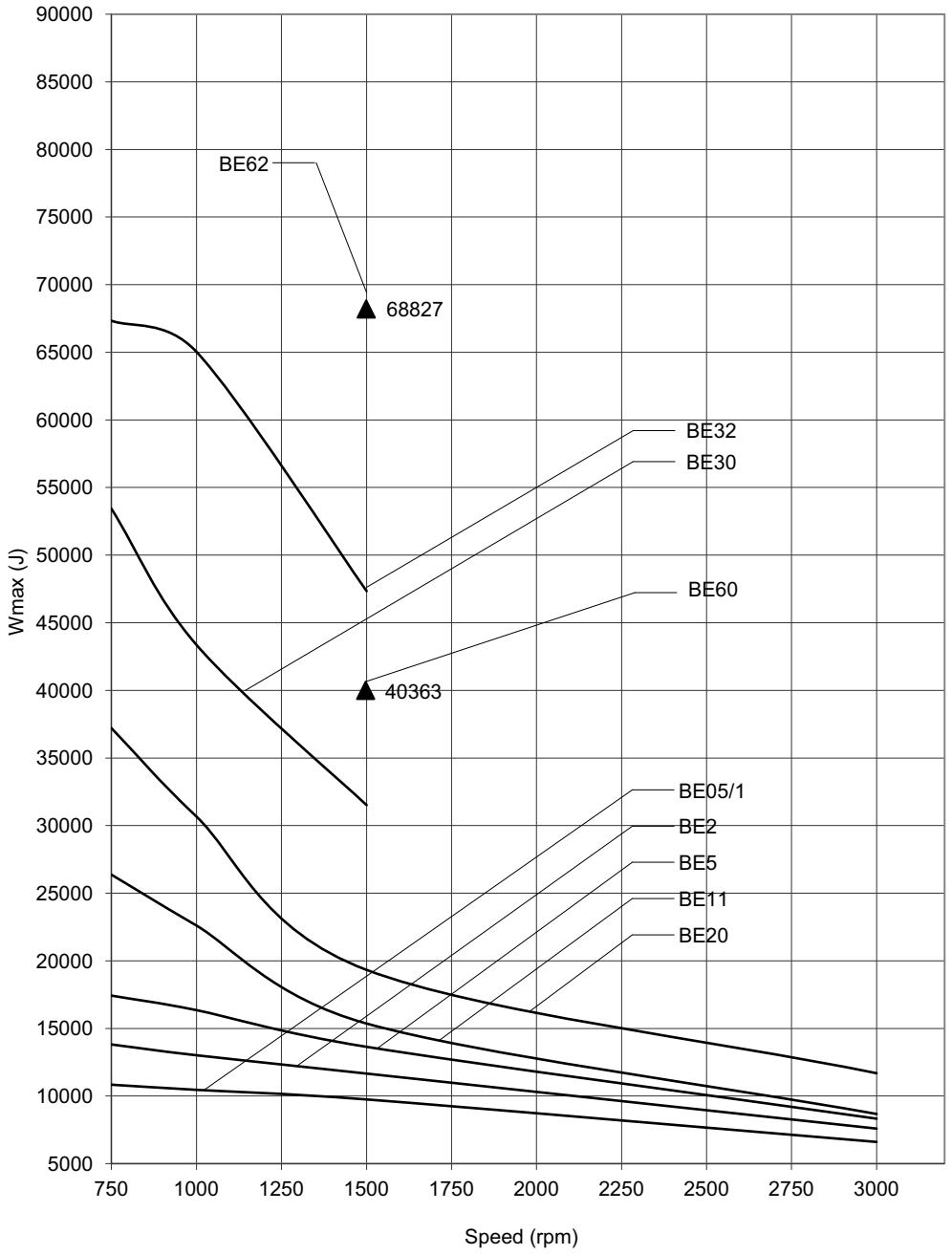
### 8.11.4 Permitted maximum braking work for emergency switching off for BE..(FS)

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<br>BE11 ($f_v$ = 1 / $f_M$ = 1) | Limit curve B<br>BE11 ($f_v$ = 10 / $f_M$ = 0.8) | Limit curve C<br>BE11 ($f_v$ = 50 / $f_M$ = 0.7) | Limit curve D<br>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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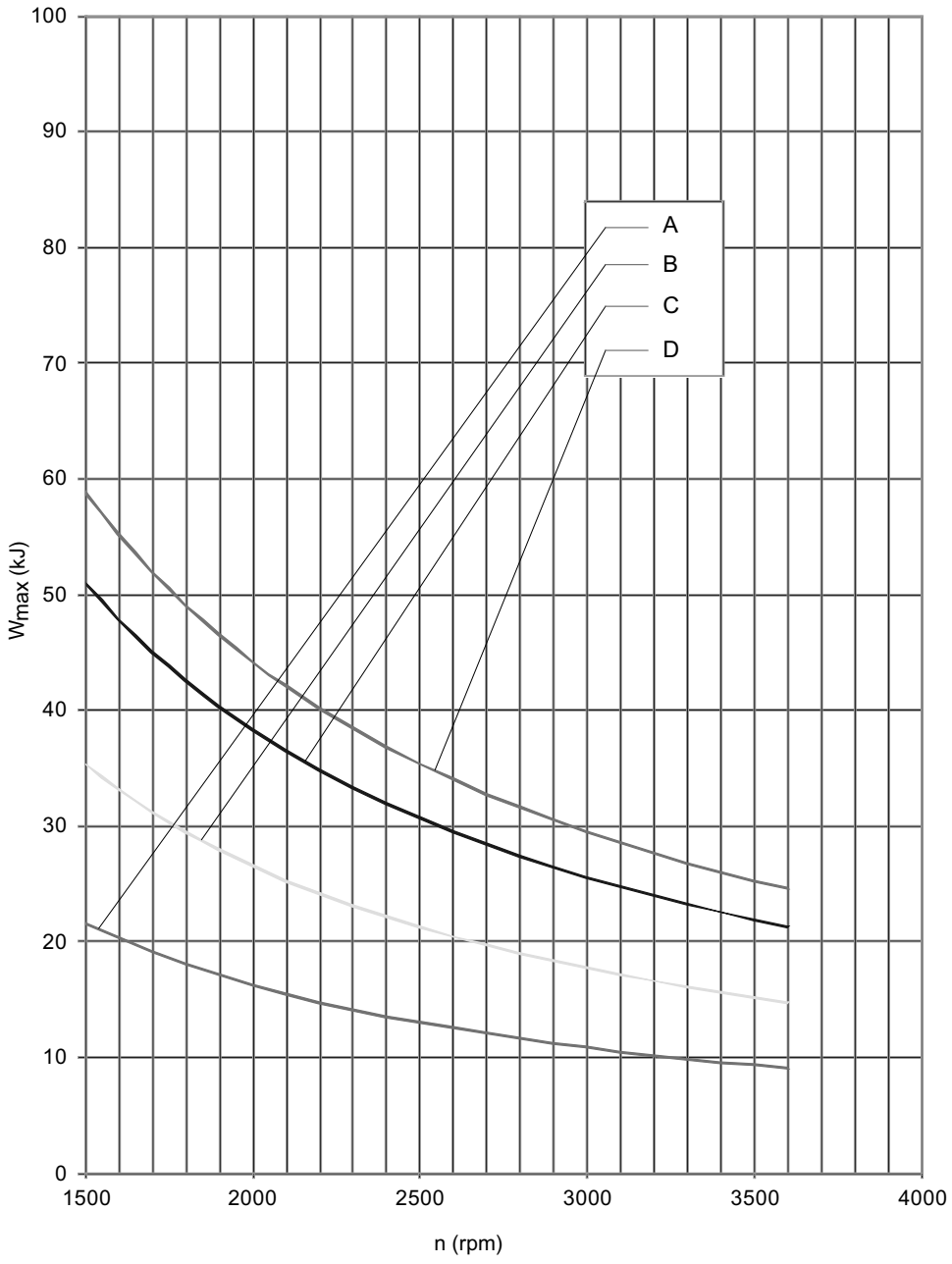
Diagram $W_{max}$ BE11:

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### BE20 brake

Value table $W_{max}$ BE20:

| n in rpm | Limit curve A<br>BE20 ($f_v$ = 1 / $f_M$ = 1) | Limit curve B<br>BE20 ($f_v$ = 10 / $f_M$ = 0.8) | Limit curve C<br>BE20 ($f_v$ = 50 / $f_M$ = 0.7) | Limit curve D<br>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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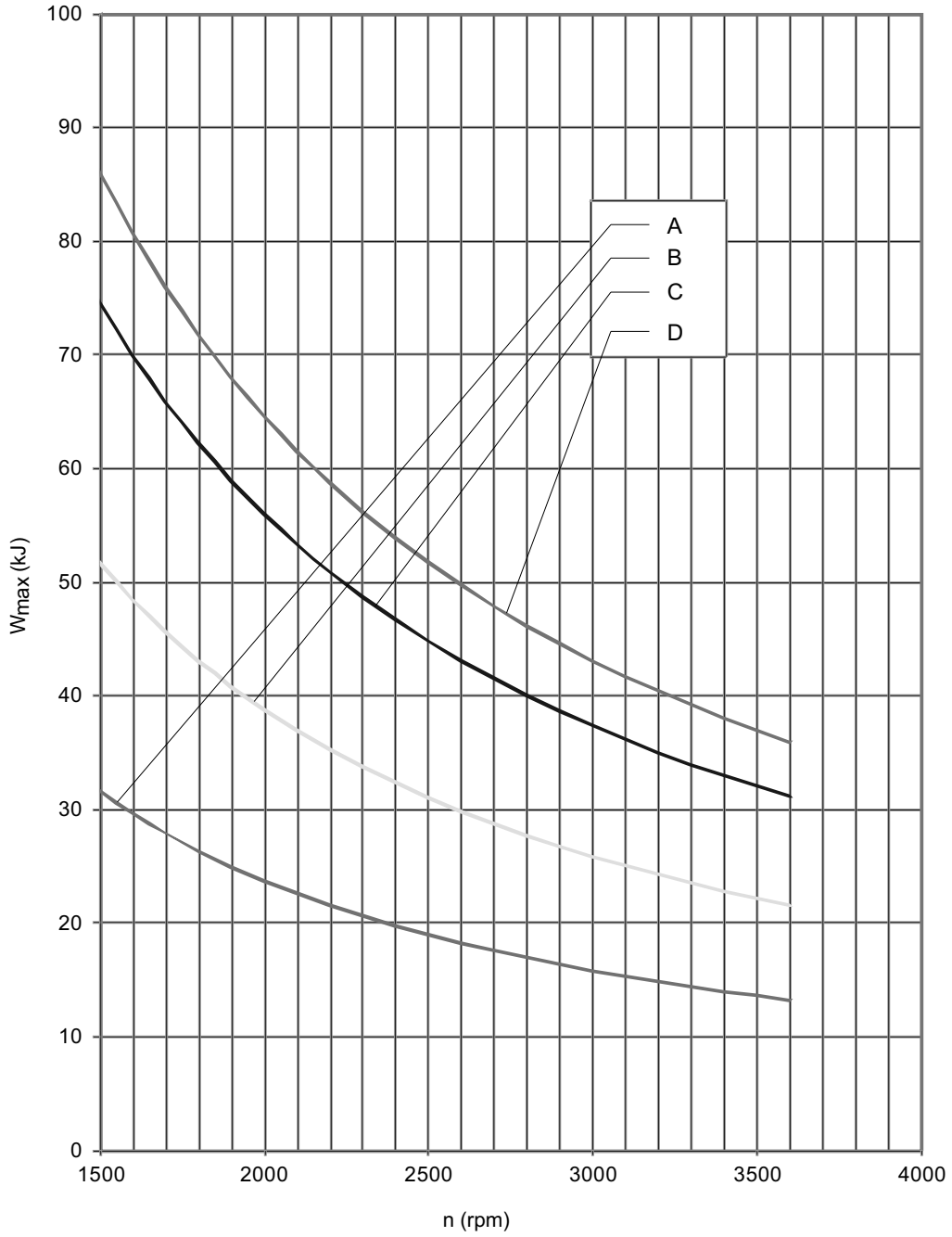
Diagram $W_{max}$ BE20:

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### BE30 brake

Value table $W_{max}$ BE30:

| n in rpm | Limit curve A<br>BE30 ($f_v$ = 1 / $f_M$ = 1) | Limit curve B<br>BE30 ($f_v$ = 10 / $f_M$ = 0.8) | Limit curve C<br>BE30 ($f_v$ = 50 / $f_M$ = 0.7) | Limit curve D<br>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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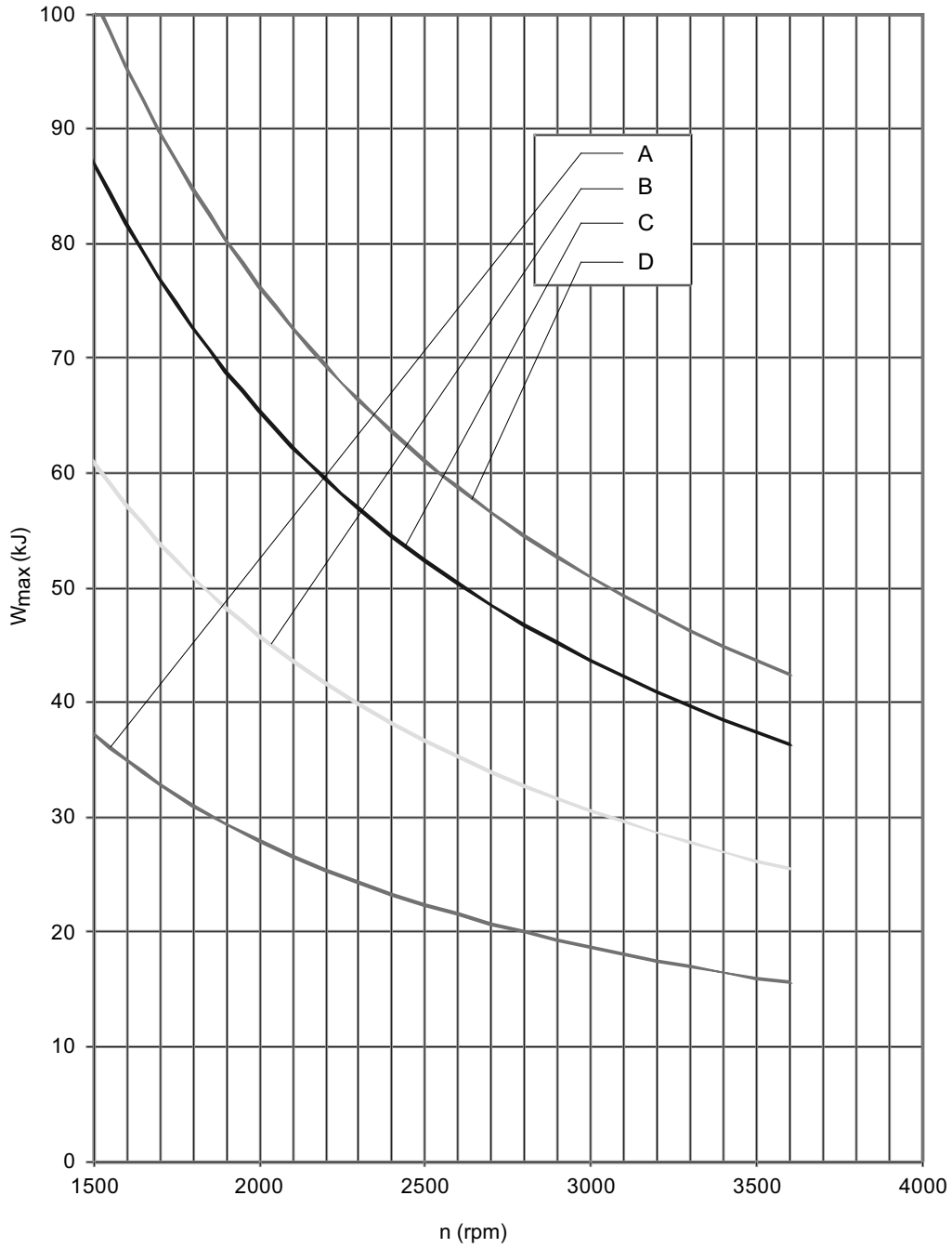
Diagram $W_{max}$ BE30:

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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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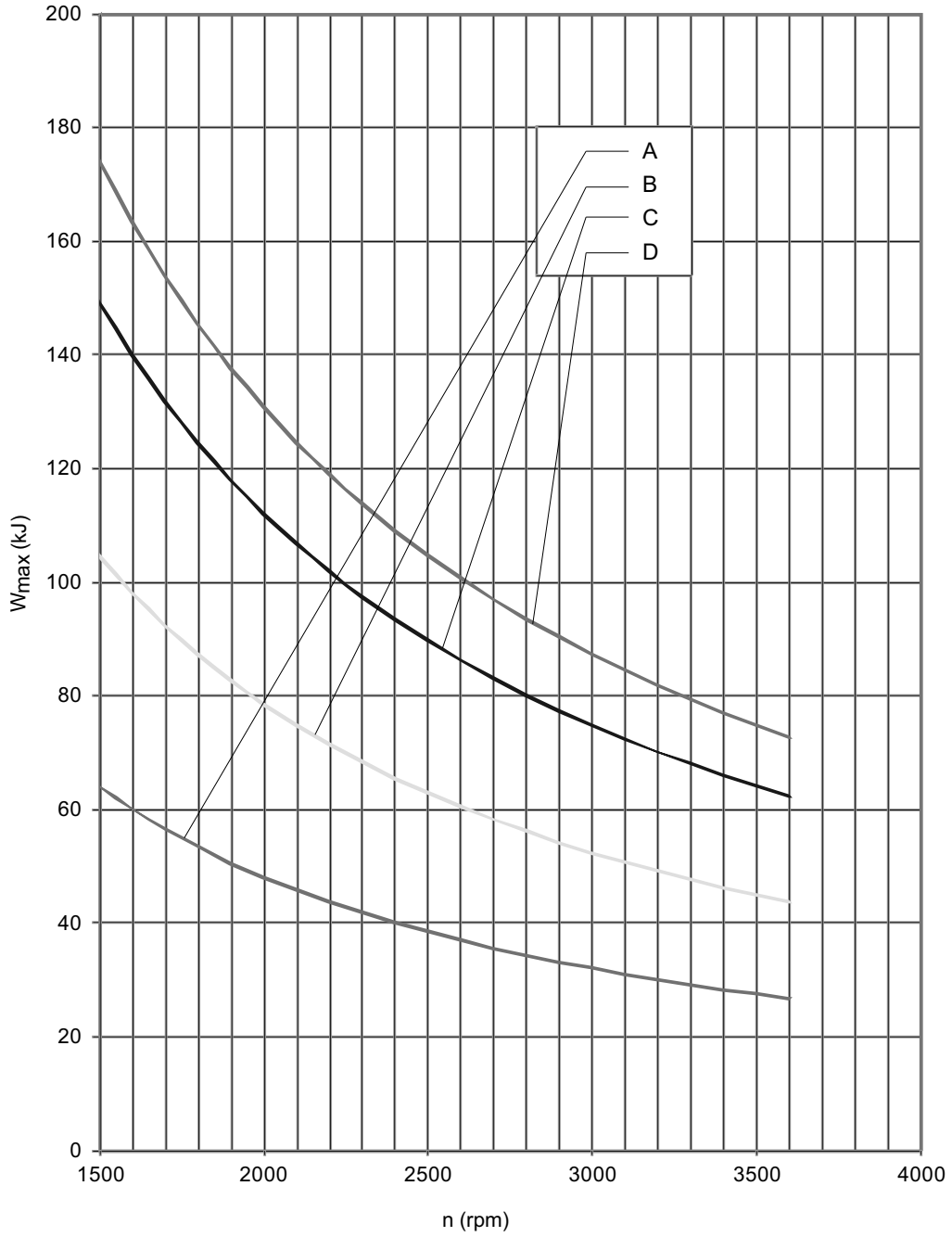
Diagram $W_{max}$ BE32:

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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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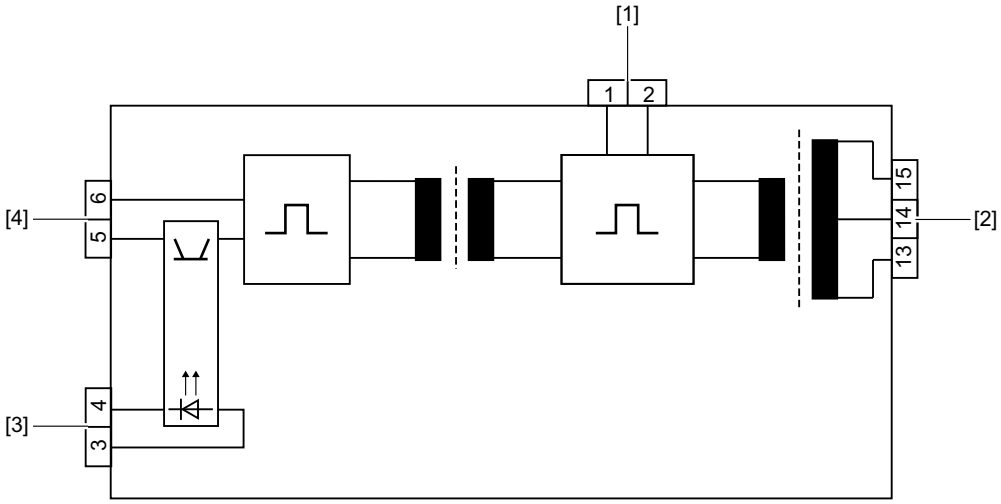
### 8.12.4 BST break module block diagram

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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 |

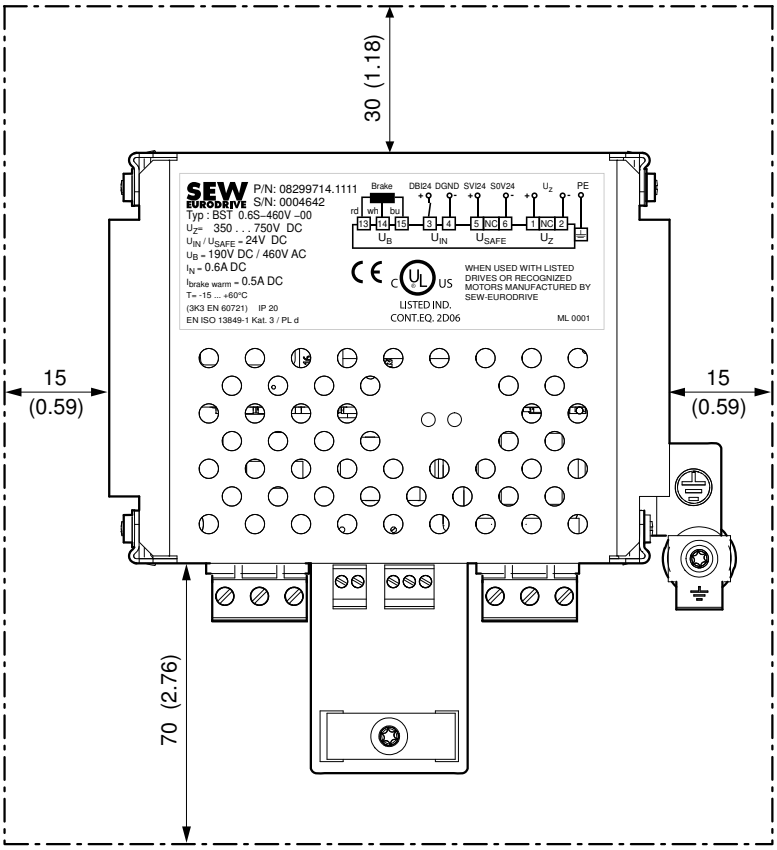
| Type | Type designation | Standard connection box | IS /plug connector | IV /plug connector (/AC.., /AS.., /AM.., /AB.., /AD.., /AK..) |
|---|---|---|---|---|
| BST | BST 1.2S | DR.71 – 225<br>BE05 – BE32 | DR.71 – 132<br>BE05 – BE11 | DR.71 – 225<br>BE05 – BE32 |
| | BST 1.0S | DR.71 – 225<br>BE05 – BE32 | DR.71 – 132<br>BE05 – BE11 | DR.71 – 225<br>BE05 – BE32 |
| | BST 0.7S | DR.71 – 225<br>BE05 – BE32 | DR.71 – 132<br>BE05 – BE11 | DR.71 – 225<br>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.

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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).

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## 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<br>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.

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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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## INFORMATION

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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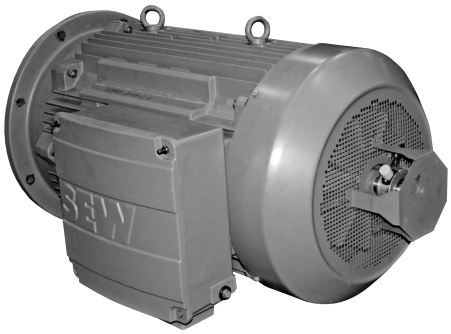
| Encoders | | ES7S | EG7S |
|---|---|---|---|
| **For motor size** | | **DR.71 – 132** | **DR.160 – 280** |
| Mounting type | | Shaft-centered; spread shaft / plug-in shaft | |
| Supply voltage $U_B$ | V | DC 7– 30 | |
| Max. current consumption $I_{in}$ | mA | 140 | |
| Output amplitude per track $U_{high}$<br>$U_{low}$ | $V_{ss}$ | 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<br>A, B<br>Revolution C | | <br>1024<br>1 | |
| Phase angle A : B | | 90° ± 3° | |
| Data memory | | 1920 | |
| Vibration resistance<br>at 10 Hz – 2 kHz | $m/s^2$ | ≤ 100 pursuant to EN 60068-2-6 | |
| Shock resistance | $m/s^2$ | ≤ 1000<br>pursuant to EN 60068-2-27 | ≤ 2000<br>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<br>$U_{high}$<br>$U_{low}$ | $V_{ss}$ | 1 |
| Signal output | | Sine / Cosine |
| Output current per track $I_{out, RMS}$ | mA | 10 |
| Max. pulse frequency $f_{max}$ | kHz | 180 |
| Periods per revolution<br>A, B<br>C | | <br>1024<br>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<br>$U_{high}$<br>$U_{low}$<br>(for terminating resistance = 120 Ω) | V | <br>≥ 2.5<br>≤ 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<br>A, B<br>C | | <br>1024<br>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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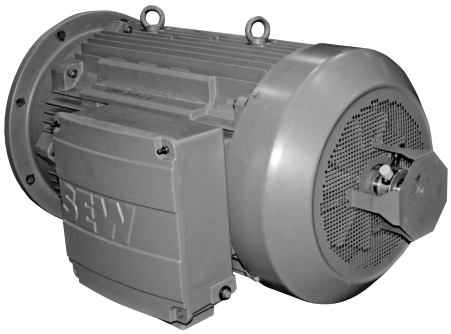

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| Encoders | | EH7R | EH7T |
|---|---|---|---|
| **For motor size** | | **DR.315** | |
| Mounting type | | Hollow shaft | |
| Supply voltage $U_B$ | V | DC 10 – 30 | DC 5 |
| Max. current consumption $I_{in}$ | mA | 140 | |
| Output amplitude<br>$U_{high}$<br>$U_{low}$ | V | <br>≥ 2.5<br>≤ 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<br>A, B<br>C | | <br>1024<br>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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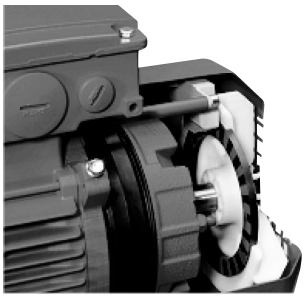
### 9.5.3 HTL sensor



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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<br>$U_{high}$<br>$U_{low}$ | V | <br>$V_{cc}$ - 3.5 to $V_{cc}$<br>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<br>A, B<br>C | | <br>24<br>0 | <br>6<br>0 | <br>2<br>0 | <br>1<br>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<br>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<br>$U_{high}$<br>$U_{low}$<br>$U_b$ = 4.75 – 6 V, terminating resistance = 120 Ω | $V_{ss}$ | <br>≥ 2.5<br>≤ 1.1 | |
| Output amplitude per track<br>$U_{high}$<br>$U_{low}$<br>$U_b$ = 6 – 30 V, terminating resistance = 1 – 3 kΩ | $V_{ss}$ | <br>≥ $U_b$ - 2.5<br>≤ 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<br>Revolution C | | 1024<br>1 | |
| Pulse duty factor | | 1 : 1 ± 10 % | |
| Phase angle A : B | | 90° ± 20° | |
| Vibration resistance<br>at 10 Hz – 2 kHz | $m/s^2$ | ≤ 100 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 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<br>$U_{high}$<br>$U_{low}$<br>$U_b$ = 10 – 30 V, terminating resistance = 1 – 3 kΩ | $V_{ss}$ | <br>≥ $U_b$ - 2.5<br>≤ 3 |
| Signal output | | HTL |
| Output current per track $I_{out, RMS}$ | mA | 30 |
| Max. pulse frequency $f_{max}$ | kHz | 300 |
| Pulses (sine cycles) per<br>A, B<br>Revolution C | | <br>1024<br>1 |
| Pulse duty factor | | 1 : 1 ± 20 % |
| Phase angle A : B | | 90° ± 20° |
| Vibration resistance<br>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 (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<br>A, B<br>C | | 2048<br>- | |
| Phase angle A : B | | 90° ± 3° | |
| Absolute encoder scanning code | | Binary code | |
| Resolution<br>• Single-turn<br>• Multi-turn | | 8192 increments / revolution<br>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<br>A, B<br>C | | 2048<br>- | |
| Phase angle A : B | | 90° ± 3° | |
| Absolute encoder scanning code | | Gray Code | |
| Resolution<br>• Single-turn<br>• Multi-turn | | 4096 increments / revolution<br>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<br>(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<br>$U_{high}$<br>$U_{low}$ | $V_{ss}$ | <br>≥ 2.5<br>≤ 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<br>A, B<br>C | | <br>2048<br>- |
| Pulse duty factor | | 1 : 1 ± 20 % |
| Phase angle A : B | | 90° ± 20° |
| Absolute encoder scanning code | | Gray Code |
| Resolution | | |
| • Single-turn<br>• Multi-turn | | 4096 increments / revolution<br>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<br>(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).

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## 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<br>ES7R<br>AS7Y<br>AS7W | EG7S<br>EG7R<br>AG7Y<br>AG7W | EH7S<br>-<br>AH7Y<br>- |

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.

### 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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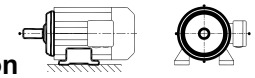
# 10 Other options and design types

## 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.

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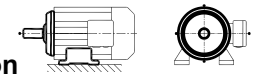
**Type designation** 

/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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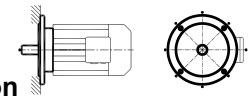
### 10.1.2 Flange-mounted motors

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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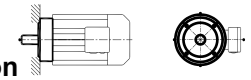
**Type designation** 

/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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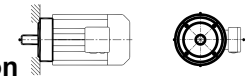
**Type designation** 

/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.

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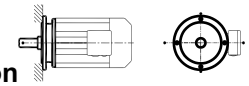
**Type designation** 

/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.

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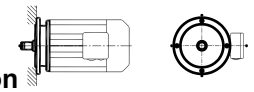
### 10.1.3 Integral motors for the SEW gear unit series

**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).



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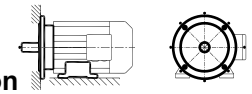
### 10.1.4 Foot- and flange-mounted motors

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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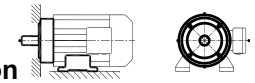
**Type designation** 

/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)

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| 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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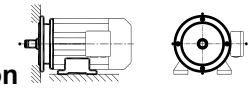
**Type designation** 

/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.

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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.

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## 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.

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Blocking direction specification:

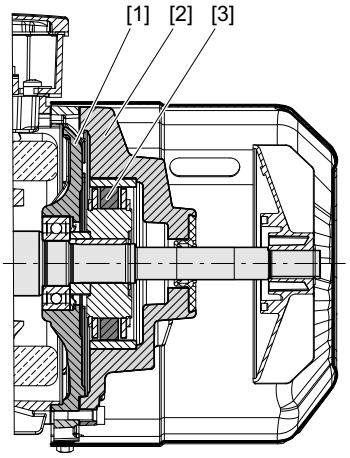
CW: Clockwise

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<br>Nm | Lift-off speed of clamping parts<br>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.

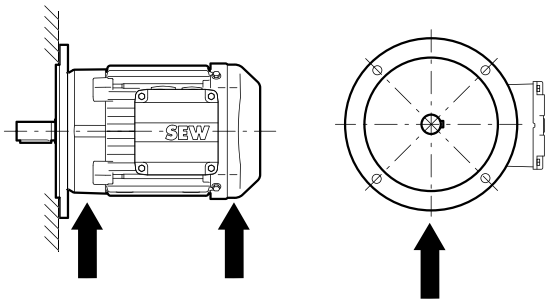
The condensation drain holes are closed with an element on delivery and must be opened regularly in order to drain any condensation. The intervals depend on the application and the environment and must be specified individually.

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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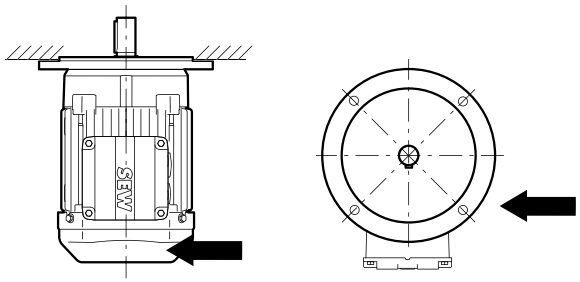
*Vertical mounting position*

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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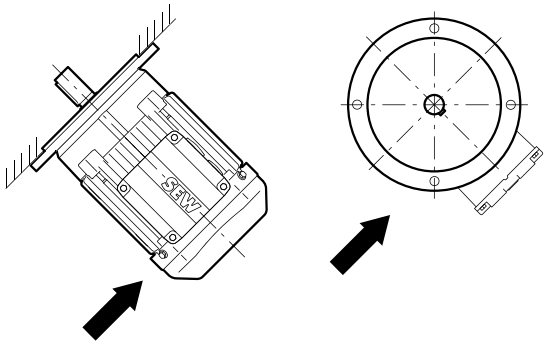
*Inclined mounting positions*

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*

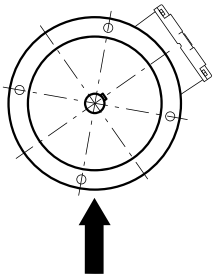
In the IM B5 mounting position, there is the special feature that the movement around the motor axis does not result in a new mounting position designation. As a result, SEW-EURODRIVE has combined this with a familiar feature for the mounting position.

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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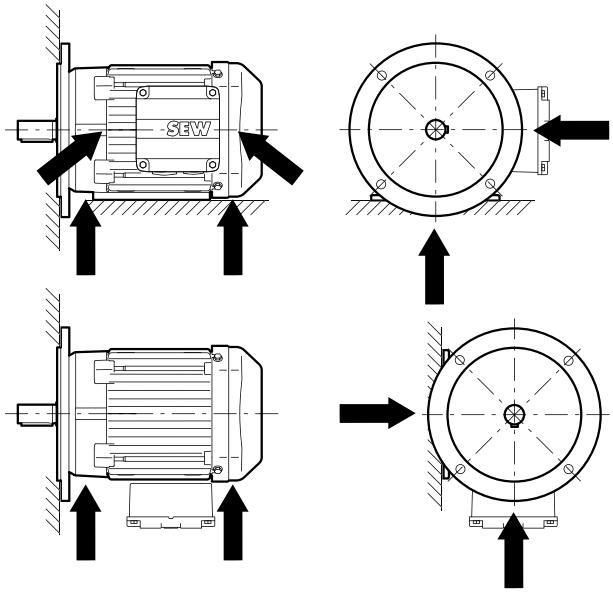
*Moving mounting position*

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*

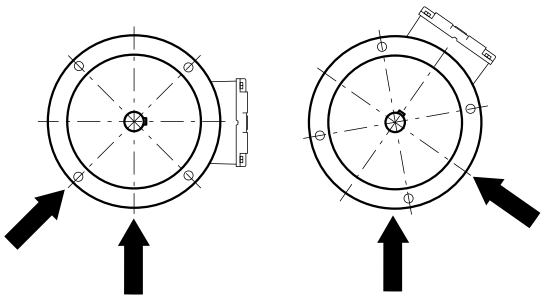
In the IM B5 mounting position, there is the special feature that the movement around the motor axis does not result in a new mounting position designation. As a result, SEW-EURODRIVE has combined this with a familiar feature for the mounting position.

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**

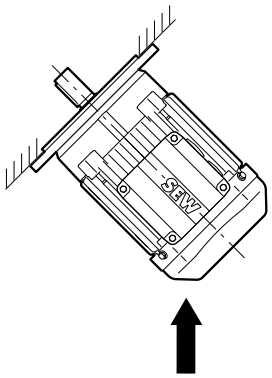
If there is the risk that liquid could remain in the fan guard, such as in the event of inclined or moving mounting positions with the fan guard underneath, waste water bores in the fan guard can be used to ensure drainage.

*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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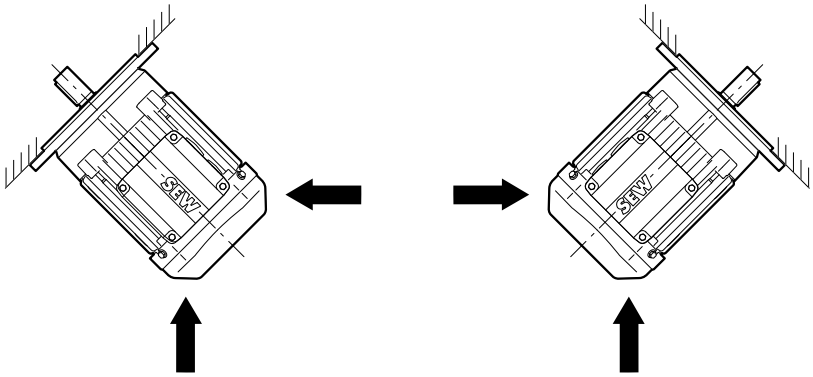
*Moving mounting position*

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.

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### 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.

**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 | |

### 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<br>DRS71S4/2, ..S8/2 | 2.69 | 0.34 | 4.9 | 7.25 | 148 % | 0.18 |
| DRS71S6,<br>DRS71S8/4 | | | 8.1 | 10.45 | 129 % | |
| DR.71M2, ..M4<br>DRS71M4/2, ..M8/2 | | | 7.1 | 9.45 | 133 % | |
| DR.71M6<br>DRS71M8/4 | | | 11.7 | 14.05 | 120 % | |
| DR.80S2, ..S4, ..S6<br>DRS80S8/2 | 4.31 | 0.97 | 14.9 | 18.24 | 122 % | 0.22 |
| DR.80M2, ..M4, ..M6<br>DRS80M4/2, ..M8/2, ..M8/4 | | | 21.4 | 24.74 | 116 % | |
| DR.90M2, ..M4<br>DRS90M4/2, ..M8/2, ..M8/4 | 6.97 | 1.32 | 35.4 | 41.05 | 116 % | 0.32 |
| DR.90L2, ..L4<br>DRS90L8/2, ..L8/4 | | | 43.7 | 49.35 | 113 % | |
| DR.90L6 | | | 43.4 | 49.05 | 113 % | |
| DR.100M2, ..M4<br>DRS100M4/2, ..M8/2, ..M8/4 | | | 56.0 | 61.65 | 110 % | |
| DR.100M6 | | | 55.6 | 61.25 | 110 % | |
| DR.100L2, ..L4<br>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<br>DRS132S4/2 | | | 146 | 151.7 | 104 % | |
| DRE132S4 | | | 190 | 195.7 | 103 % | |
| DR.132M2<br>DRS132M4/2 | | | 193 | 198.7 | 103 % | |
| DRE132MC2 | | | 239 | 244.7 | 102 % | |

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| 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<br>DRS112M8/2, ..M8/4 | | | 146 | 156.6 | 107 % | |
| DR.132S6 | | | 188 | 198.6 | 106 % | |
| DRS132S4<br>DRS132S8/4 | | | 190 | 200.6 | 106 % | |
| DR.132M6 | | | 250 | 260.6 | 104 % | |
| DR.132M4<br>DRS132M8/2, ..M8/4 | | | 253 | 263.6 | 104 % | |
| DR.132MC6 | | | 337 | 347.6 | 103 % | |
| DR.132MC4 | | | 340 | 350.6 | 103 % | |
| DR.160S4<br>DRS160S4/2, ..S8/4 | 61.2 | 5.97 | 370 | 425.2 | 115 % | 0.96 |
| DRS160S6 | | | 520 | 575.2 | 111 % | |
| DR.160M4<br>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<br>DRS180S8/4 | | | 895 | 944.4 | 106 % | |
| DR.180M4 | | | 1110 | 1159 | 104 % | |
| DR.180L4<br>DRS180L8/4 | | | 1300 | 1349 | 104 % | |
| DR.180LC4 | | | 1680 | 1729 | 103 % | |
| DR.200L4<br>DRS200L8/4 | 157 | 16.85 | 2360 | 2500 | 106 % | 1.77 |
| DR.225S4<br>DRS225S8/4 | | | 2930 | 3070 | 105 % | |
| DR.225M4<br>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.

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### 10.10.4 Axially separable fan guard for brakemotors

**Type designation**

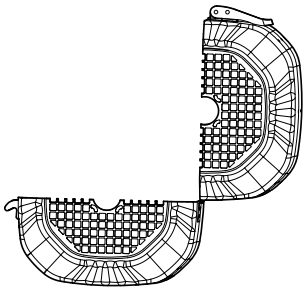
None

**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.

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### 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 |

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### 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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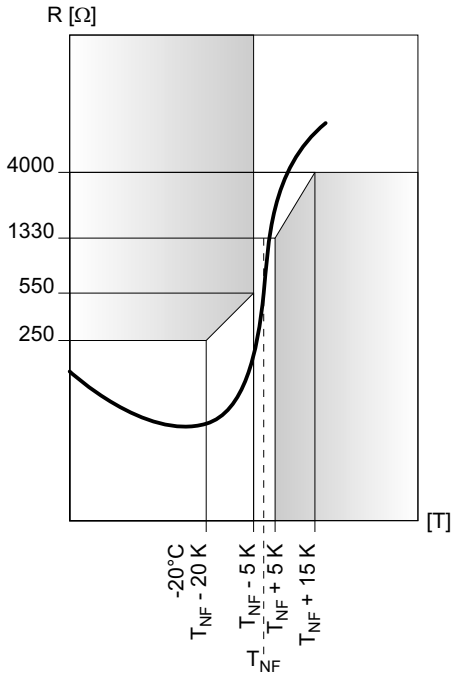
The below figure shows the characteristic curve of a TF with reference to the nominal response temperature (referred to as $T_{NF}$).

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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),

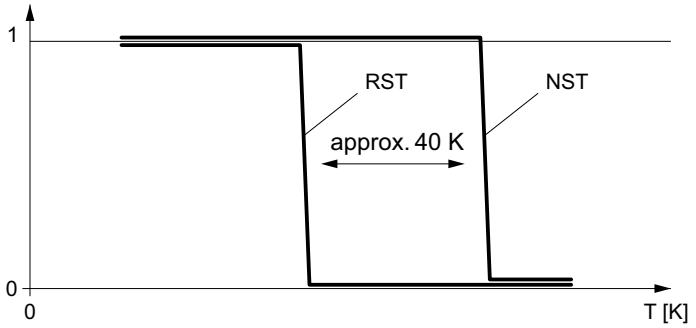
Please contact us if you are considering the double /TH design.

#### 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.

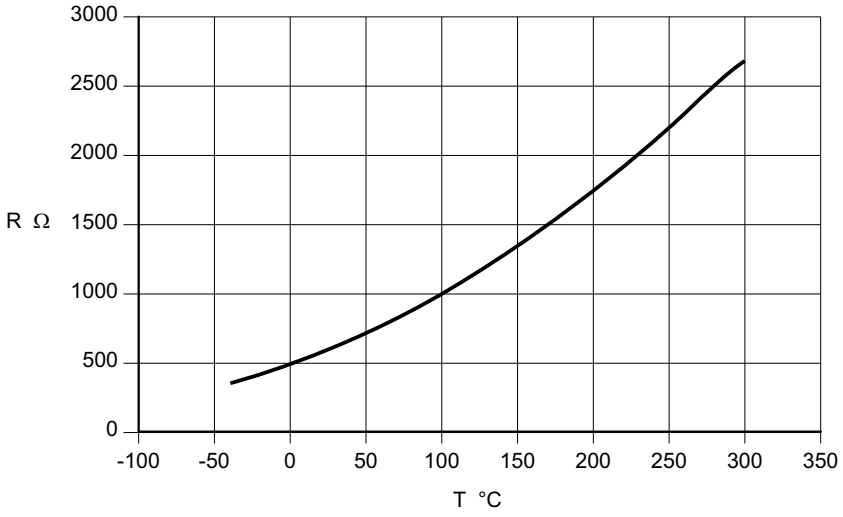
| Type | KTY84-130 |
|---|---|
| Connection | red conductor = +<br>blue conductor = - |
| Total resistance at 20 – 25° C | 540 Ω < R < 640 Ω |
| Test current | < 3 mA |

## 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.

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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**

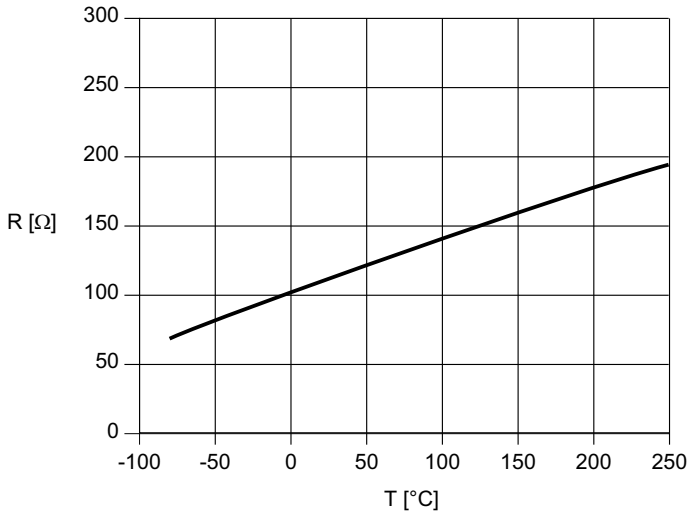
The PT100 temperature sensor continuously detects the motor temperature. One or three PT100 sensors are used depending on the requirements.

| 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.

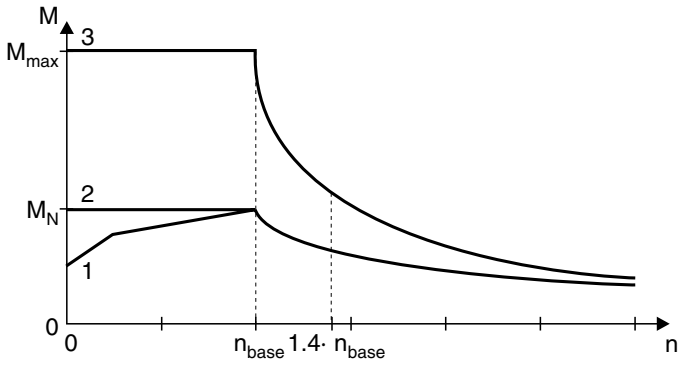
The forced cooling fan is installed in order to ensure motor cooling independent of the motor speed. This means the motor can permanently deliver the full nominal torque at low speeds without the risk that the motor will overheat.

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 |

### 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 |
| | | 人 | 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 |
| | | 人 | 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



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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 | – | • | • | • |

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### 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**

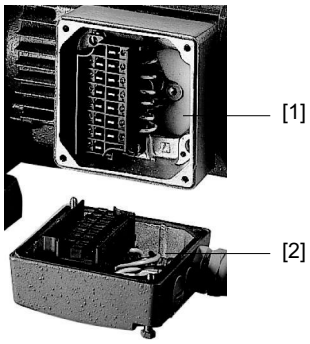
/IS

**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 |

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| 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.

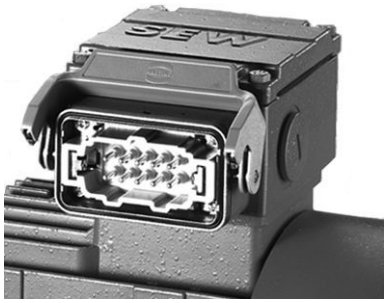
- HAN® 10 ES
- HAN® 10 E
- HAN® Modular in four different configurations.

**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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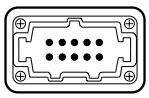
### Notes on configuration

The 10 contacts of the HAN® 10ES / 10E are used in the most diverse assignment configurations.

| Type | Unit | /ASB.<br>/ACB. | /ASE.<br>/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®<br>EMC housing 10B<br>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)<br>AS..= cage clamps (HAN® 10ES) | |
| Contact type | | Pin<br>(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.**



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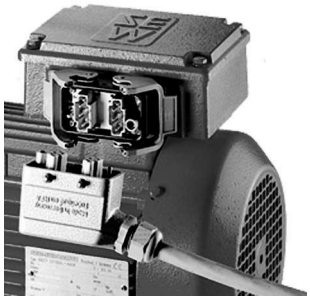
### 10.19.2 HAN® Modular

**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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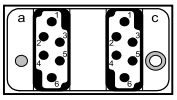
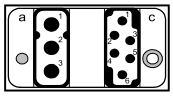
### Notes on configuration

Depending on the module assembly, up to 12 contacts are used in the most diverse assignment configurations.

| Type | Unit | /AMB.<br>/AME. | /ABB.<br>/ABE. |
|---|---|---|---|
| Plug connector for motor size | | DR. 71 – 132 | DR. 71 – 132<br>DR.160 – 225 [1] |
| Closure type of mating connector | | AMB: double locking latch<br>AME: single locking latch | ABB: double locking latch<br>ABE: single locking latch |
| Basic connector system | | Harting: HAN®<br>EMC housing 10B<br>DR71 – 132: aluminum terminal box<br>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<br>b: empty module<br>c: E module | a: C module<br>b: empty module<br>c: E module |
| Grounding (PE) | | Via two housing pins on articulated frame | |
| Connection to contacts | | Crimp contacts (HAN® Modular) | |
| Contact type | | Pin<br>(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<br>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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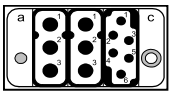
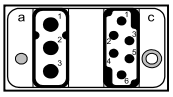
Depending on the module assembly, up to 12 contacts are used in the most diverse assignment configurations.

| Type | Unit | /ADB2<br>/ADE2 | /AKB.<br>/AKE. |
|---|---|---|---|
| Plug connector for motor size | | DR. 71 – 132<br>DR.160 – 225 [1] | DR.160 – 225[1] |
| Closure type of mating connector | | ADB2: double locking latch<br>ADE2: single locking latch | ADB: double locking latch<br>ADE: single locking latch |
| Basic connector system | | Harting: HAN®<br>EMC housing 10B<br>DR71 – 132: aluminum terminal box<br>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<br>b: C module l<br>c: E module | a: C module<br>b: empty module<br>c: E module |
| Grounding (PE) | | Via two housing pins on articulated frame | |
| Connection to contacts | | Crimp contacts (HAN® Modular) | C module: axial screw connection<br>E module = crimp contacts (HAN® Modular) |
| Contact type | | Pin<br>(bushing in mating connector) | |
| Maximum voltage (IEC) | $V_{AC}$ | 500 | |
| Maximum voltage (CSA) | $V_{AC}$ | 600 | |
| Maximum contact load | $A_{AC}$ | 6 × 36<br>6 × 16 | 3 × 60<br>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.**

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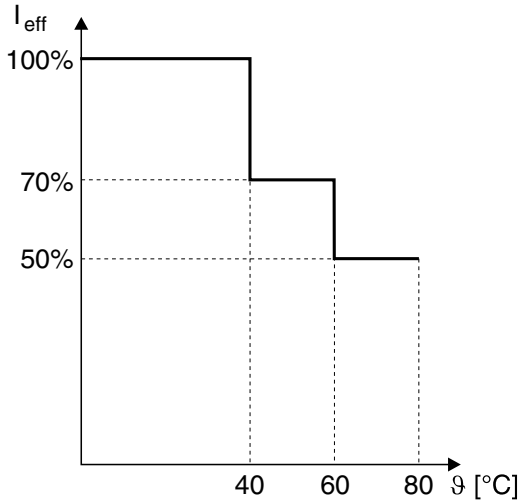
### 10.19.3 Contact rating at ambient temperatures over 40°C

**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.



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## 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<br>6 or 10 for brakemotor |
| Grounding (PE) | | 1 additional terminal |
| Connection to terminals | | Cage clamp |
| Maximum core cross section | | Rigid conductors: 4 mm²<br>Flexible conductors: 4 mm²<br>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 |

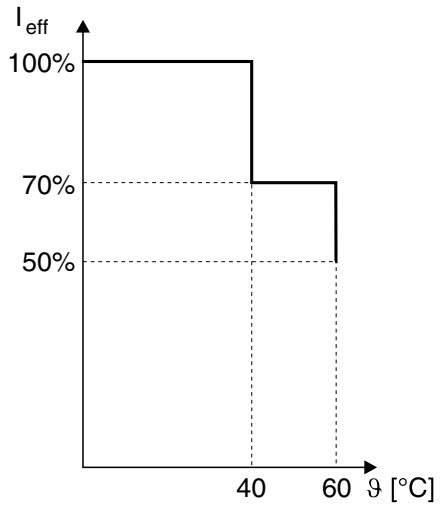
The auxiliary terminals – e.g., for thermal motor protection – are generally connected separately via screw terminals and not via the terminal strip.

### 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<br>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<br>Flexible conductors: 2.5 mm²<br>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.

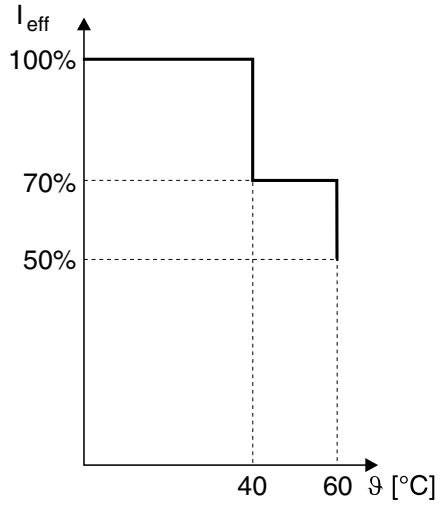
The terminal strip is approved by CSA (Canada) for a maximum of 5 amps.



### 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 |
| | $V_{AC}$<br>$V_{DC}$ | 24[1)] |
| Rated switching capacity | $A_{AC}$ | 6.0 (at 250 V) |
| | $A_{AC}$<br>$A_{DC}$ | 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 berylli-um-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.



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### 10.22.2 Function monitoring

**Type designation**

/DUB

**Description**

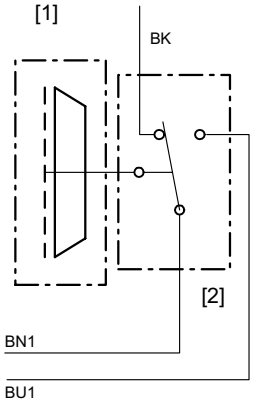
The function monitoring system signals whether the brake releases properly.

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.

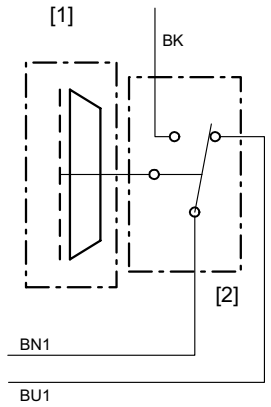
This is done via the NC function of the contact in the microswitch.

**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.

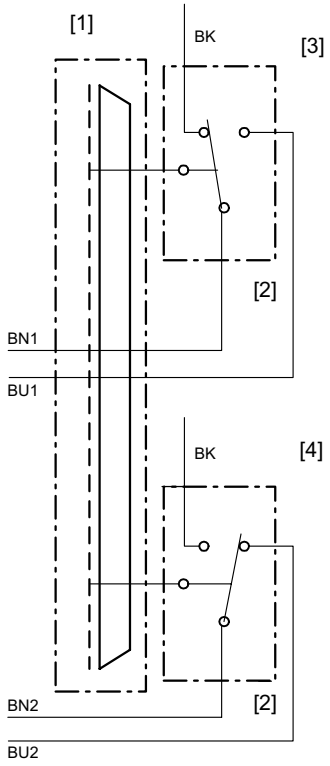
  This is done via the NO function of the contact in the first microswitch.
- The wear monitoring system signals when the brake has reached a specified wear limit. However, the brake remains functional.

  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
[2] MP321-1MS microswitch
[3] Function monitoring
[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.

*3976847243*

### 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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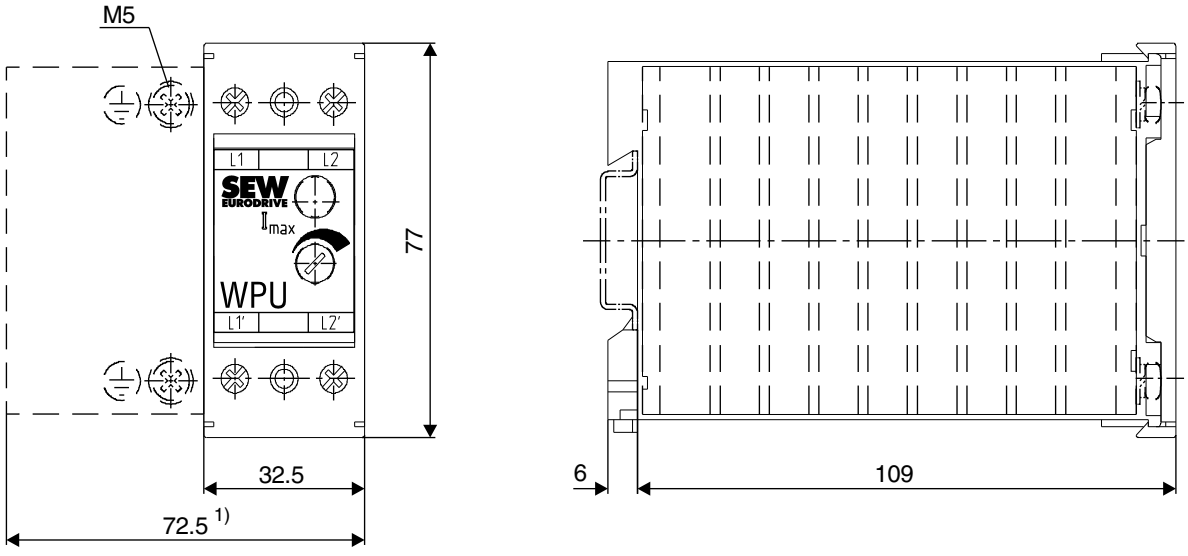
### 10.24.3 Technical data

| 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 $\vartheta_{amb}$ | -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

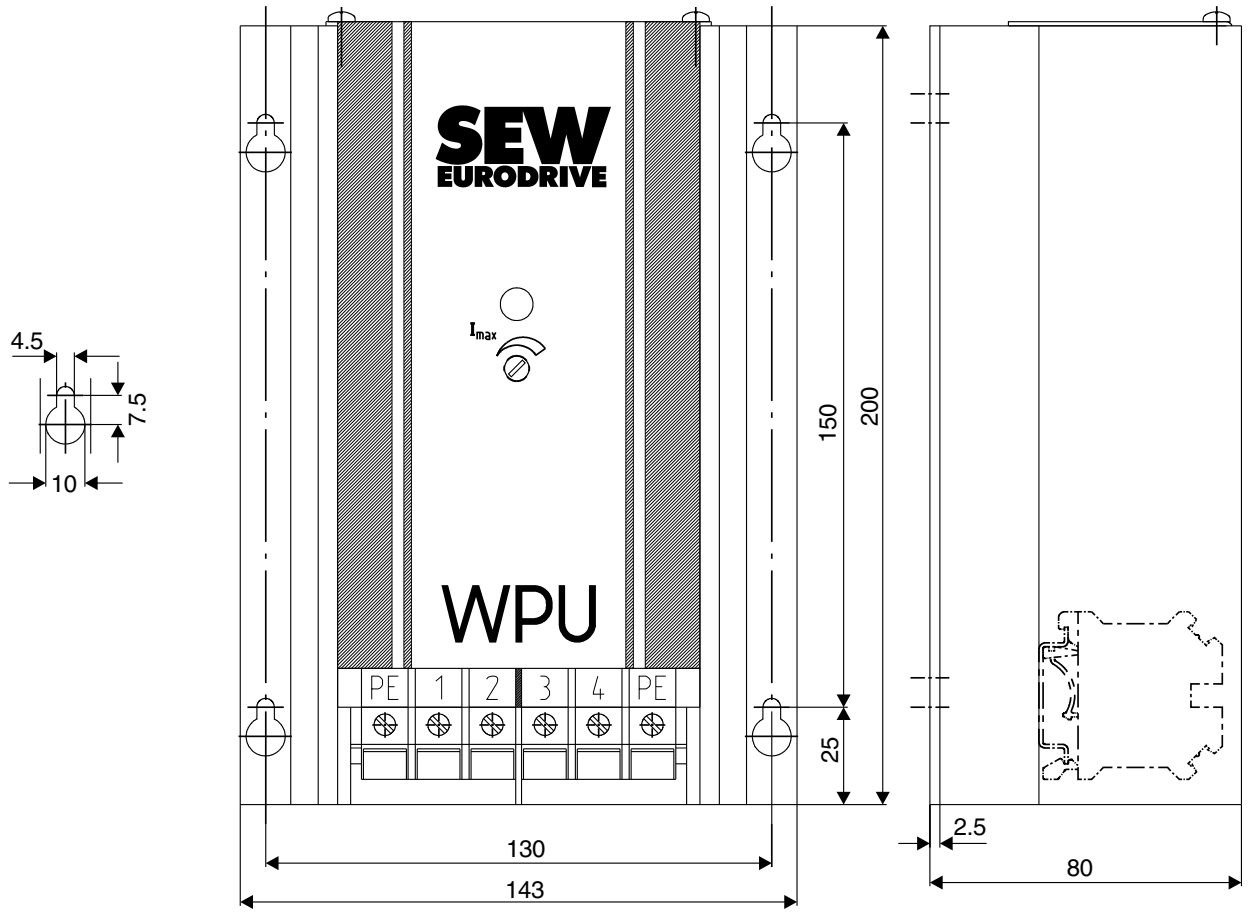
**WPU 1001, 1003, 1010**




*3976853003*

1) Heat sink only for WPU 1010

**WPU 2030**




*3976855691*

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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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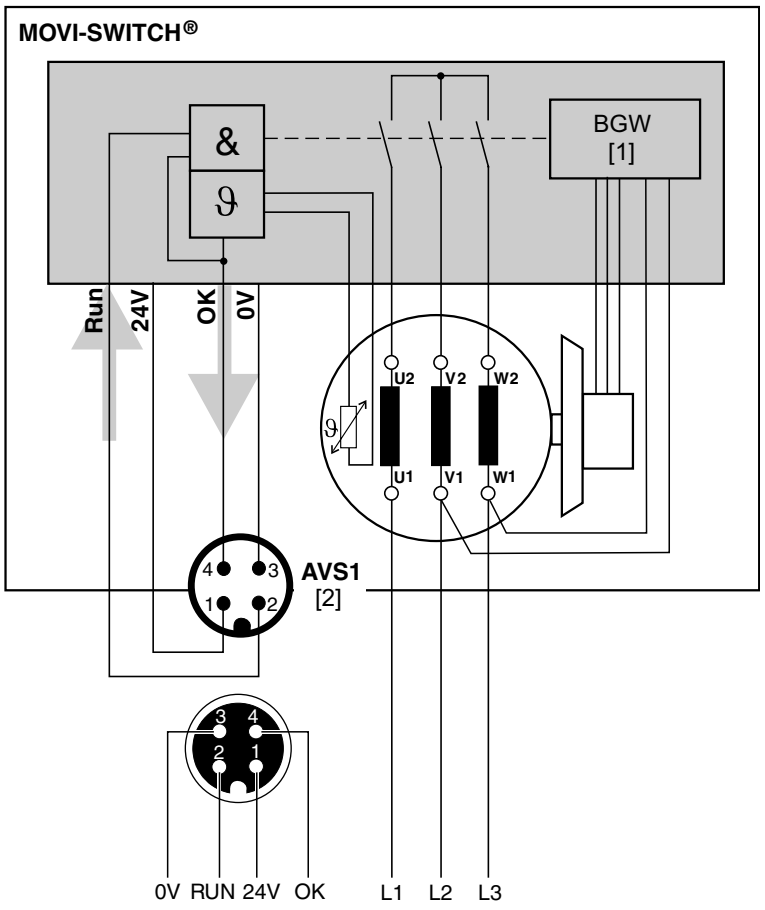
## 11.2 Project planning notes – MOVI-SWITCH®

### 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.




*4153304203*

[1] = Brake control

[2] = M12 plug connector (standard coding)

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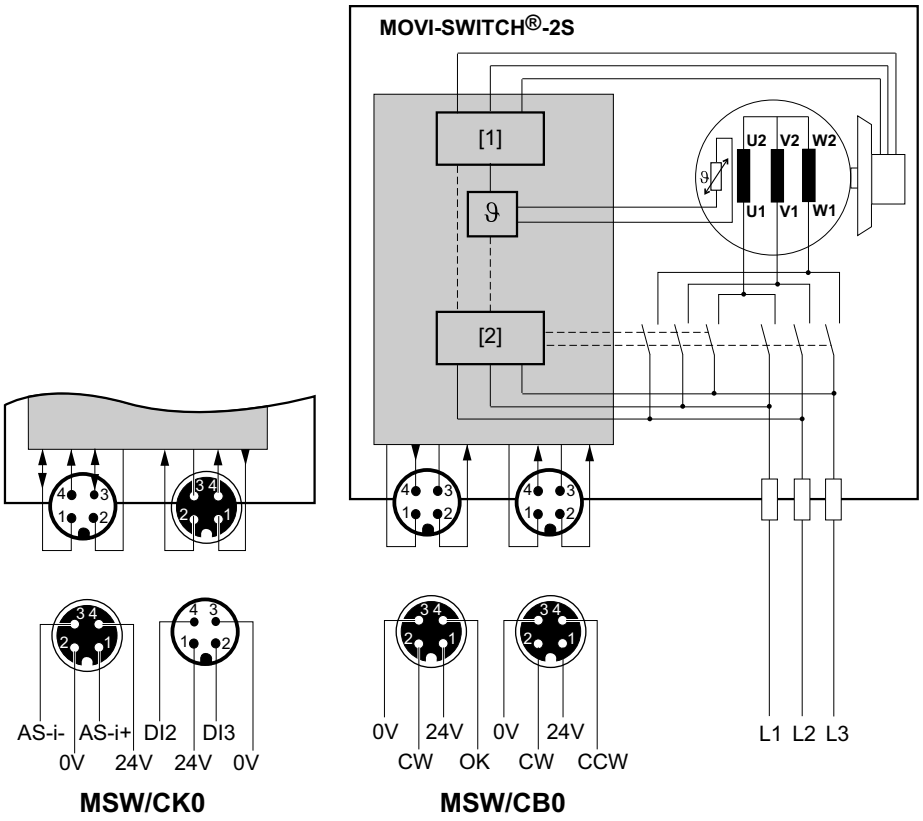
The following figure illustrates how MOVI-SWITCH®-2S operates.




[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

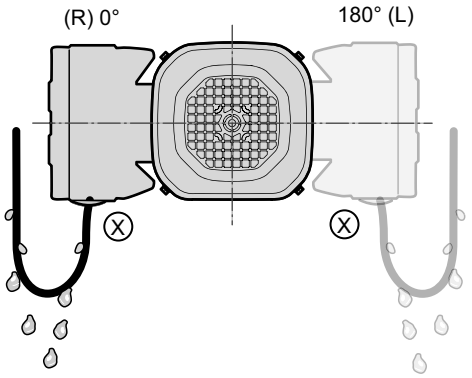
**Properties**

MOVI-SWITCH® 1E drives in enclosure IP66 are characterized by the following features:

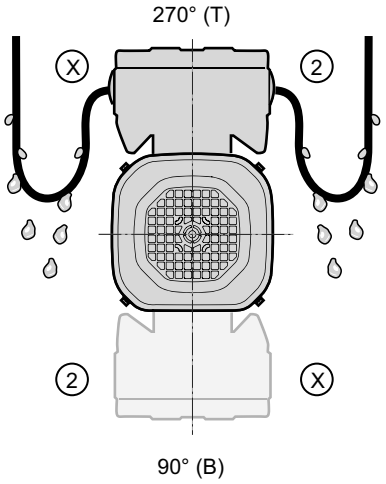
- IP66 motor with condensation drain hole and corrosion protection
- IP66 connection box with cable outlet on one end
- Stainless steel screw plugs with seal on inside
- Stainless steel retaining screws in connection box cover
- Two metal cable glands (1 x M25 and 1 x M16, enclosed loose)
- Available with optional pressure compensation fitting (M16, enclosed loose)

**Available designs**

MOVI-SWITCH® **without** pressure compensation




MOVI-SWITCH® **with** pressure compensation




| Drives | Type | Possible positions of connection box/cable entry |
|---|---|---|
| MOVI-SWITCH® 1E<br>without pressure compensation fitting | D../MSW/AVS1/IP66 | 0°/X<br>180°/X |
| MOVI-SWITCH® 1E<br>with pressure compensation fitting | D../MSW/AVS1/IP66 | 90°/X<br>270°/X<br>90°/2<br>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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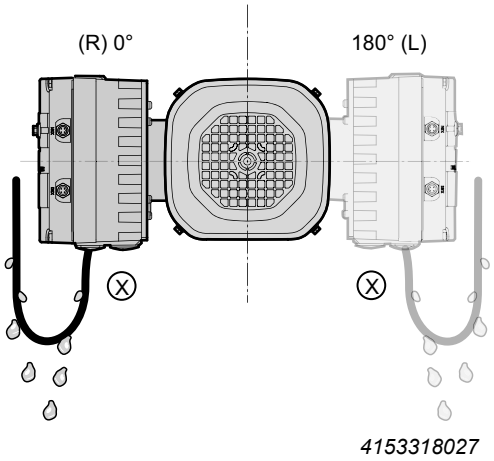
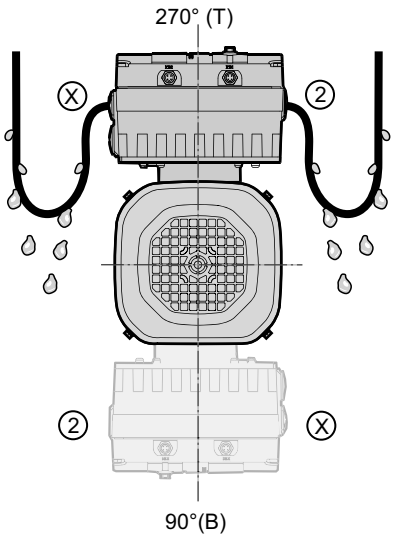
**Available designs**

MOVI-SWITCH® **without** pressure compensation




MOVI-SWITCH® **with** pressure compensation




| Drives | Type | Possible positions of connection box/ cable entry |
|---|---|---|
| MOVI-SWITCH® 2S<br>without pressure compensation fitting | D../MSW/C.. /RA2A – IP66 | 0°/X<br>180°/X |
| MOVI-SWITCH® 2S<br>with pressure compensation fitting | D../MSW/C.. /RA2A – IP66 | 90°/X<br>270°/X<br>90°/2<br>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<br>Power | 1 x M12 x 1 round plug connector<br>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**<br>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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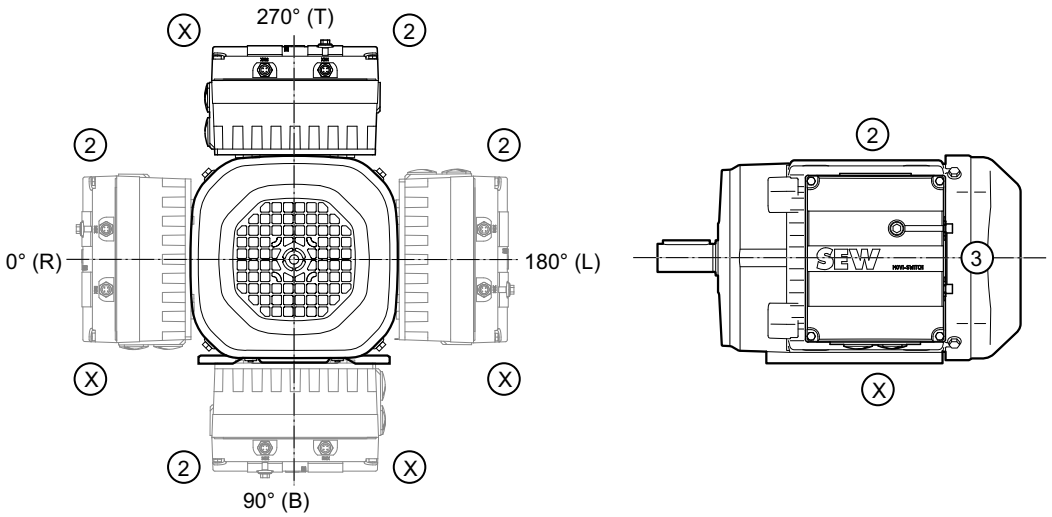
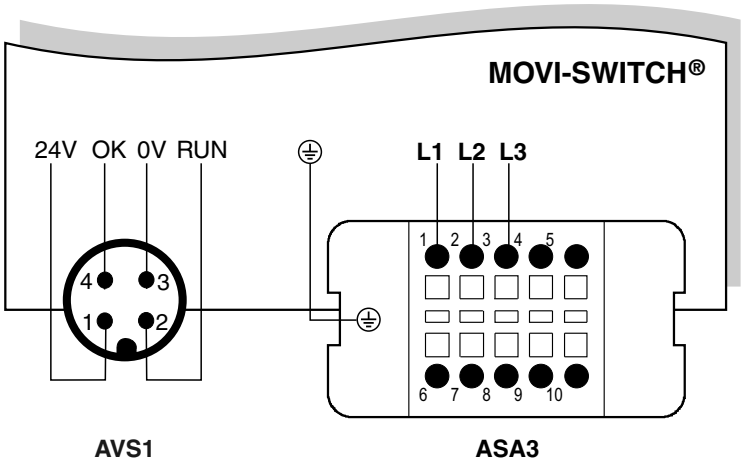



4153328139

*AVS1/ASA3 pin assignment*

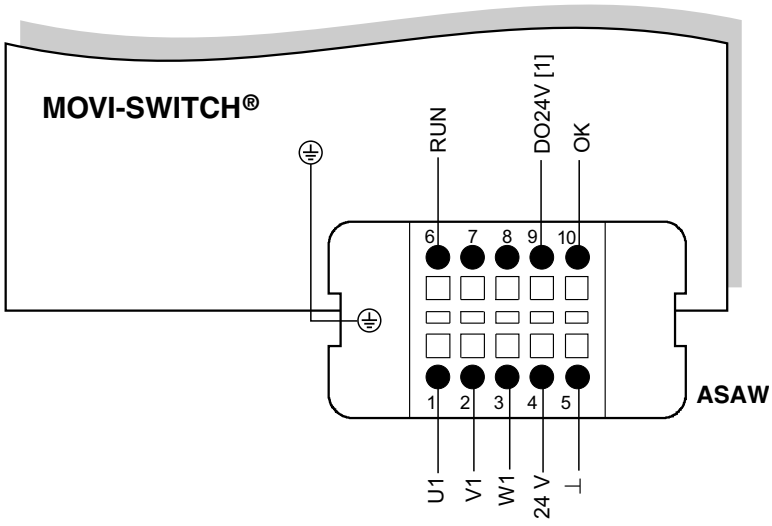
The following figure shows the assignment of the AVS1/ASA3 plug connector:




4153330827

*ASAW pin assignment*

The following figure shows the assignment of the ASAW plug connector:




*4153333515*

[1] Plug connector monitoring possible with suitable connection wiring

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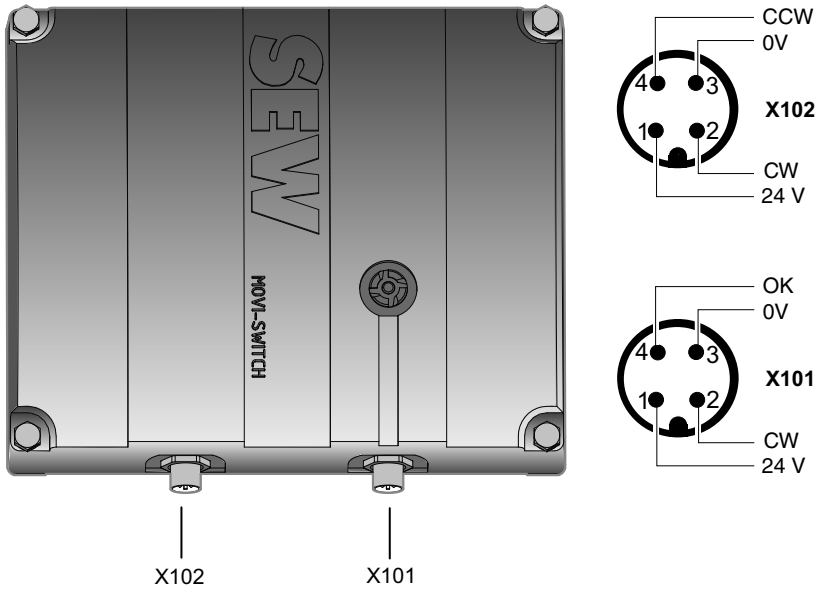
### 11.2.8 MSW-2S

**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.




*4153338251*

*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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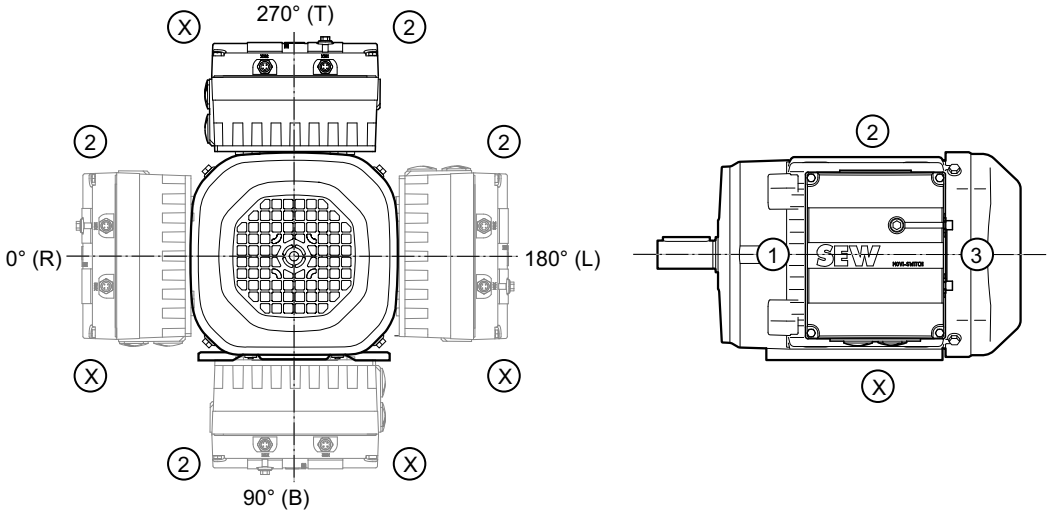
*Possible plug connector positions*

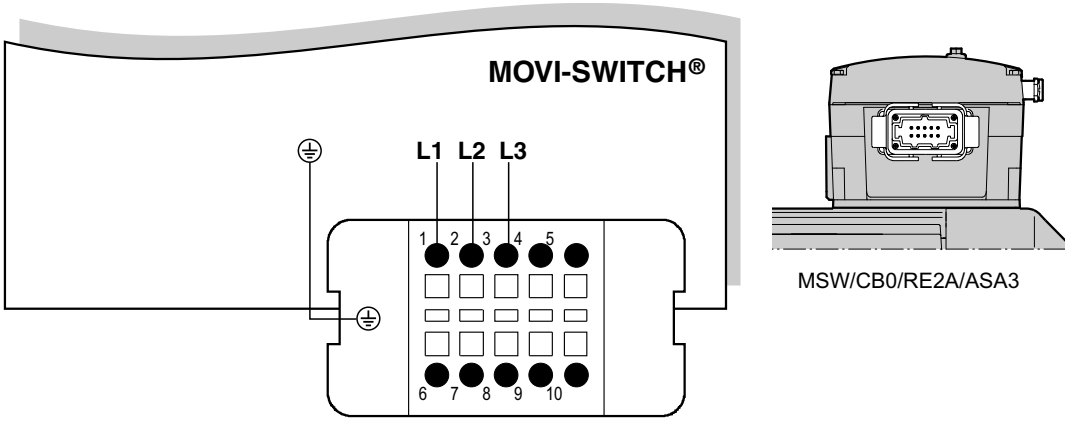
The positions shown in the following figure are possible for plug connectors. Some positions might not be possible for certain gear unit types and mounting positions; please contact SEW-EURODRIVE.




*4153341963*

*ASA3 pin assignment*

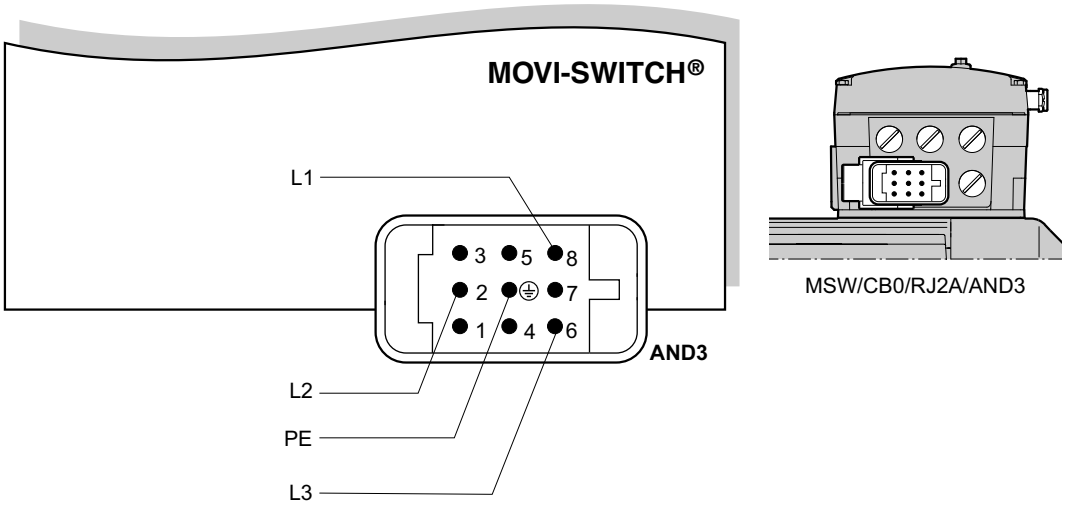
The following figure shows the assignment of the ASA3 plug connector:




*4153344651*

*AND3 pin assignment*

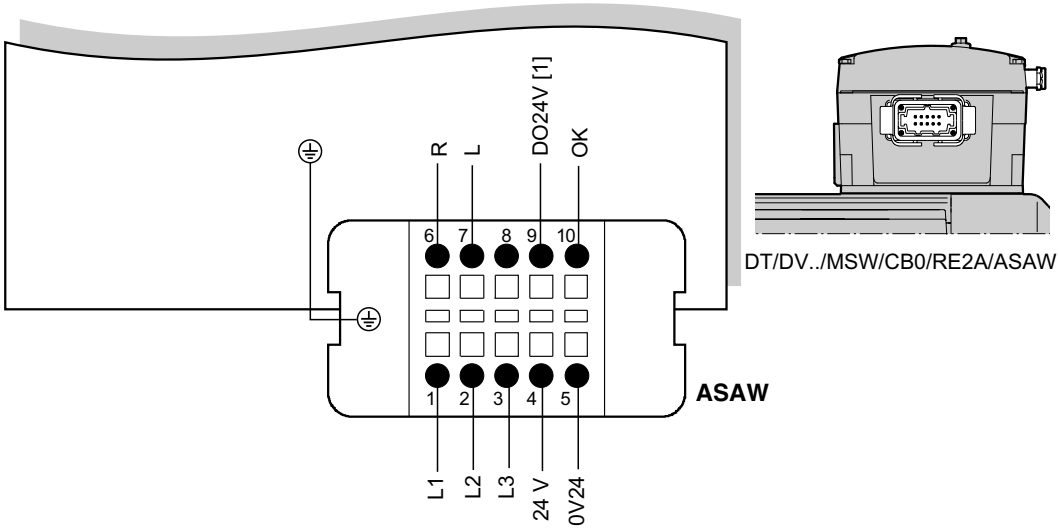
The following figure shows the assignment of the AND3 plug connector:




*4153347339*

*ASAW pin assignment*

The following figure shows the assignment of the ASAW plug connector:




*4153350027*

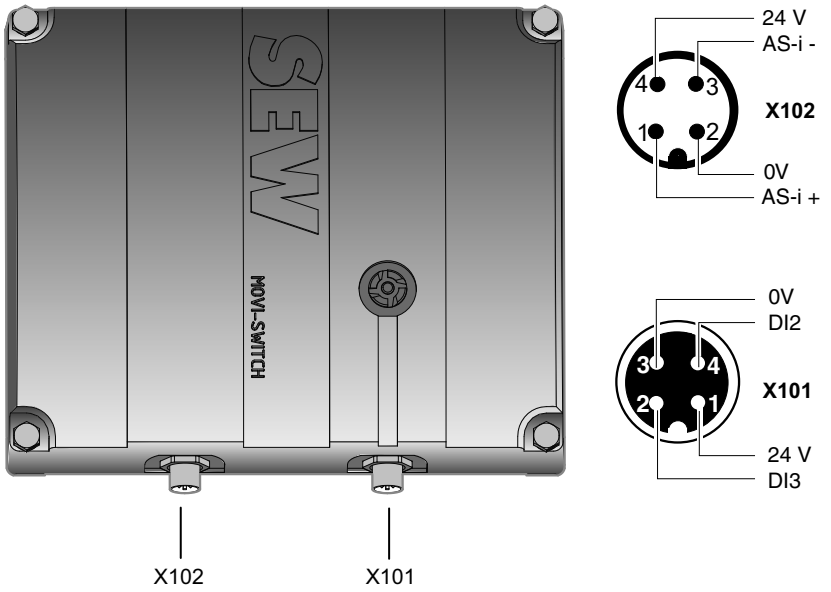
[1] Plug connector monitoring possible with suitable connection wiring

### 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.




*4153353739*

*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) +<br>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) +<br>1 x M12 x 1 round plug connector |

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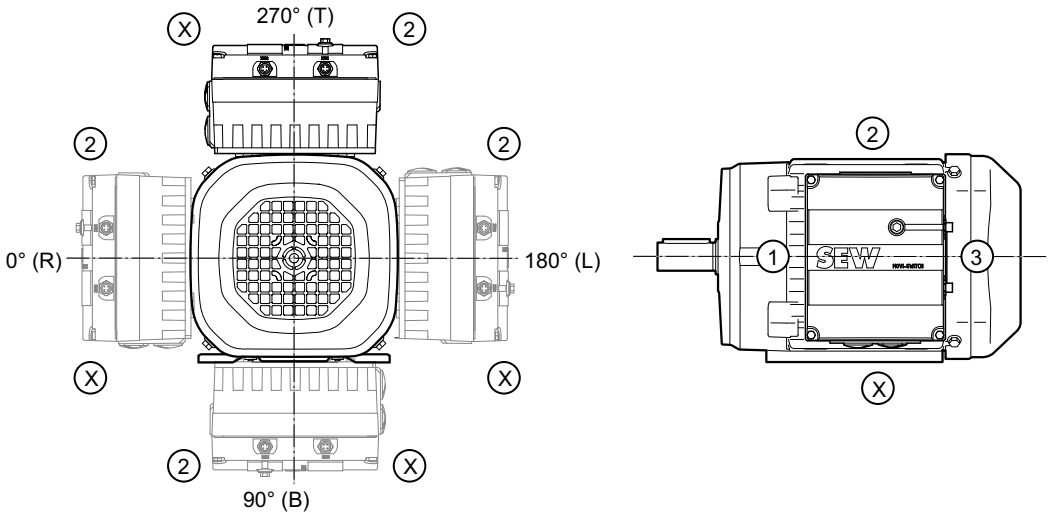
*Possible plug connector positions*

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)

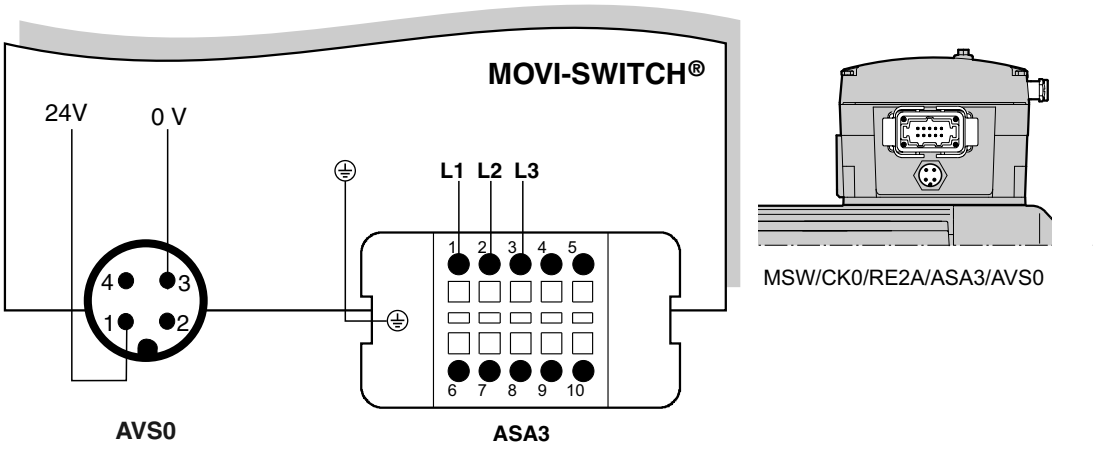



*4153341963*

*Pin assignments*

*AVS0/ASA3 pin assignment*

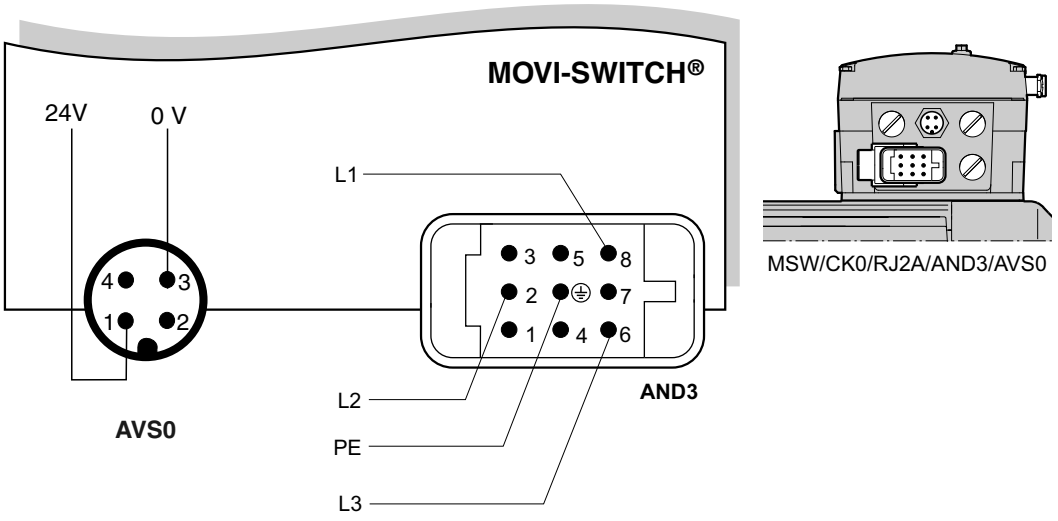
The following figure shows the assignment of the AVS0/ASA3 plug connector:




*4153359499*

*AVS0/AND3 pin assignment*

The following figure shows the assignment of the AVS0/AND3 plug connector:




*4153362187*

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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<br>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<br>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<br>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<br>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<br>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<br>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<br>4500 | 3.5 | 12 | 8.51 |
| DRS80S2 | 0.75 | 2.55 | 2800 | 12 | 15.3 | BE05 | 1400<br>3300 | 5 | 14 | 16.8 |
| DRS80M2 | 1.1 | 3.7 | 2840 | 14 | 21.7 | BE1 | 1300<br>3000 | 7 | 17 | 23.2 |
| DRS90M2 | 1.5 | 5.1 | 2830 | 18 | 35.7 | BE1 | 1100<br>2700 | 10 | 21 | 37.3 |
| DRS90L2 | 2.2 | 7.4 | 2820 | 21 | 43.9 | BE2 | 900<br>2200 | 14 | 26 | 48.6 |
| DRS100M2 | 3 | 10.1 | 2840 | 26 | 56.2 | BE2 | 700<br>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<br>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<br>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<br>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<br>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<br>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<br>3200 | 5 | 17 | 23.2 |
| DRE90M2 | 1.1 | 3.65 | 2870 | 18 | 35.7 | BE1 | 1100<br>2700 | 10 | 21 | 37.3 |
| DRE90M2 | 1.5 | 5.1 | 2830 | 18 | 35.7 | BE1 | 1100<br>2700 | 10 | 21 | 37.3 |
| DRE100M2 | 2.2 | 7.3 | 2880 | 26 | 56.2 | BE2 | 700<br>1800 | 14 | 31 | 61 |
| DRE100L2 | 3 | 10.1 | 2850 | 29 | 68.6 | BE2 | 450<br>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<br>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<br>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<br>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<br>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<br>2.4 | 3.5 |

**2-pole DRP../MSW motors/brakemotors**

| Motor type DRP | $P_N$ kW | $M_N$ Nm | $n_N$ rpm | m kg | $J_{Mot}$ $10^{-4}$ 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<br>3200 | 5 | 17 | 23.2 |
| DRP90M2 | 1.1 | 3.65 | 2870 | 18 | 35.7 | BE1 | 1100<br>2700 | 7 | 21 | 37.3 |
| DRP100M2 | 1.5 | 4.95 | 2890 | 26 | 56.2 | BE2 | 700<br>1800 | 14 | 31 | 61 |
| DRP100M2 | 2.2 | 7.3 | 2880 | 26 | 56.2 | BE2 | 700<br>1800 | 14 | 31 | 61 |
| DRP100LC2 | 3 | 9.8 | 2920 | 31 | 90 | BE2 | 300<br>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 | $\eta_{50\%}$ % | $\eta_{75\%}$ % | $\eta_{100\%}$ % | $I_A/I_N$ | $M_A/M_N$ $M_H/M_N$ | $M_K/M_N$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DRS71S4 | 0.37 | 2.55 | 1380 | 1.14 | 1.24 | 0.70 | IE1 | 59.1 | 65.3 | 66.6 | 3.5 | 1.8<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>9500 | 5 | 10 | 6.43 |
| DRS71M4 | 0.55 | 3.85 | 1360 | 9.1 | 7.21 | BE1 | 4100<br>11000 | 10 | 12 | 8.51 |
| DRS80S4 | 0.75 | 5.1 | 1400 | 12 | 15.9 | BE1 | 3500<br>9000 | 10 | 14 | 17.4 |
| DRS80M4 | 1.1 | 7.4 | 1410 | 14 | 22.3 | BE2 | 3500<br>9000 | 14 | 18 | 26.8 |
| DRS90M4 | 1.5 | 10.3 | 1395 | 18 | 36.6 | BE2 | 2900<br>7500 | 20 | 23 | 41.3 |
| DRS90L4 | 2.2 | 15 | 1400 | 21 | 44.9 | BE5 | 2300<br>5600 | 40 | 27 | 50.9 |
| DRS100M4 | 3 | 20.5 | 1400 | 26 | 57.2 | BE5 | -<br>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 | $\eta_{50\%}$ % | $\eta_{75\%}$ % | $\eta_{100\%}$ % | $I_A/I_N$ | $M_A/M_N$ $M_H/M_N$ | $M_K/M_N$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DRE80S4 | 0.37 | 2.45 | 1435 | 0.87 | - | 0.77 | IE2 | 76.5 | 78.5 | 78.8 | 4.9 | 2.6<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>9000 | 10 | 14 | 17.4 |
| DRE80M4 | 0.55 | 3.65 | 1445 | 14 | 22.3 | BE1 | 3500<br>9000 | 10 | 17 | 23.8 |
| DRE80M4 | 0.75 | 5 | 1435 | 14 | 22.3 | BE1 | 3500<br>9000 | 10 | 17 | 23.8 |
| DRE90M4 | 1.1 | 7.4 | 1420 | 18 | 36.6 | BE2 | 3000<br>8000 | 14 | 23 | 41.3 |
| DRE90L4 | 1.5 | 10 | 1430 | 21 | 44.9 | BE2 | 3000<br>8000 | 20 | 26 | 49.6 |
| DRE100M4 | 2.2 | 14.7 | 1425 | 26 | 57.2 | BE5 | -<br>8000 | 55 | 32 | 63.2 |
| DRE100LC4 | 3 | 19.7 | 1455 | 31 | 91 | BE5 | -<br>3800 | 40 | 37 | 97 |
| DRE112M4 | 3 | 19.7 | 1455 | 41 | 148 | BE5 | -<br>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<br>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<br>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<br>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<br>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<br>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<br>7500 | 10 | 21 | 38.2 |
| DRP90L4 | 1.1 | 7.3 | 1440 | 21 | 44.9 | BE2 | 2300<br>5600 | 14 | 26 | 49.6 |
| DRP100M4 | 1.5 | 9.9 | 1440 | 26 | 57.2 | BE2 | -<br>8500 | 20 | 31 | 61.9 |
| DRP100L4 | 2.2 | 14.6 | 1440 | 29 | 69.5 | BE5 | -<br>7600 | 28 | 35 | 75.5 |
| DRP112M4 | 3 | 19.7 | 1455 | 41 | 148 | BE5 | -<br>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 | $\eta_{50\%}$ % | $\eta_{75\%}$ % | $\eta_{100\%}$ % | $I_A/I_N$ | $M_A/M_N$ $M_H/M_N$ | $M_K/M_N$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DRS71S6 | 0.25 | 2.65 | 895 | 0.83 | 0.86 | 0.70 | IE1 | 55.3 | 61.4 | 62.2 | 2.7 | 1.7<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>16,000 | 5 | 10 | 9.59 |
| DRS71M6 | 0.37 | 3.9 | 905 | 9.1 | 11.9 | BE1 | 6600<br>15,000 | 10 | 12 | 13.2 |
| DRS80S6 | 0.55 | 5.7 | 915 | 12 | 15.9 | BE2 | 6000<br>14,000 | 20 | 15 | 20.4 |
| DRS80M6 | 0.75 | 7.8 | 915 | 14 | 22.3 | BE2 | 4300<br>10,000 | 20 | 18 | 26.8 |
| DRS90L6 | 1.1 | 11.3 | 930 | 21 | 44.6 | BE5 | 3500<br>8000 | 40 | 27 | 50.5 |
| DRS100M6 | 1.5 | 15.5 | 925 | 26 | 56.8 | BE5 | -<br>7000 | 40 | 32 | 62.8 |
| DRS100LC6 | 2.2 | 22 | 955 | 31 | 91 | BE5 | -<br>5000 | 55 | 37 | 97 |
| DRS112M6 | 2.2 | 22 | 955 | 41 | 148 | BE11 | -<br>4000 | 80 | 56 | 158 |
| DRS112M6 | 3 | 30.5 | 945 | 41 | 148 | BE11 | -<br>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<br>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<br>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<br>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<br>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<br>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<br>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<br>1.8 | 2.7 |
| DRE132S6 | 3 | 30 | 955 | 6.8 | 7 | 0.74 | IE2 | 85.4 | 85.8 | 84.4 | 5.5 | 2.3<br>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<br>15,000 | 5 | 12 | 13.2 |
| DRE80S6 | 0.37 | 3.8 | 935 | 12 | 15.9 | BE1 | 6000<br>14,000 | 10 | 14 | 17.4 |
| DRE80M6 | 0.55 | 5.6 | 935 | 14 | 22.3 | BE2 | 4300<br>10,000 | 14 | 18 | 26.8 |
| DRE90L6 | 0.75 | 7.6 | 940 | 21 | 44.6 | BE2 | 3500<br>8000 | 20 | 26 | 49.2 |
| DRE100M6 | 1.1 | 11.2 | 940 | 26 | 56.8 | BE5 | -<br>7000 | 28 | 32 | 62.8 |
| DRE100L6 | 1.5 | 15.2 | 940 | 29 | 69 | BE5 | -<br>6000 | 40 | 35 | 75 |
| DRE112M6 | 2.2 | 22 | 955 | 41 | 148 | BE5 | -<br>4000 | 55 | 48 | 152 |
| DRE132S6 | 3 | 30 | 955 | 46 | 190 | BE11 | -<br>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 | $\eta_{50\%}$ % | $\eta_{75\%}$ % | $\eta_{100\%}$ % | $I_A/I_N$ | $M_A/M_N$<br>$M_H/M_N$ | $M_K/M_N$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DRP90L6 | 0.75 | 7.6 | 940 | 2.05 | 2.1 | 0.65 | IE3 | 78.7 | 80.5 | 80.0 | 4.6 | 2.4<br>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<br>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<br>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<br>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<br>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<br>8000 | 20 | 26 | 49.2 |
| DRP100L6 | 1.1 | 11.1 | 950 | 29 | 69 | BE5 | -<br>6000 | 28 | 35 | 75 |
| DRP112M6 | 1.5 | 14.8 | 965 | 41 | 148 | BE5 | -<br>4000 | 40 | 48 | 152 |
| DRP132S6 | 2.2 | 22 | 965 | 46 | 190 | BE5 | -<br>3500 | 55 | 54 | 195 |
| DRP132M6 | 3 | 29.5 | 970 | 60 | 251 | BE11 | -<br>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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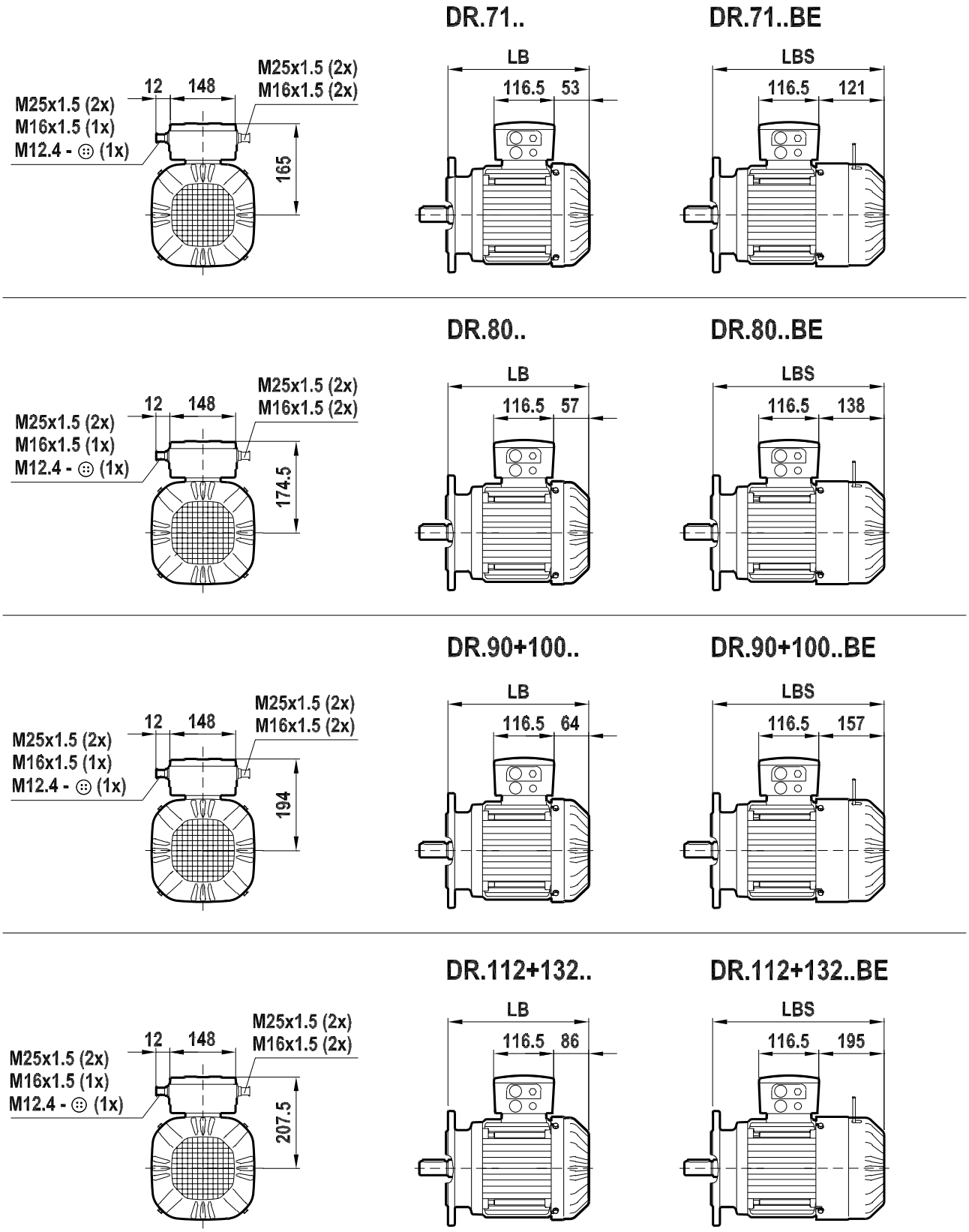
## 11.8 Dimension sheets for DR.. motors / brakemotors with MOVI-SWITCH®

**MSW-1E**

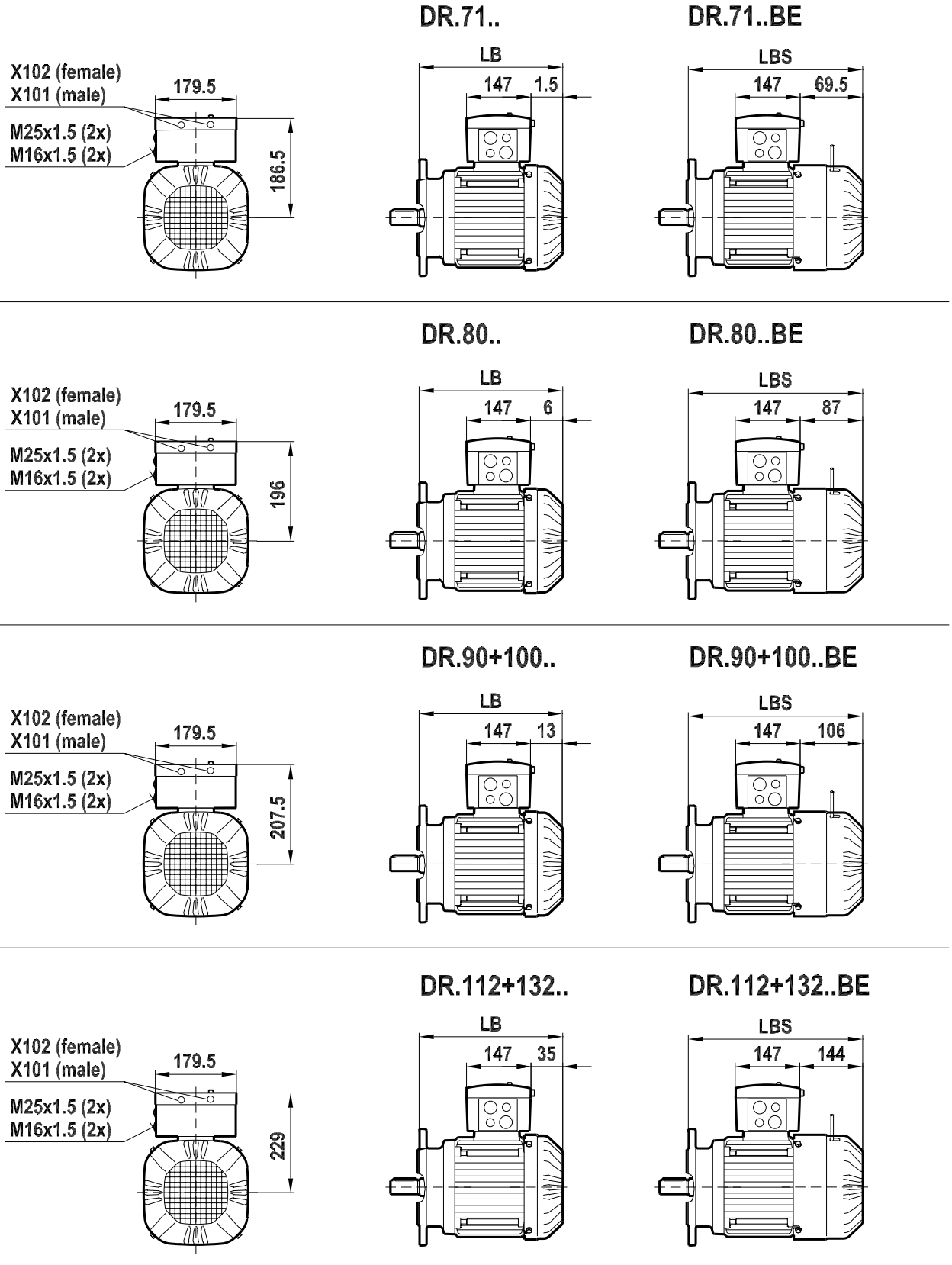
**08 411 01 08**
1 (1)



9007204387410827

## MSW-2S

08 412 01 08
1 (1)




9007204387413259

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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.

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- 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 | DC 24 V voltage supply (380 – 500 V) |
| MLU21A | DC 24 V voltage supply (200 – 240 V) |
| MLG11A | Setpoint adjuster with DC 24 V voltage supply (380 – 500 V) |
| MLG21A | Setpoint adjuster with DC 24 V voltage supply (200 – 240 V) |
| 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:

*4153829643*

- 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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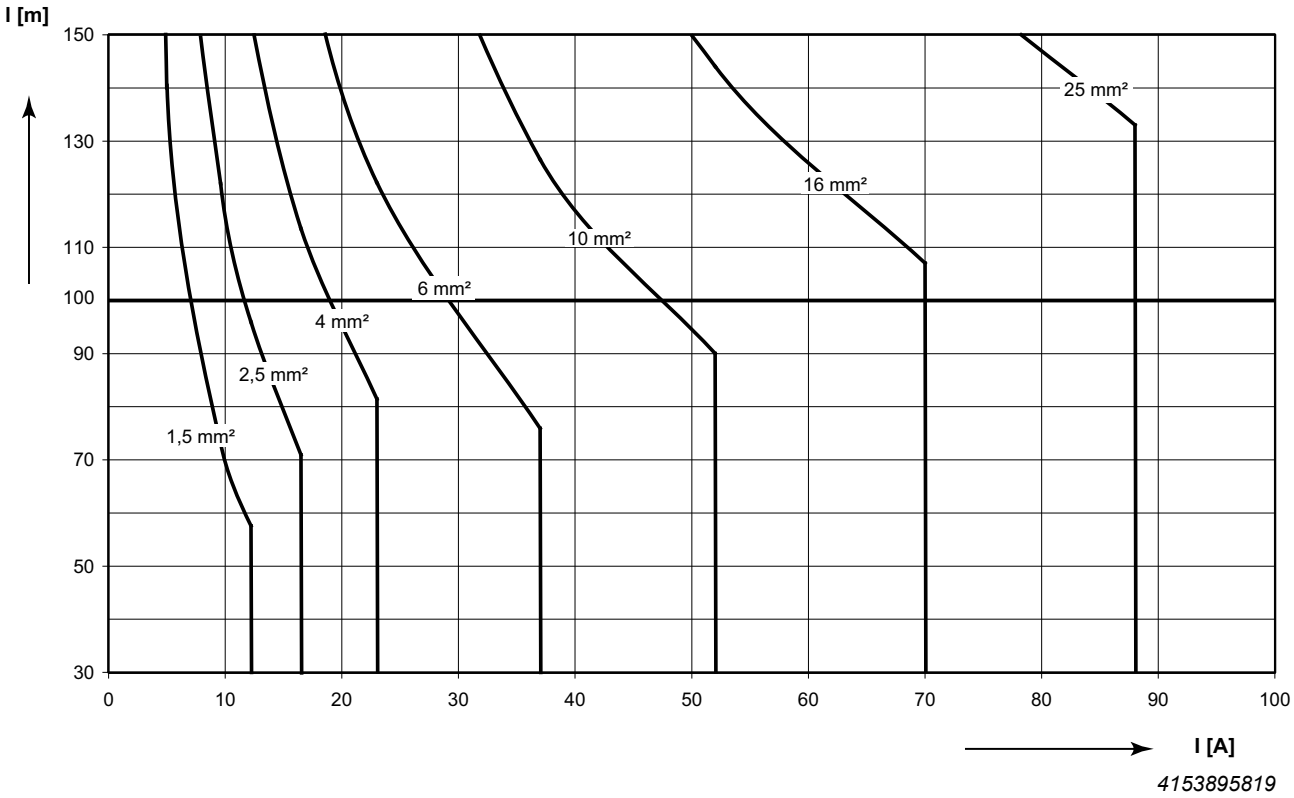
## 12.2 Project planning

### 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.




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 |
|---|---|---|---|
| mm² | 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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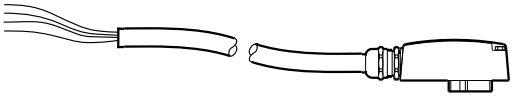
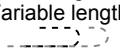
## 12.3 Overview of power cables for DR.. motors

### 12.3.1 Brakemotor cable with IS

| Connection cable | | | Length/installation type | Specification |
|---|---|---|---|---|
| Motor end | | | | |
|  | | | Set length,<br>Variable length<br>  | On the motor end, all 12 contacts of the integrated plug connector are used for connecting motor, brake, and motor protection.<br>The cables are available with variable terminal link in star or delta connection.<br>For wiring in the control cabinet and field distributors, the cores are fitted with ring-type cable lugs or conductor end sleeves.<br>Detailed information: (→ 🗎 572) |
| Open (conductor end sleeve and ring cable lug) | | IS | | |



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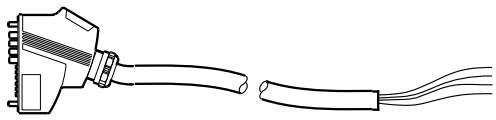
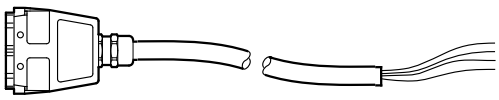
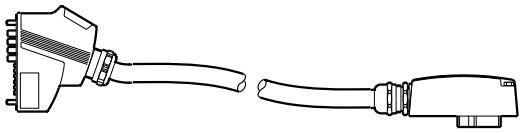
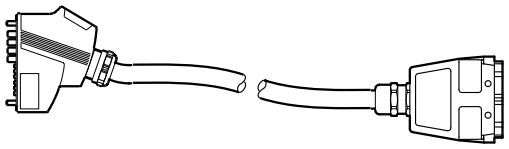
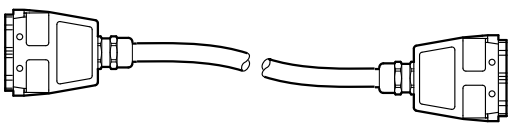
### 12.3.2 Brakemotor cable for decentralized MOVI-SWITCH®

**Prefabricated cables for motor side**

| Connection cable | | | Length/installation type | Specification |
|---|---|---|---|---|
| **Motor end** | | | | |
|  | | | Set length,<br>Variable length | Detailed information: (→ 🗎 574) |
| PLUSCON VC | | Open (conductor end sleeve and ring cable lug) | | |
|  | | | Set length,<br>Variable length | Detailed information: (→ 🗎 575) |
| Han® 10E | | Open (conductor end sleeve and ring cable lug) | | |
|  | | | Set length,<br>Variable length | Detailed information: (→ 🗎 576) |
| PLUSCON VC | | IS | | |
|  | | | Set length,<br>Variable length | Detailed information: (→ 🗎 577) |
| PLUSCON VC | | Han® 10E | | |
|  | | | Set length,<br>Variable length | Detailed information: (→ 🗎 578) |
| Han® 10E | | Han® 10E | | |

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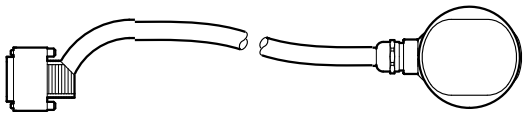
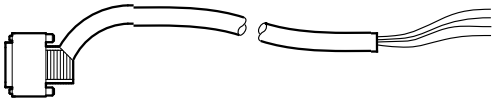
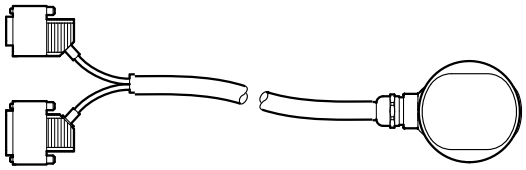
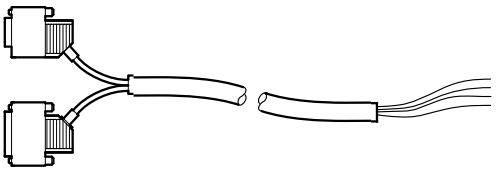
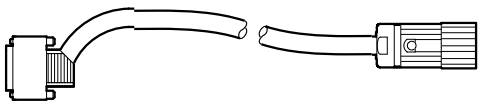
## 12.4 Overview of encoder cables for DR.. motors – MOVIDRIVE®

| 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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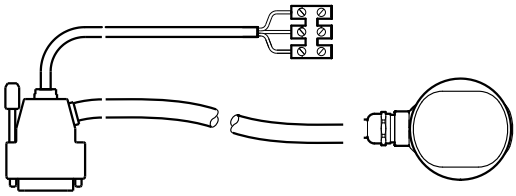
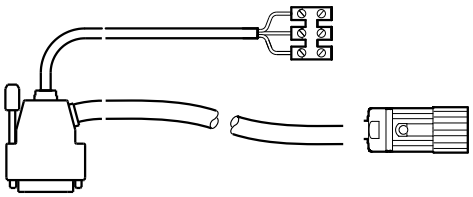
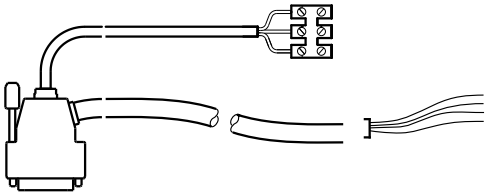
## 12.5 Overview of encoder cables for DR.. motors – MOVIAXIS®

| 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.<br>Connection with MOVIAXIS®: A 15-pin plug is available that matches the interface on the inverter.<br>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.<br>The motor protection is routed from the D-sub connector.<br>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.<br>The cable gland in the connection cover is included in the scope of delivery of the encoder.<br>Connection with MOVIAXIS®: A 15-pin plug is available that matches the interface on the inverter.<br>The motor protection is routed from the D-sub connector.<br>Detailed information: (→ 🗎 589) |
| D-sub, (15-pin) | | Open (conductor end sleeve and ring cable lug) | | |

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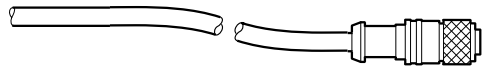
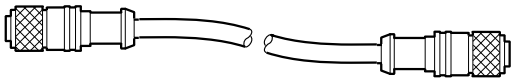
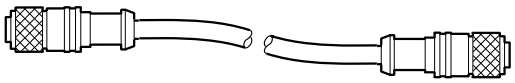
## 12.6 Overview of built-in encoder cable for DR.. motors

The used cable types for fixed and cable carrier installation are listed in chapter 'Cable specifications'.

| Connection cable | | | Length/installation type | Specification |
|---|---|---|---|---|
| Motor end | | | | |
|  | | | Set length,<br>Variable length | 4-pole, 8-pole.<br>Cable is suitable for E17 encoder.<br>Detailed information: (→ 🗎 591) |
| | | M12 | | |
|  | | | Set length,<br>Variable length | 4-pole, 8-pole.<br>Cable is suitable for E17 encoder.<br>Detailed information: (→ 🗎 593) |
| M12 | | M12 | | |
|  | | | Set length,<br>Variable length | 8-pole.<br>Cable can also be used for E17-FS encoders.<br>Detailed information: (→ 🗎 593) |
| M12 | | M12 | | |



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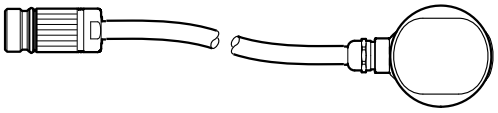
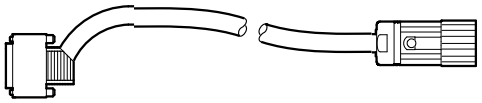
## 12.7 Overview of extensions for add-on encoder cables for DR.. motors

### 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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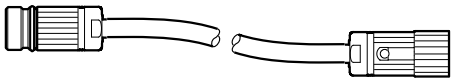
### Extension

| Connection cable | | | Length / Installation type | Specification |
|---|---|---|---|---|
| Motor end | | | | |
|  | | | Set length, Variable length | Detailed information: (→ 598) |
| M23 | | M23 | | |



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## 12.8 Power cable

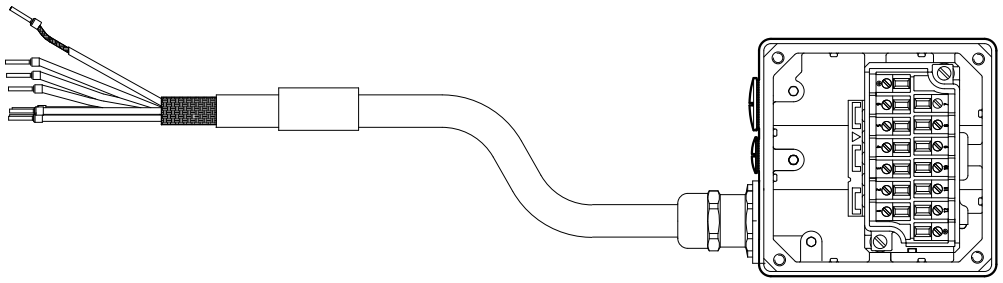
### 12.8.1 Brakemotor cable with IS

**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



*4154025099*

| | Cable core color | Signal | Contact | |
|---|---|---|---|---|
| | | | 1 | Delta connection |
| | Black (BK) | U1 | 2 | |
| | | | 3 | |
| | Black (BK) | V1 | 4 | |
| | | | 5 | |
| | Black (BK) | W1 | 6 | |
| | Black (BK) | | 7 | Star connection |
| | | | 8 | |
| | White (WH) | | 9 | |
| | Red (RD) | | 10 | |
| | Blue (BU) | | 11 | |
| | Black (BK) | | 12 | |
| | Green/yellow (GN/YE) | | PE | |

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*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**

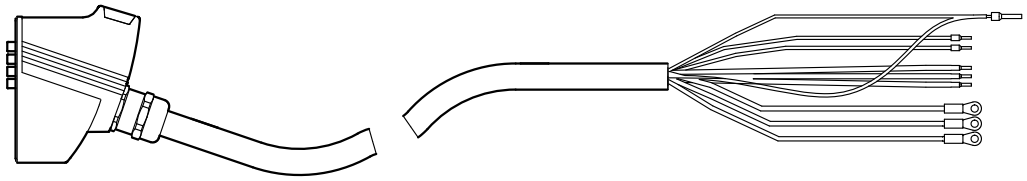
| Motor type | Brake type | Connector |
|---|---|---|
| DR.71 | BE05, BE1 | /ISU /ASB4 |
| DR.80 | BE05, BE1, BE2 | |
| DR.90 | BE1, BE2, BE5 | |
| DR.100 | BE2, BE5 | |

**MOVI-SWITCH®**

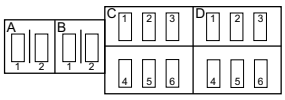
| MOVI-SWITCH® | PLUSCON VC | Han® 10E |
|---|---|---|
| MSW-2S | .../APG4 | .../ALA4 |

**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 |

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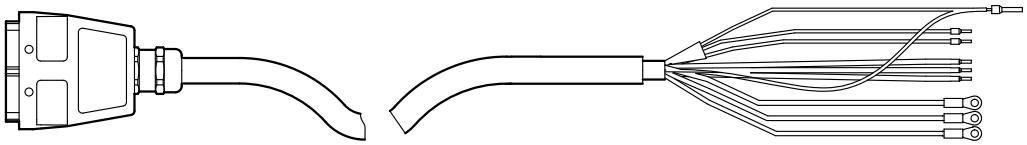
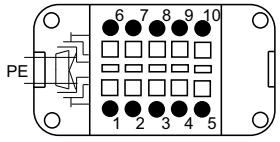
### Cable drawing, wiring – Han® 10E

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 |



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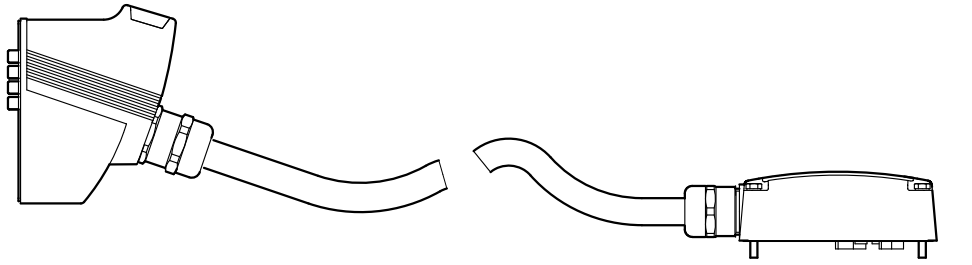
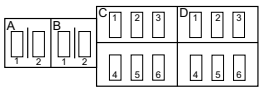
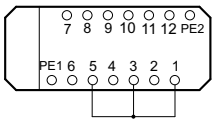
### Cable drawing, wiring – ISU and PLUSCON VC

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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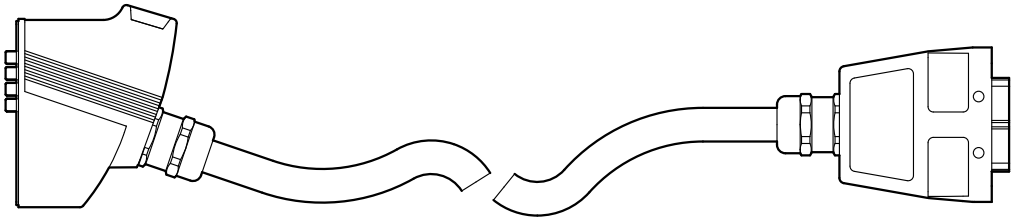
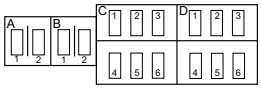
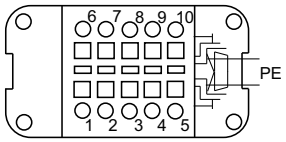
### Cable drawing, wiring – Han® 10E and PLUSCON VC

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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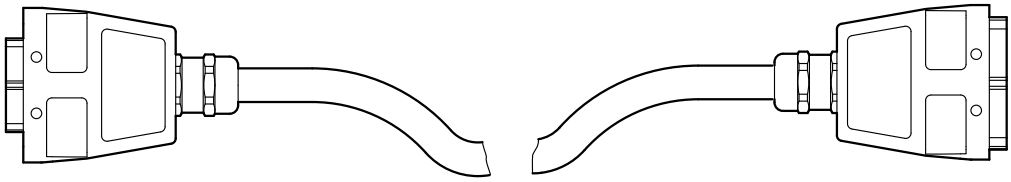
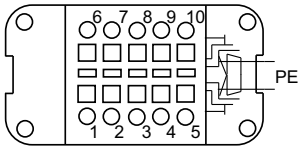
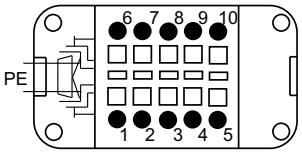
### Cable drawing, wiring – Han® 10E and Han 10E

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®

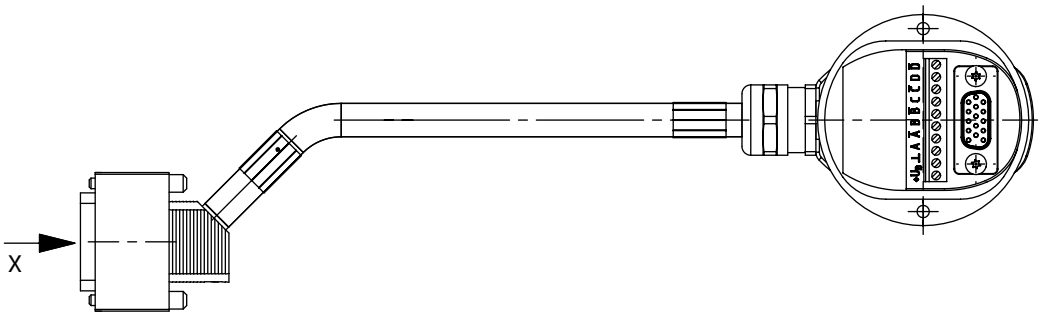
### 12.9.1 Encoder cable with connection cover and D-sub

**Prefabricated cables for encoders**

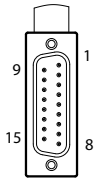
| Encoder types | DR.71 – 132 | DR.160 – 280 |
|---|---|---|
| Sine encoder | ES7S | EG7S |
| TTL ($V_B$ = DC 9 – 30 V) | ES7R | EG7R |
| RS485 | AS7W | AG7W |

**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 |

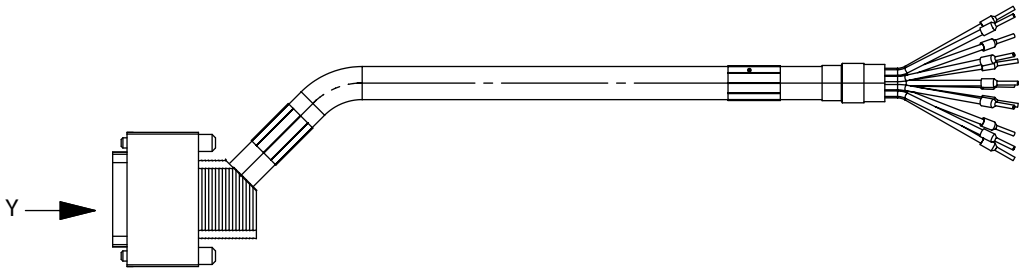
### 12.9.2 Encoder cable with conductor end sleeves and D-sub

**Prefabricated cables for encoders**

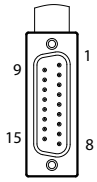
| Encoder types | DR.71 – 132 | DR.160 – 280 |
|---|---|---|
| Sine encoder | ES7S | EG7S |
| TTL ($V_B$ = DC 9 – 30 V) | ES7R | EG7R |
| RS485 | AS7W | AG7W |

**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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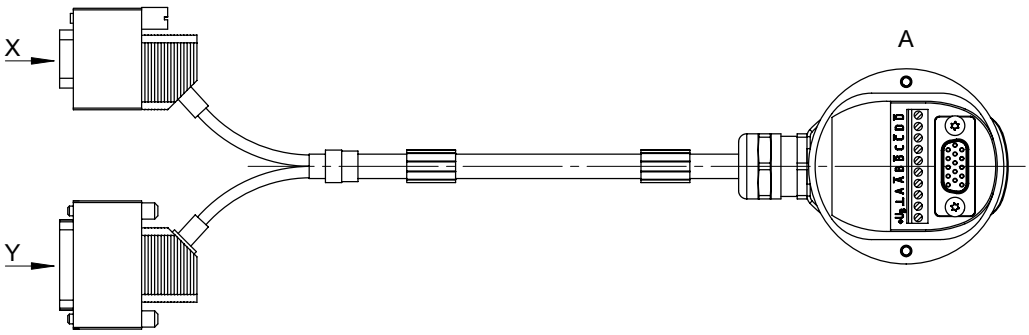
### 12.9.3 Encoder cable with connection cover and 2 D-sub

**Prefabricated cables for encoders**

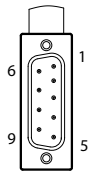
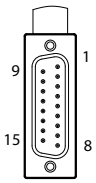
| Encoder types | DR.71 – 132 | DR.160 – 280 | DR.315 |
|---|---|---|---|
| M-SSI | AS7Y | AG7Y | AH7Y |

**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**<br>View X<br>  <br>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**<br>View Y<br>  <br>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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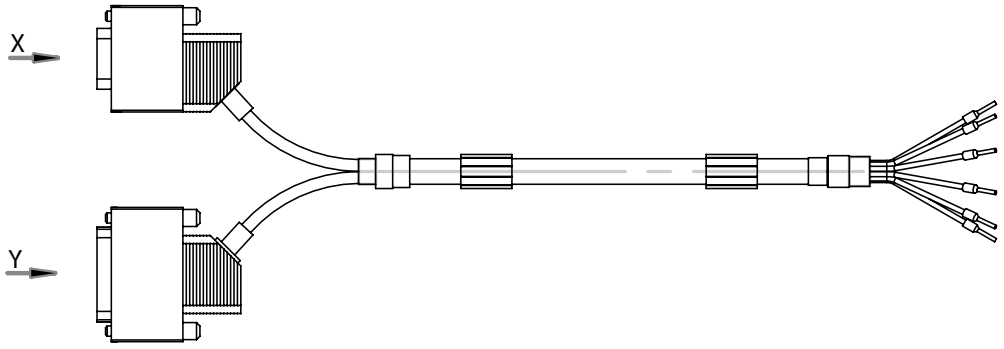
### 12.9.4 Encoder cable with conductor end sleeve and 2 D-sub

**Prefabricated cables for encoders**

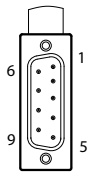
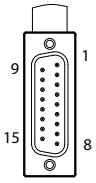
| Encoder types | DR.71 – 132 | DR.160 – 280 | DR.315 |
|---|---|---|---|
| M-SSI | AS7Y | AG7Y | AH7Y |

**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**<br>View X<br>  <br>9-pole | 1 | Data+ | Black (BK) | Data+ | S |
| | 6 | Data- | Violet (VT) | Data- | $\overline{D}$ |
| | 3 | C+ | Brown (BN) | C+ | C |
| | 8 | C- | White (WH) | C- | $\overline{C}$ |
| | 5 | GND | Pink (PK) | GND | GND |
| | 9 | UB | Grey (GY) | UB | +UB |
| **Sub-D**<br>View Y<br>  <br>15-pole | 1 | cos + | Red (RD) | cos + | A |
| | 9 | cos- | Blue (BU) | cos- | $\overline{A}$ |
| | 2 | sin+ | Yellow (YE) | sin+ | B |
| | 10 | sin- | Green (GN) | sin- | $\overline{B}$ |

*Part numbers*

| Cable type | Connection cover or conductor end sleeve, 2 x D-sub |
|---|---|
| Fixed installation | 13602640 |
| cable carrier installation | 13623265 |

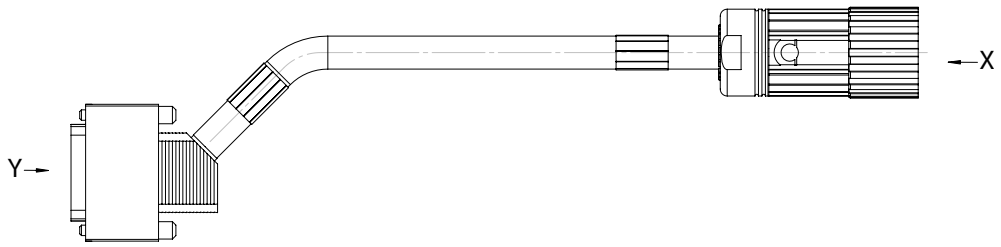
### 12.9.5 Encoder cable with M23 and D-sub

**Prefabricated cables for encoders**

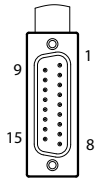
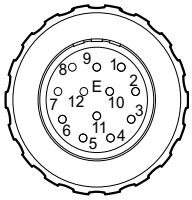
| Encoder types | DR.315 |
|---|---|
| Sine encoder | EH7S |

**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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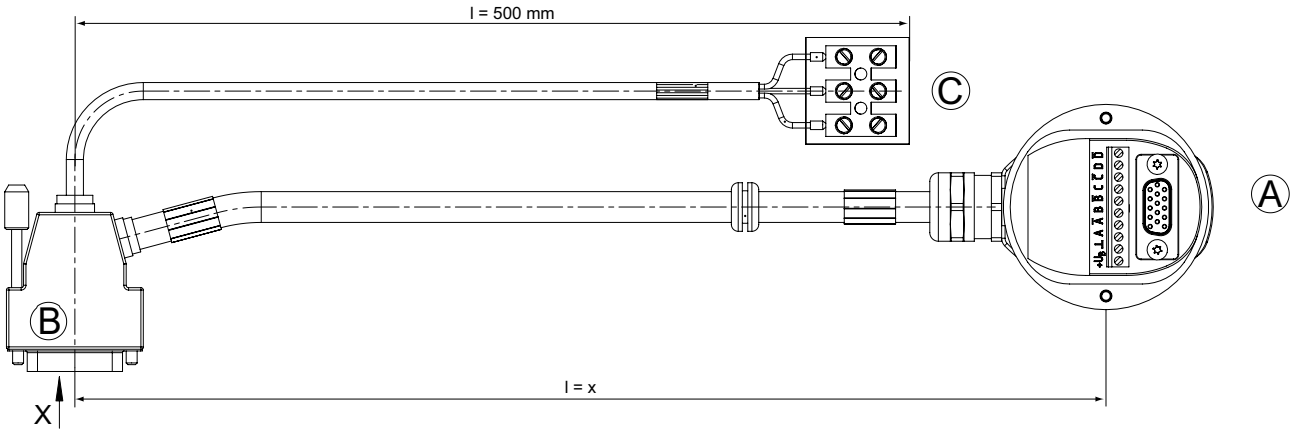
## 12.10 Add-on encoder cables for MOVIAXIS®

### 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<br>View X | Contact<br>B | Signal | Cable core color | Signal | Contact<br>A | |
| D-sub<br>9 1<br>15 8<br>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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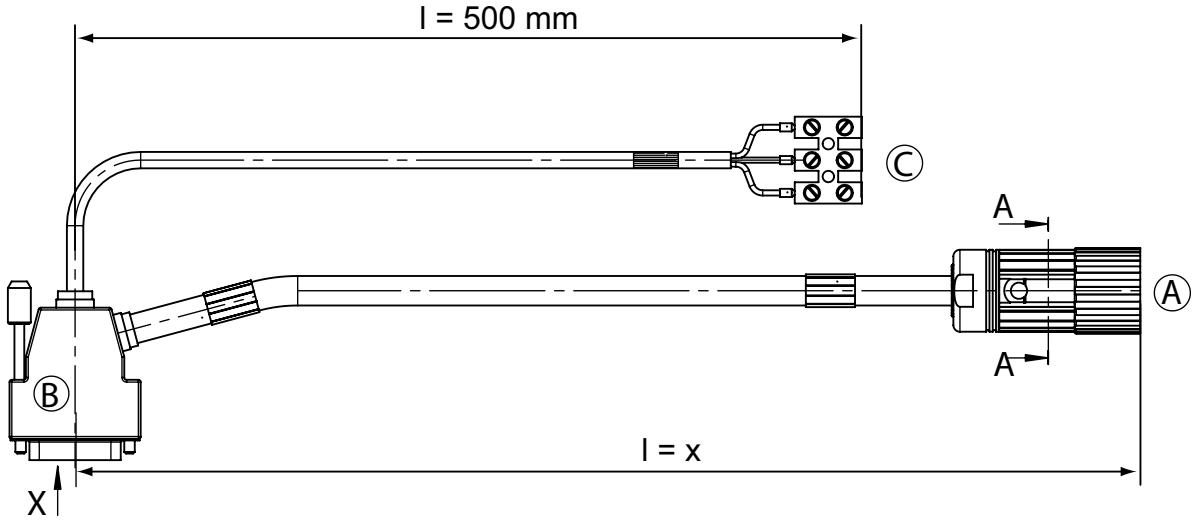
### 12.10.2 Encoder cable with M23 and D-sub

**Prefabricated cables for encoders**

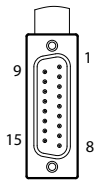
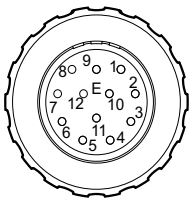
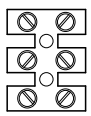
| Encoder types |
|---|
| ES7S, EG7S, ES7R, EG7R, AS7W, AG7W |

**Cable drawing, wiring**




*18014401506392843*

l = x: Length that can be ordered

| MOVIAXIS®connection | | | | | Motor connection side | |
|---|---|---|---|---|---|---|
| Plug connectors<br>View X | Contact<br>B | Signal | Cable core color | Signal | Contact<br>A | |
| D-sub<br>  <br>15-pole | 1 | A | Red (RD) | A cos+ | 3 | ASTA 021 FR<br>  |
| | 9 | $\overline{A}$ | Blue (BU) | $\overline{A}$ cos- | 4 | |
| | 2 | B | Yellow (YE) | B sin+ | 5 | |
| | 10 | $\overline{B}$ | Green (GN) | $\overline{B}$ sin- | 6 | |
| | 3 | C | Brown (BN) | C+ | 1 | |
| | 11 | $\overline{C}$ | White (WH) | C- | 2 | |
| | 4 | 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 | |
| | 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<br>  |
| | 6 | TF/TH/KTY- | White (WH) | TF/TH/KTY- | 2 | |
| | | | | Shielding | 3 | |

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*Part numbers*

| Cable type | M23, D-sub 15 |
|---|---|
| Fixed installation | 13631691 |
| cable carrier installation | 13631705 |

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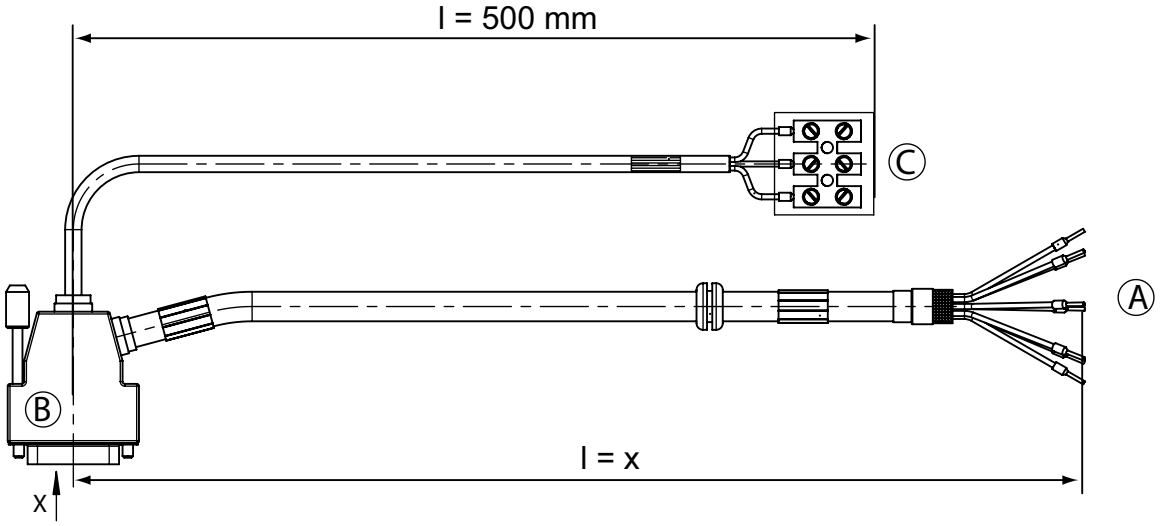
### 12.10.3 Encoder cable with conductor end sleeves and D-sub

**Prefabricated cables for encoders**

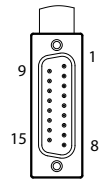
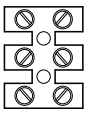
| Encoder types |
|---|
| E.7., A.7. |

**Cable drawing, wiring**




18014401506396555

l = x: Length that can be ordered

| MOVIAXIS® connection | | | | | Motor connection side | |
|---|---|---|---|---|---|---|
| Plug connectors<br>View X | Contact<br>B | Signal | Cable core color | Signal | Contact<br>A | |
| D-sub<br>  <br>15-pole | 1 | A | Red (RD) | A cos+ | A | |
| | 9 | $\overline{A}$ | Blue (BU) | $\overline{A}$ cos- | $\overline{A}$ | |
| | 2 | B | Yellow (YE) | B sin+ | B | |
| | 10 | $\overline{B}$ | Green (GN) | $\overline{B}$ sin- | $\overline{B}$ | |
| | 3 | C | Brown (BN) | C+ | C | |
| | 11 | $\overline{C}$ | White (WH) | C- | $\overline{C}$ | |
| | 4 | 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 | Conductor end sleeves, D-sub 15 |
|---|---|
| Fixed installation | 13631659 |
| cable carrier installation | 13631667 |

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## 12.11 Built-in encoder cable

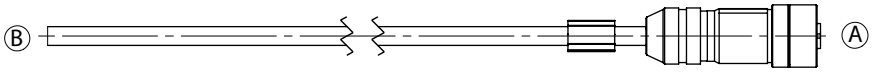
### 12.11.1 Encoder cable with an M12 connector

**Prefabricated cables**

| Encoder types | DR.71 – 132 |
|---|---|
| HTL | EI7C, EI76, EI72, EI71 |

**Cable drawing, wiring**

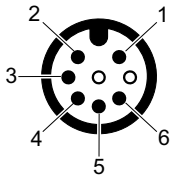
Encoder cable with one M12




9735112587



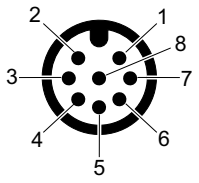
8-pole without TF

| 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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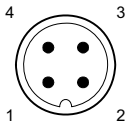
4-pole

| 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 |

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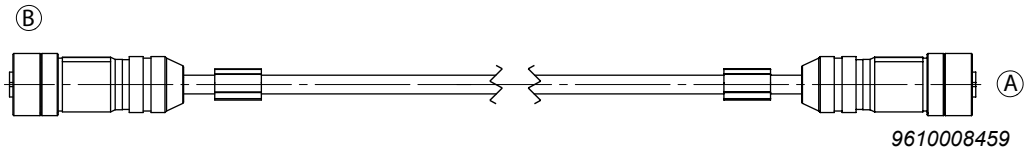
### 12.11.2 Encoder cable with two M12 connectors

**Prefabricated cables**

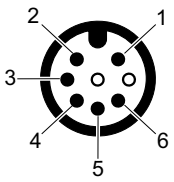
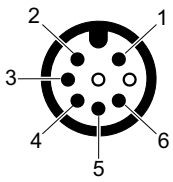
| Encoder types | DR.71 – 132 |
|---|---|
| HTL | EI7C, EI7C FS, EI76, EI72, EI71 |

**Cable drawing, wiring**

Encoder cable with two M12 connectors – 8- and 4-pole

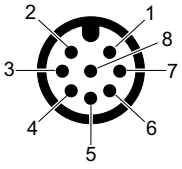
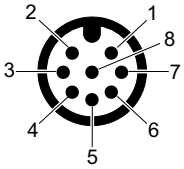



8-pole without TF (EI7C FS)

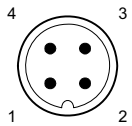
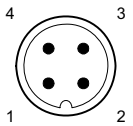
| Inverter connection | | | | | Motor connection side | |
|---|---|---|---|---|---|---|
| | Contact B | Signal | Cable core color | Signal | Contact A | |
|  | 3 | A cos+ | Brown (BN) | A cos+ | 3 |  |
| | 4 | $\overline{A}$ cos | White (WH) | $\overline{A}$ cos | 4 | |
| | 5 | B sin+ | Yellow (YE) | 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 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 | TS | Red (RD) | TS | 7 | |
| | 8 | TF- | Blue (BU) | TF- | 8 | |
| | 1 | UB | Gray (GY) | UB | 1 | |
| | 2 | GND | Pink (PK) | GND | 2 | |

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 |

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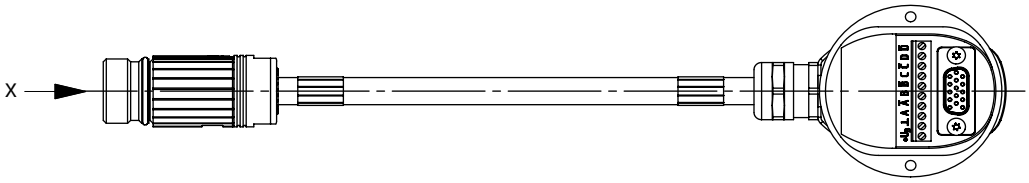
## 12.12 Extensions for add-on encoder cables

### 12.12.1 Encoder extension cable with connection cover and M23

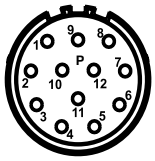
**Prefabricated cables for encoders**

| 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**




*4173472011*

| Inverter connection | | | | | Motor connection side |
|---|---|---|---|---|---|
| **Plug connectors**<br>**View X** | **Contact** | **Signal** | **Cable core color** | **Signal** | **Contact** |
| **AKUA 020**<br>  <br>*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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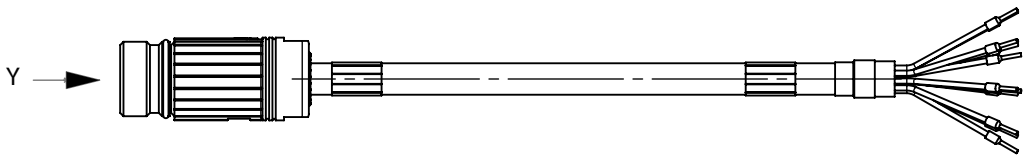
### 12.12.2 Encoder extension cable with conductor end sleeves and M23

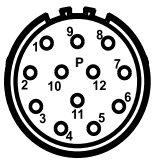
**Prefabricated cables for encoders**

| 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**




*4173474571*

| 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 |

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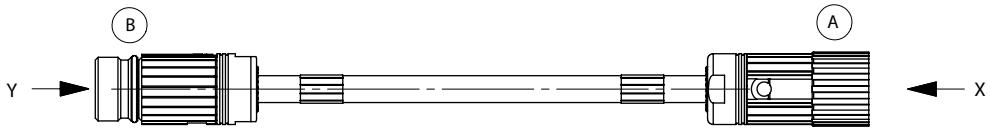
### 12.12.3 Encoder extension cable with two M23

**Prefabricated cables for encoders**

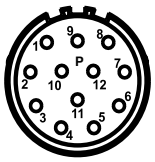
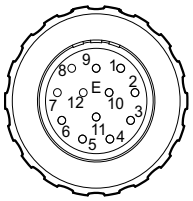
| Encoder types | DR.71 – 132 | DR.160 – 280 |
|---|---|---|
| Sine encoder | ES7S | EG7S |
| TTL ($V_B$ = DC 9 – 30 V) | ES7R | EG7R |
| RS485 | AS7W | AG7W |

**Cable drawing, wiring**




*4173478155*



| Motor connection side | | | | | Inverter connection | |
|---|---|---|---|---|---|---|
| Plug connectors View Y | Contact | Signal | Cable core color | Signal | Contact | Plug connectors View X |
| AKUA 020  *900720407393908 3* | 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*

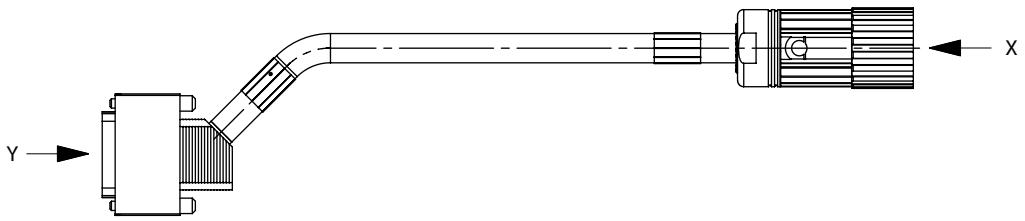
| Cable type | M23 – M23 |
|---|---|
| Fixed installation | 13623192 |
| Cable carrier installation | 13621971 |

### 12.12.4 Encoder extension cable with M23 and D-sub

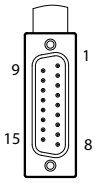
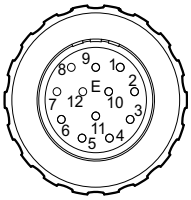
**Prefabricated cables for encoders**

| 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**




*4173480971*

| Motor connection side | | | | | Inverter connection | |
|---|---|---|---|---|---|---|
| Plug connectors<br>View Y | Contact | Signal | Cable core color | Signal | Contact | Plug connectors<br>View X |
|  | 1 | A cos+ | Red (RD) | A cos+ | 3 |  |
| | 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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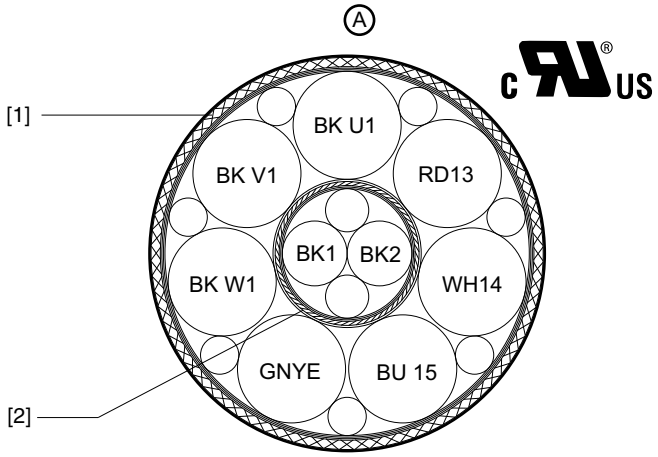
## 12.13 Cable specifications of the power cables

### 12.13.1 Cable type A

**Mechanical design**




*4173573387*

**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 us 600 V)
- Operating voltage for conductor 0.75 $mm^2$: max. 350 V ( c UL us 600 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 (c UL us: -30 °C to +80 °C)
- Transport and storage: -40 °C to +90 °C (c UL us: -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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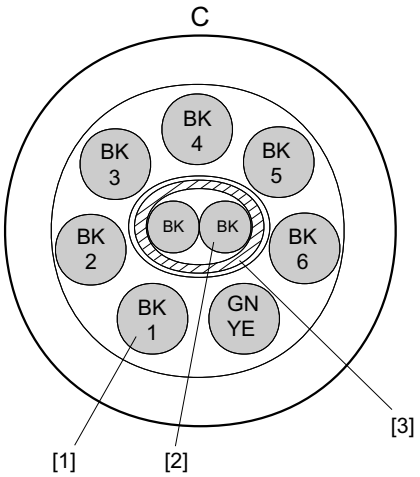
### 12.13.2 Cable type C

**Mechanical design**




*4173611659*

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 mm²
- Control cores: 2 x 0.75 mm²
- 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 mm²: 8.5 Ω/km
- Conductor resistance for 0.75 mm²: 26 Ω/km
- Operating voltage for 2.5 mm² cores: 600 V/1000 V
- Operating voltage for conductors 0.75 mm²: 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



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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<br>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 | $I_A/I_N$ | $M_A/M_N$ $M_H/M_N$ | $J_{Mot}$ | | $Z_0$ | $M_{Bmax}$ | m[1] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | [2] | [3] | BG[4] BGE[5] | | | |
| | 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 | $I_A/I_N$ | $M_A/M_N$ $M_H/M_N$ | $J_{Mot}$ | | $Z_0$ | $M_{Bmax}$ | m[1] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | [2] | [3] | BG[4] BGE[5] | | [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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SEW EURODRIVE

## 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:

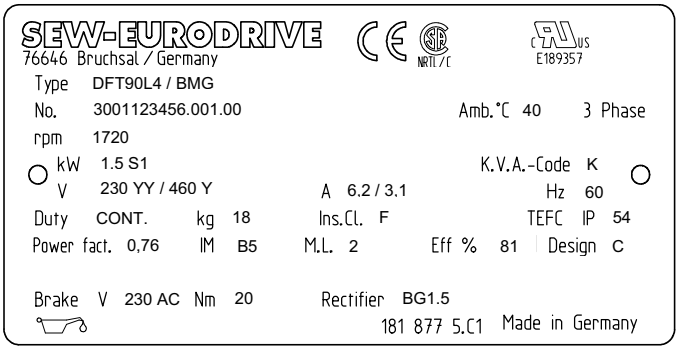
- Terminal designation T1, T2, etc. in addition to U1, V1, etc.
- The terminal boxes are part of the motor housing.
- Cable entry in the terminal box compliant with ANSI/ASME B1.20.1.-1983 with NPT threads (conical inch threads). The following table shows the number of cable entries and NPT sizes for 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

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"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).



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## 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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## 13.6 Important order information

### 13.6.1 Position of motor terminal box and cable entry

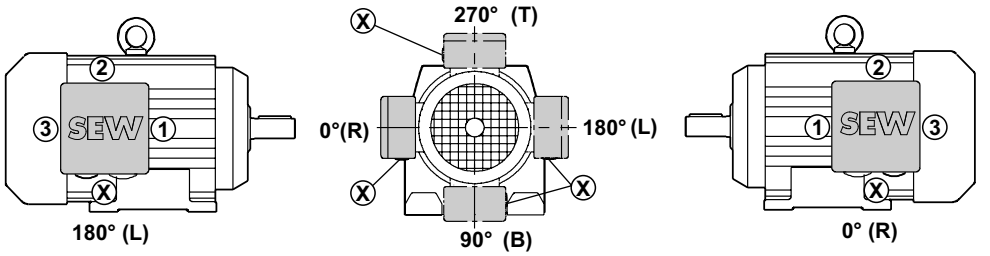
To date, the position of the motor terminal box has been specified as 0°, 90°, 180° or 270° as viewed onto the fan guard = B-side. A change in the product standard EN 60034 specifies that the following designations must be used for terminal box positions for foot-mounted motors in the future:

- 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).

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## 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 $V_{AC}$ △ /人<br>290/500 $V_{AC}$ △ /人 |
| | 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 | 人 / Δ |
| 4 | 1500 | 人 ; 人 / Δ |
| 6 | 1000 | 人 / 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/人 | Δ | 230 | +20% | 0% | -17% | -17% |

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| 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 | - | **266/460$V_{AC}$** Δ/⅄<br>220/380 $V_{AC}$ Δ/⅄<br>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 |

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| | 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.



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## 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



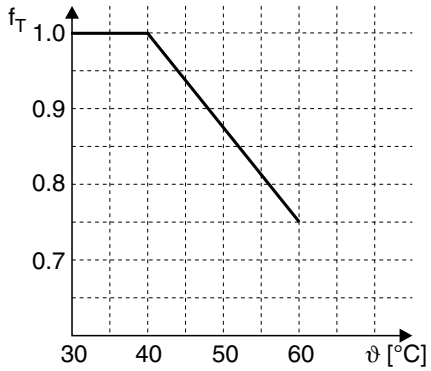
The rated power $P_N$ of an AC motor or the thermally permitted torque $M_N$ of an asynchronous servomotor is dependent on the ambient temperature and the installation altitude. The rated power or rated torque stated on the nameplate applies to an ambient temperature of 40°C and a maximum installation 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:

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

$$\mathbf{M_{Nred} = M_N \bullet f_T \bullet f_H}$$

#### AC motors

Refer to the following diagrams for factors $f_T$ and $f_H$ for AC motors:

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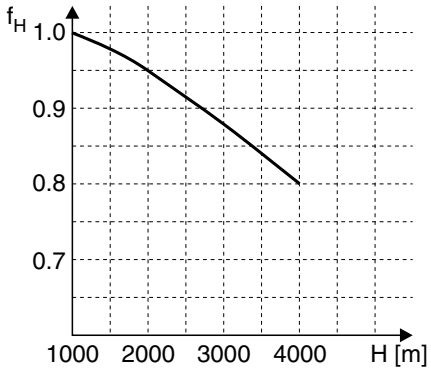


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ϑ = ambient temperature

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<br>Number of poles | Permitted overhung load $F_R$ in N<br>Permitted axial load $F_A$ in N;<br>$F_{A_tensile} = F_{A_pressure}$ |
|---|---|---|
| Flange-mounted motor | 1000<br>6 | 600<br>150 |
| | 1500<br>4 | 500<br>110 |
| | 3000<br>2 | 400<br>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**

$$F_{xL} = F_R \bullet \frac{a}{b + x} \text{ [N]}$$

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### $F_{xW}$ based on shaft strength

$$F_{xW} = \frac{c}{f + x} \text{ [N]}$$

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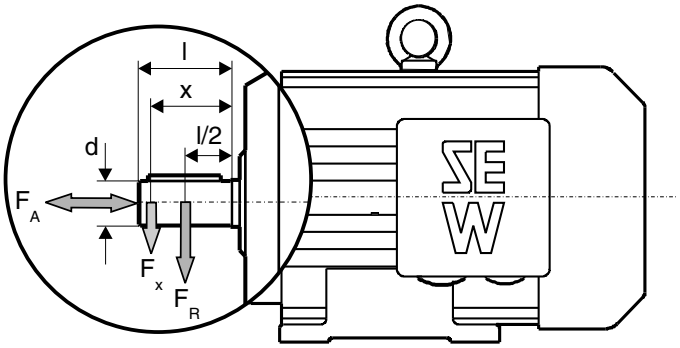
$F_R$ = Permitted overhung load (x = l/2) in N

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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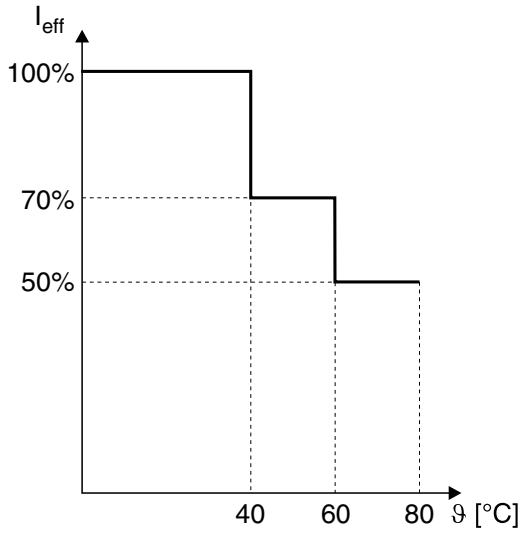
## 13.16 Project planning, technical data – plug connectors

### 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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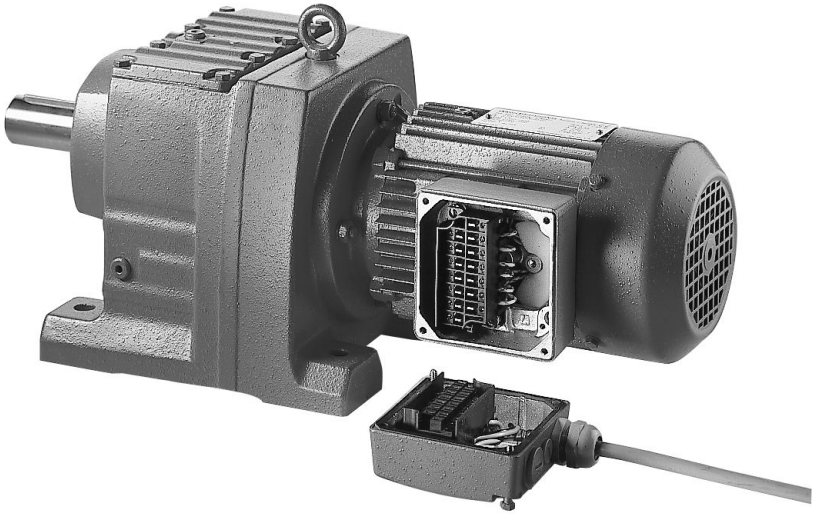
$I_{eff}$ = Current value of the maximum permitted contact load, 100% = value as listed in the "Technical Data", from (→ 🗎 624)

$\vartheta$ = 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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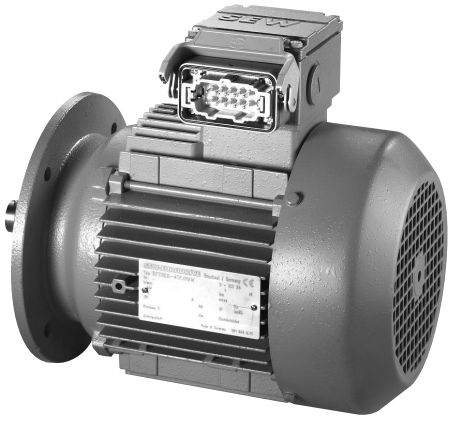
### 13.16.3 Plug connectors AS.., AC.., AM.., AB..



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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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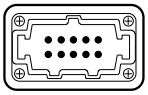
### 13.16.6 Installed plug connectors AS.., AM..

**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)<br>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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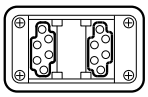
**Technical data AM..**

| 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 type2) | | 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.

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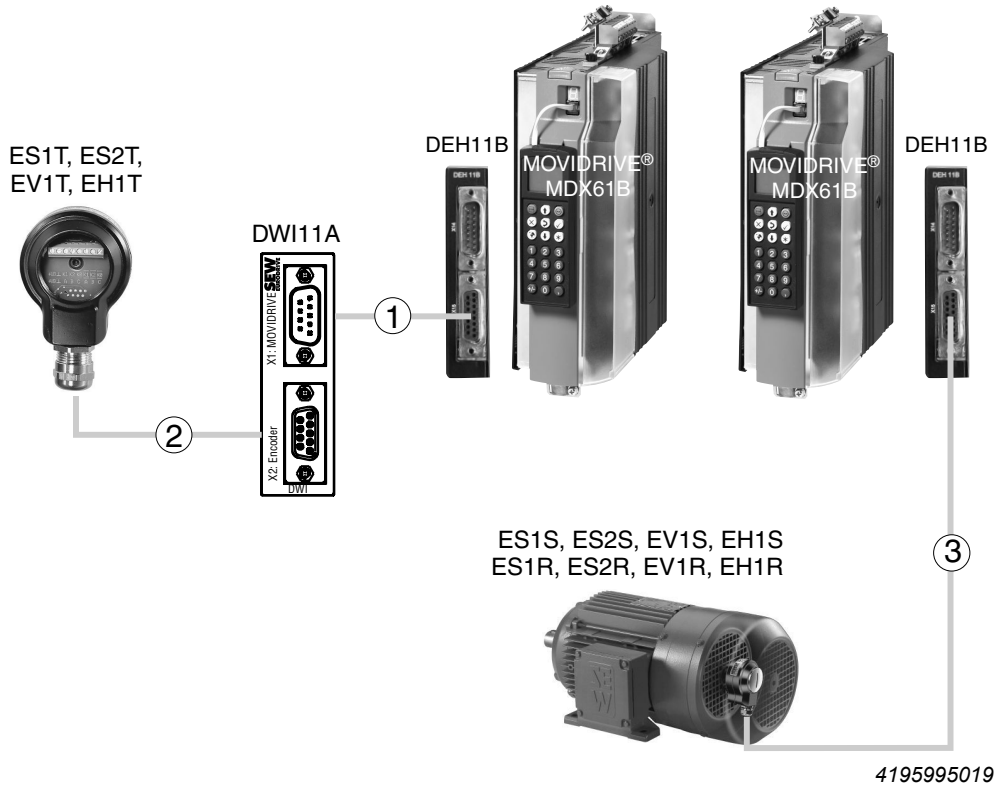
### 13.17.2 Prefabricated cables for encoder connection

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:



①

Prefabricated cables for encoder connection:

| **Part number** | **8179573** |
|---|---|
| Installation | Fixed installation |
| For encoders with<br>5 V voltage supply | EH1T |
| Cable cross section | 4×2×0.25 mm² (AWG23) + 1×0.25 mm² (AWG23) |
| Conductor colors | A: yellow (YE)<br>A: green (GN)<br>B: red (RD)<br>B: blue (BU)<br>C: pink (PK)<br>C: gray (GY)<br>UB: white (WH)<br>⊥: brown (BN)<br>Sensor cable: violet (VT) |
| Manufacturer and type<br>Lapp<br>Helukabel | <br>Unitronic Li2YCY (TP)<br>Paar-Tronic-CY |
| For inverters | MOVIDRIVE® MDX61B with DEH11B option |
| Connection<br>on the DWI11A<br>on the inverter | <br>with 9-pin D-sub socket<br>with 15-pin D-sub connector |



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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 $mm^2$ (AWG23) + 1×0.25 $mm^2$ (AWG23) | |
| Conductor colors | A: yellow (YE)<br>A: green (GN)<br>B: red (RD)<br>B: blue (BU)<br>C: pink (PK)<br>C: gray (GY)<br>UB: white (WH)<br>⊥: brown (BN)<br>Sensor cable: violet (VT) | |
| Manufacturer and type<br>Lapp<br>Helukabel | Unitronic Li2YCY (TP)<br>Paar-Tronic-CY | Unitronic LiYCY<br>Super-Paar-Tronic-C-PUR |
| For inverters | MOVIDRIVE® MDX61B with DEH11B option | |
| Connection to encoder/motor | with conductor end sleeves<br>Connect the violet conductor (VT) with the encoder at UB<br>with 9-pin D-sub connector | |

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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)<br>A: green (GN)<br>B: red (RD)<br>B: blue (BU)<br>C: pink (PK)<br>C: gray (GY)<br>UB: white (WH)<br>⊥: brown (BN)<br>Sensor cable: violet (VT) | |
| Manufacturer and type<br>Lapp<br>Helukabel | <br>Unitronic Li2YCY (TP)<br>Paar-Tronic-CY | <br>Unitronic LiYCY<br>Super-Paar-Tronic-C-PUR |
| For inverters | MOVIDRIVE® MDX61B with DEH11B option | |
| Connection to encoder/motor | with conductor end sleeves<br>Cut off the violet conductor (VT) of the cable at the encoder end,<br>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 | $U_{high}$<br>$U_{low}$ | ≥ 2.5 $V_{DC}$<br>≤ 0.5 $V_{DC}$ | 1 $V_{SS}$ | ≥ 2.5 $V_{DC}$<br>≤ 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<br>A, B<br>Revolution C | | <br>1024<br>1 | | |
| Pulse duty factor | | 1 : 1 ±20% | | |
| Phase angle A : B | | 90° ±20% | | |
| Vibration resistance<br>(10 Hz – 2000 Hz) | | ≤ 100 $m/s^2$ (EN 60068-2-6) | | |
| Shock resistance | | ≤ 1000 $m/s^2$ (EN 60068-2-27) | | |
| Ambient temperature $\vartheta_U$ | | -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).



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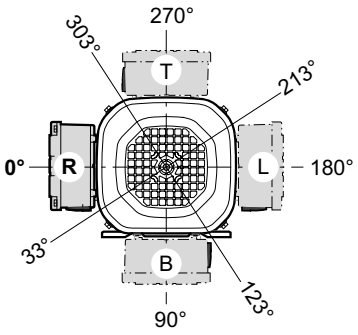
# 14 Dimension sheets – DT56, DR63

## 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.

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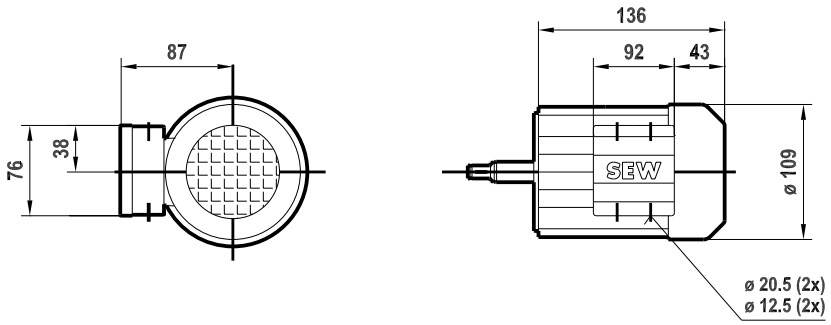
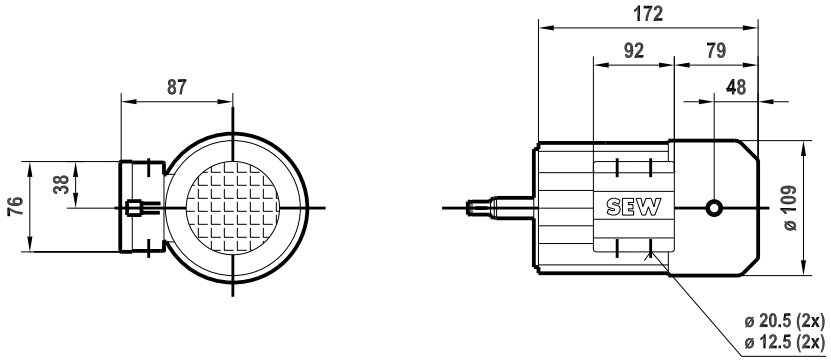
## 14.2 Dimension sheets for DT56, DR63 motors/brakemotors

08 181 01 02

### DT56




### DT56 / B

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## DFR63

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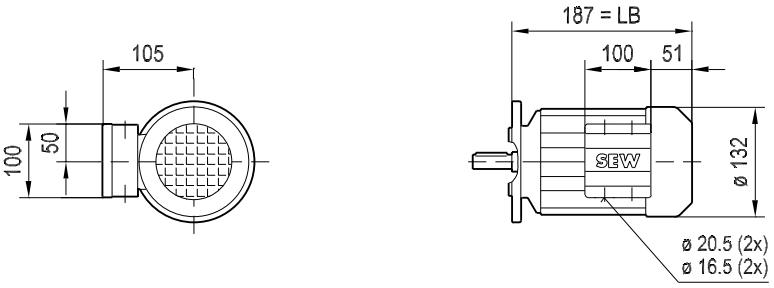


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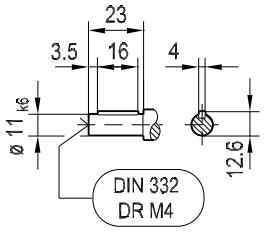


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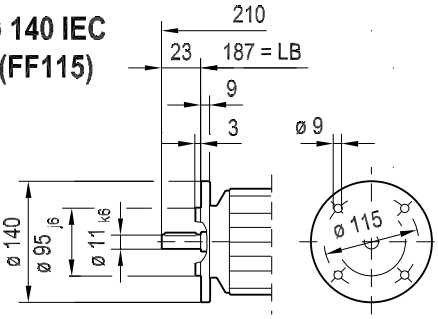


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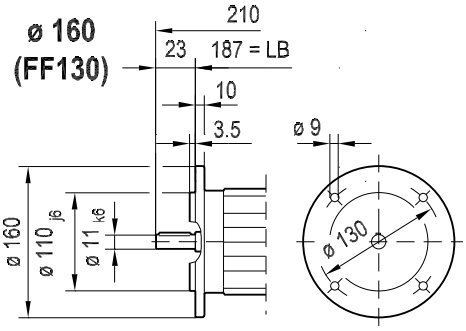


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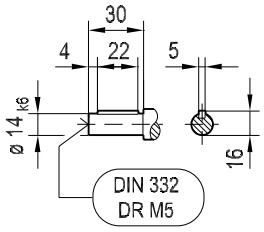


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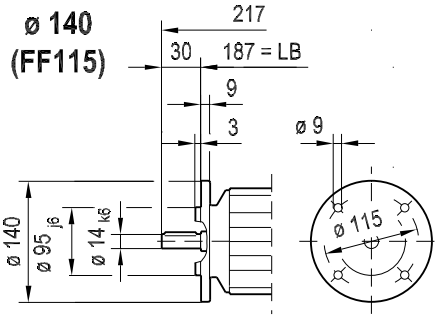


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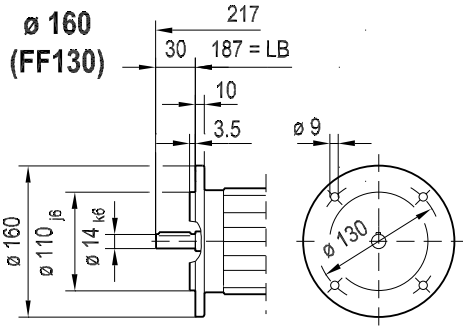


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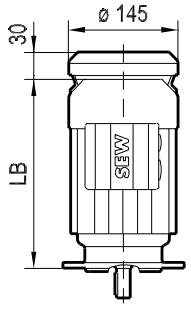


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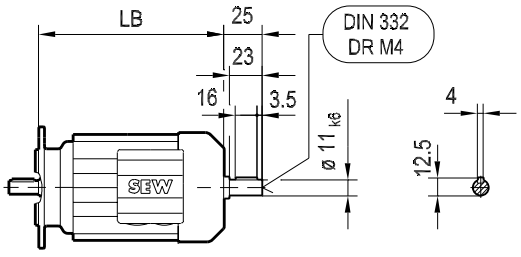


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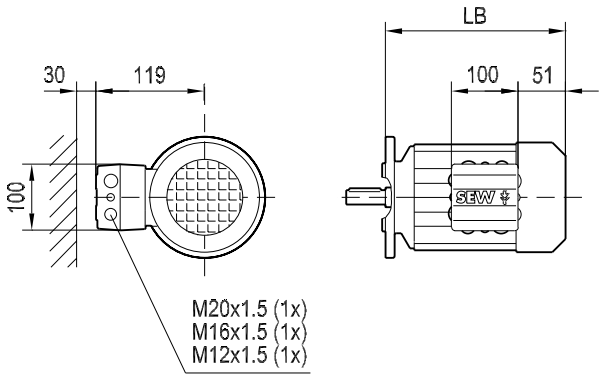


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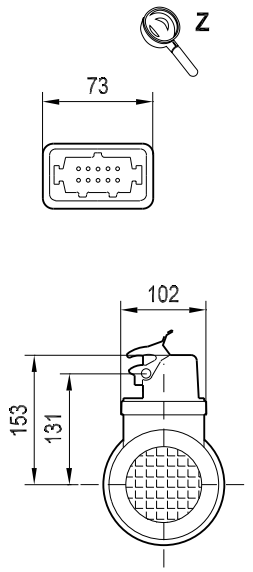


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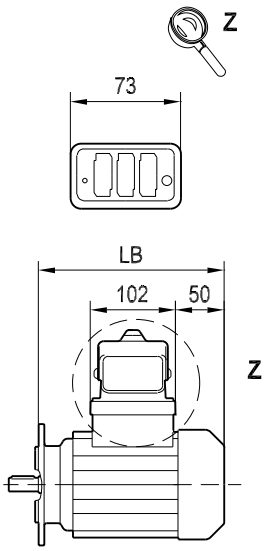


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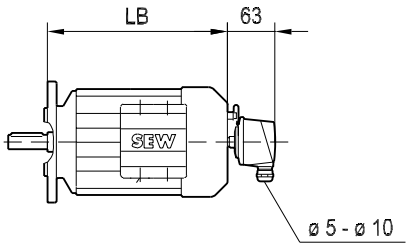


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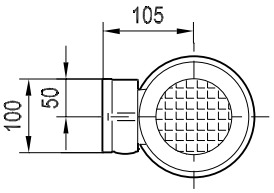


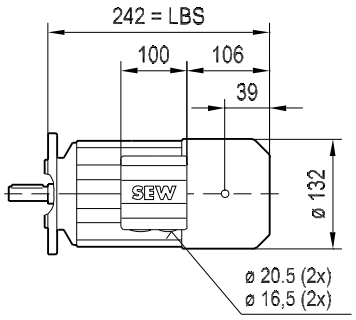


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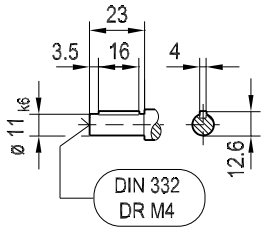


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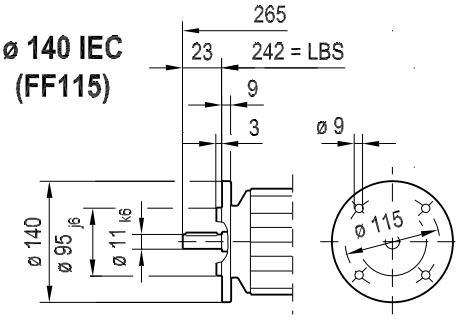


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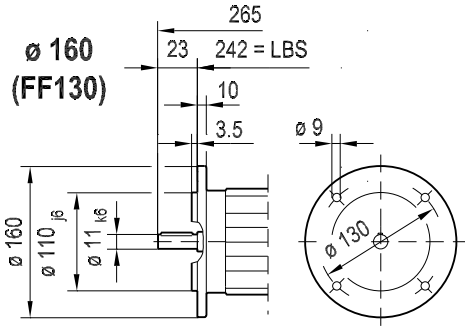


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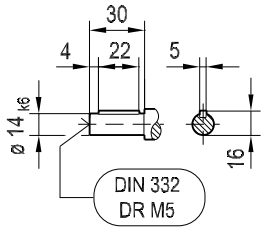


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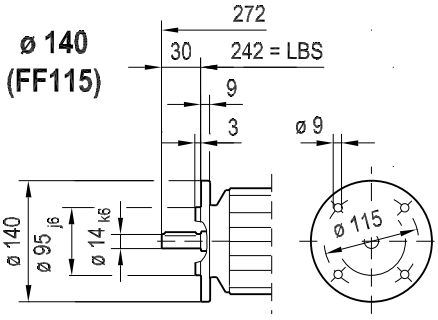


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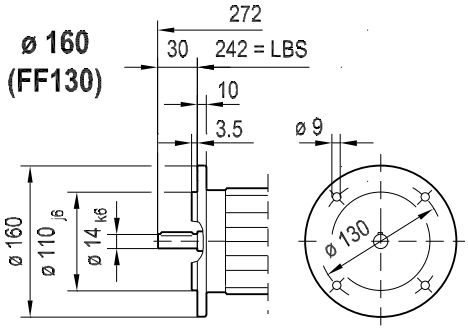


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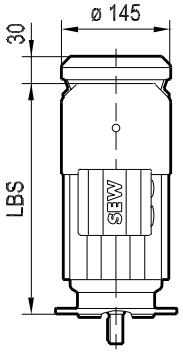


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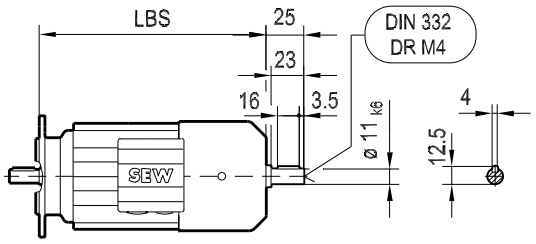


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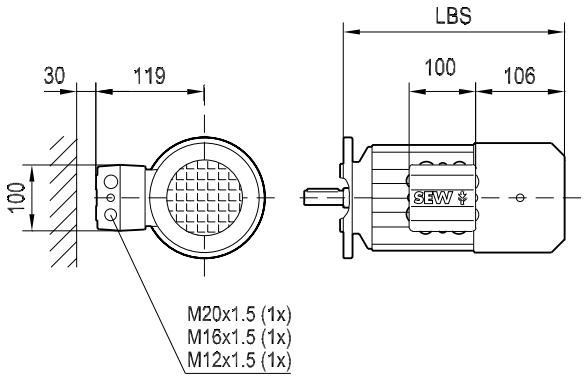


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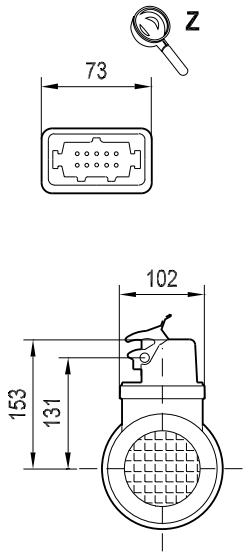


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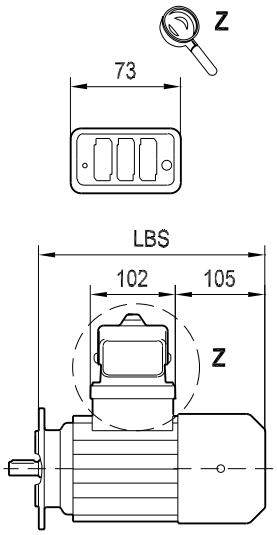


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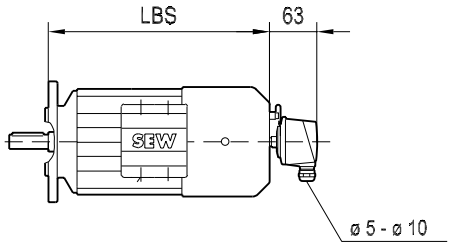


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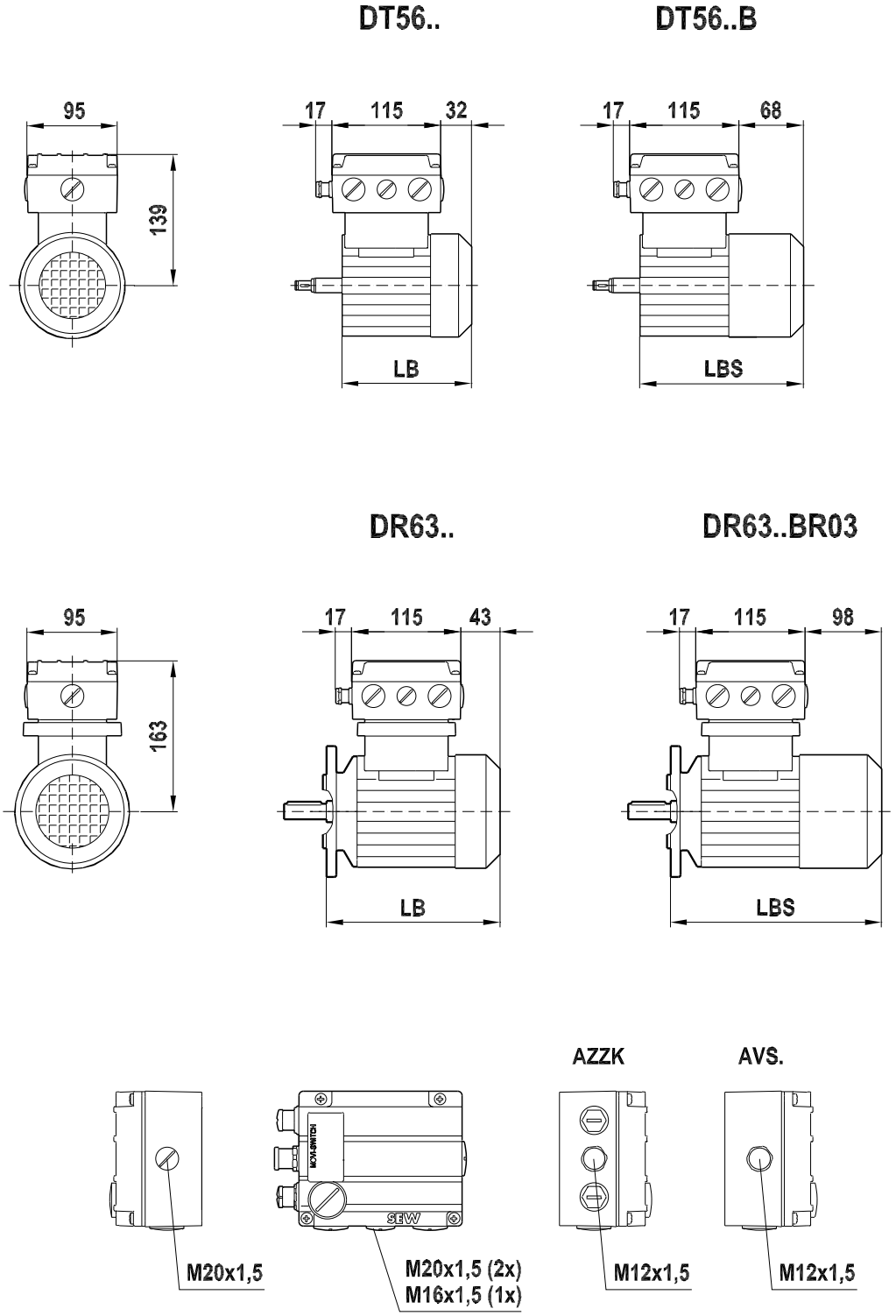
1 (1)

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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.

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### 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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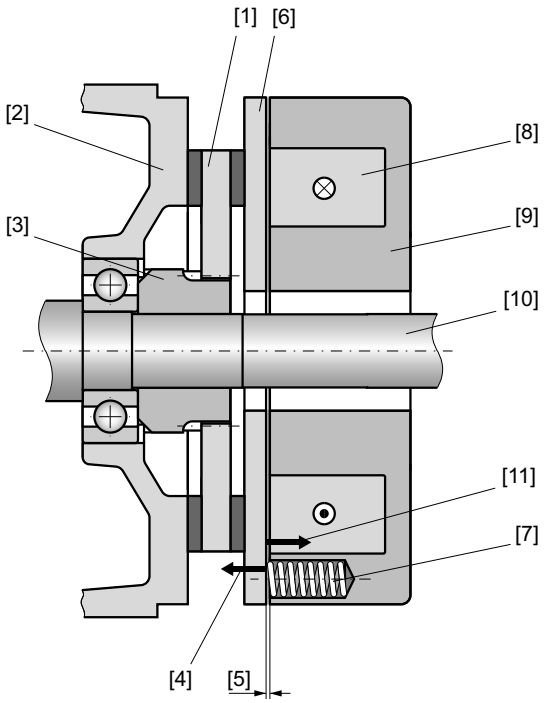
### 15.2.2 Basic function

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
[2] Brake endshield
[3] Driver
[4] Spring force
[5] Working air gap
[6] Pressure plate
[7] Brake spring
[8] Brake coil
[9] Coil body
[10] Motor shaft
[11] Electromagnetic force

**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

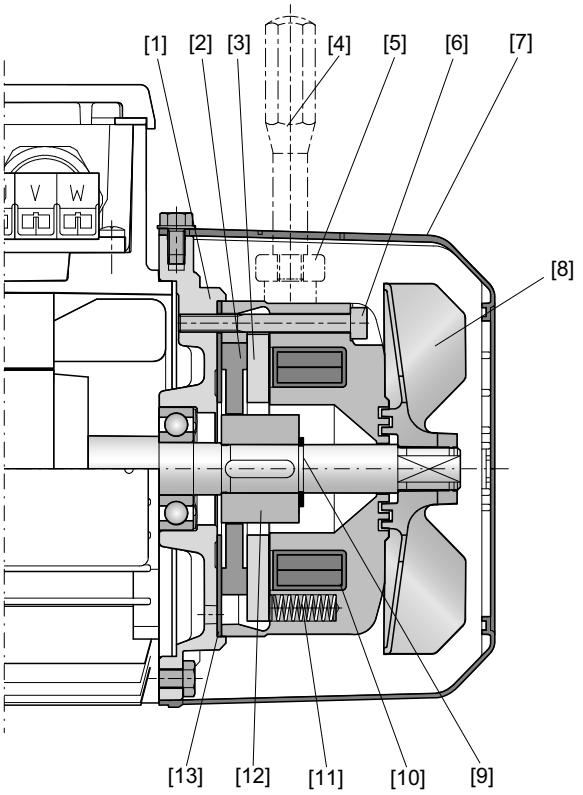
### 15.3.1 BMG02 brake

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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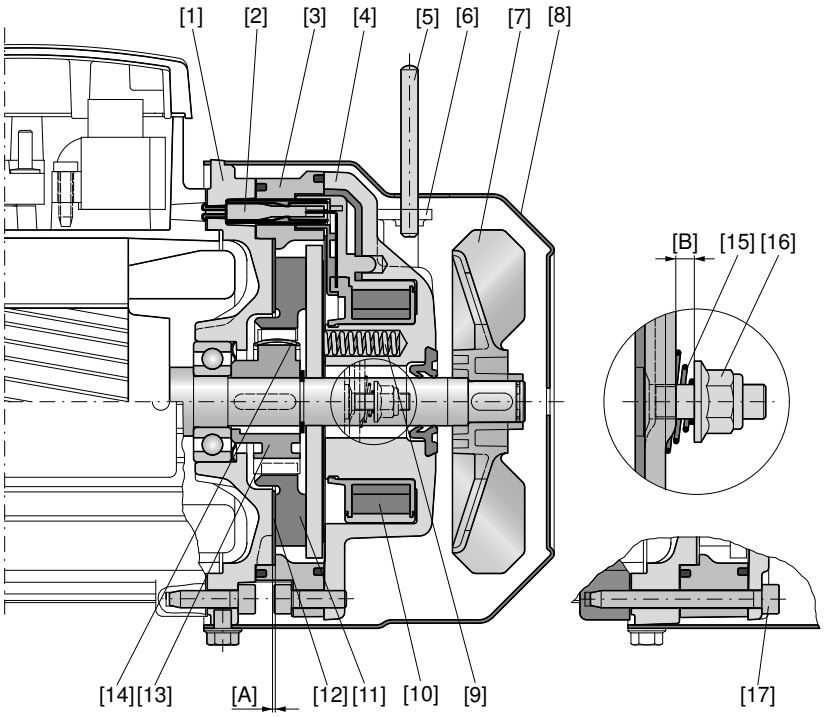
### 15.3.2 BR03 brake

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 $t_2$I 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 |



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## 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 $t_2$I 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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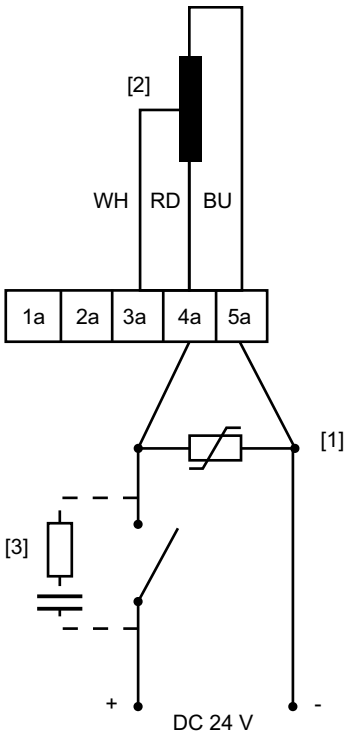
No brake control is supplied with the standard version for 24 V DC voltage supply of DT56..BMG and DR63..BR motors. The customer must install suitable overvoltage protection.

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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 $t_2$II 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 | | | | | | | | | | | | | | | | | | | | | |

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 | | | | | | | | | | | | | | | | | | | | | |

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.

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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<br>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 $10^6$J | $t_1$ $10^{-3}$/s | $t_2$ | | $P_B$ W |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | $t_2$II $10^{-3}$/s | $t_2$I $10^{-3}$/s | |
| 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

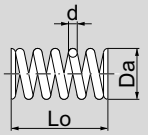
$t_2$I = Brake application time for cut-off in the AC circuit

$t_2$II = 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

| Brakes | Mounting on motor | Braking torque | Number and type of brake springs | | Part (order) no. and brake spring dimensions | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |  *4203675915* | | | | |
| | | | | | Normal | | | | Part no. | | | | | Brake spring part no. |
| | | Nm | Normal | Red | Lo | Da | d | w | | Lo | Da | d | w | |
| 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 | | | | | | | | | | |

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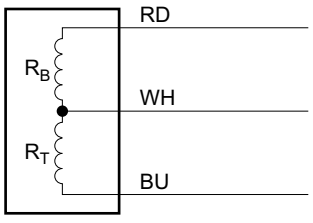
### 15.8.3 Brake coil resistance

**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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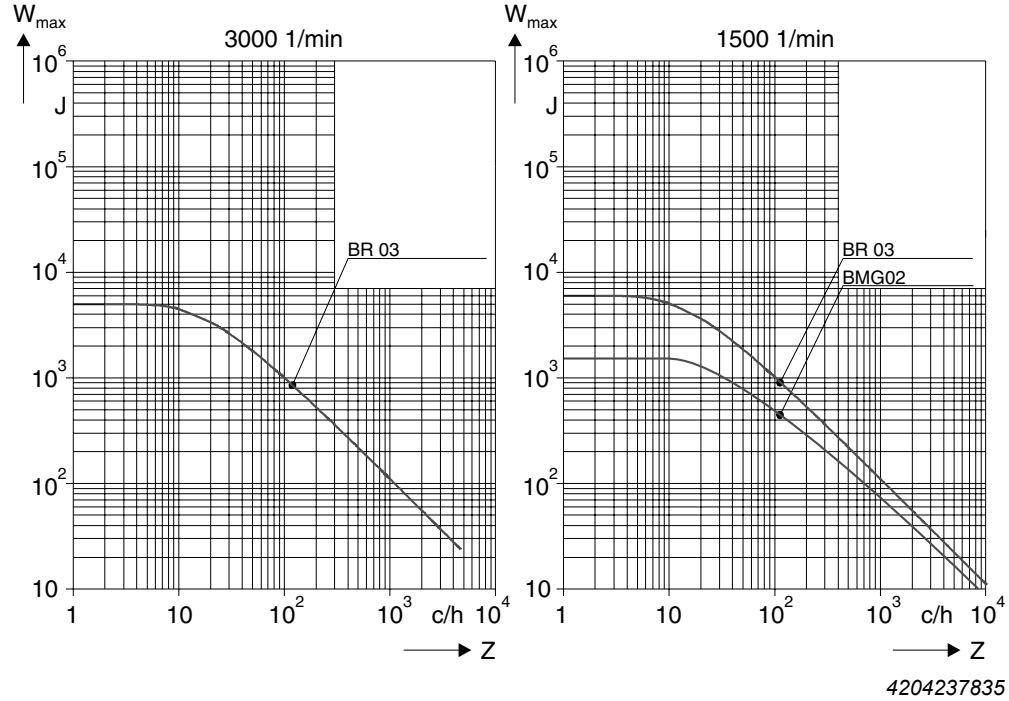
BS = Accelerator coil
TS = Coil section
$R_B$ = Accelerator coil resistance at 20°C in Ω
$R_T$ = Coil section resistance at 20°C in Ω
$U_N$ = Nominal voltage (nominal voltage range)
RD = Red
WH = White
BU = Blue

### 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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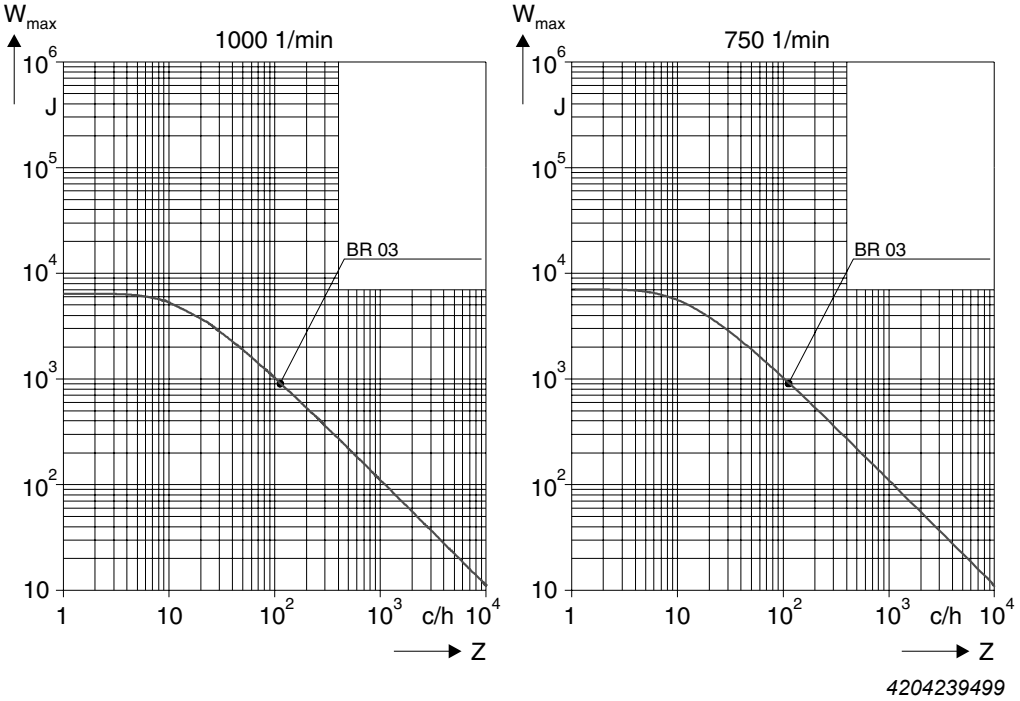


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## 15.9 Project planning notes

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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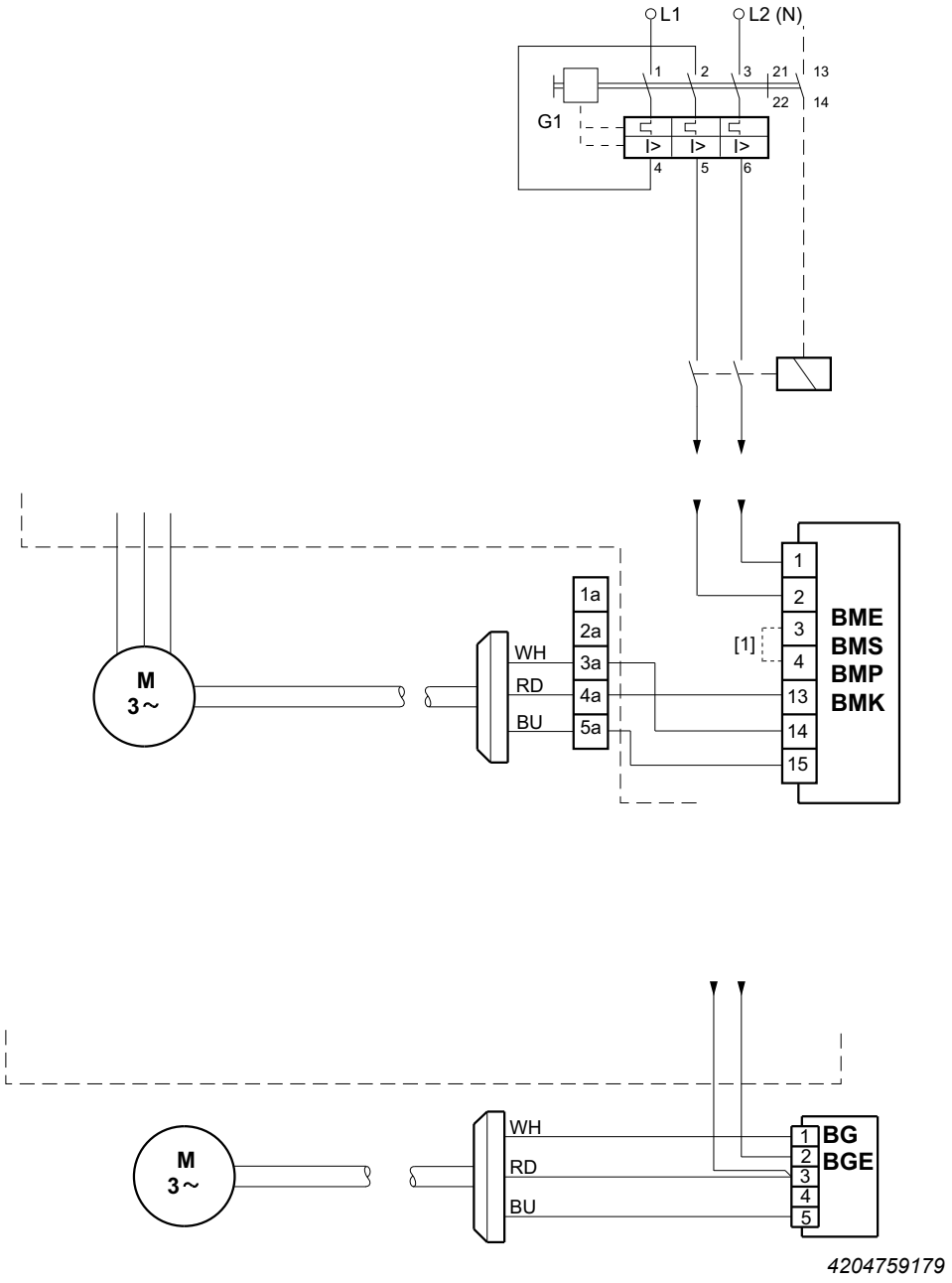
Advantage: Motor protection switches prevent the brake coil from being destroyed when a fault occurs in the brake rectifier or when the brake coil is connected incorrectly (keeps costs resulting from repairs and downtimes low).




[1] Customers are responsible for connecting terminals 3 and 4.

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### 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**<br>**Braking distance**<br>**Deceleration**<br>**Braking accuracy** | The required data can only be observed if the aforementioned parameters meet the requirements |
| **Braking work**<br>**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.

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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 $mm^2$ (AWG) for cable lengths ≤ 50 meters and brake voltage (AC V) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 42 | 48 | 56<br>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 $mm^2$ 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 $t_2$I 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

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| **Headquarters Production plant Sales** | **Bruchsal** | SEW-EURODRIVE GmbH & Co KG<br>Ernst-Blickle-Strasse 42<br>76646 Bruchsal, Germany<br>P.O. box address<br>Postfach 3023 • D-76642 Bruchsal, Germany | Tel. +49 7251 75-0<br>Fax +49 7251 75-1970<br>http://www.seweurodrive.com<br>sew@sew-eurodrive.de |
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| **Assembly plant**<br>**Sales** | **Buenos Aires** | SEW EURODRIVE ARGENTINA S.A.<br>Ruta Panamericana Km 37.5, Lote 35<br>(B1619IEA) Centro Industrial Garín<br>Prov. de Buenos Aires | Tel. +54 3327 4572-84<br>Fax +54 3327 4572-21<br>sewar@sew-eurodrive.com.ar<br>http://www.sew-eurodrive.com.ar |
| | **Córdoba** | SEW EURODRIVE ARGENTINA S.A.<br>Ruta Nacional 19, Manzana 97, Lote 5<br>(X5125) Malvinas Argentinas<br>Prov. de Córdoba | Tel. +54 351-490-0010<br>sewcor@sew-eurodrive.com.ar<br>http://www.sew-eurodrive.com.ar |
| | **Santa Fe** | SEW EURODRIVE ARGENTINA S.A.<br>Ruta Prov. 21 Km 7, Lote 41<br>Parque Industrial Alvear<br>(2126) Gral. Alvear<br>Prov. de Santa Fe | Tel. +54 341-317-7277<br>sewsfe@sew-eurodrive.com.ar<br>http://www.sew-eurodrive.com.ar |
| **Service** | **Mendoza** | SEW EURODRIVE ARGENTINA S.A. | Tel. +54 261-430-0060<br>sewmen@sew-eurodrive.com.ar<br>http://www.sew-eurodrive.com.ar |
| **Technical offices** | **Tucumán** | SEW EURODRIVE ARGENTINA S.A.<br>Balcarce 609<br>(T4000IAM) S.M. de Tucumán<br>Prov. de Tucumán | Tel. +54 381-400-4569<br>sewtuc@sew-eurodrive.com.ar<br>http://www.sew-eurodrive.com.ar |
| | **Bahía Blanca** | SEW EURODRIVE ARGENTINA S.A.<br>O'Higgins 95, 1er Piso A<br>(B8000IVA) Bahía Blanca<br>Prov. de Buenos Aires | Tel. +54 291-451-7345<br>sewbb@sew-eurodrive.com.ar<br>http://www.sew-eurodrive.com.ar |
| | **Comahue** | SEW EURODRIVE ARGENTINA S.A.<br>Puerto Rico 1885<br>(R8324IOE) Cipolletti<br>Prov. de Río Negro | Tel. +54 299-478-1290<br>sewcomahue@sew-eurodrive.com.ar<br>http://www.sew-eurodrive.com.ar |

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| Argentina | | | |
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| **Mining** | **Mendoza** | SEW EURODRIVE ARGENTINA S.A. | Tel. +54 261-430-0060<br>mineria@sew-eurodrive.com.ar<br>http://www.sew-eurodrive.com.ar |

| Australia | | | |
|---|---|---|---|
| **Assembly plants**<br>**Sales**<br>**Service** | **Melbourne** | SEW-EURODRIVE PTY. LTD.<br>27 Beverage Drive<br>Tullamarine, Victoria 3043, Australia | Tel. +61 3 9933-1000<br>Fax +61 3 9933-1003<br>http://www.sew-eurodrive.com.au<br>enquires@sew-eurodrive.com.au |
| | **Sydney** | SEW-EURODRIVE PTY. LTD.<br>9, Sleigh Place, Wetherill Park<br>New South Wales, 2164, Australia | Tel. +61 2 9725-9900<br>Fax +61 2 9725-9905<br>enquires@sew-eurodrive.com.au |
| **Sales**<br>**Service** | **Adelaide** | SEW-EURODRIVE PTY. LTD.<br>9C Park Way<br>Mawson Lakes, SA 5095, Australia | Tel. +61 8 8161 4000<br>Fax +61 8 8161 4002<br>enquires@sew-eurodrive.com.au |
| | **Brisbane** | SEW-EURODRIVE PTY.LTD.<br>1 /34 Collinsvale St<br>Rocklea, Queensland, 4106, Australia | Tel. +61 7 3276 5100<br>Fax +61 7 3276 5102<br>enquires@sew-eurodrive.com.au |
| | **Perth** | SEW-EURODRIVE PTY. LTD.<br>10 Colin Jamieson Drive<br>Welshpool, WA 6106, Australia | Tel. +61 8 9251-4900<br>Fax +61 8 9251-4903<br>enquires@sew-eurodrive.com.au |
| **Sales** | **Townsville** | SEW-EURODRIVE PTY. LTD.<br>12 Leyland Street<br>Garbutt, QLD 4814, Australia | Tel. +61 7 4779 4333<br>Fax +61 7 4779 5333<br>enquires@sew-eurodrive.com.au |

| Austria | | | |
|---|---|---|---|
| **Assembly plant**<br>**Sales**<br>**Service** | **Vienna** | SEW-EURODRIVE Ges.m.b.H.<br>Richard-Strauss-Strasse 24<br>1230 Wien, Austria | Tel. +43 1 617 55 00-0<br>Fax +43 1 617 55 00-30<br>http://www.sew-eurodrive.at<br>sew@sew-eurodrive.at |
| **Technical offices** | **Linz** | SEW-EURODRIVE Ges.m.b.H.<br>Reuchlinstr. 6/3<br>4020 Linz, Austria | Tel. +43 732 655 109-0<br>Fax +43 732 655 109-20<br>tb-linz@sew-eurodrive.at |
| | **Graz** | SEW-EURODRIVE Ges.m.b.H.<br>Grabenstraße 231<br>8045 Graz, Austria | Tel. +43 316 685 756-0<br>Fax +43 316 685 755<br>tb-graz@sew-eurodrive.at |
| | **Dornbirn** | SEW-EURODRIVE Ges.m.b.H.<br>Lustenauerstraße 27/1<br>6850 Dornbirn, Austria | Tel. +43 5572 3725 99-0<br>Fax +43 5572 3725 99-20<br>tb-dornbirn@sew-eurodrive.at |

| Bangladesh | | | |
|---|---|---|---|
| **Sales** | **Bangladesh** | SEW-EURODRIVE INDIA PRIVATE LIMITED<br>345 DIT Road<br>East Rampura<br>Dhaka-1219, Bangladesh | Mobile +88 01729 097309<br>salesdhaka@seweurodrivebangla-desh.com |

| Belarus | | | |
|---|---|---|---|
| **Sales** | **Minsk** | SEW-EURODRIVE BY<br>RybalkoStr. 26<br>220033 Minsk, Belarus | Tel. +375 17 298 47 56 / 298 47 58<br>Fax +375 17 298 47 54<br>http://www.sew.by<br>sales@sew.by |

| Belgium | | | |
|---|---|---|---|
| **Assembly plant**<br>**Sales**<br>**Service** | **Brussels** | **SEW-EURODRIVE n.v./s.a.**<br>Researchpark Haasrode 1060<br>Evenementenlaan 7<br>BE-3001 Leuven | Tel. +32 16 386-311<br>Fax +32 16 386-336<br>http://www.sew-eurodrive.be<br>info@sew-eurodrive.be |
| **Service Competence Centers** | **Industrial gear units** | **SEW-EURODRIVE n.v./s.a.**<br>Rue de Parc Industriel, 31<br>6900 Marche-en-Famenne, Belgium | Tel. +32 84 219-878<br>Fax +32 84 219-879<br>http://www.sew-eurodrive.be<br>service-wallonie@sew-eurodrive.be |

| Brazil | | | |
|---|---|---|---|
| **Production plant**<br>**Sales**<br>**Service** | **São Paulo** | SEW-EURODRIVE Brasil Ltda.<br>Avenida Amâncio Gaiolli, 152 - Rodovia Presi-dente Dutra Km 208<br>Guarulhos - 07251-250 - SP, Brazil<br>SAT - SEW ATENDE - 0800 7700496 | Tel. +55 11 2489-9133<br>Fax +55 11 2480-3328<br>http://www.sew-eurodrive.com.br<br>sew@sew.com.br |



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| **Brazil** | | | |
| **Assembly plants**<br>**Sales**<br>**Service** | **Rio Claro** | SEW-EURODRIVE Brasil Ltda.<br>Rodovia Washington Luiz, Km 172<br>Condomínio Industrial Conpark<br>Caixa Postal: 327<br>13501-600 – Rio Claro / SP | Tel. +55 19 3522-3100<br>Fax +55 19 3524-6653<br>montadora.rc@sew.com.br |
| | **Joinville** | SEW-EURODRIVE Brasil Ltda.<br>Rua Dona Francisca, 12.346 – Pirabeiraba<br>89239-270 – Joinville / SC | Tel. +55 47 3027-6886<br>Fax +55 47 3027-6888<br>filial.sc@sew.com.br |
| | **Indaiatuba** | SEW-EURODRIVE Brasil Ltda.<br>Estrada Municipal Jose Rubim, 205<br>Rodovia Santos Dumont Km 49<br>13347-510 – Indaiatuba / SP | Tel. +55 19 3835-8000<br>sew@sew.com.br |
| **Bulgaria** | | | |
| **Sales** | **Sofia** | BEVER-DRIVE GmbH<br>Bogdanovetz Str.1<br>1606 Sofia, Bulgaria | Tel. +359 2 9151160<br>Fax +359 2 9151166<br>bever@bever.bg |
| **Cameroon** | | | |
| **Sales** | **Douala, Cameroon** | Electro-Services<br>Rue Drouot Akwa<br>B.P. 2024<br>Douala, Cameroon | Tel. +237 33 431137<br>Fax +237 33 431137<br>electrojemba@yahoo.fr |
| **Canada** | | | |
| **Assembly plants**<br>**Sales**<br>**Service** | **Toronto** | SEW-EURODRIVE CO. OF CANADA LTD.<br>210 Walker Drive<br>Bramalea, ON L6T 3W1 | Tel. +1 905 791-1553<br>Fax +1 905 791-2999<br>http://www.sew-eurodrive.ca<br>l.watson@sew-eurodrive.ca |
| | **Vancouver** | SEW-EURODRIVE CO. OF CANADA LTD.<br>Tilbury Industrial Park<br>7188 Honeyman Street<br>Delta, BC V4G 1G1 | Tel. +1 604 946-5535<br>Fax +1 604 946-2513<br>b.wake@sew-eurodrive.ca |
| | **Montreal** | SEW-EURODRIVE CO. OF CANADA LTD.<br>2555 Rue Leger<br>Lasalle, PQ H8N 2V9 | Tel. +1 514 367-1124<br>Fax +1 514 367-3677<br>a.peluso@sew-eurodrive.ca |
| | Please contact us for more addresses of service centers in Canada. | | |
| **Chile** | | | |
| **Assembly plant**<br>**Sales**<br>**Service** | **Santiago de Chile** | SEW-EURODRIVE CHILE LTDA.<br>Las Encinas 1295<br>Parque Industrial Valle Grande<br>LAMPA<br>RCH-Santiago de Chile<br>P.O. box address<br>Casilla 23 Correo Quilicura - Santiago - Chile | Tel. +56 2 75770-00<br>Fax +56 2 75770-01<br>http://www.sew-eurodrive.cl<br>ventas@sew-eurodrive.cl |
| **China** | | | |
| **Production plant**<br>**Assembly plant**<br>**Sales**<br>**Service** | **Tianjin** | SEW-EURODRIVE (Tianjin) Co., Ltd.<br>No. 46, 7th Avenue, TEDA<br>Tianjin 300457 | Tel. +86 22 25322612<br>Fax +86 22 25323273<br>info@sew-eurodrive.cn<br>http://www.sew-eurodrive.cn |
| **Assembly plant**<br>**Sales**<br>**Service** | **Suzhou** | SEW-EURODRIVE (Suzhou) Co., Ltd.<br>333, Suhong Middle Road<br>Suzhou Industrial Park<br>Jiangsu Province, 215021 | Tel. +86 51262581781<br>Fax +86 512 62581783<br>suzhou@sew-eurodrive.cn |
| | **Guangzhou** | SEW-EURODRIVE (Guangzhou) Co., Ltd.<br>No. 9, JunDa Road<br>East Section of GETDD<br>Guangzhou 510530, China | Tel. +86 20 82267890<br>Fax +86 20 82267922<br>guangzhou@sew-eurodrive.cn |
| | **Shenyang** | SEW-EURODRIVE (Shenyang) Co., Ltd.<br>10A-2, 6th Road<br>Shenyang Economic Technological Development Area<br>Shenyang, 110141, China | Tel. +86 24 25382538<br>Fax +86 24 25382580<br>shenyang@sew-eurodrive.cn |

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| China | | | |
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| | **Wuhan** | SEW-EURODRIVE (Wuhan) Co., Ltd.<br>10A-2, 6th Road<br>No. 59, the 4th Quanli Road, WEDA<br>430056 Wuhan, China | Tel. +86 27 84478388<br>Fax +86 27 84478389<br>wuhan@sew-eurodrive.cn |
| | **Xi'An** | SEW-EURODRIVE (Xi'An) Co., Ltd.<br>No. 12 Jinye 2nd Road<br>Xi'An High-Technology Industrial Development Zone<br>Xi'An 710065 | Tel. +86 29 68686262<br>Fax +86 29 68686311<br>xian@sew-eurodrive.cn |

| Colombia | | | |
|---|---|---|---|
| **Assembly plant**<br>**Sales**<br>**Service** | **Bogota** | SEW-EURODRIVE COLOMBIA LTDA.<br>Calle 22 No. 132-60<br>Bodega 6, Manzana B<br>Santafé de Bogotá, Colombia | Tel. +57 1 54750-50<br>Fax +57 1 54750-44<br>http://www.sew-eurodrive.com.co<br>sew@sew-eurodrive.com.co |

| Côte d'Ivoire | | | |
|---|---|---|---|
| **Sales** | **Abidjan** | SICA<br>Société Industrielle & Commerciale pour l'Afrique<br>165, Boulevard de Marseille<br>26 BP 1173 Abidjan 26 | Tel. +225 21 25 79 44<br>Fax +225 21 25 88 28<br>sicamot@aviso.ci |

| Croatia | | | |
|---|---|---|---|
| **Sales**<br>**Service** | **Zagreb** | KOMPEKS d. o. o.<br>Zeleni dol 10<br>10 000 Zagreb, Croatia | Tel. +385 1 4613-158<br>Fax +385 1 4613-158<br>kompeks@inet.hr |

| Czech Republic | | | |
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| **Sales**<br>**Assembly plant**<br>**Service** | **Hostivice** | SEW-EURODRIVE CZ S.R.O.<br>Floriánova 2459<br>253 01 Hostivice | Tel. +420 255 709 601<br>Fax +420 235 350 613<br>http://www.sew-eurodrive.cz<br>sew@sew-eurodrive.cz |
| | **Drive Service Hotline/24-hour availability** | HOTLINE: +420 800 739 739 (800 SEW SEW) | **Service:**<br>Tel. +420 255 709 632<br>Fax +420 235 358 218<br>servis@sew-eurodrive.cz |
| **Assembly plant**<br>**Service** | **Plzeň** | SEW-EURODRIVE CZ S.R.O.<br>Areal KRPA a.s.<br>Zahradni 173/2<br>326 00 Plzeň | Tel. +420 378 775 320<br>Fax +420 377 970 710<br>sew@sew-eurodrive.cz |
| **Technical offices** | **Brno** | SEW-EURODRIVE CZ S.R.O.<br>Křenová 52<br>60200 Brno | Tel. +420 543 254 174<br>Fax +420 543 256 845<br>radek.chmela@sew-eurodrive.cz |
| | **Hradec Králové** | SEW-EURODRIVE CZ S.R.O.<br>Čechova 498<br>50202 Hradec Králové | Tel. +420 495 510 141<br>Fax +420 495 521 313<br>miroslav.moravec@sew-eurodrive.cz |
| | **Ostrava** | SEW-EURODRIVE CZ S.R.O.<br>Studentská 6202/17<br>708 00 Ostrava-Poruba | Tel. +420 597 329 044<br>david.kenkus@sew-eurodrive.cz |
| | **Klatovy** | SEW-EURODRIVE CZ S.R.O.<br>Vídeňská 841<br>33901 Klatovy | Tel. +420 376 331 634<br>Fax +420 376 331 634<br>viktor.kubernat@sew-eurodrive.cz |
| **Service** | **Horní Moštěnice** | SEW-EURODRIVE CZ S.R.O.<br>Nám.Dr.M.Tyrše 14/64<br>751 17 Horní Moštěnice | Tel. +420 581 224 374<br>Fax +420 581 224 374<br>servis@sew-eurodrive.cz |

| Denmark | | | |
|---|---|---|---|
| **Assembly plant**<br>**Sales**<br>**Service** | **Copenhagen** | SEW-EURODRIVE A/S<br>Geminivej 28-30<br>2670 Greve, Denmark | Tel. +45 43 9585-00<br>Fax +45 43 9585-09<br>http://www.sew-eurodrive.dk<br>sew@sew-eurodrive.dk |

| Egypt | | | |
|---|---|---|---|
| **Sales**<br>**Service** | **Cairo** | Copam Egypt<br>for Engineering & Agencies<br>33 El Hegaz ST, Heliopolis, Cairo, Egypt | Tel. +20 2 22566-299 +1 23143088<br>Fax +20 2 22594-757<br>http://www.copam-egypt.com/<br>copam@datum.com.eg |



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| Estonia | | | |
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| **Sales** | **Tallinn** | ALAS-KUUL AS<br>Reti tee 4<br>EE-75301 Peetri küla, Rae vald, Harjumaa, Estonia | Tel. +372 6593230<br>Fax +372 6593231<br>veiko.soots@alas-kuul.ee |

| Finland | | | |
|---|---|---|---|
| **Assembly plant**<br>**Sales**<br>**Service** | **Hollola** | SEW-EURODRIVE OY<br>Vesimäentie 4<br>15860 Hollola 2, Finland | Tel. +358 201 589-300<br>Fax +358 3 780-6211<br>http://www.sew-eurodrive.fi<br>sew@sew.fi |
| **Service** | **Hollola** | SEW-EURODRIVE OY<br>Keskikankaantie 21<br>FIN-15860 Hollola | Tel. +358 201 589-300<br>Fax +358 3 780-6211<br>http://www.sew-eurodrive.fi<br>sew@sew.fi |
| **Technical offices** | **Helsinki** | SEW-EURODRIVE OY<br>Luutnantintie 5<br>00410 Helsinki, Finland | Tel. +358 201 589-300<br>sew@sew.fi |
| | **Vaasa** | SEW-EURODRIVE OY<br>Asemakatu 7<br>65100 Vaasa, Finland | Tel. +358 201 589-300<br>sew@sew.fi |
| | **Kuopio** | SEW-EURODRIVE OY<br>Viestikatu 3<br>70600 Kuopio, Finland | Tel. +358 201 589-300<br>sew@sew.fi |
| **Production plant**<br>**Assembly plant** | **Karkkila** | SEW Industrial Gears Oy<br>Valurinkatu 6, PL 8<br>FI-03600 Karkkila, 03601 Karkkila | Tel. +358 201 589-300<br>Fax +358 201 589-310<br>sew@sew.fi<br>http://www.sew-eurodrive.fi |

| Gabon | | | |
|---|---|---|---|
| **Sales** | **Libreville, Gabon** | ESG Electro Services Gabun<br>Feu Rouge Lalala<br>1889 Libreville<br>Gabon | Tel. +241 741059<br>Fax +241 741059<br>esg_services@yahoo.fr |

| Greece | | | |
|---|---|---|---|
| **Sales** | **Athens** | Christ. Boznos & Son S.A.<br>12, K. Mavromichali Street<br>P.O. Box 80136<br>GR-18545 Piraeus | Tel. +30 2 1042 251-34<br>Fax +30 2 1042 251-59<br>http://www.boznos.gr<br>info@boznos.gr |
| **Technical office** | **Thessaloniki** | Christ. Boznos & Son S.A.<br>Asklipiou 26<br>562 24 Evosmos, Thessaloniki, Greece | Tel. +30 2 310 7054-00<br>Fax +30 2 310 7055-15<br>info@boznos.gr |

| Great Britain | | | |
|---|---|---|---|
| **Assembly plant**<br>**Sales**<br>**Service** | **Normanton** | SEW-EURODRIVE Ltd.<br>DeVilliers Way<br>Trident Park<br>Normanton<br>West Yorkshire<br>WF6 1GX | Tel. +44 1924 893-855<br>Fax +44 1924 893-702<br>http://www.sew-eurodrive.co.uk<br>info@sew-eurodrive.co.uk |
| | **Drive Service Hotline/24-hour availability** | | Tel. +44 1924 896911 |
| **Service Competence Centers** | **Southern England** | SEW-EURODRIVE Ltd.<br>Unit 41<br>Easter Park<br>Benyon Road<br>Silchester<br>Reading<br>Berkshire<br>RG7 2PQ | Tel. +44 1189 701-699<br>Fax +44 1189 701-021 |
| **Technical offices** | **Midlands** | SEW-EURODRIVE Ltd.<br>5 Sugar Brook Court<br>Aston Road<br>Bromsgrove<br>Worcs.<br>B60 3EX | Tel. +44 1527 877-319<br>Fax +44 1527 575-245 |

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| Great Britain | | | |
|---|---|---|---|
| | **Scotland** | SEW-EURODRIVE Ltd.<br>No 37 Enterprise House<br>Springkerse Business Park<br>Stirling<br>FK7 7UF | Tel. +44 17 8647-8730<br>Fax +44 17 8645-0223 |

| Hong Kong | | | |
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| **Assembly plant**<br>**Sales**<br>**Service** | **Hong Kong** | SEW-EURODRIVE LTD.<br>Unit No. 801-806, 8th Floor<br>Hong Leong Industrial Complex<br>No. 4, Wang Kwong Road<br>Kowloon, Hong Kong | Tel. +852 36902200<br>Fax +852 36902211<br>contact@sew-eurodrive.hk |

| Hungary | | | |
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| **Sales**<br>**Service** | **Budapest** | SEW-EURODRIVE Kft.<br>1037 Budapest, Hungary<br>Kunigunda u. 18 | Tel. +36 1 437 06-58<br>Fax +36 1 437 06-50<br>http://www.sew-eurodrive.hu<br>office@sew-eurodrive.hu |

| India | | | |
|---|---|---|---|
| **Company office**<br>**Assembly plant**<br>**Sales**<br>**Service** | **Vadodara** | SEW-EURODRIVE India Private Limited<br>Plot No. 4, GIDC<br>POR Ramangamdi • Vadodara - 391 243, India<br>Gujarat | Tel. +91 265 3045200, +91 265 2831086<br>Fax +91 265 3045300, +91 265 2831087<br>http://www.seweurodriveindia.com<br>salesvadodara@seweurodriveindia.com |
| **Assembly plant**<br>**Sales**<br>**Service** | **Chennai** | SEW-EURODRIVE India Private Limited<br>Plot No. K3/1, Sipcot Industrial Park Phase II<br>Mambakkam Village<br>Sriperumbudur - 602105<br>Kancheepuram Dist, Tamil Nadu | Tel. +91 44 37188888<br>Fax +91 44 37188811<br>saleschennai@seweurodriveindia.com |
| **Technical offices** | **Ahmedabad** | SEW-EURODRIVE India Private Limited<br>306, Shaan office complex, Behind Sakar-IV,<br>Ellisebridge, Ashram Road<br>Ahmedabad – Gujarat, India | Tel. +91 79 40072067/68<br>Fax +91 79 40072069<br>salesahmedabad@seweurodrivein-dia.com |
| | **Aurangabad** | SEW-EURODRIVE INDIA PRIVATE LIMITED | Tel. +91 86000 12333<br>salesaurangabad@seweurodrivein-dia.com |
| | **Bangalore** | SEW-EURODRIVE India Private Limited<br>Sy.no:41-P3, Peenya1, Phase 1A, Peenya Village, Yeswanthapura Hobli, Bangalore North Taluk,<br>Bangalore Dist, Karnataka | Tel. +91 80 22266565<br>Fax +91 80 22266569<br>salesbangalore@seweurodriveindia.com |
| | | SEW-EURODRIVE India Private Limited<br># C-104, 3rd Block, KSSIDC Complex, Electronic City.<br>Bangalore – 560100, Karnataka | Tel. +91 80 28522662 / 28522663<br>salesbangalore@seweurodriveindia.com |
| | **Bangladesh** | SEW-EURODRIVE INDIA PRIVATE LIMITED<br>Genetic Udayanchal,<br>House-96 (6th Floor), Road-23/A,<br>Block-B, Banani, Dhaka-1213, Bangladesh | Mobile +88 01729 097309<br>salesdhaka@seweurodrivebangla-desh.com |
| | **Bellary** | SEW-EURODRIVE India Private Limited<br>Door no-56/279 Ward No-16, Sindhigi compound, Near Raghavendra talkies,<br>Bellary-583101<br>Karnataka | Tel. +91 77609 88668<br>salesbellary@seweurodriveindia.com |
| | **Chandigarh** | SEW-EURODRIVE India Private Limited<br># 72, Type- 4, Power Colony,<br>Chandigarh - Rupnagar Highway<br>Rupnagar- 140001, Punjab | Tel. +91 81462 67606<br>saleschandigarh@seweurodrivein-dia.com |
| | **Chennai** | SEW-EURODRIVE India Private Limited<br>2nd Floor, Josmans Complex,<br>No. 5, McNichols Road,<br>Chetpet<br>Chennai - 600031 - Tamil Nadu, India | Tel. +91 44 42849813<br>Fax +91 44 42849816<br>saleschennai@seweurodriveindia.com |
| | **Kochi** | SEW-EURODRIVE India Private Limited<br>CF7-(2), Block No 1, Vasanth Nagar,<br>Opposite Jawahar Lal Nehru Stadium,<br>Palarivattom – Cochin 682025 | Tel. +91 98951 30375<br>salescochin@seweurodriveindia.com |



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| India | | | |
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| | **Coimbatore** | SEW-EURODRIVE INDIA PRIVATE LIMITED<br>687/2, SRI SAKTHIVEL TOWERS (NEAR DEEPAM HOSPITAL)<br>TRICHY ROAD, RAMANATHAPURAM<br>COIMBATORE - 641 045.Tamilnadu, India | Tel. +91 422 2322420<br>Fax +91 422 2323988<br>salescoimbatore@seweurodrivein-dia.com |
| | **Cuttack** | SEW-EURODRIVE India Private Limited<br>Plot No. 1764,<br>Nuasahi, Nayapalli<br>Bhubaneswar-12<br>Orissa | Tel. +91 9937446333<br>salescuttack@seweurodriveindia.com |
| | **Gandhidham** | SEW-EURODRIVE India Private Limited<br>TCX-S-28, FF, Ward 12/A,<br>Gandhidham - Kutch - 370201 | Tel. +91 81282 36850<br>salesgandhidham@seweurodrivein-dia.com |
| | **Hyderabad** | SEW-EURODRIVE India Private Limited<br>408, 4th Floor, Meridian Place<br>Green Park Road<br>Amerpeet<br>Hyderabad - 500016 - Andhra Pradesh, India | Tel. +91 40 23414698<br>Fax +91 40 23413884<br>saleshyderabad@seweurodriveindia.com |
| | **Jamshedpur** | SEW-EURODRIVE India Private Limited<br>Flat no.: S1 " Kashi Kunj",h. No. 60, New Rani Kudar Road No - 3<br>P.o. + P.s. - Kadma<br>Jamshedpur - Pin - 831005 Jharkhand | Tel. +91 9934123671<br>salesjamshedpur@seweurodrivein-dia.com |
| | **Kolhapur** | SEW EURODRIVE India Private Limited | Tel. +91 86000 20846<br>saleskolhapur@seweurodriveindia.com |
| | **Kolkata** | SEW EURODRIVE India Private Limited<br>2nd floor, Room No. 35<br>Chowringhee Court<br>55, Chowringhee Road<br>Kolkata - 700 071 - West Bengal, India | Tel. +91 33 22827457<br>Fax +91 33 22894204<br>saleskolkata@seweurodriveindia.com |
| | **Lucknow** | SEW-EURODRIVE India Private Limited<br>69, Shiv Vihar Colony<br>Vikas Nagar-5<br>Lucknow 226022 - Uttar Pradesh | Tel. +91 9793627333<br>saleslucknow@seweurodriveindia.com |
| | **Mumbai** | SEW-EURODRIVE India Private Limited<br>312 A, 3rd Floor, Acme Plaza, J.B. Nagar,<br>Andheri Kurla Road, Andheri (E)<br>Mumbai - 400059 - Maharashtra, India | Tel. +91 22 28348440<br>Fax +91 22 28217858<br>salesmumbai@seweurodriveindia.com |
| | **Nagpur** | SEW-EURODRIVE India Private Limited<br>Plot No 49, New Kailash Nager, Samta colony,<br>Nagpur-440027 | Tel. +91 95610 89525<br>salesnagpur@seweurodriveindia.com |
| | **Nashik** | SEW-EURODRIVE India Private Limited<br>107, "YOG" Bunglow,<br>Mahatama Nagar, Trimbak Road,<br>Nashik, Maharashtra – 422 007 | Tel. +91 9665752978<br>salesnashik@seweurodriveindia.com |
| | **New Delhi** | SEW-EURODRIVE India Private Limited<br>1008, 10th Floor, 12th Level<br>"Westend Mall"<br>Tower Plot, District Centre<br>Adjacent Hotel Hilton<br>Janak Puri, New Delhi – 110058 | Tel. +91 11 25544111<br>Fax +91 11 25544113<br>salesdelhi@seweurodriveindia.com |
| | **Pune** | SEW-EURODRIVE India Private Limited<br>Jai Tulajabhavani Complex.<br>Office No: 15 First Floor,<br>Opp. Century Enka Company,<br>MIDC Bhosari, Pune 411 026 | Tel. +91 20-65118890 / 91<br>Fax +91 20 25380721<br>salespune@seweurodriveindia.com |
| | | SEW-EURODRIVE India Private Limited<br>LUNAWAT PRISM<br>4th Floor, S.No. 148<br>Opposite Wanaz Company, Besides Mega Mart<br>At Neena Co-Operative Housing Society, Paud Road,<br>Pune 411038 - Maharashtra, India | Tel. +91 20 25380730/735<br>Fax +91 20 25380721<br>salespune@seweurodriveindia.com<br>praveen.hosur@seweurodriveindia.com |
| | **Raipur** | SEW-EURODRIVE India Private Limited<br>A-42, Ashoka Millenium Complex,<br>Ring Road-1,<br>Raipur 492 001 - Chhattisgarh, India | Tel. +91 771 4090765<br>Fax +91 771 4090765<br>salesraipur@seweurodriveindia.com |

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| India | | | |
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| | **Ranchi** | SEW-EURODRIVE India Private Limited<br>Flat No.: A - 101,<br>Krishna Shree Apartment,<br>Anantpur, P.O. Doranda – Ranchi 834002 | Tel. +91 8294630772<br>salesranchi@seweurodriveindia.com |
| | **Tiruchirappalli** | SEW-EURODRIVE India Private Limited<br>A-106,Trichy Towers,<br>Chandrasekarapuram,<br>Salai Road,<br>Trichy – 620018. | Mobile +91 95009 88081<br>salestrichy@seweurodriveindia.com |
| | **Vadodara** | SEW-EURODRIVE India Private Limited<br>Unit No. 301, Savorite Bldg,<br>Plot No. 143, Vinayak Society,<br>off old Padra Road,<br>Vadodara - 390 007. Gujarat | Tel. +91 265 2325258<br>Fax +91 265 2325259<br>salesvadodara@seweurodriveindia.com |
| | **Vijayawada** | SEW-EURODRIVE India Private Limited<br>Door No:40-5/3-10A, Syam Nagar, NGO's Colony,<br>Tikkle Road, Vijayawada-520010 | Tel. +91 99895 01748<br>Fax +91 8662475157<br>Mobile +91 9989501748<br>salesvijayawada@seweurodrivein-dia.com |

| Indonesia | | | |
|---|---|---|---|
| **Sales** | **Jakarta** | PT. Cahaya Sukses Abadi<br>Komplek Rukan Puri Mutiara Blok A no 99, Sunter<br>Jakarta 14350, Indonesia | Tel. +62 21 65310599<br>Fax +62 21 65310600<br>csajkt@cbn.net.id |
| | | PT. Agrindo Putra Lestari<br>Jl.Prof.DR.Latumenten no27/A<br>Jakarta 11330 | Tel. +62 21 63855588<br>Fax +62 21 63853789<br>aplindo@indosat.net.id |
| | **Medan** | PT. Serumpun Indah Lestari<br>Pulau Solor no. 8, Kawasan Industri Medan II<br>Medan 20252 | Tel. +62 61 687 1221<br>Fax +62 61 6871429 / +62 61 6871458 / +62 61 30008041<br>sil@serumpunindah.com<br>serumpunindah@yahoo.com |
| | **Surabaya** | PT. TRIAGRI JAYA ABADI<br>Jl. Sukosemolo No. 63, Galaxi Bumi Permai G6 No. 11<br>Surabaya 60122 | Tel. +62 31 5990128<br>Fax +62 31 5962666<br>triagri@indosat.net.id |
| | | CV. Multi Mas<br>Jl. Raden Saleh 43A Kav. 18<br>Surabaya 60174 | Tel. +62 31 5458589 / +62 31 5317224<br>Fax +62 31 5317220 / +62 31 5994629<br>sianhwa@sby.centrin.net.id |

| Ireland | | | |
|---|---|---|---|
| **Sales**<br>**Service** | **Dublin** | Alperton Engineering Ltd.<br>48 Moyle Road<br>Dublin Industrial Estate<br>Glasnevin, Dublin 11, Ireland | Tel. +353 1 830-6277<br>Fax +353 1 830-6458<br>info@alperton.ie<br>http://www.alperton.ie |

| Iceland | | | |
|---|---|---|---|
| **Sales** | **Reykjavik** | VARMA & VELAVERK EHF<br>Dalshrauni 5<br>IS-220 Hafnarjördur | Tel. +354 585 1070<br>Fax +354 585 1071<br>varmaverk@varmaverk.is<br>http://www.varmaverk.is |

| Israel | | | |
|---|---|---|---|
| **Sales** | **Tel Aviv** | Liraz Handasa Ltd.<br>Ahofer Str 34B / 228<br>58858 Holon, Israel | Tel. +972 3 5599511<br>Fax +972 3 5599512<br>http://www.liraz-handasa.co.il<br>office@liraz-handasa.co.il |

| Italy | | | |
|---|---|---|---|
| **Assembly plant**<br>**Sales**<br>**Service** | **Solaro** | SEW-EURODRIVE di R. Blickle & Co.s.a.s.<br>Via Bernini,14<br>I-20020 Solaro (Milano), Italy | Tel. +39 02 96 9801<br>Fax +39 02 96 980 999<br>http://www.sew-eurodrive.it<br>sewit@sew-eurodrive.it |
| **Technical offices** | **Bologna** | SEW-EURODRIVE di R. Blickle & Co.s.a.s.<br>Via della Grafica, 47<br>40064 Ozzano dell'Emilia (Bo), Italy | Tel. +39 051 65-23-801<br>Fax +39 02 96 980 499 |



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| Italy | | | |
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| | **Caserta** | SEW-EURODRIVE di R. Blickle & Co.s.a.s.<br>Viale Carlo III Km. 23,300<br>81020 S. Nicola la Strada (Caserta), Italy | Tel. +39 0823 219011<br>Fax +39 02 96 980 599 |
| | **Milan** | SEW-EURODRIVE di R. Blickle & Co.s.a.s.<br>Via Bernini,14<br>I-20020 Solaro (Milano), Italy | Tel. +39 02 96 980229<br>Fax +39 02 96 980 999 |
| | **Pescara** | SEW-EURODRIVE di R. Blickle & Co.s.a.s.<br>Viale Europa,132<br>I-65010 Villa Raspa di Spoltore (PE) | Tel. +39 085 41-59-427<br>Fax +39 02 96 980 699 |
| | **Turin** | SEW-EURODRIVE di R. Blickle & Co.s.a.s.<br>Filiale Torino<br>c.so Unione Sovietica 612/15 - int. C<br>10135 Torino, Italy | Tel. +39 011 3473780<br>Fax +39 02 96 980 799 |
| | **Verona** | SEW-EURODRIVE di R. Blickle & Co.s.a.s.<br>Via Antonio Meucci 5,<br>I-37042 - Caldiero ( VR ) | Tel. +39 045 89-239-11<br>Fax +39 02 96 980 814 |

| Japan | | | |
|---|---|---|---|
| **Assembly plant**<br>**Sales**<br>**Service** | **Iwata** | SEW-EURODRIVE JAPAN CO., LTD<br>250-1, Shimoman-no,<br>Iwata<br>Shizuoka 438-0818 | Tel. +81 538 373811<br>Fax +81 538 373855<br>http://www.sew-eurodrive.co.jp<br>sewjapan@sew-eurodrive.co.jp |
| **Technical offices** | **Fukuoka** | SEW-EURODRIVE JAPAN CO., LTD.<br>C-go, 5th-floor, Yakuin-Hiruzu-Bldg.<br>1-5-11, Yakuin, Chuo-ku<br>Fukuoka, 810-0022, Japan | Tel. +81 92 713-6955<br>Fax +81 92 713-6860<br>sewkyushu@jasmine.ocn.ne.jp |
| | **Osaka** | SEW-EURODRIVE JAPAN CO., LTD.<br>Higobashi Shimizu Bldg. 10th floor<br>1-3-7 Tosabori, Nishi-ku<br>Osaka, 550-0001, Japan | Tel. +81 6 6444--8330<br>Fax +81 6 6444--8338<br>sewosaka@crocus.ocn.ne.jp |
| | **Tokyo** | SEW-EURODRIVE JAPAN CO., LTD.<br>Omarimon Yusen Bldg. 13th floor<br>3-23-5 Nishinbashi, Minato-ku<br>Tokyo 105-0003, Japan | Tel. +81 3 3239-0469<br>Fax +81 3 3239-0943<br>sewtokyo@basil.ocn.ne.jp |

| Kazakhstan | | | |
|---|---|---|---|
| **Sales** | **Almaty** | ТОО "СЕВ-ЕВРОДРАЙВ"<br>пр.Райымбека, 348<br>050061 г. Алматы<br>Республика Казахстан | Тел. +7 (727) 334 1880<br>Факс +7 (727) 334 1881<br>http://www.sew-eurodrive.kz<br>sew@sew-eurodrive.kz |

| Kenya | | | |
|---|---|---|---|
| **Sales** | **Nairobi** | Barico Maintenances Ltd<br>Kamutaga Place<br>Commercial Street<br>Industrial Area<br>P.O.BOX 52217 - 00200<br>Nairobi | Tel. +254 20 6537094/5<br>Fax +254 20 6537096<br>info@barico.co.ke |

| Latvia | | | |
|---|---|---|---|
| **Sales** | **Riga** | SIA Alas-Kuul<br>Katlakalna 11C<br>1073 Riga, Latvia | Tel. +371 6 7139253<br>Fax +371 6 7139386<br>http://www.alas-kuul.com<br>info@alas-kuul.com |

| Lebanon | | | |
|---|---|---|---|
| **Sales Lebanon** | **Beirut** | Gabriel Acar & Fils sarl<br>B. P. 80484<br>Bourj Hammoud, Beirut, Lebanon | Tel. +961 1 510 532<br>Fax +961 1 494 971<br>ssacar@inco.com.lb |
| | | After Sales Service | service@medrives.com |
| **Sales Jordan / Kuwait / Saudi Arabia / Syria** | **Beirut** | Middle East Drives S.A.L. (offshore)<br>Sin El Fil.<br>B. P. 55-378<br>Beirut | Tel. +961 1 494 786<br>Fax +961 1 494 971<br>info@medrives.com<br>http://www.medrives.com |
| | | After Sales Service | service@medrives.com |

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| Lithuania | | | |
|---|---|---|---|
| **Sales** | **Alytus** | UAB Irseva<br>Statybininku 106C<br>LT-63431 Alytus | Tel. +370 315 79204<br>Fax +370 315 56175<br>irmantas@irseva.lt<br>http://www.sew-eurodrive.lt |

| Luxembourg | | | |
|---|---|---|---|
| **Assembly plant**<br>**Sales**<br>**Service** | **Brussels** | **SEW-EURODRIVE n.v./s.a.**<br>Researchpark Haasrode 1060<br>Evenementenlaan 7<br>BE-3001 Leuven | Tel. +32 16 386-311<br>Fax +32 16 386-336<br>http://www.sew-eurodrive.lu<br>info@sew-eurodrive.be |

| Madagascar | | | |
|---|---|---|---|
| **Sales** | **Antananarivo** | Ocean Trade<br>BP21bis. Andraharo<br>Antananarivo.<br>101 Madagascar | Tel. +261 20 2330303<br>Fax +261 20 2330330<br>oceantrabp@moov.mg |

| Malaysia | | | |
|---|---|---|---|
| **Assembly plant**<br>**Sales**<br>**Service** | **Johor** | SEW-EURODRIVE SDN BHD<br>No. 95, Jalan Seroja 39, Taman Johor Jaya<br>81000 Johor Bahru, Johor<br>West Malaysia | Tel. +60 7 3549409<br>Fax +60 7 3541404<br>sales@sew-eurodrive.com.my |
| **Technical offices** | **Kuala Lumpur** | SEW-EURODRIVE Sdn. Bhd.<br>No. 2, Jalan Anggerik Mokara 31/46<br>Kota Kemuning Seksyen 31<br>40460 Shah Alam<br>Selangor Darul Ehsan | Tel. +60 3 51229633<br>Fax +60 3 51229622<br>sewsa@sew-eurodrive.com.my |
| | **Kuching** | SEW-EURODRIVE Sdn. Bhd.<br>Lot 268, Section 9 KTLD<br>Lorong 9, Jalan Satok<br>93400 Kuching, Sarawak<br>East Malaysia | Tel. +60 82 232380<br>Fax +60 82 242380 |
| | **Penang** | SEW-EURODRIVE Sdn. Bhd.<br>No. 38, Jalan Bawal<br>Kimsar Garden<br>13700 Prai, Penang | Tel. +60 4 3999349<br>Fax +60 4 3999348<br>sewpg@sew-eurodrive.com.my |

| Morocco | | | |
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| **Sales**<br>**Service** | **Mohammedia** | SEW-EURODRIVE SARL<br>2 bis, Rue Al Jahid<br>28810 Mohammedia | Tel. +212 523 32 27 80/81<br>Fax +212 523 32 27 89<br>sew@sew-eurodrive.ma<br>http://www.sew-eurodrive.ma |

| Mauritania | | | |
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| **Sales** | **Zouérat** | AFRICOM - SARL<br>En Face Marché Dumez<br>P.B. 88<br>Zouérate | Tel. +222 45 44 50 19<br>Fax +222 45 44 03 14<br>contact@africom-sarl.com |

| Macedonia | | | |
|---|---|---|---|
| **Sales** | **Skopje** | Boznos DOOEL<br>Dime Anicin 2A/7A<br>1000 Skopje | Tel. +389 23256553<br>Fax +389 23256554<br>http://www.boznos.mk |

| Mexico | | | |
|---|---|---|---|
| **Assembly plant**<br>**Sales**<br>**Service** | **Quéretaro** | SEW-EURODRIVE MEXICO SA DE CV<br>SEM-981118-M93<br>Tequisquiapan No. 102<br>Parque Industrial Quéretaro<br>C.P. 76220<br>Quéretaro, Mexico | Tel. +52 442 1030-300<br>Fax +52 442 1030-301<br>http://www.sew-eurodrive.com.mx<br>scmexico@seweurodrive.com.mx |

| Mongolia | | | |
|---|---|---|---|
| **Sales** | **Ulan Bator** | SEW-EURODRIVE Representative Office Mongolia<br>Olympic street 8,<br>2nd floor Juulchin corp bldg.,<br>Sukhbaatar district,<br>Ulaanbaatar 14253 | Tel. +976-70009997<br>Fax +976-70009997<br>http://www.sew-eurodrive.mn<br>sew@sew-eurodrive.mn |



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| Namibia | | | |
|---|---|---|---|
| **Sales** | **Swakopmund** | DB Mining & Industrial Services<br>Einstein Street<br>Strauss Industrial Park<br>Unit1<br>Swakopmund | Tel. +264 64 462 738<br>Fax +264 64 462 734<br>sales@dbmining.in.na |

| New Zealand | | | |
|---|---|---|---|
| **Assembly plants**<br>**Sales**<br>**Service** | **Auckland** | SEW-EURODRIVE NEW ZEALAND LTD.<br>P.O. Box 58-428<br>82 Greenmount Drive<br>East Tamaki Auckland, New Zealand | Tel. +64 9 2745627<br>Fax +64 9 2740165<br>http://www.sew-eurodrive.co.nz<br>sales@sew-eurodrive.co.nz |
| | **Christchurch, New Zealand** | SEW-EURODRIVE NEW ZEALAND LTD.<br>10 Settlers Crescent, Ferrymead<br>Christchurch, New Zealand | Tel. +64 3 384-6251<br>Fax +64 3 384-6455<br>sales@sew-eurodrive.co.nz |
| **Technical offices** | **Palmerston North** | SEW-EURODRIVE NEW ZEALAND LTD.<br>C/-Grant Shearman, RD 5, Aronui Road<br>Palmerston North | Tel. +64 6 355-2165<br>Fax +64 6 355-2316<br>sales@sew-eurodrive.co.nz |

| Netherlands | | | |
|---|---|---|---|
| **Assembly plant**<br>**Sales**<br>**Service** | **Rotterdam** | SEW-EURODRIVE B.V.<br>Industrieweg 175<br>3044 AS Rotterdam, Netherlands<br>Postbus 10085<br>3004 AB Rotterdam, Netherlands | Tel. +31 10 4463-700<br>Fax +31 10 4155-552<br>Service: 0800-SEWHELP<br>http://www.sew-eurodrive.nl<br>info@sew-eurodrive.nl |

| Nigeria | | | |
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| **Sales** | **Lagos** | EISNL Engineering Solutions and Drives Ltd<br>Plot 9, Block A, Ikeja Industrial Estate (Ogba Scheme)<br>Adeniyi Jones St. End<br>Off ACME Road, Ogba, Ikeja, Lagos<br>Nigeria | Tel. +234 1 217 4332<br>team.sew@eisnl.com<br>http://www.eisnl.com |

| Norway | | | |
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| **Assembly plant**<br>**Sales**<br>**Service** | **Moss** | SEW-EURODRIVE A/S<br>Solgaard skog 71<br>1599 Moss, Norway | Tel. +47 69 24 10 20<br>Fax +47 69 24 10 40<br>http://www.sew-eurodrive.no<br>sew@sew-eurodrive.no |

| Pakistan | | | |
|---|---|---|---|
| **Sales** | **Karatschi** | Industrial Power Drives<br>Al-Fatah Chamber A/3, 1st Floor Central Commercial Area,<br>Sultan Ahmed Shah Road, Block 7/8,<br>Karachi | Tel. +92 21 452 9369<br>Fax +92-21-454 7365<br>seweurodrive@cyber.net.pk |

| Paraguay | | | |
|---|---|---|---|
| **Sales** | **Fernando de la Mora** | SEW-EURODRIVE PARAGUAY S.R.L<br>De la Victoria 112, Esquina nueva Asunción<br>Departamento Central<br>Fernando de la Mora, Barrio Bernardino | Tel. +595 991 519695<br>Fax +595 21 3285539<br>sew-py@sew-eurodrive.com.py |

| Peru | | | |
|---|---|---|---|
| **Assembly plant**<br>**Sales**<br>**Service** | **Lima** | SEW DEL PERU MOTORES REDUCTORES S.A.C.<br>Los Calderos, 120-124<br>Urbanizacion Industrial Vulcano, ATE, Lima, Peru | Tel. +51 1 3495280<br>Fax +51 1 3493002<br>http://www.sew-eurodrive.com.pe<br>sewperu@sew-eurodrive.com.pe |

| Philippines | | | |
|---|---|---|---|
| **Sales** | **Luzon** | Totaltech Corporation<br>5081-B C&L Mansion Filmore Ave. Cor. Fahrenheit St.<br>1235 Makati City | Tel. +63 2 551-9265 / +63 2 551-9271 / +63 2 551-9378<br>Fax +63 2 551-9273<br>totaltech89@gmail.com |
| | **All Areas** | P.T. Cerna Corporation<br>4137 Ponte St., Brgy. Santa Cruz, Makati City<br>1205 | Tel. +63 2 519 6214<br>Fax +63 2 890 2802<br>mech_drive_sys@ptcerna.com |

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| Poland | | | |
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| **Assembly plant**<br>**Sales**<br>**Service** | **Łódź** | SEW-EURODRIVE Polska Sp.z.o.o.<br>ul. Techniczna 5<br>92-518 Łódź, Poland | Tel. +48 42 676 53 00<br>Fax +48 42 676 53 49<br>http://www.sew-eurodrive.pl<br>sew@sew-eurodrive.pl |
| | **Service** | Tel. +48 42 6765332 / 42 6765343<br>Fax +48 42 6765346 | Linia serwisowa 24 hour hotline<br>Tel. +48 602 739 739<br>(+48 602 SEW SEW)<br>serwis@sew-eurodrive.pl |
| **Technical office** | **Tychy** | SEW-EURODRIVE Polska Sp.z.o.o.<br>ul. Strzelecka 66<br>PL-43-109 Tychy | Tel. +48 32 32 32 610<br>Fax +48 32 32 32 648 |
| | **Bydgoszcz** | SEW-EURODRIVE Polska Sp.z.o.o.<br>ul. Fordońska 246<br>PL-85-959 Bydgoszcz | Tel. +48 52 3606590<br>Fax +48 52 3606591 |
| | **Gdansk** | SEW-EURODRIVE Polska Sp.z.o.o.<br>ul. Galaktyczna 30A<br>PL-80-299 Gdańsk | Tel. +48 58 762 70 00<br>Fax +48 58 762 70 09 |
| | **Poznan** | SEW-EURODRIVE Polska Sp.z.o.o.<br>ul. Romana Maya 1<br>61-371 Poznań, Poland | Tel. +48 61 6465500<br>Fax +48 61 6465519 |
| | **Radom** | SEW-EURODRIVE Polska Sp.z.o.o.<br>ul. Słowackiego 84<br>26-600 Radom, Poland | Tel. +48 48 365 40 50<br>Fax +48 48 365 40 52 |

| Portugal | | | |
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| **Assembly plant**<br>**Sales**<br>**Service** | **Coimbra** | SEW-EURODRIVE, LDA.<br>Apartado 15<br>3050-901 Mealhada, Portugal | Tel. +351 231 20 9670<br>Fax +351 231 20 3685<br>http://www.sew-eurodrive.pt<br>infosew@sew-eurodrive.pt |
| **Service Competence Centers** | **Lisbon** | SEW-EURODRIVE, LDA.<br>Núcleo Empresarial I de São Julião do Tojal<br>Rua de Entremuros, 54<br>Fracção I<br>2660-533 São Julião do Tojal, Portugal | Tel. +351 21 958-0198<br>Fax +351 21 958-0245<br>esc.lisboa@sew-eurodrive.pt |
| **Technical office** | **Porto** | SEW-EURODRIVE, LDA.<br>Av. 25 de Abril, 68<br>4440-502 Valongo, Portugal | Tel. +351 229 350 383<br>Fax +351 229 350 384<br>Tel. +351 9 32559110<br>esc.porto@sew-eurodrive.pt |

| Romania | | | |
|---|---|---|---|
| **Sales**<br>**Service** | **Bucharest** | Sialco Trading SRL<br>str. Brazilia nr. 36<br>011783 Bucuresti, Romania | Tel. +40 21 230-1328<br>Fax +40 21 230-7170<br>sialco@sialco.ro |

| Russia | | | |
|---|---|---|---|
| **Assembly plant**<br>**Sales**<br>**Service** | **St. Petersburg** | ZAO SEW-EURODRIVE<br>P.O. Box 36<br>RUS-195220 St. Petersburg | Tel. +7 812 3332522 +7 812 5357142<br>Fax +7 812 3332523<br>http://www.sew-eurodrive.ru<br>sew@sew-eurodrive.ru |
| **Technical office** | **Ekaterinburg** | ZAO SEW-EURODRIVE<br>Kominterna Str. 16<br>Office 614<br>620078 Ekaterinburg, Russia | Tel. +7 343 310 3977<br>Fax +7 343 310 3978<br>eso@sew-eurodrive.ru |
| | **Irkutsk** | ZAO SEW-EURODRIVE<br>5-Armii Str., 31<br>664011 Irkutsk, Russia | Tel. +7 3952 25 5880<br>Fax +7 3952 25 5881<br>iso@sew-eurodrive.ru |
| | **Moscow** | ZAO SEW-EURODRIVE<br>Malaja Semjonowskaja Str.<br>д. 9, корпус 2<br>107023 Moscow | Tel. +7 495 9337090<br>Fax +7 495 9337094<br>mso@sew-eurodrive.ru |
| | **Novosibirsk** | ZAO SEW-EURODRIVE<br>pr. K Marksa 30<br>630087 Novosibirsk, Russia | Tel. +7 383 3350200<br>Fax +7 383 3462544<br>nso@sew-eurodrive.ru |
| | **Perm** | ZAO SEW-EURODRIVE<br>Stakhanovskaya str., 45 Office 512<br>RUS-614066 Perm | Tel. +7 342 2219494<br>Fax +7 342 2219444<br>pso@sew-eurodrive.ru |



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| | | | |
|---|---|---|---|
| **Russia** | | | |
| | **Togliatti** | ZAO SEW-EURODRIVE<br>Sportivnaya Str. 4B, office 2<br>Samarskaya obl.<br>445057 Togliatti, Russia | Tel. +7 8482 710529<br>Fax +7 8482 810590 |
| **Senegal** | | | |
| **Sales** | **Dakar** | SENEMECA<br>Mécanique Générale<br>Km 8, Route de Rufisque<br>B.P. 3251, Dakar | Tel. +221 338 494 770<br>Fax +221 338 494 771<br>senemeca@sentoo.sn<br>http://www.senemeca.com |
| **Serbia** | | | |
| **Sales** | **Belgrade** | DIPAR d.o.o.<br>Ustanicka 128a<br>PC Košum, IV sprat<br>SRB-11000 Beograd, Serbia | Tel. +381 11 347 3244 / +381 11 288 0393<br>Fax +381 11 347 1337<br>office@dipar.rs |
| **Singapore** | | | |
| **Assembly plant**<br>**Sales**<br>**Service** | **Singapore** | SEW-EURODRIVE PTE. LTD.<br>No 9, Tuas Drive 2<br>Jurong Industrial Estate<br>Singapore 638644 | Tel. +65 68621701<br>Fax +65 68612827<br>http://www.sew-eurodrive.com.sg<br>sewsingapore@sew-eurodrive.com |
| **Slovakia** | | | |
| **Sales** | **Bratislava** | SEW-EURODRIVE SK s.r.o.<br>Rybničná 40<br>831 06 Bratislava, Slovakia | Tel. +421 2 33595 202<br>Fax +421 2 33595 200<br>sew@sew-eurodrive.sk<br>http://www.sew-eurodrive.sk |
| | **Žilina** | SEW-EURODRIVE SK s.r.o.<br>Industry Park - PChZ<br>ulica M.R.Štefánika 71<br>010 01 Žilina, Slovakia | Tel. +421 41 700 2513<br>Fax +421 41 700 2514<br>sew@sew-eurodrive.sk |
| | **Banska Bystrica** | SEW-EURODRIVE SK s.r.o.<br>Rudlovská cesta 85<br>974 11 Banská Bystrica, Slovakia | Tel. +421 48 414 6564<br>Fax +421 48 414 6566<br>sew@sew-eurodrive.sk |
| | **Košice** | SEW-EURODRIVE SK s.r.o.<br>Slovenská ulica 26<br>040 01 Košice, Slovakia | Tel. +421 55 671 2245<br>Fax +421 55 671 2254<br>sew@sew-eurodrive.sk |
| **Slovenia** | | | |
| **Sales**<br>**Service** | **Celje** | Pakman - Pogonska Tehnika d.o.o.<br>Ul. XIV. divizije 14<br>3000 Celje, Slovenia | Tel. +386 3 490 83-20<br>Fax +386 3 490 83-21<br>pakman@siol.net |
| **Spain** | | | |
| **Assembly plant**<br>**Sales**<br>**Service** | **Bilbao** | SEW-EURODRIVE ESPAÑA, S.L.<br>Parque Tecnológico, Edificio, 302<br>48170 Zamudio (Vizcaya), Spain | Tel. +34 94 43184-70<br>Fax +34 94 43184-71<br>http://www.sew-eurodrive.es<br>sew.spain@sew-eurodrive.es |
| **Technical offices** | **Barcelona** | Delegación Barcelona<br>Avda. Francesc Macià, 60 – Planta 16, porta 1<br>Eix Macià – "Torre Milenium"<br>08208 Sabadell (Barcelona), Spain | Tel. +34 93 7162200<br>Fax +34 93 7233007 |
| | **Madrid** | Delegación Madrid<br>Gran Via. 48-2° A-D<br>28220 Majadahonda (Madrid), Spain | Tel. +34 91 6342250<br>Fax +34 91 6340899 |
| | **Sevilla** | MEB<br>Pólogono Calonge, C/A Nave 2 - C<br>E-41.077 Sevilla, Spain | Tel. +34 954 356 361<br>Fax +34 954 356 274<br>mebsa.sevilla@mebsa.com |
| | **Valencia** | MEB<br>Músico Andreu i Piqueres, 4<br>E-46.900 Torrente (Valencia) | Tel. +34 961 565 493<br>Fax +34 961 566 688<br>mebsa.valencia@mebsa.com |
| **Sri Lanka** | | | |
| **Sales** | **Colombo** | SM International (Pte) Ltd<br>254, Galle Raod<br>Colombo 4, Sri Lanka | Tel. +94 1 2584887<br>Fax +94 1 2582981 |

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| South Africa | | | |
|---|---|---|---|
| **Assembly plants**<br>**Sales**<br>**Service** | **Johannesburg** | SEW-EURODRIVE (PROPRIETARY) LIMITED<br>Eurodrive House<br>Cnr. Adcock Ingram and Aerodrome Roads<br>Aeroton Ext. 2<br>Johannesburg 2013, South Africa<br>P.O.Box 90004<br>Bertsham 2013, South Africa | Tel. +27 11 248-7000<br>Fax +27 11 494-3104<br>http://www.sew.co.za<br>info@sew.co.za |
| | **Cape Town** | SEW-EURODRIVE (PROPRIETARY) LIMITED<br>Rainbow Park<br>Cnr. Racecourse & Omuramba Road<br>Montague Gardens<br>Cape Town, South Africa<br>P.O. Box 36556<br>Chempet 7442<br>Cape Town, South Africa | Tel. +27 21 552-9820<br>Fax +27 21 552-9830<br>Telex 576 062<br>bgriffiths@sew.co.za |
| | **Durban, South Africa** | SEW-EURODRIVE (PROPRIETARY) LIMITED<br>48 Prospecton Road<br>Isipingo<br>Durban, South Africa<br>P.O. Box 10433, Ashwood 3605, South Africa | Tel. +27 31 902 3815<br>Fax +27 31 902 3826<br>cdejager@sew.co.za |
| | **Nelspruit** | SEW-EURODRIVE (PTY) LTD.<br>7 Christie Crescent<br>Vintonia<br>P.O. Box 1942<br>Nelspruit 1200 | Tel. +27 13 752-8007<br>Fax +27 13 752-8008<br>robermeyer@sew.co.za |
| **Technical offices** | **Port Elizabeth** | SEW-EURODRIVE PTY LTD.<br>8 Ruan Access Park<br>Old Cape Road<br>Greenbushes<br>6000 Port Elizabeth | Tel. +27 41 3722246<br>Fax +27 41 3722247<br>dtait@sew.co.za |

| South Korea | | | |
|---|---|---|---|
| **Assembly plant**<br>**Sales**<br>**Service** | **Ansan** | SEW-EURODRIVE KOREA CO., LTD.<br>B 601-4, Banweol Industrial Estate<br>#1048-4, Shingil-Dong, Danwon-Gu,<br>Ansan-City, Kyunggi-Do Zip 425-839 | Tel. +82 31 492-8051<br>Fax +82 31 492-8056<br>http://www.sew-korea.co.kr<br>master.korea@sew-eurodrive.com |
| | **Busan** | SEW-EURODRIVE KOREA Co., Ltd.<br>No. 1720 - 11, Songjeong - dong<br>Gangseo-ku<br>Busan 618-270, Korea | Tel. +82 51 832-0204<br>Fax +82 51 832-0230<br>master@sew-korea.co.kr |
| **Technical offices** | **Daegu** | SEW-EURODRIVE KOREA Co., Ltd.<br>No.1108 Sungan officetel<br>87-36, Duryu 2-dong, Dalseo-ku<br>Daegu 704-712 | Tel. +82 53 650-7111<br>Fax +82 53 650-7112 |
| | **Daejeon** | SEW-EURODRIVE KOREA Co., Ltd.<br>No. 1502, Hongin officetel<br>536-9, Bongmyung-dong, Yusung-ku<br>Daejeon 305-301 | Tel. +82 42 828-6461<br>Fax +82 42 828-6463 |
| | **Gwangju** | SEW-EURODRIVE KOREA Co., Ltd.<br>4fl., Dae-Myeong B/D<br>96-16 Unam-dong, Buk-ku<br>Kwangju 500-170 | Tel. +82 62 511-9172<br>Fax +82 62 511-9174 |
| | **Seoul** | SEW-EURODRIVE KOREA Co., Ltd.<br>No.504 Sunkyung officetel<br>106-4 Kuro 6-dong, Kuro-ku<br>Seoul 152-054, Korea | Tel. +82 2 862-8051<br>Fax +82 2 862-8199 |

| Swaziland | | | |
|---|---|---|---|
| **Sales** | **Manzini** | C G Trading Co. (Pty) Ltd<br>PO Box 2960<br>Manzini M200 | Tel. +268 2 518 6343<br>Fax +268 2 518 5033<br>engineering@cgtrading.co.sz |

| Sweden | | | |
|---|---|---|---|
| **Assembly plant**<br>**Sales**<br>**Service** | **Jönköping** | SEW-EURODRIVE AB<br>Gnejsvägen 6-8<br>55303 Jönköping, Sweden<br>Box 3100 S-55003 Jönköping | Tel. +46 36 3442 00<br>Fax +46 36 3442 80<br>http://www.sew-eurodrive.se<br>jonkoping@sew.se |



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| Sweden | | | |
|---|---|---|---|
| **Sales** | **Göteborg** | SEW-EURODRIVE AB<br>Gustaf Werners gata 8<br>42132 Västra Frölunda, Sweden | Tel. +46 31 70968 80<br>Fax +46 31 70968 93<br>goteborg@sew.se |
| | **Stockholm** | SEW-EURODRIVE AB<br>Björkholmsvägen 10<br>14146 Huddinge, Sweden | Tel. +46 8 44986 80<br>Fax +46 8 44986 93<br>stockholm@sew.se |
| | **Malmö** | SEW-EURODRIVE AB<br>Borrgatan 5<br>21124 Malmö, Sweden | Tel. +46 40 68064 80<br>Fax +46 40 68064 93<br>malmo@sew.se |
| | **Skellefteå** | SEW-EURODRIVE AB<br>Trädgårdsgatan 8<br>93131 Skellefteå, Sweden | Tel. +46 910 7153 80<br>Fax +46 910 7153 93<br>skelleftea@sew.se |

| Switzerland | | | |
|---|---|---|---|
| **Assembly plant**<br>**Sales**<br>**Service** | **Basel** | Alfred Imhof A.G.<br>Jurastrasse 10<br>CH-4142 Münchenstein bei Basel | Tel. +41 61 417 1717<br>Fax +41 61 417 1700<br>http://www.imhof-sew.ch<br>info@imhof-sew.ch |
| **Technical offices** | **Romandy** | André Gerber<br>Es Perreyres<br>1436 Chamblon, Switzerland | Tel. +41 24 445 3850<br>Fax +41 24 445 4887 |
| | **Bern / Solothurn** | Rudolf Bühler<br>Muntersweg 5<br>2540 Grenchen, Switzerland | Tel. +41 32 652 2339<br>Fax +41 32 652 2331 |
| | **Central Switzerland, Aargau** | Armin Pfister<br>Stierenweid<br>4950 Huttwill, BE, Switzerland | Tel. +41 62 962 54 55<br>Fax +41 62 962 54 56 |
| | **Zurich, Tessin** | Gian-Michele Muletta<br>Fischerstrasse 61<br>8132 Egg bei Zürich, Switzerland | Tel. +41 44 994 81 15<br>Fax +41 44 994 81 16 |
| | **Lake Constance and Eastern Switzerland** | Markus Künzle<br>Eichweg 4<br>9403 Goldach, Switzerland | Tel. +41 71 845 2808<br>Fax +41 71 845 2809 |

| Taiwan (R.O.C.) | | | |
|---|---|---|---|
| **Sales** | **Nan Tou** | Ting Shou Trading Co., Ltd.<br>No. 55 Kung Yeh N. Road<br>Industrial District<br>Nan Tou 540 | Tel. +886 49 255353<br>Fax +886 49 257878 |
| | **Taipei** | Ting Shou Trading Co., Ltd.<br>6F-3, No. 267, Sec. 2<br>Tung Hwa South Road, Taipei, Taiwan | Tel. +886 2 27383535<br>Fax +886 2 27368268<br>Telex 27 245<br>sewtwn@ms63.hinet.net |

| Tanzania | | | |
|---|---|---|---|
| **Sales** | **Dar es Salaam** | SEW-EURODRIVE PTY LIMITED TANZANIA<br>Plot 52, Regent Estate<br>PO Box 106274<br>Dar Es Salaam | Tel. +255 0 22 277 5780<br>Fax +255 0 22 277 5788<br>uroos@sew.co.tz |

| Thailand | | | |
|---|---|---|---|
| **Assembly plant**<br>**Sales**<br>**Service** | **Chonburi** | SEW-EURODRIVE (Thailand) Ltd.<br>700/456, Moo.7, Donhuaroh<br>Muang<br>Chonburi 20000, Thailand | Tel. +66 38 454281<br>Fax +66 38 454288<br>sewthailand@sew-eurodrive.com |
| **Technical offices** | **Bangkok** | SEW-EURODRIVE (Thailand) Ltd.<br>6th floor, TPS Building<br>1023, Phattanakarn Road<br>Suanluang<br>Bangkok,10250 | Tel. +66 2 7178149<br>Fax +66 2 7178152<br>sewthailand@sew-eurodrive.com |
| | **Hat Yai** | SEW-EURODRIVE (Thailand) Ltd.<br>Hadyai Country Home Condominium<br>59/101 Soi.17/1<br>Rachas-Utid Road.<br>Hadyai, Songkhla 90110, Thailand | Tel. +66 74 359441<br>Fax +66 74 359442<br>sewthailand@sew-eurodrive.com |

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| Thailand | | | |
|---|---|---|---|
| | **Khon Kaen** | SEW-EURODRIVE (Thailand) Ltd.<br>4th Floor, Kaow-U-HA MOTOR Bldg,<br>359/2, Mitraphab Road.<br>Muang District<br>Khonkaen 40000, Thailand | Tel. +66 43 225745<br>Fax +66 43 324871<br>sew-thailand@sew-eurodrive.com |

| Tunisia | | | |
|---|---|---|---|
| **Sales** | **Tunis** | T. M.S. Technic Marketing Service<br>Zone Industrielle Mghira 2<br>Lot No. 39<br>2082 Fouchana | Tel. +216 79 40 88 77<br>Fax +216 79 40 88 66<br>http://www.tms.com.tn<br>tms@tms.com.tn |

| Turkey | | | |
|---|---|---|---|
| **Assembly plant**<br>**Sales**<br>**Service** | **Kocaeli-Gebze** | SEW-EURODRİVE<br>Sistemleri San. Ve TIC. Ltd. Sti<br>Gebze Organize Sanayi Böl. 400 Sok No. 401<br>41480 Gebze Kocaeli | Tel. +90-262-9991000-04<br>Fax +90-262-9991009<br>http://www.sew-eurodrive.com.tr<br>sew@sew-eurodrive.com.tr |
| **Technical offices** | **Adana** | SEW-EURODRİVE<br>Cevat Yurdakul Cad.No:52<br>Akdoğan İş Merkezi K:5 D.18<br>Seyhan / Adana | Tel. +90 322 359 94 15<br>Fax +90 322 359 94 16 |
| | **Ankara** | SEW-EURODRİVE<br>1368.Cadde Eminel İşmerkezi<br>No: 18/68<br>İvogsan / Ankara | Tel. +90 312 385 33 90<br>Fax +90 312 385 32 58 |
| | **Bursa** | SEW-EURODRİVE<br>Üçevler Mah. Bayraktepe Sok.<br>Akay İş Merkezi Kat:3 No: 7/6<br>Nilüfer / Bursa | Tel. +90 224 443 45 60<br>Fax +90 224 443 45 58 |
| | **Istanbul** | SEW-EURODRİVE<br>Tekstilkent Ticaret Merkezi<br>B-13 Blok No:70<br>Esenler / İstanbul | Tel. +90-262-9991000-04<br>Fax +90-262-9991009 |
| | **Izmir** | SEW-EURODRİVE<br>1203/11 Sok. No. 4/614<br>Kara Hasan Atlı İş Merkezi Kat :6<br>Yenişehir / İzmir | Tel. +90 232 469 62 64<br>Fax +90 232 433 61 05 |

| Ukraine | | | |
|---|---|---|---|
| **Assembly plant**<br>**Sales**<br>**Service** | **Dnipropetrowsk** | ООО «СЕВ-Евродрайв»<br>ул.Рабочая, 23-В, офис 409<br>49008 Днепропетровск | Тел. +380 56 370 3211<br>Факс. +380 56 372 2078<br>http://www.sew-eurodrive.ua<br>sew@sew-eurodrive.ua |
| **Sales** | **Kiev** | ООО «СЕВ-Евродрайв»<br>ул.С.Олейника, 21<br>02068 Киев | Тел. +380 44 503 95 77<br>Факс. +380 44 503 95 78<br>kso@sew-eurodrive.ua |
| | **Donetsk** | ООО «СЕВ-Евродрайв»<br>ул.25-летия РККА, 1-В, оф. 805<br>83000 Донецк | Тел. +380 62 38 80 545<br>Факс. +380 62 38 80 533<br>dso@sew-eurodrive.ua |
| | **Ivano-Frankivsk** | ООО «СЕВ-Евродрайв»<br>ул.Независимости, 4, оф.303<br>83000 Ивано-Франковск | Тел. +380 342 725 190<br>Факс. +380 342 725 191<br>ifso@sew-eurodrive.ua |

| Uruguay | | | |
|---|---|---|---|
| **Assembly plant**<br>**Sales** | **Montevideo** | SEW-EURODRIVE Uruguay, S. A.<br>Jose Serrato 3569 Esqina Corumbe<br>CP 12000 Montevideo | Tel. +598 2 21181-89<br>Fax +598 2 21181-89<br>sewuy@sew-eurodrive.com.uy |

| USA | | | |
|---|---|---|---|
| **Production plant**<br>**Assembly plant**<br>**Sales**<br>**Service** | **Southeast Region** | SEW-EURODRIVE INC.<br>1295 Old Spartanburg Highway<br>P.O. Box 518<br>Lyman, S.C. 29365 | Tel. +1 864 439-7537<br>Fax Sales +1 864 439-7830<br>Fax Manufacturing +1 864 439-9948<br>Fax Assembly +1 864 439-0566<br>Fax Confidential/HR +1 864 949-5557<br>http://www.seweurodrive.com<br>cslyman@seweurodrive.com |



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| USA | | | |
|---|---|---|---|
| **Assembly plants**<br>**Sales**<br>**Service** | **Northeast Region** | SEW-EURODRIVE INC.<br>Pureland Ind. Complex<br>2107 High Hill Road, P.O. Box 481<br>Bridgeport, New Jersey 08014, USA | Tel. +1 856 467-2277<br>Fax +1 856 845-3179<br>csbridgeport@seweurodrive.com |
| | **Midwest Region** | SEW-EURODRIVE INC.<br>2001 West Main Street<br>Troy, Ohio 45373, USA | Tel. +1 937 335-0036<br>Fax +1 937 332-0038<br>cstroy@seweurodrive.com |
| | **Southwest Region** | SEW-EURODRIVE INC.<br>3950 Platinum Way<br>Dallas, Texas 75237, USA | Tel. +1 214 330-4824<br>Fax +1 214 330-4724<br>csdallas@seweurodrive.com |
| | **Western Region** | SEW-EURODRIVE INC.<br>30599 San Antonio St.<br>Hayward, CA 94544, USA | Tel. +1 510 487-3560<br>Fax +1 510 487-6433<br>cshayward@seweurodrive.com |
| | Please contact us for other service center addresses in the USA. | | |

| Venezuela | | | |
|---|---|---|---|
| **Assembly plant**<br>**Sales**<br>**Service** | **Valencia** | SEW-EURODRIVE Venezuela S.A.<br>Av. Norte Sur No. 3, Galpon 84-319<br>Zona Industrial Municipal Norte<br>Valencia, Estado Carabobo, Venezuela | Tel. +58 241 832-9804<br>Fax +58 241 838-6275<br>http://www.sew-eurodrive.com.ve<br>ventas@sew-eurodrive.com.ve<br>sewfinanzas@cantv.net |

| United Arab Emirates | | | |
|---|---|---|---|
| **Sales**<br>**Service** | **Sharjah** | Copam Middle East (FZC)<br>Sharjah Airport International Free Zone<br>P.O. Box 120709<br>Sharjah | Tel. +971 6 5578-488<br>Fax +971 6 5578-499<br>copam_me@eim.ae |

| Vietnam | | | |
|---|---|---|---|
| **Sales** | **Ho-Chi-Minh-Stadt** | **All sectors except for ports and offshore:**<br>Nam Trung Co., Ltd<br>250 Binh Duong Avenue, Thu Dau Mot Town,<br>Binh Duong Province<br>HCM office: 91 Tran Minh Quyen Street<br>District 10, Ho Chi Minh City | Tel. +84 8 8301026<br>Fax +84 8 8392223<br>namtrungco@hcm.vnn.vn<br>truongtantam@namtrung.com.vn<br>khanh-nguyen@namtrung.com.vn |
| | | **Ports and offshore:**<br>DUC VIET INT LTD<br>Industrial Trading and Engineering Services<br>A75/6B/12 Bach Dang Street, Ward 02,<br>Tan Binh District, 70000 Ho Chi Minh City | Tel. +84 8 62969 609<br>Fax +84 8 62938 842<br>totien@ducvietint.com |
| | **Hanoi** | Nam Trung Co., Ltd<br>R.205B Tung Duc Building<br>22 Lang ha Street<br>Dong Da District, Hanoi City | Tel. +84 4 37730342<br>Fax +84 4 37762445<br>namtrunghn@hn.vnn.vn |

| Zambia | | | |
|---|---|---|---|
| **Sales** | **Kitwe** | EC Mining Limited<br>Plots No. 5293 & 5294,Tangaanyika Road, Off<br>Mutentemuko Road,<br>Heavy Industrial Park,<br>P.O.BOX 2337<br>Kitwe | Tel. +260 212 210 642<br>Fax +260 212 210 645<br>sales@ecmining.com<br>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:** _____

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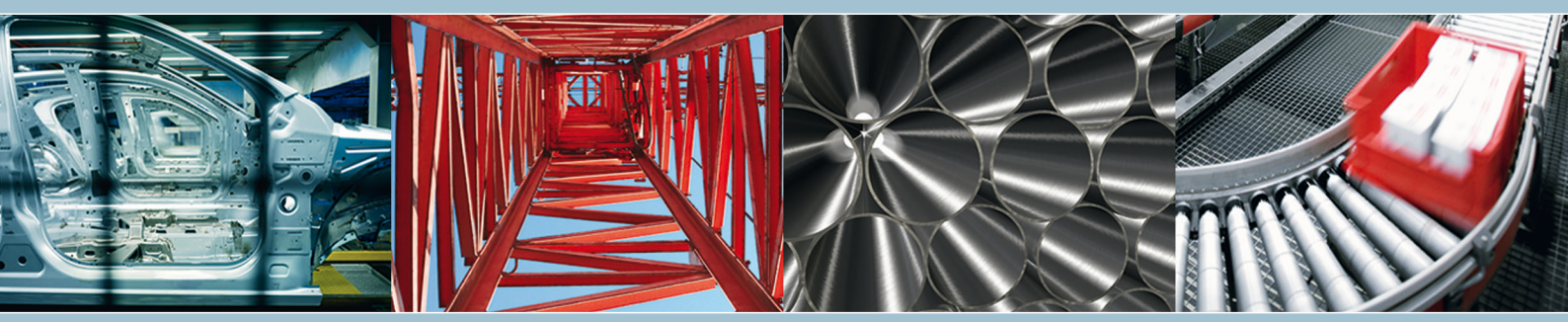

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