Drive Technology \ Drive Automation \ System Integration \ Services

Catalog

AC Motors
DRS71 – 315, DRE80 – 315, DRP90 – 315, DRL71 – 225
DT56, DR63, DV250/280

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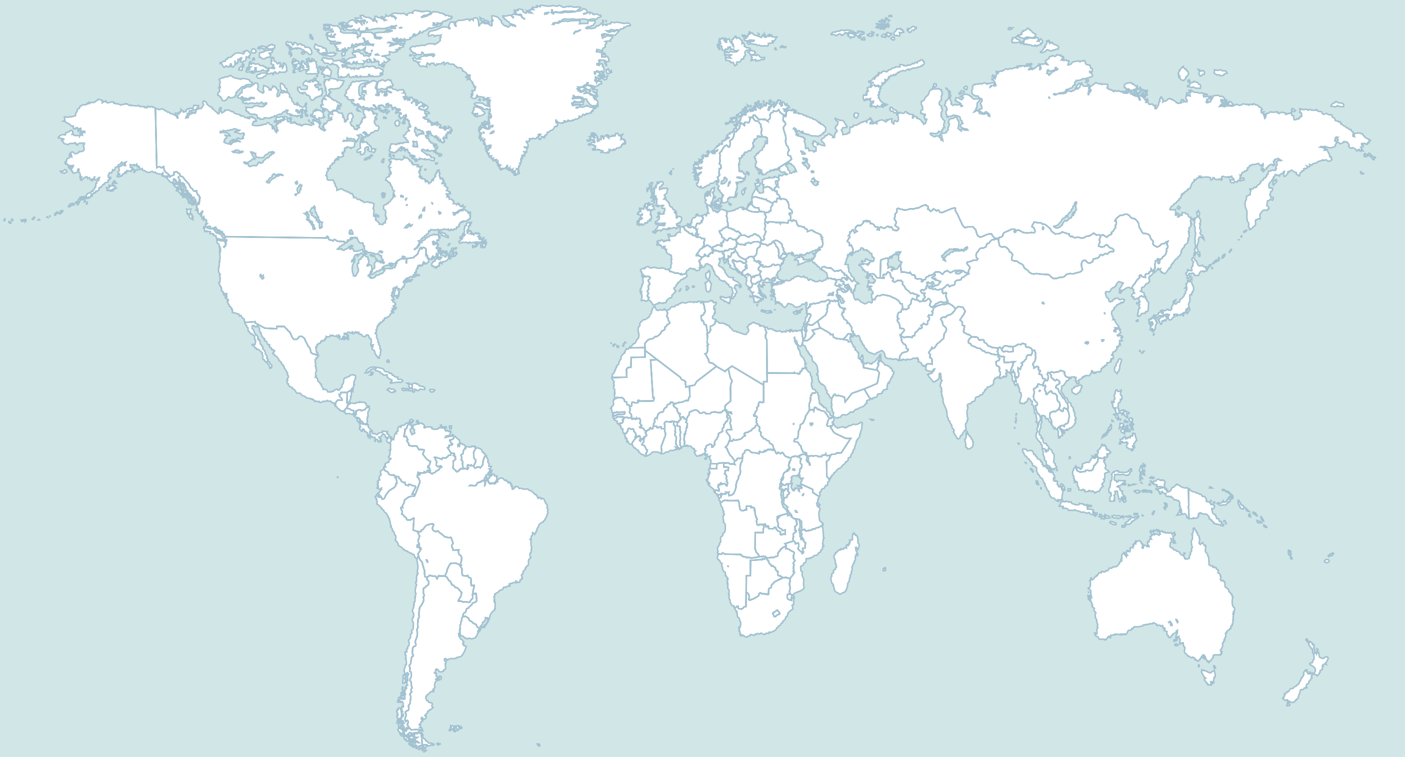


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1 Introduction

1.1 The SEW-EURODRIVE Group of Companies

Global presence

Driving the world – with innovative drive solutions for all branches and for every application. Products and systems from SEW-EURODRIVE are used in a multitude of applications – worldwide. SEW-EURODRIVE products are found in a variety of industries, including automotive, building materials, food and beverage as well as metal-processing. The decision to use drive technology 'made by SEW-EURODRIVE' stands for safety in functionality and investment.

We are represented in the most important branches of industry all over the world: with 12 manufacturing plants, 67 assembly plants in 46 countries and our comprehensive range of services, which we consider an integrative service that continues our commitment to outstanding quality.

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, space available and the ambient conditions. Gear units and gearmotors offering a unique and finely tuned performance range and the best economic prerequisites to face your drive challenges.

The gearmotors are powered by MOVITRAC® frequency inverters, MOVIDRIVE® inverters and MOVIAXIS® multi-axis servo inverters, a combination that blends perfectly with the existing SEW-EURODRIVE program. As in the case for mechanical systems, the development, production and assembly is also carried out completely by SEW-EURODRIVE. In combination with our drive electronics, these drives will 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 provide precision and dynamics. From single-axis or multi-axis applications all the way to synchronized process sequences, servo drive systems by SEW-EURODRIVE offer a flexible and customized implementation of your application.

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 hybrid cables have been designed specifically to ensure cost-effective solutions, independent of the philosophy behind or the size of the system. The latest developments from SEW-EURODRIVE: MOVITRANS® system components for contactless energy transfer, MOVIPRO®, the decentralized drive control and MOVIFIT®, the new decentralized intelligence.

Power, quality and sturdy design combined in one standard product: With high torque levels, industrial gear units from SEW-EURODRIVE realize major movements. The modular concept will once again provide optimum adaptation of industrial gear units to meet a wide range of different applications.

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 applications in all branches of industries and applications.

1.2 Products and systems from SEW-EURODRIVE

The products and systems from SEW-EURODRIVE are divided into 4 product groups. These 4 product groups are:

1. Gearmotors and frequency inverters
2. Servo drive systems
3. Decentralized drive systems
4. Industrial gear units

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

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

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

3. Decentralized drive systems		
Decentralized drives	**Communication and installation**	**Contactless energy transfer**
• MOVIMOT® gearmotors with integrated frequency inverter • MOVIMOT® motors/brakemotors with integrated frequency inverter • MOVI-SWITCH® gearmotors with integrated switching and protection function • MOVI-SWITCH® motors/brakemotors with integrated switching and protection function • Explosion-proof MOVIMOT® and MOVI-SWITCH® gearmotors	• Fieldbus interfaces • Field distributors for decentralized installation • MOVIFIT® product range – MOVIFIT®-MC to control MOVIMOT® drives – MOVIFIT®-SC with integrated electronic motor switch – MOVIFIT®-FC with integrated frequency inverter	• MOVITRANS® system – Stationary components for energy supply – Mobile components for energy consumption – Line cables and installation material

4. Industrial gear units
• Helical gear units • Bevel-helical gear units • Planetary gear units

Products and systems covering several product groups
• Operator terminals • MOVI-PLC® drive-based control system

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
- International customer service

Visit our homepage at

→ **www.sew-eurodrive.com**

The website provides comprehensive information and services.

1.3 Additional documentation

Contents of this publication

This catalog/price catalog provides a detailed description of the following product groups from SEW-EURODRIVE:

- AC motors of the DR series
- Asynchronous servomotors of the DRL series
- AC motors of the DT56, DR63, DV250/280 series
- Options and accessories for motors

The catalog/price catalog contains the following information:

- Unit designations
- Product descriptions
- Project planning information
- Technical data
- Technical data of options and additional features
- Important information on the dimensions sheets
- Dimension sheets
- Information on brakes from SEW-EURODRIVE
- Information on prefabricated cables
- Price catalog – Prices and option pricing of options and accessories

Additional documentation

Information about motor/inverter combinations and dynamic and thermal limit characteristic curves necessary for project planning are listed in the 'AC Motors' manual. This manual contains additional content relevant for this catalog.

Content of the manual:

- Motor/inverter assignment DRL-MOVIDRIVE®
- Dynamic and thermal limit characteristic curves DRL-MOVIDRIVE®

- Motor/inverter assignment DRL-MOVIAXIS®; PWM = 4 kHz; U_{Zk} = 565 V and U_{Zk} = 750 V
- Dynamic and thermal limit characteristic curves DRL-MOVIAXIS®; PWM = 4 kHz; U_{Zk} = 565 V and U_{Zk} = 750 V

- Motor/inverter assignment DRL-MOVIAXIS®; PWM = 8 kHz; U_{Zk} = 565 V and U_{Zk} = 750 V
- Dynamic and thermal limit characteristic curves DRL-MOVIAXIS®; PWM = 8 kHz; U_{Zk} = 565 V and U_{Zk} = 750 V

Additional documentation

The following price catalogs/catalogs are available from SEW-EURODRIVE in addition to this motor catalog:

- DR gearmotors
- CMP servomotors
- Synchronous servo gearmotors

The price catalogs and catalogs offer the following information:

- Product descriptions
- Unit designations
- Project planning instructions for drives and gear units
- Visual representation of mounting positions
- Explanation on the order information
- Design and operating notes
- Important information on tables and dimension sheets
- Description of the different types
- Overview of all permitted combinations
- Selection tables for gearmotors
- Gearmotor dimension sheets
- Technical data
- Price catalog – Prices and option pricing of options and accessories

Please note that the complete range of technical documentation is available on our home page:

www.sew-eurodrive.com

1.4 Product names and trademarks

The brands and product names in this catalog are trademarks or registered trademarks of the titleholders.

1.5 Copyright

2 General Product Description

2.1 DR. series AC motors

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.

Coating

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

Surface and 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.

Air admission and accessibility

The motors / brakemotors must be mounted on the driven machine in such a way that both axially and radially there is enough space left for unimpeded air admission and for maintenance of the brake. Please also refer to the notes in the motor dimension sheets.

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 setscrew. The brake is controlled by a brake controller 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 end shield is a part of both the motor and the brake. The integrated construction of the SEW-EURODRIVE brakemotor permits particularly compact and sturdy solutions.

Inverter operation DRS/DRE/DRP motors can be combined with the proven SEW-EURODRIVE frequency inverter series MOVIDRIVE®, MOVITRAC®, MOVIFIT® and MOVIMOT®, and as of now also with MOVIPRO®.

The asynchronous DRL servomotors are operated with the inverters of the MOVIDRIVE® series and the multi-axis servo inverters of the MOVIAXIS® series.

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. Contact your sales representative to assist you in such cases.

2.2 Energy-efficient motors of the DR motor series

SEW energy-efficient motors tap the full potential

Since 2002, SEW-EURODRIVE has been using rotors with a cast copper cage for the production of energy-efficient motors.

The advantages of this innovative copper die-cast technology used for the DR motor series is beneficial to the entire motor spectrum.

The design, which is optimized in size and material, allows for combining standard motors, energy-efficient motors and premium motors in one series for the first time.

This means that using different motor types or series is a thing of the past as well as using different additional features and options.

In view of existing and foreseeable national and international legislation and regulations, the DR motors have been developed and designed as a modular energy saving system. They apply all the advantages of a modular system with re-usage and multiple usage of parts to achieve the required efficiency levels safely and easily.

Voluntary agreement

CEMEP, the association of European electric motor manufacturers, has reached an agreement with the European Commission's General Directorate for Energy that all 2 and 4-pole low-voltage AC motors from 1 to 100 kW will be classified on the basis of their efficiency, and that this classification will be identified on the nameplate and in catalogs. The classification distinguishes between EFF3, EFF2 and EFF1 classes.

EFF3 refers to motors without any particular efficiency requirement. EFF2 indicates improved efficiency motors and EFF1 is for high-efficiency motors.

Since 1997, SEW-EURODRIVE has participated in creating the voluntary agreement. We actively advocated an extension of the voluntary agreement in 2005, and we countersigned the agreement in 2006.

The efficiency values are determined according to the method described in IEC 60034 T2 (1972), assuming 0.5 % additional losses.

EFF2

The DRS AC motors of sizes 80M to 225MC meet the requirements of efficiency class EFF2.

EFF1

The DRE AC motors of sizes 90M to 225MC meet the requirements of efficiency class EFF1.

Premium

The voluntary agreement from 1998 does not include any premium class motors yet. The 4-pole DRP AC motors of sizes 90M to 225MC surpass the requirements of efficiency class EFF1 significantly.

This means they are energy-efficient motors of the Premium efficiency class.

The European manufacturers of asynchronous AC motors agreed to stop labeling the motors according to the Voluntary Agreement in spring 2009, and to classify them instead according to IEC 60034-30 with IE1, IE2 and IE3.

EuP directive

The European Commission enacted a directive in 2005 which contains regulations concerning the permitted energy consumption of products. Lot 11 of the directive 2005/32/EC - Energy Using Products - also includes asynchronous AC motors.

After the publication of the results of a study by order of the EU commission about the best possible design of asynchronous AC motors, implementing regulations were drawn up in winter 2008/2009 in Brussels.

They prohibit the sale of motors with standard efficiency levels and stipulate a minimum efficiency equivalent to IE2 as of June 16, 2011. Two more stages for increasing the minimum efficiency levels of asynchronous AC motors to the Premium level were determined as well.

As of January 2015, motors with a power rating of 7.5 kW and higher will have to meet level IE3, and as of January 1, 2017, motors with a power rating of 0.75 kW and higher must meet level IE3 in supply system operation. Motors of class IE2 operated on a frequency inverter are exempt from this.

The implementing regulation for the EuP directive refers to the new parts of IEC 60034. In part T30 (see below), the international classification and minimum efficiency values are described. The new T2-1 part regulates the method for determining the numerical value of the efficiency.

The DRE and DRP energy-efficiency motors comply with the specifications and values derived from IEC 60034 2-1 and -30.

The motors are no longer labeled with the EFF1 logo.

IEC 60034 T2-1 (2007)

Part 2-1 of IEC 60034 still describes the measuring method for determining the efficiency of an asynchronous AC motor.

What is new in part 2-1 is how additional losses are determined. The across-the-board approach of 0.5% is no longer used. A power-based value of 3.5% for small power ratings down to 0.5% for large motors has replaced it.

These numbers seem to indicate that the motor performance has worsened, even though only the across-the-board proportion was changed. No motor component was modified and the energy consumption is still the same.

IEC 60034 T30

After different standards have coexisted for years, part 30 of IEC 60034 now constitutes an internationally uniform efficiency classification.

Similar to the IP label for the degree of protection, this classification will be based on IE. The abbreviation IE stands for "International Efficiency".

Currently, there are three classes:

- IE1= Standard Efficiency = EFF2
- IE2= High Efficiency = EFF1
- IE3= Premium Efficiency

Minimum efficiency levels are defined for classes IE1, IE2 and IE3 at 50 Hz and at 60 Hz, 2-, 4- and 6-pole, in the power range 0.75 kW to 375 kW. This is the first time such a standard is available for consumers, manufacturers and legislature.

The values for the efficiency levels in accordance with IEC 60034-30 are listed in the technical data overview for DRS, DRE or DRP motors (see page 44 ff).

MEPS 2006

The minimum efficiency (MESP) stipulated by law both in Australia and New Zealand has come into effect on April 1, 2006 in Australia and on June 1, 2006 in New Zealand.

It regulates numerical values and measuring methods for the efficiency of 2-, 4-, 6- and 8-pole motors from 0.75 kW (1 hp) to 185 kW (250 hp).

There are no regulations up to 0.55 kW; the DRS motors up to this power rating are therefore permitted.

For 0.75 kW and higher, the specified efficiency values correspond to those of the European EFF1 motors.

The DRE motors and the advanced DRP motors meet the legal requirements and have been approved by the authorization agency.

Indivisible gearmotors are exempt from the regulations. 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 DRS design can therefore be supplied in line with the regulations.

For an overview of permitted motors on the Internet, go to http://www.energyrating.gov.au/appsearch/motors.asp and select SEW-EURODRIVE.

USA, Canada

Registering AC motors with UL (Underwriters Laboratories) offers advantages for the US-American market, since this ensures a lower fire insurance premium.

For the Canadian market, a CSA (Canadian Standard Association) approval is mandatory.

The motors of the DR series have the following approvals:

- UL (as recognized component UR) and
- CSA.

DRS motors

This means the following designs of 4-pole DRS motors can be supplied to the USA and Canada.

Motor design	USA	Canada
IEC foot-mounted motors (IM B3 and similar)	0.37 kW - 3.7 kW (0.5 hp - 5 hp)	0.37 kW - 3.7 kW (0.5 hp - 5 hp)
IEC flange-mounted motors (IM B5 and similar)	0.37 kW - 55 kW (0.5 hp - 75 hp)	0.37 kW - 3.7 kW (0.5 hp - 5 hp)
Gearmotors	0.37 kW - 55 kW (0.5 hp - 75 hp)	0.37 kW - 3.7 kW (0.5 hp - 5 hp)
	DRS motors in foot-mounted design from 0.75 kW – 3.7 kW (1 hp – 5 hp) are in NEMA design C and therefore exempt from the energy saving regulations.	

DRE and DRP motors

The energy-efficient motor approval for the 4-pole DRE and DRP motors for the USA and Canada has been granted.

Motor design	USA	Canada
IEC foot-mounted motors (IM B3 and similar)	Mandatory according to EPAct 1992 DRE: 4 kW - 45 kW (5.5 hp - 60 hp) DRP: 4 kW - 37 kW (5.5 hp - 50 hp)	DRE: 4 kW - 45 kW (5.5 hp - 60 hp) DRP: 4 kW - 37 kW (5.5 hp - 50 hp)
IEC flange-mounted motors (IM B5 and similar)	Not mandatory, possible for: DRE: 0.75 kW - 45 kW (1 hp - 60 hp) DRP: 0.75 kW - 37 kW (1 hp - 50 hp)	DRE: 4 kW - 45 kW (5.5 hp - 60 hp) DRP: 4 kW - 37 kW (5.5 hp - 50 hp)
Gearmotors	Not mandatory, possible for: DRE: 0.75 kW - 45 kW (1 hp - 60 hp) DRP: 0.75 kW - 37 kW (1 hp - 50 hp)	DRE: 4 kW - 45 kW (5.5 hp - 60 hp) DRP: 4 kW - 37 kW (5.5 hp - 50 hp)
	Foot-mounted DRE/DRP motors from 0.75 kW to 3.7 kW (1 hp – 5 hp) are voluntary.	

The regulations will be tightened

- on December 19, 2010 in the USA
- on January 1, 2011 in Canada.

This catalog/price catalog only contains the data tables of 50 Hz motors. Please contact your SEW-EURODRIVE representative for additional information.

Brazil

In Brazil, new energy efficiency regulations will take effect on December 8, 2009.

Until then, all DRS motors can be supplied. As of December 2009, delivered motors with power ratings of 0.75 kW (1 CV) and higher must have an improved efficiency. The DRE motors meet these requirements.

This catalog/price catalog only contains the data tables of 50 Hz motors. Please contact your SEW-EURODRIVE representative for additional information.

South Korea

In South Korea, the energy saving regulation comes into effect on January 1, 2010.

As of this date, delivered motors with power ratings of 0.75 kW (1 hp) and higher must have an improved efficiency. The DRE motors meet these requirements.

As the motors must be labeled accordingly, we ask you to specify this when ordering DRE motors for delivery to South Korea.

This catalog only contains the data tables of 50 Hz motors. Please contact your SEW-EURODRIVE representative for additional information.

People's Republic of China

Asynchronous AC motors delivered to China must comply with minimum efficiency regulation that became effective on January 18, 2008.

Until July 1, 20011, a motor of class EFF2/IE1 is sufficient. After that, the motor must be in class EFF1/IE2.

As the motors must be labeled accordingly, we ask you to specify this when ordering DRE motors for delivery to China.

Approval of the DR motors is pending. Please contact your SEW-EURODRIVE representative for additional information.

2.3 Asynchronous servomotors of the DRL series

Asynchronous servomotors are the link between the classical asynchronous AC motors for supply system and inverter operation and the highly dynamic synchronous servomotors with permanent magnets.

DRL motors

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

In its basic variant, the drive package always contains

- Encoder, sine signals and electronic nameplate,
- Thermal motor protection
- Dynamics package
- Various connection options
- Winding optimized with respect to speed

Depending on the application· and requirements, the following elements can be added:

- Forced cooling fan
- Connection via plug connectors instead of terminals
- Temperature sensing
- And many more

Alternatives can be selected instead of the elements of the basic variant, e.g. an absolute encoder instead of the sine encoder.

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 a higher current and theoretically a greater torque as well. In this case, the mechanical resistance of the motor against the overload, which might reach or exceed the permitted limit values, must be checked.

As a rule, the synchronous servomotors and the corresponding inverters are designed for a high short-time overload. 400% of the rated torque can usually be reached and are permitted.

The mechanical design of asynchronous servomotors of the DRL series 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.

SEW-EURODRIVE offers the DRL motors in two dynamics packages:

Package	Overload capacity to rated torque
Dynamics 1 (D1)	190 % - 220 %
Dynamics 2 (D2)	300 % - 350 %

The nameplate of the motor specifies the respective dynamics package.

Speeds

SEW-EURODRIVE offers the DRL servomotors with 4 rated speeds:

- 1200 rpm
- 1700 rpm
- 2100 rpm
- 3000 rpm

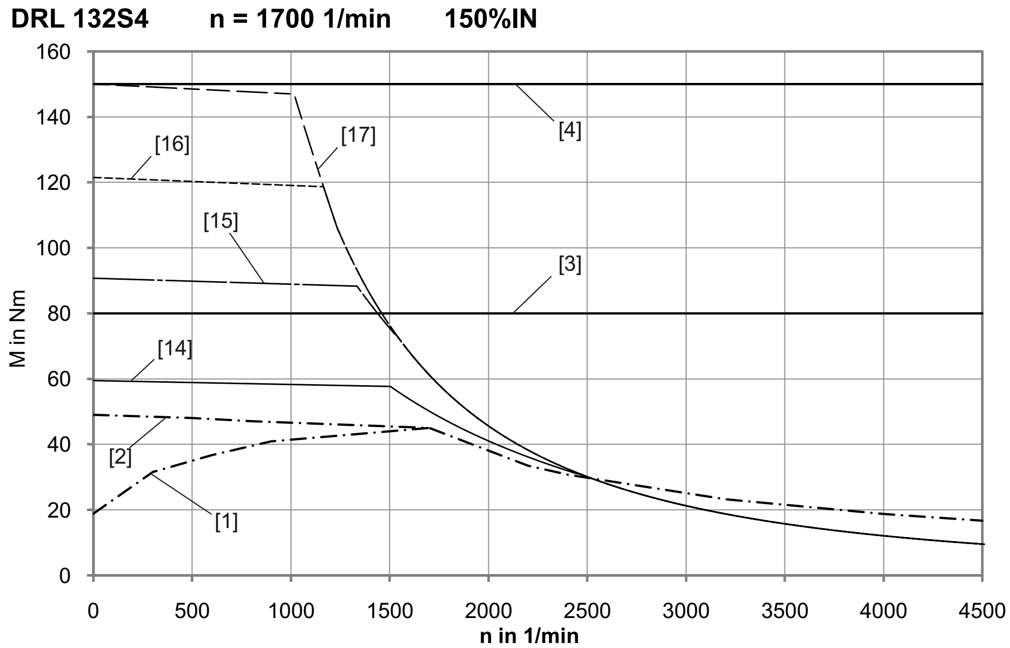
In inverter operation, field weakening begins at the rated speed.

Inverter combinations

The DRL motors are optimally adapted to operation on MOVIDRIVE® inverters and MOVIAXIS® multi-axis servo inverters.

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.

Sample selection diagram for the MOVIDRIVE® inverter (dynamic and thermal limit characteristic curve):



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

Startup

Startup of DRL motors on the MOVIDRIVE® inverter is particularly user-friendly with encoders that have an electronic nameplate.

The nameplate of the following encoders contains all drive-relevant data that is uploaded from the encoder to the inverter before the startup procedure.

- Incremental encoders ES7S, EG7S
- Absolute encoders AS7W, AG7W.

2.4 Corrosion and surface protection

General information

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

The protective measures comprise two groups:

- KS corrosion protection
- OS surface protection

For motors, optimum protection is offered by a combination of corrosion protection KS and surface protection OS.

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

KS corrosion protection

Corrosion protection KS 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.
- A top coating is applied to various motor parts.
- The flange contact surfaces and shaft ends are treated with a temporary anti-corrosion agent.
- Additional measures for brakemotors.

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

TIP

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

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

OS surface protection

In addition to standard surface protection, motors and gear units also available with surface protection OS1 to OS4. The special procedure 'Z' can also be performed in addition. The special procedure "Z" means that large surface recesses are sprayed with a rubber filling prior to painting.

Surface protection	Layers		Regular coat thickness [µm]	Suitable for
	Variant 1[1)]	Variant 2[1)]		
Standard	• 1 x dip primer • 1 x one-component top coat		70	• Normal ambient conditions • Relative humidity below 90% • Max. surface temperature 120°C • Corrosivity category C1[2)]
OS1	• 1 x dip primer • 1 × two-component base coat • 1 × two-component top coat	• 1 x dip primer • 1 × two-component high-solid top coat	120 - 180	• Low environmental impact • Relative humidity max. 95% • Max. surface temperature 120°C • Corrosivity category C2[2)]
OS2	• 1 x dip primer • 1 × two-component high-solid base coat • 1 × two-component base coat • 1 × two-component top coat	• 1 x dip primer • 1 × two-component high-solid base coat • 1 × two-component high-solid top coat	160 - 250	• Medium environmental impact • Relative humidity up to 100% • Max. surface temperature 120°C • Corrosivity category C3[2)]
OS3	• 1 x dip primer • 1 × two-component high-solid base coat • 2 × two-component base coat • 1 × two-component top coat	• 1 x dip primer • 1 × two-component high-solid base coat • 1 × two-component base coat • 1 × two-component high-solid top coat	210 - 320	• High environmental impact • Relative humidity up to 100% • Max. surface temperature 120°C • Corrosivity category C4[2)]
OS4	• 1 x dip primer • 2 × two-component epoxy base coat • 2 × two-component top coat	• 1 x dip primer • 2 × two-component epoxy base coat • 1 × two-component high-solid top coat	260 - 380	• Very high environmental impact • Relative humidity up to 100% • Max. surface temperature 120°C • Corrosivity category C5-1[2)]

1) The variant used currently depends on the color of the top coating.

2) In accordance with DIN EN ISO 12944-2

2.5 Operating temperatures

The motors of the DR series are designed for use in a temperature range from -20 °C to +40 °C.

Contact SEW-EURODRIVE if the motors are operated outside this temperature range!

2.6 The motors at a glance

DR. motors, 50 Hz, 2-pole

Motor type	DRS			DRE			DRP			
	P_N [kW] M_N[Nm]	n_N [rpm]	IE class	P_N [kW] M_N[Nm]	n_N [rpm]	IE class	P_N [kW] M_N[Nm]	n_N [rpm]	IE class	J_{Mot} [10^{-4} kgm^2]
DR.71M2	0.55 1.87	2810	-	-	-	-	-	-	-	7.1
DR.80S2	0.75 2.55	2800	IE1	-	-	-	-	-	-	14.9
DR.80M2	1.1 3.7	2840	IE1	0.75 2.5	2890	IE2	0.75 4.95	2890	IE3	21.5
DR.90M2	1.5 5.1	2830	IE1	1.1 3.65	2870	IE2	1.1 3.95	2870	IE3	35.5
	-	-	-	1.5 5.1	2830	IE2	-	-	-	
DR.90L2	2.2 7.4	2820	IE1	-	-	-	-	-	-	43.5
DR.100M2	3 10.1	2820	IE1	2.2 7.3	2880	IE2	1.5 5.1	2830	IE3	56
	-	-	-	-	-	-	2.2 7.3	2880	IE3	
DR.100L2	-	-	-	3 10.1	2850	IE2	-	-	-	68
DR.100LC2	4 13.2	2900	IE1	-	-	-	3 9.8	2920	IE3	90
DR.112M2	4 13.2	2900	IE1	4 13.2	2900	IE2	3 9.8	2920	IE3	113
DR.132S2	5.5 18.2	2890	IE1	5.5 18.2	2890	IE2	4 13.1	2910	IE3	146
DR.132M2	7.5 24.7	2900	IE1	7.5 24.3	2920	IE2	-	-	-	255
	9.2 30.4		IE1	-	-	-	-	-	-	
DR.132MC2	-	-	-	9.2 30.4	2900	IE2	5.5 17.8	2950	IE3	340

DR. motors, 50 Hz, 4-pole

Motor type	DRS			DRE			DRP			
	P_N [kW] M_N[Nm]	n_N [rpm]	IE class	P_N [kW] M_N[Nm]	n_N [rpm]	IE class	P_N [kW] M_N[Nm]	n_N [rpm]	IE class	J_{Mot} [10^{-4} kgm^2]
DR.56M4	See technical data of DT56M4 page 397			-	-	-	-	-	-	See page 397
DR.56L4	See technical data of DT56L4 page 397			-	-	-	-	-	-	
DR.63S4	See technical data of DR63S4 page 397			-	-	-	-	-	-	
DR.63M4	See technical data of DR63M4 page 397			-	-	-	-	-	-	
DR.63L4	See technical data of DR63L4 page 397			-	-	-	-	-	-	
DR.71S4	0.37 2.56	1380	-	-	-	-	-	-	-	4.9
DR.71M4	0.55 3.81	1380	-	-	-	-	-	-	-	7.1
DR.80S4	0.75 5.12	1400	IE1	-	-	-	-	-	-	14.9
DR.80M4	1.1 7.44	1410	IE1	0.75 4.99	1435	IE2	-	-	-	21.5
DR.90M4	1.5 10.3	1395	IE1	1.1 7.4	1420	IE2	0.75 4.94	1450	IE3	35.5
DR.90L4	2.2 15	1400	IE1	1.5 10	1430	IE2	1.1 7.29	1440	IE3	43.5
DR.100M4	3 20.5	1400	IE1	2.2 14.7	1425	IE2	1.5 9.95	1440	IE3	56
DR.100L4	-	-	-	-	-	-	2.2 14.6	1440	IE3	68
DR.100LC4	4 26.4	1445	IE1	3 19.7	1455	IE2	-	-	-	90
DR.112M4	4 26.6	1435	IE1	3 19.7	1455	IE2	3 19.7	1455	IE3	146
DR.132S4	5.5 36.3	1445	IE1	4.0 26.2	1460	IE2	-	-	-	190
DR.132M4	7.5 49.6	1445	IE1	5.5 36.1	1455	IE2	4 26.1	1465	IE3	255
DR.132MC4	9.2 60	1465	IE1	7.5 48.7	1470	IE2	5.5 35.6	1475	IE3	340
DR.160S4	9.2 60.2	1460	IE1	7.5 48.9	1465	IE2	5.5 35.6	1475	IE3	370
DR.160M4	11 71.9	1460	IE1	9.2 59.8	1470	IE2	7.5 48.7	1470	IE3	450
DR.160MC4	15 97.4	1465	IE1	11 71.2	1475	IE2	9.2 59.6	1475	IE3	590
DR.180S4	15 98.1	1460	IE1	11 71.5	1470	IE2	9.2 59.6	1475	IE3	900
DR.180M4	18.5 121	1465	IE1	15 97.4	1470	IE2	11 71.2	1475	IE3	1110
DR.180L4	22 143	1465	IE1	18.5 120	1470	IE2	15 97.1	1475	IE3	1300
DR.180LC4	30 195	1470	IE1	22 142	1480	IE2	18.5 119	1480	IE3	1680
DR.200L4	30 194	1475	IE1	30 194	1475	IE2	22 142	1482	IE3	2360

Table continued on next page.

Motor type	DRS			DRE			DRP			
	P_N [kW] M_N[Nm]	n_N [rpm]	IE class	P_N [kW] M_N[Nm]	n_N [rpm]	IE class	P_N [kW] M_N[Nm]	n_N [rpm]	IE class	J_{Mot} [10^{-4} kgm^2]
DR.225S4	37 240	1475	IE1	37 239	1477	IE2	30 194	1480	IE3	2930
DR.225M4	45 290	1480	IE1	45 291	1478	IE2	37 238	1482	IE3	3430
DR.225MC4	55 355	1480	IE1	-	-	-	-	-	-	4330
DR.250M4	See technical data of DV250M4 page 397			See technical data of DVE250M4 page 398			-	-	-	
DR.280S4	See technical data of DV280S4 page 397			See technical data of DVE280S4 page 398			-	-	-	See page 397
DR.280M4	See technical data of DV280M4 page 397			See technical data of DVE280M4 page 398			-	-	-	
DR.315K4	110 709	1482	IE1	110 708	1483	IE2	90 579	1484	IE3	18400
DR.315S4	132 848	1486	IE1	132 848	1487	IE2	110 707	1486	IE3	22500
DR.315M4	160 1030	1483	IE1	160 1030	1484	IE2	132 847	1488	IE3	27900
DR.315L4	200 1290	1481	IE1	200 1289	1482	IE2	160 1027	1488	IE3	31900

DR. motors, 50 Hz, 6-pole

Motor type	DRS			DRE			DRP			
	P_N [kW] M_N[Nm]	n_N [rpm]	IE class	P_N [kW] M_N[Nm]	n_N [rpm]	IE class	P_N [kW] M_N[Nm]	n_N [rpm]	IE class	J_{Mot} [10^{-4} kgm^2]
DR.71S6	0.25 2.65	895	-	-	-	-	-	-	-	4.9
DR.71M6	0.37 3.9	905	-	-	-	-	-	-	-	7.1
DR.80S6	0.55 5.7	915	-	-	-	-	-	-	-	14.9
DR.80M6	0.75 7.8	915	IE1	-	-	-	-	-	-	21.5
DR.90L6	1.1 11.3	930	IE1	0.75 7.6	940	IE2	0.75 7.6	940	IE3	43.5
DR.100M6	1.5 15.5	925	IE1	1.1 11.2	940	IE2	-	-	-	56
DR.100L6	-	-	-	1.5 15.2	940	IE2	1.1 11.1	950	IE3	68
DR.112M6	2.2 22	955	IE1	2.2 22	955	IE2	1.5 14.8	965	IE3	146
DR.112M6	3 30.5	945	IE1	-	-	-	-	-	-	146
DR.132S6	4 40.5	940	IE1	3 30	955	IE2	2.2 22	965	IE3	190
DR.132M6	-	-	-	4 40	960	IE2	3 29.5	970	IE3	255
DR.160S6	5.5 55	960	IE1	-	-	-	-	-	-	520
DR.160M6	7.5 75	955	IE1	5.5 54	965	IE2	4 39	975	IE3	630

Pole-changing motors

2

DRS..8/2

Motor type DRS..	P_N [kW]	n_N [rpm]	cosφ	J_{Mot} [10^{-4} kgm^2]
DRS71S8/2	0.06 0.25	685 2870	0.62 0.69	4.9
DRS71M8/2	0.1 0.4	670 2850	0.62 0.79	7.1
DRS80S8/2	0.15 0.6	655 2680	0.59 0.89	14.9
DRS80M8/2	0.22 0.9	680 2780	0.6 0.8	21.4
DRS90M8/2	0.3 1.3	710 2880	0.55 0.8	35.4
DRS90L8/2	0.45 1.8	710 2890	0.55 0.81	43.7
DRS100M8/2	0.6 2.4	715 2900	0.55 0.83	56
DRS112M8/2	0.8 3	710 2730	0.53 0.83	146
DRS132M8/2	1.1 4.6	710 2785	0.56 0.91	253

DRS..8/4

Motor type DRS..	P_N [kW]	n_N [rpm]	cosφ	J_{Mot} [10^{-4} kgm^2]
DRS112M8/4	1,2 2,2	675 1390	0,58 0,87	146
DRS132S8/4	1,6 3,3	680 1385	0,55 0,87	190
DRS132M8/4	2,1 4,2	680 1390	0,59 0,87	253
DRS160S8/4	2,7 5,5	725 1470	0,54 0,84	370
DRS160M8/4	3,8 7,5	730 1470	0,54 0,84	448
DRS180S8/4	5,5 10	730 1465	0,55 0,87	895
DRS180L8/4	7,5 15	735 1470	0,55 0,87	1300
DRS200L8/4	11 22	735 1475	0,52 0,85	2360
DRS225S8/4	14 28	735 1475	0,52 0,85	2930
DRS225M8/4	18 34	740 1475	0,53 0,86	3430

DRL motors

Motor type	M_N[Nm]				M_{pk} (D1) [Nm]	M_{pk} (D2) [Nm]	J_{Mot} [10^{-4} kgm^2]
	1200 [rpm]	1700 [rpm]	2100 [rpm]	3000 [rpm]			
DRL71S4	2.7	2.7	2.6	2.5	5	8.5	4.9
DRL71M4	4.0	4.0	3.8	3.6	7	14	7.1
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
DRL180M4	135	135	130	105	250	430	1110
DRL180L4	165	165	160	130	320	520	1300
DRL180LC4	175	175	170	140	420	600	1680
DRL225S4	250	245	235	195	520	770	2930
DRL225MC4	290	280	265	220	770	1100	4330

3 General Project Planning Notes

3.1 Standards and regulations

Conformity with standards

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

- 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
  Rotating electrical machines, classification of efficiency levels IE1, IE2, IE3.
- EN 60529, IEC60034-5, EN60034-5
  IP degrees of protection for enclosures.
- IEC 60072
  Dimensions and performance of rotating electrical machinery.
- EN 50262
  Metric threads of cable glands.
- EN 50347
  Standardized dimensions and power ranges.

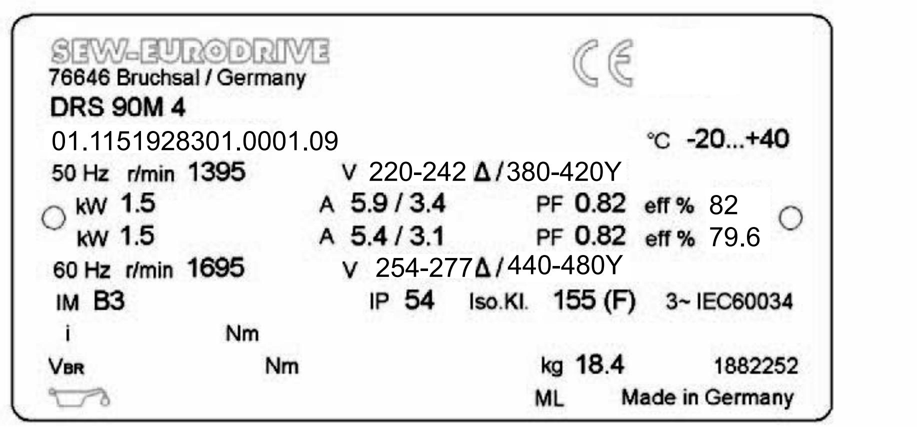
Rated data

The specific data of an asynchronous AC motor (AC squirrel cage motor) are:

- Size
- Rated power
- Cyclic duration factor
- Rated speed
- Rated current
- Rated voltage
- Power factor cos φ
- Degree of protection
- Thermal class
- efficiency class

This data is given on the nameplate of the motor, see page 28. In accordance with IEC 60034 (EN 60034), the nameplate data apply to a maximum ambient temperature of 40 °C and a maximum altitude of 1000 m above sea level.

Example: DR motor nameplate.



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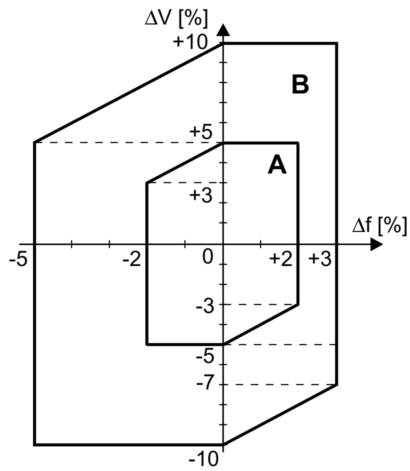
Tolerances

According to 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	$P_N \leq 50$ kW $P_N > 50$ kW	$-0.15 \times (1-\eta)$ $-0.1 \times (1-\eta)$
Power factor cos φ		$-\frac{1 - \cos\varphi}{6}$
Slip	$P_N < 1$ kW $P_N \geq 1$ kW	± 30 % ± 20 %
Starting current		+ 20 %
Tightening torque		- 15 % - + 25 %
Breakdown torque		- 10 %
Mass moment of inertia		± 10 %

Tolerance A, tolerance B

Tolerances A and B describe the permitted range within which the frequency and voltage are allowed to deviate from their respective rated points. The origin identified with "0" indicates the respective rated points for frequency and voltage.



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

In the tolerance range B, the motor must be able to deliver the rated torque but not in continuous duty. The increase in temperature and deviations from the rated data are higher than in tolerance range A. Avoid frequent operation of the motor at the 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 insufficiently large motor cable. This is particularly true for motor startup where the starting current amounts to a multiple of the rated current.

3.2 Switching and protective equipment of the DR motor series

EMC measures

AC motors, AC brakemotors and MOVIMOT® drives from SEW-EURODRIVE are components for installation in machinery and systems. The designer of the machine or system is responsible for complying with the EMC directive 2004/108/EC. Please refer to the publication "Drive Engineering - Practical Implementation, EMC in Drive Engineering" for detailed information about this topic. For specific information on MOVIMOT® drives, refer to the "Drive System for Decentralized Installation" system manual.

Supply system 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 supply system operation.

Switching operation

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

Inverter operation

For inverter operation, refer to the installation and EMC instructions provided by the inverter manufacturer.

Please also note the information in section "Operation on inverters" on page 100 ff and the following project planning guidelines:

Brakemotors 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.

Connecting tachometers to inverters

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.
- Install signal cables separately from power cables or brake cables (min. distance 200 mm).

Please also note the information in section "Operation on inverters" on page 100 ff .

Connecting positive temperature coefficient 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.

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 include fuses or motor circuit breakers.

Temperature dependent protection devices are PTC thermistors or bimetallic switches (thermostats) in the winding. PTC thermistors or bimetallic switches respond when the maximum permitted winding temperature is reached. The advantage is that temperatures are measures where they actually occur.

Motor circuit breakers

Motor circuit breakers offer adequate protection against overload in standard operation with a low switching frequency, brief start-ups and starting currents that are not excessive. The motor circuit breaker is set to the rated motor current.

Motor circuit breakers are not adequate as the sole means of protection given switching operation with a high switching frequency (> 60 per h) and for high inertia starting. In these cases, SEW-EURODRIVE recommends to use positive temperature coefficient thermistors TF in addition.

TF PTC thermistor

Three positive temperature coefficient thermistors **TF** (PTC, characteristic curve according to DIN 44080) are connected in series in the motor and connected from the terminal box to the TF/TH input of the inverter or to a trip switch in the control cabinet. Motor protection with positive temperature coefficient (PTC) thermistors 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 supply systems. A motor circuit breaker is usually installed in addition to the TF. SEW-EURODRIVE recommends always using motors equipped with TF for inverter operation.

TH bi-metallic switch

Three bimetallic switches **TH**, connected in series in the motor, are looped directly into the motor monitoring circuit from the terminal box.

Trigger temperature

Thermal motor protection is realized by TF temperature sensors or TH bimetallic switches built into the end winding of the motors. The trigger temperature is slightly lower than the limit value of the thermal classification to achieve maximum motor protection. Temperature sensor TF and bimetallic switch TH are available with the following trigger temperatures:

Thermal class	Trigger temperature (rated response temperature with TF) (Rated switching temperature for TH)	
	DRS, DRE, DRP	DRL
155 (F)	150 °C	150 °C
180 (H)	170 °C	-

3

KTY temperature sensor

KTY temperature sensors are used to determine the temperature at the installation location and is usually measured in the winding.

For modern, highly dynamic inverter drives, the temperature of the motor model stored in the inverter (procedure similar to CFC) is corrected to achieve higher dynamic properties. In this case, it is necessary to detect the winding temperature, e.g. with KTY sensors.

Fuses

Fuses do not protect the motor from overload. Their only purpose is short-circuit protection.

Various protection equipment

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

○ = No thermal protection ◑ = Limited motor protection (requires verification) ● = Thermal protection is given	Temperature sensor (TF)	Bimetallic switch (TH)	Protective circuit breaker
Continuous operation at the load limit, slight overload permanently present (max. 200 % I_N)	●	●	●
Heavy start	●	◑	◑
Blocked motor	◑	◑	◑
Switching operation (number of cycles too high)	●	●	◑
Phase failure	●	●	●
Voltage and frequency deviation	●	●	●
Forced cooling fan failure	●	●	○

Secure switching of inductances

Note the following notes for switching of inductances:

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. 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, we recommend installing suppressor circuits on the switching devices.

4 Unit designations

4.1 Unit designations for the DR. motor series

AC motor series

Designation	
DRS..	Motor, Standard efficiency IE1, 50 Hz
DRE..	Energy-efficient motor, High efficiency IE2, 50 Hz
DRP..	Energy-efficient motor, Premium efficiency IE3, 50 Hz
DRL..	Asynchronous servomotor
DRK..[1)]	Single-phase operation with running capacitor
DRM..[1)]	Torque motor: Torque motor for operation at speed n = 0
71 - 315	Sizes: 71 / 80 / 90 / 100 / 112 / 132 / 160 / 180 / 200 / 225 / 315
K - L	Lengths: K= very short / S = short / M = medium / L = long MC/LC = Rotors with copper cage
2, 4, 6, 8/2, 8/4	Number of poles

1) In preparation

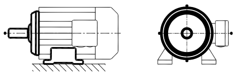
Unit designation DR: Output variants

Designation	Option
/FI	IEC foot-mounted motor with specification of shaft height
/FG	7 Series integral motor, as stand-alone motor
/FF	IEC flange-mounted motor with bore holes
/FT	IEC flange motor with threads
/FL	General flange-mounted motor (other than IEC)
/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

Output types of the motors

Foot-mounted motor

Unit designation /FI



SEW motor with IEC feet and A endshield

Description

The /FI foot-mounted motor is designed as a motor with a shaft end and feet to IEC specifications. The shaft and feet dimensions for 4-pole motors are based on the power rating of the DRS motor.

Different feet and shaft dimensions are available for motors with efficiency rating requirements (DRE, DRP).

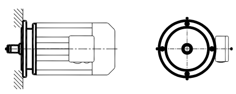
According to EN50347, each power rating is assigned the corresponding shaft height. Some DR motors allow for implementing a higher power rating in a smaller size (e.g. DRS100LC4 with 4 kW).

If an application requires the EN compliant shaft height, the motor can be equipped with another foot height instead.

If the power assigned to the motor differs from EN50347, the shaft height will be indicated in the unit designation. For example: DRS100LC4/FI112M.

7 series gearmotor

Unit designation /FG



Motors for gear unit mounting

Description

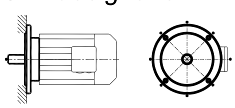
Motors sold as stand-alone motor with preparation for mounting to a gear unit are assigned the designation /FG. This designation is eliminated if the motor is mounted together with the gear unit (as conventional gearmotor).

The /FG flange mounted motor is the gear unit mounting version of the motor. The flange dimensions are implemented according to the SEW work standards for gear unit mounting.

The pinion shaft end is dimensioned according to the motor power rating. It is therefore possible that DRS, DRE and DRP motors have different pinion shaft ends within one motor size and length.

IEC flange-mounted motor with boreholes

Unit designation /FF



IEC flange-mounted motor with bores

Description

The design /FF is a variant with through bores in the flange, comparable to IEC type of construction B5.

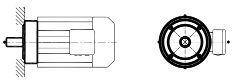
The flange dimensions for 4-pole motors with Standard Efficiency (DRS), High Efficiency (DRE) or Premium Efficiency (DRP) are based on the power rating according to the standard.

Flange combinations deviating from the standard are given the unit designation /FL (see below).

If the motor size deviates from the standard, the flange size is added accordingly: e.g.: DRS90L4/FF100M

IEC flange-mounted motor with threads

Unit designation /FT



IEC flange motor with threads

Description

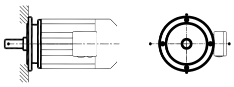
This type is for example comparable with the IEC type B14.

The flange dimensions for shaft dimensions of 4-pole motors with standard efficiency level (DRS) are designed according to the standard EN 50 347 2001.

Other shaft dimensions are available for energy-efficient motors or for power enhanced motors with copper rotor.

Flange-mounted motor (deviating from IEC)

Unit designation /FL



Flange-mounted motor with dimensions deviating from IEC

Description

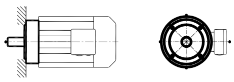
This flange-mounted motor is a motor variant deviating from IEC.

The /FL option enables the customer to choose an IEC flange that does not correspond to the power assigned to the motor (see IEC standard flange assignment /FF).

The shaft collar is not necessarily at the same level as the flange bolt surface.

"C-face" flange-mounted motor

Unit designation /FC



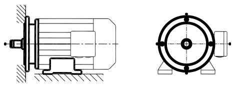
Description

The "C-face" flange-mounted motor is a motor type with tapped holes in the flanged end shield similar to an FT type (B14).

The flange and shaft dimensions for 4-pole DRS motors with standard efficiency level are designed in compliance with the NEMA standard (in inches).

7 series gearmotor with feet

Unit designation /FM



Integral motor on 7 series with feet

Only motors sold as stand-alone motors with preparation for being mounted to a gear unit are assigned the designation /FM. This designation is eliminated if the motor is mounted together with the gear unit.

Description

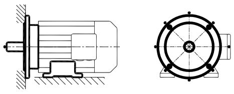
/FM is the gear unit mounting version of the motor with feet. It is the combination of the options /FG and /FI.

The flange dimensions are implemented according to the SEW work standards for gear unit mounting.

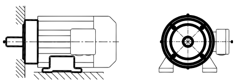
The pinion shaft end is dimensioned according to the motor power rating. It is therefore possible that DRS, DRE and DRP motors have different pinion shaft ends within one motor size and length.

4

Foot-/flange-mounted motor

Unit designation	/FE
	Motor with flange, bores and feet according to IEC
Description	The foot- and flange-mounted motor is an IEC variant of the motor and is, for example, comparable with the IEC type B35. The foot and flange dimensions for 4-pole motors with Standard Efficiency (DRS), High Efficiency (DRE) or Premium Efficiency (DRP) are based on the power rating according to the standard.

IEC flange-mounted motor with threads and feet

Unit designation	/FY
	Motor with flange, threads and feet according to IEC
Description	The foot- and flange-mounted motor is an IEC variant of the motor and is, for example, comparable with the IEC type B34. The foot and flange dimensions for 4-pole motors with Standard Efficiency (DRS), High Efficiency (DRE) or Premium Efficiency (DRP) are based on the power rating according to the standard.

Mechanical attachments

Designation	Option
BE..	Spring-loaded brake with specification of size
HR	Manual brake release of the brake, automatic disengaging function
HF	Manual brake release, lockable
/RS	Backstop
/MSW	MOVI-SWITCH®
/MI	Motor identification module for MOVIMOT®
/MM03 - MM40	MOVIMOT®
/MO	MOVIMOT® option(s)

Temperature sensor/temperature detection

Designation	Option
/TF	Temperature sensor (positive coefficient thermistor or PTC resistor)
/TH	Thermostat (bimetallic switch)
/KY	One KTY84 - 130 sensor
/PT	One / three PT100 sensor(s)

For detailed information, refer to page 300 ff.

Encoder

Designation	Option
/ES7S /EG7S /EH7S /EV7S	Mounted speed sensor with sin/cos interface
/ES7R /EG7R /EH7R	Mounted speed sensor with TTL (RS-422) interface, V = 9 - 26 V
/EI7C	Mounted speed sensor with HTL interface
/EI76 /EI72 /EI71	Mounted speed sensor with HTL interface and 6 / 2 / 1 period(s)
/AS7W /AG7W	Mounted absolute encoder, RS-485 interface (multi-turn)
/AS7Y /AG7Y /AH7Y	Mounted absolute encoder, SSI interface (multi-turn)
/ES7A/EG7A	Mounting adapter for encoders from the SEW portfolio
/XV.A	Mounting adapter for non-SEW encoders
/XV..	Mounted non-SEW encoders

For detailed information, refer to page 285 ff.

4

Connection variants

Designation	Option
/IS	Integrated plug connector
/ASB.	HAN 10ES plug connector on terminal box with two-clamp closure (cage clamps on motor end)
/ACB.	HAN 10E plug connector on terminal box with two-clamp closure (crimp contacts on motor end)
/AMB. /ABB. /ADB. /AKB.	HAN Modular 10B plug connector on terminal box with two-clamp closure (crimp contacts on motor end)
/ASE.	HAN 10ES plug connector on terminal box with single-clamp closure (cage clamps on motor end)
/ACE.	HAN 10ES plug connector on terminal box with single-clamp closure (crimp contacts on motor end)
/AME. /ABE. /ADE. /AKE.	HAN Modular 10B plug connector on terminal box with single-clamp closure (crimp contacts on motor end)
/ASK.	HAN 10ES ECOFAST® plug connector on terminal box with single-clamp closure (cage clamp on motor end), additionally with mounting screws for optional carrier plate
/KCC	Terminal strip with cage clamps (for DR.71 - DR.132)
/KC1	C1 profile compliant connection of the DR80 overhead trolley drive (VDI guideline 3643) (for DR71, 80)

For detailed information, refer to page 305 ff.

Ventilation

Designation	Option
/V	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 the fan guard
/LF	Air filter
/LN	Low-noise fan guard (for DR.71 – 132)

For detailed information, refer to page 311 ff.

Bearing

Designation	Option
/NS	Relubrication device (for DR.315 only)
/ERF	Reinforced bearing A-side with roller bearing (for DR.315 only)
/NIB	Insulated bearing B-side (for DR.315 only)

For detailed information, refer to page 322 ff.

Condition monitoring

Designation	Option
/DUB	Diagnostic unit brake = brake monitoring
/DUV	Diagnostic unit vibration = vibration sensor

For detailed information about /DUB refer to page 281 ff, zu , and for /DUV refer to page 319 ff.

Explosion-proof motors

Designation	Option
/2GD	Motors according to 94/9/EC, category 2 (gas / dust)
/3GD	Motors according to 94/9/EC, category 3 (gas / dust)
/3D	Motors according to 94/9/EC, category 3 (dust)
/VE	Forced cooling fan for motors according to 94/9/EC, category 3 (gas / dust)

Other additional features

Designation	Option
/DH	Condensation drain hole
/RI	Reinforced winding insulation
/2W	Second shaft end on the motor/brakemotor

For detailed information, refer to page 322 ff.

4.2 Serial number

01. 1221234301. 0001. 09

- 09 – End digits of the year of manufacture (2 digits)
- 0001. – Quantity (4 digit)
- 01. – Order item (2 digits)
- 12212343 – Order number (8 digits)
- 01. – Sales organization

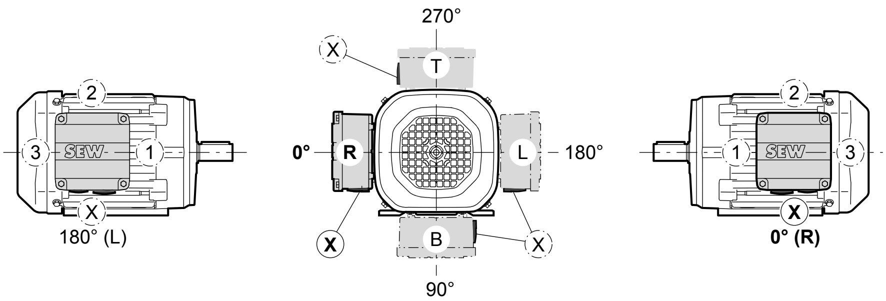
4.3 Examples for the unit designation of DR series AC motors

Motor variant	Unit designation of the motor variant									
Other additional features										
2. shaft end	-	/2W								
Reinforced winding insulation	-	/RI								
Condensation hole	-	/HD								
Explosion-proof motors										
Explosion protection	-	/2GD	/3GD	/3D						
Condition monitoring										
Brake monitoring		/DUB	/DUV							
Bearing										
Insulated bearing (only 315)	-	/NIB								
Relubrication (only 315)	-	/NS								
Higher overhung load (only 315)	-	/ERF								
Fan										
Low noise fan guard	-	/LN								
Fan guard	-	/C	/LF							
Fan	-	/Z	/AL	/U	/OL					
Forced cooling fan	-	/V	/VE							
Connection alternatives										
Connection alternatives	-	/IS	/AB..	/AC..	/AD..	/AK..	/AM..	/AS..	/KCC	/KC1
Encoders										
Built-in encoder	-	/EI7C	/EI76	/EI72	/EI71					
Encoder	-	/ES7.	/EG7.	/EH7.	/EV7.	/AS7.	/AG7.	/AH7.	/XV..	
Temperature sensor/temperature detection										
Thermal motor protection	-	/TF	/TH							
Temperatures detection	-	/KT	/PT							

Motor variant	Unit designation of the motor variant											
Mechanical attachments												
Decentralized installation	-	/MI	/MO	/MSW	/MM03	/MM05	/MM07	/MM11	/MM15	/MM22	/MM30	/MM40
Backstop	-	/RS										
Manual brake release	-	HF	HR									
Brake	-	BE05	BE1	BE2	BE5	BE11	BE20	BE30	BE32	BE120	BE122	
Output design												
Output design	**/FF**	/FG	/FM	/FI*	/FT	/FC	/FE*	/FY*	/FL	/FK*	*= shaft height	
AC motor series												
Number of poles	**4**	2	6	12	8/2	8/4						
Length	**S**	M	L	MC	LC							
Size	**71**	80	90	100	112	132	160	180	200	225	3154	
Unit designation	**S**	E	P	K	M	L						
Series	**DR**											

4.4 Mounting position designations of the motors

Position of motor terminal box and cable entry



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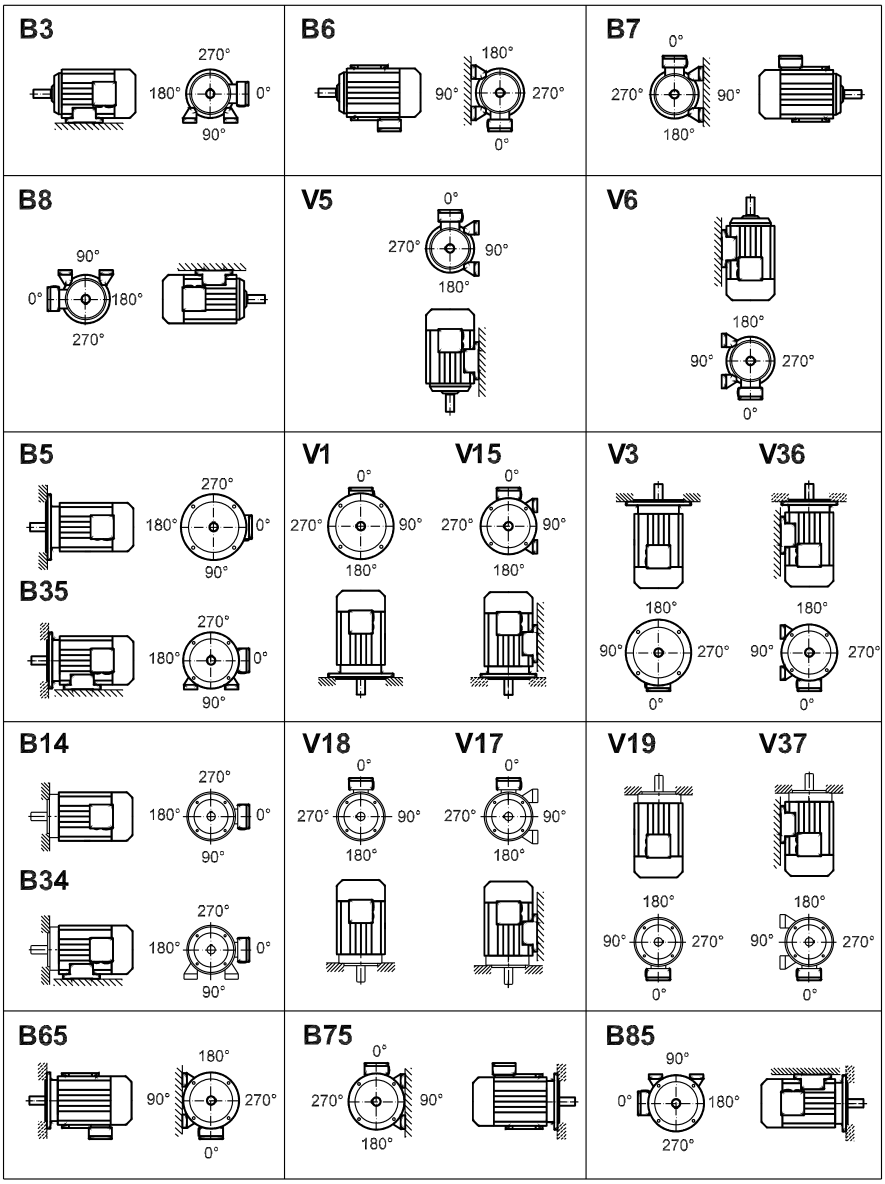
Mounting positions

Mounting positions for AC motors



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5 DR Series AC Motors/Brakemotors

5.1 Notes on the data of energy-efficient motors

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	Switching frequency for operation with BG brake controller
Z_0 BGE	Switching frequency for operation with BGE brake controller
M_B	Braking torque
m_B	Mass of the brakemotor
J_{MOT_BE}	Mass moment of inertia of the brakemotor

5.2 *Technical data of 2-pole energy-efficient motors*

DRS: 3000 rpm - S1 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 class	$\eta_{75\%}$ $\eta_{100\%}$ [%][1)]	I_A/I_N	M_A/M_N M_H/M_N	m [kg][2)]	J_{Mot} [10^{-4} kgm^2]
DRS71M2	0.55	1.87	2810	1.37	1.42	0.79	–	73.5 72.9	4.9	2.9 2.1	9.1	7.1
DRS80S2	0.75	2.55	2800	1.73	1.78	0.84	IE1	74.6 74.4	4.6	2.5 2.3	11.5	14.9
DRS80M2	1.1	3.7	2840	2.35	2.4	0.88	IE1	77.7 76.5	6	2.7 2.5	14.3	21.5
DRS90M2	1.5	5.1	2830	3.1	3.2	0.89	IE1	80 78.3	5.9	2.7 2.6	18.4	35.5
DRS90L2	2.2	7.4	2820	4.45	4.6	0.89	IE1	82.8 80.5	5.8	2.9 2.5	21.5	43.5
DRS100M2	3	10.1	2840	5.8	6	0.91	IE1	84.6 82.5	6.4	3.1 2.8	26	56
DRS100LC2	4	13.2	2900	7.8	8	0.88	IE1	85.6 84.2	7.7	2.7 2.1	31	90
DRS112M2	4	13.2	2900	7.6	7.9	0.89	IE1	85.9 84.8	6.3	2.3 2.1	41.5	113
DRS132S2	5.5	18.2	2890	10.2	10.7	0.91	IE1	87 85.5	6.5	2.3 2.1	44	146
DRS132M2	7.5	24.5	2910	13.7	14.4	0.91	IE1	87.8 86.5	7.3	2.5 2.3	60	193
DRS132M2	9.2	30.5	2900	16.9	17.6	0.89	IE1	88.8 87.2	6.9	2.5 2.5	60	193

1) Efficiency levels according to IEC 60034-2-1 Ed.1 (2007) / PLL from Residual Losses

2) Applies for foot-mounted motor (DRS.../FI..)

DRE: 3000 rpm - S1 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 class	$\eta_{75\%}$ $\eta_{100\%}$ [%][1)]	I_A/I_N	M_A/M_N M_H/M_N	m [kg][2)]	J_{Mot} [10^{-4} kgm^2]
DRE80M2	0.75	2.5	2890	1.54	1.6	0.89	IE2	79.2 79.2	7.9	3.4 3	14.3	21.5
DRE90M2	1.1	3.65	2870	2.2	2.3	0.89	IE2	82.2 81.2	7.2	3.2 3	18.4	35.5
DRE90M2	1.5	5.1	2830	2.95	3.05	0.89	IE2	83.5 81.8	5.9	2.7 2.6	18.4	35.5
DRE100M2	2.2	7.3	2880	4.15	4.3	0.91	IE2	85.6 84.5	8.2	3.8 3.3	26	56
DRE100L2	3	10.1	2850	5.5	5.7	0.93	IE2	87.4 85.6	7.2	3.5 3.1	29	68
DRE112M2	4	13.2	2900	7.5	7.8	0.89	IE2	87.6 86.5	6.3	2.3 2.1	41.5	113
DRE132S2	5.5	18.2	2890	10	10.5	0.91	IE2	88.9 87.4	6.5	2.3 2.1	46.5	146
DRE132M2	7.5	24.5	2910	13.5	14.3	0.91	IE2	89.8 88.5	7.3	2.5 2.3	60	193
DRE132MC2	9.2	30	2935	17.2	17.9	0.87	IE2	89.7 88.8	7.2	2.2 1.9	63	240

1) Efficiency levels according to IEC 60034-2-1 Ed.1 (2007) / PLL from Residual Losses

2) Applies for foot-mounted motor (DRE.../FI..)

5

Motor type DRS	P_N [kW]	M_N [Nm]	n_N [rpm]	BE..	Z_0 BG[1) BGE[2)] [1/h]	M_B [Nm][3)]	m_B [kg][4)]	J_{Mot_BE} [10^{-4} kgm^2]
DRS71M2	0.55	1.87	2810	BE05	2000 4500	3.5	11.5	8.4
DRS80S2	0.75	2.55	2800	BE05	1400 3300	5	14.2	16.4
DRS80M2	1.1	3.7	2840	BE1	1300 3000	7	17.3	23
DRS90M2	1.5	5.1	2830	BE1	1100 2700	10	22.5	37
DRS90L2	2.2	7.4	2820	BE2	900 2200	14	26	48.5
DRS100M2	3	10.1	2840	BE2	700 1800	20	30.5	61
DRS100LC2	4	13.2	2900	BE5	- 700	28	37	96
DRS112M2	4	13.2	2900	BE5	- 600	28	50	118
DRS132S2	5.5	18.2	2890	BE5	- 500	40	53	151
DRS132M2	7.5	24.5	2910	BE5	- 500	55	75	205
DRS132MC2	9.2	30.5	2900	BE11	- 500	80	75	205

1) Operation with BG brake control system

2) Operation with BGE brake control system

3) Standard braking torque for IEC brakemotor

4) Applies for foot-mounted motor (DRS...BE../FI..)

Motor type DRE	P_N [kW]	M_N [Nm]	n_N [rpm]	BE..	Z_0 BG[1)] BGE[2)] [1/h]	M_B [Nm][3)]	m_B [kg][4)]	J_{Mot_BE} [10^{-4} kgm^2]
DRE80M2	0.75	2.5	2890	BE05	1300 3200	5	17	23
DRE90M2	1.1	3.65	2870	BE1	1100 2700	10	22.5	37
DRE90M2	1.5	5.1	2830	BE1	1100 2700	10	22.5	37
DRE100M2	2.2	7.3	2880	BE2	700 1800	14	30.5	61
DRE100L2	3	10.1	2850	BE2	450 1000	20	33.5	73
DRE112M2	4	13.2	2900	BE5	- 600	28	50	118
DRE132S2	5.5	18.2	2890	BE5	- 500	40	55	151
DRE132M2	7.5	24.5	2910	BE5	- 500	55	69	198
DRE132MC2	9.2	30	2935	BE11	- 380	80	78	250

1) Operation with BG brake control system

2) Operation with BGE brake control system

3) Standard braking torque for IEC brakemotor

4) Applies for foot-mounted motor (DRE...BE../FI..)

DRP: 3000 rpm - S1 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 class	$\eta_{75\%}$ $\eta_{100\%}$ [%][1)]	I_A/I_N	M_A/M_N M_H/M_N	m [kg][2)]	J_{Mot} [10^{-4} kgm^2]
DRP80M2	0.75	2.5	2890	1.46	1.51	0.89	IE3	83.2 83.2	7.9	3.4 3	14.3	21.5
DRP90M2	1.1	3.65	2870	2.1	2.2	0.89	IE3	84.7 83.7	7.2	3.2 3	18.4	35.5
DRP100M2	1.5	4.95	2890	2.65	–[3]	0.93	IE3	87.9 87.1	8.7	3.8 3.3	26	56
DRP100M2	2.2	7.3	2880	4	–[3]	0.91	IE3	87.8 86.7	8.2	3.8 3.3	26	56
DRP100LC2	3	9.8	2920	5.5	–[3]	0.9	IE3	88 87.1	9.1	3 2.4	31	90
DRP112M2	3	9.8	2920	5.5	–[3)]	0.89	IE3	88.6 88.2	7.4	2.6 2.4	41.5	113
DRP132S2	4	13.1	2910	7.2	–[3]	0.91	IE3	89.2 88.2	7.3	2.5 2.2	46.5	146
DRP132M2	5.5	17.9	2935	9.8	–[3]	0.9	IE3	90.7 90.1	8.7	2.9 2.5	60	193

1) Efficiency levels according to IEC 60034-2-1 Ed.1 (2007) / PLL from Residual Losses

2) Applies for foot-mounted motor (DRP.../FI..)

3) In preparation

Motor type DRP	P_N [kW]	M_N [Nm]	n_N [rpm]	BE..	Z_0 BG1) BGE2) [1/h]	M_B [Nm]3)	m_B [kg]4)	J_{Mot_BE} [10^{-4} kgm^2]
DRP80M2	0.75	2.5	2890	BE05	1300 3200	5	17	23
DRP90M2	1.1	3.65	2870	BE1	1100 2700	7	22.5	37
DRP100M2	1.5	4.95	2890	BE2	700 1800	14	30.5	61
DRP100M2	2.2	7.3	2880	BE2	700 1800	14	30.5	61
DRP100LC2	3	9.8	2920	BE2	300 700	20	36	95
DRP112M2	3	9.8	2920	BE5	– 600	20	50	118
DRP132S2	4	13.1	2910	BE5	– 500	28	55	151
DRP132M2	5.5	17.9	2935	BE5	– 500	40	69	198

1) Operation with BG brake control system
2) Operation with BGE brake control system
3) Standard braking torque for IEC brakemotor
4) Applies for foot-mounted motor (DRP...BE../FI..)

5.3 Technical data of 4-pole energy-efficient motors

DRS: 1500 rpm - S1 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 class	$η_{75\%}$ $η_{100\%}$ [%][1)]	I_A/I_N	M_A/M_N M_H/M_N	m [kg][2)]	J_{Mot} [10^{-4} kgm^2]
DRS71S4	0.37	2.55	1380	1.14	1.24	0.7	–	65.3 66.6	3.5	1.8 1.8	7.8	4.9
DRS71M4	0.55	3.8	1380	1.55	1.62	0.72	–	71.9 70.6	3.6	2.1 2.1	9.1	7.1
DRS80S4	0.75	5.1	1400	1.8	1.82	0.81	IE1	76.6 75.3	4.3	1.9 1.9	11.5	14.9
DRS80M4	1.1	7.4	1410	2.40	2.50	0.84	IE1	78.6 77	5.1	2.2 1.7	14.3	21.5
DRS90M4	1.5	10.3	1395	3.30	3.40	0.82	IE1	82 79.6	5.0	2.3 2.0	18.4	35.5
DRS90L4	2.2	15	1400	4.85	4.95	0.81	IE1	83.1 81.1	5.1	2.5 2.2	21.5	43.5
DRS100M4	3	20.5	1400	6.4	6.5	0.82	IE1	84.7 82.4	5.3	2.8 2.4	26	56
DRS100LC4	4	26.5	1445	8.4	8.5	0.81	IE1	86.4 85.3	6.5	2.5 2.3	31	90
DRS112M4	4	26.5	1435	8.1	8.4	0.84	IE1	85.6 83.8	6	2 1.7	41.5	146
DRS132S4	5.5	36.5	1445	11.1	11.6	0.82	IE1	86.7 85.7	6.7	2.4 2.1	44	190
DRS132M4	7.5	49.5	1445	14.4	15.1	0.85	IE1	89.1 87.1	6.6	2.4 1.9	60	255
DRS132MC4	9.2	60	1465	18.6	19.3	0.81	IE1	88.5 87.6	7.2	2.1 1.6	63	340
DRS160S4	9.2	60	1460	18.9	19.2	0.79	IE1	89 88	6.4	2.5 2	80	370
DRS160M4	11	72	1460	22	22.5	0.81	IE1	89.1 88	6.8	2.7 2.3	92	450
DRS160MC4	15	97	1470	30	31	0.80	IE1	90.2 89.1	6.3	2.1 1.7	94	590
DRS180S4	15	98	1460	29	29.5	0.83	IE1	90.3 89.5	6.2	2.3 2	122	900
DRS180M4	18.5	121	1465	34.5	35.5	0.85	IE1	92.8 90	6.5	2.2 1.8	141	1110
DRS180L4	22	143	1465	41.5	42.5	0.84	IE1	91.2 90.5	6.9	2.4 2	152	1300
DRS180LC4	30	195	1470	57	59	0.84	IE1	92.0 90.9	5.6	1.8 1.5	161	1680
DRS200L4	30	194	1475	57	59	0.82	IE1	91.9 91.3	6.4	2.1 1.9	260	2360
DRS225S4	37	240	1475	70	72	0.82	IE1	92 91.6	7.1	2.4 1.9	295	2930
DRS225M4	45	290	1480	84	86	0.83	IE1	92.7 92.3	7.4	2.5 2.2	315	3430
DRS225MC4	55	355	1480	106	108	0.81	IE1	92.8 92.4	6.8	2.4 1.8	330	4330
DRS315K4	110	710	1482	200	210	0.84	IE1	94.2 94	6.1	2.2 1.7	850	18400
DRS315S4	132	850	1484	230	240	0.85	IE1	94.2 94.2	6.5	2.4 1.9	930	22500
DRS315M4	160	1030	1483	280	290	0.87	IE1	94.8 94.6	6.9	2.1 1.7	1090	27900
DRS315L4	200	1290	1481	350	375	0.88	IE1	94.9 94.6	6.4	2.1 1.7	1170	31900

1) Efficiency levels according to IEC 60034-2-1 Ed.1 (2007) / PLL from Residual Losses

2) Applies for foot-mounted motor (DRS.../FI..)

Motor type DRS	P_N [kW]	M_N [Nm]	n_N [rpm]	BE..	Z_0 BG[1)] BGE[2)] [1/h]	M_B [Nm][3)]	m_B [kg][4)]	J_{Mot_BE} [10^{-4} kgm^2]
DRS71S4	0.37	2.55	1380	BE05	6000 9500	5	10.2	6.2
DRS71M4	0.55	3.8	1380	BE1	4100 11000	10	11.7	8.4
DRS80S4	0.75	5.1	1400	BE1	3500 9000	10	14.5	16.4
DRS80M4	1.1	7.4	1410	BE2	3500 9000	14	18	26
DRS90M4	1.5	10.3	1395	BE2	2900 7500	20	23	40
DRS90L4	2.2	15	1400	BE5	- 5600	40	27.5	49.5
DRS100M4	3	20.5	1400	BE5	- 8500	40	32	62
DRS100LC4	4	26.5	1445	BE5	- 3800	55	37	96
DRS112M4	4	26.5	1435	BE5	- 3100	55	50	151
DRS132S4	5.5	36.5	1445	BE11	- 2800	80	59	200
DRS132M4	7.5	49.5	1445	BE11	- 2000	110	75	265
DRS132MC4	9.2	60	1465	BE11	- 1500	110	78	355
DRS160S4	9.2	60	1460	BE20	- 1100	150	106	420
DRS160M4	11	72	1460	BE20	- 1000	150	118	500
DRS160MC4	15	97	1470	BE20	- 900	200	120	640
DRS180S4	15	98	1460	BE20	- 900	200	154	960
DRS180M4	18.5	121	1465	BE30	- 800	300	181	1250
DRS180L4	22	143	1465	BE30	- 590	300	192	1440
DRS180LC4	30	195	1470	BE32	- 520	400	205	1910
DRS200L4	30	194	1475	BE32	- 550	400	315	2590
DRS225S4	37	240	1475	BE32	- 320	500	350	3160
DRS225M4	45	290	1480	BE32	- 270	600	370	3660
DRS225MC4	55	355	1480	BE32	- 200	600	375	4560
DRS315K4	110	710	1482	BE122	- 65	1600	1000	19500
DRS315S4	132	850	1484	BE122	- 50	2000	1080	23600
DRS315M4	160	1030	1483	BE122	- 35	2000	1230	29000
DRS315L4	200	1290	1481	BE122	- 25	2000	1310	33000

1) **Operation with BG brake control system**
2) **Operation with BGE brake control system**
3) **Standard braking torque for IEC brakemotor**
4) **Applies for foot-mounted motor (DRS...BE../FI..)**

DRE: 1500 rpm - S1 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 class	$\eta_{75\%}$ $\eta_{100\%}$ [%][1)]	I_A/I_N	M_A/M_N M_H/M_N	m [kg][2)]	J_{Mot} [10^{-4} kgm^2]
DRE80M4	0.75	5.0	1435	1.68	1.75	0.79	IE2	81.3 81	6.2	2.8 2.1	14.3	21.5
DRE90M4	1.1	7.4	1420	2.45	2.55	0.79	IE2	83.5 82.4	5.9	2.8 2.3	18.4	35.5
DRE90L4	1.5	10	1430	3.35	3.45	0.77	IE2	84.7 84	6.6	3.2 2.8	21.5	43.5
DRE100M4	2.2	14.7	1425	4.6	4.7	0.80	IE2	86.7 85.4	6.4	3.3 2.7	26	56
DRE100LC4	3	19.7	1455	6.2	6.3	0.81	IE2	87.1 86.3	7.5	2.7 2.4	31	90
DRE112M4	3	19.7	1455	6	6.2	0.83	IE2	87.4 86.5	7.3	2.4 2	41.5	146
DRE132S4	4.0	26.0	1460	8	8.2	0.82	IE2	88.2 87.4	8	2.7 2.4	46.5	190
DRE132M4	5.5	36	1455	10.5	11	0.85	IE2	89.6 88.3	7.7	2.6 1.9	60	255
DRE132MC4	7.5	48.5	1470	14.8	15.2	0.82	IE2	89.5 89.0	8.2	2.2 1.8	63	340
DRE160S4	7.5	49	1465	14.7	15.3	0.82	IE2	90.3 89.3	6.5	2.4 1.8	80	370
DRE160M4	9.2	60	1470	18.3	18.7	0.80	IE2	90.7 90	7.7	2.9 2.2	89	450
DRE160MC4	11	71	1475	21.5	22	0.81	IE2	90.6 90	7.7	2.6 1.9	84	590
DRE180S4	11	71	1470	21	21.5	0.83	IE2	90.4 90.2	7.2	2.6 2.2	122	900
DRE180M4	15	97	1470	28	29	0.85	IE2	91.5 91	7.1	2.4 2	138	1110
DRE180L4	18.5	120	1470	34	35.5	0.85	IE2	92 92.6	7.1	2.5 2.1	152	1300
DRE180LC4	22	142	1480	42	43	0.82	IE2	92.2 91.8	7.1	2.3 1.9	161	1680
DRE200L4	30	194	1475	57	59	0.82	IE2	92.9 92.4	6.3	2.1 1.9	260	2360
DRE225S4	37	240	1477	70	72	0.82	IE2	93.4 93	7	2.5 2	295	2930
DRE225M4	45	290	1478	84	86	0.83	IE2	93.7 93.3	7.3	2.5 2.1	315	3430
DRE315K4	110	710	1483	196	205	0.85	IE2	994.9 94.7	6.0	2.3 1.8	850	18400
DRE315S4	132	850	1487	230	235	0.87	IE2	95 95	6.6	2.4 2	930	22500
DRE315M4	160	1030	1484	275	285	0.88	IE2	95.5 95.3	6.8	2.2 1.8	1090	27900
DRE315L4	200	1290	1482	345	360	0.89	IE2	95.7 95.3	6.6	2.2 1.8	1170	31900

1) Efficiency levels according to IEC 60034-2-1 Ed.1 (2007) / PLL from Residual Losses

2) Applies for foot-mounted motor (DRE.../FI..)

Motor type DRE	P_N [kW]	M_N [Nm]	n_N [rpm]	BE..	Z_0 BG[1)]BGE[2)] [1/h]	M_B [Nm][3)]	m_B [kg][4)]	J_{Mot_BE} [10^{-4} kgm^2]
DRE80M4	0.75	5.0	1435	BE1	3500 9000	10	17.3	23
DRE90M4	1.1	7.4	1420	BE2	3000 8000	14	23	40
DRE90L4	1.5	10	1430	BE2	3000 8000	20	26	48.5
DRE100M4	2.2	14.7	1425	BE5	- 8000	28	32	62
DRE100LC4	3	19.7	1455	BE5	- 3800	40	37	96
DRE112M4	3	19.7	1455	BE5	- 3100	40	50	151
DRE132S4	4.0	26.0	1460	BE5	- 2800	55	55	195
DRE132M4	5.5	36	1455	BE11	- 2000	80	75	265
DRE132MC4	7.5	48.5	1470	BE11	- 1500	110	78	355
DRE160S4	7.5	49	1465	BE11	- 1100	110	98	390
DRE160M4	9.2	60	1470	BE20	- 1000	150	115	500
DRE160MC4	11	71	1475	BE20	- 900	150	120	640
DRE180S4	11	71	1470	BE20	- 900	150	154	960
DRE180M4	15	97	1470	BE20	- 800	200	170	1170
DRE180L4	18.5	120	1470	BE30	- 590	300	192	1440
DRE180LC4	22	142	1480	BE30	- 520	300	200	1820
DRE200L4	30	194	1475	BE30	- 550	400	310	2500
DRE225S4	37	240	1477	BE32	- 320	500	350	3160
DRE225M4	45	290	1478	BE32	- 270	600	370	3660
DRE315K4	110	710	1483	BE122	- 65	1600	1000	19500
DRE315S4	132	850	1487	BE122	- 50	2000	1080	23600
DRE315M4	160	1030	1484	BE122	- 35	2000	1230	29000
DRE315L4	200	1290	1482	BE122	- 25	2000	1310	33000

1) Operation with BG brake control system

2) Operation with BGE brake control system

3) Standard braking torque for IEC brakemotor

4) Applies for foot-mounted motor (DRE...BE../FI..)

DRP: 1500 rpm - S1 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 class	$η_{75\%}$ $η_{100\%}$ [%][1]	I_A/I_N	M_A/M_N M_H/M_N	m [kg][2]	J_{Mot} [10^{-4} kgm^2]
DRP90M4	0.75	4.95	1450	1.81	1.86	0.72	IE3	82.7 83.3	7.3	3.7 3.1	18.4	35.5
DRP90L4	1.1	7.3	1440	2.4	2.5	0.78	IE3	86.0 85.3	6.8	3.2 2.7	21.5	43.5
DRP100M4	1.5	9.9	1440	3.2	3.3	0.79	IE3	87.2 86.6	7.4	3.6 3.1	26	56
DRP100L4	2.2	14.6	1440	4.75	4.85	0.77	IE3	87.5 87.1	7.7	4.1 3.2	29	68
DRP112M4	3	19.7	1455	6	6.2	0.82	IE3	88.7 88	7.3	2.4 2	41.5	146
DRP132M4	4	26	1465	7.7	8	0.84	IE3	90.4 89.7	8.9	2.6 2	60	255
DRP132MC4	5.5	35.5	1475	11	11.4	0.84	IE3	90.8 90.3	8.8	2.3 1.9	63	340
DRP160S4	5.5	35.5	1475	10.9	11.2	0.8	IE3	91.1 90.7	8	3.0 2.2	80	370
DRP160M4	7.5	48.5	1470	14.7	15.2	0.81	IE3	91.3 90.7	8.1	3.1 2.3	89	450
DRP160MC4	9.2	60	1475	17.5	18.2	0.84	IE3	92 91.3	7.6	2.5 1.8	94	590
DRP180S4	9.2	60	1475	17.5	18.1	0.82	IE3	92 92	7.8	2.8 2.3	122	900
DRP180M4	11	71	1475	20.5	21.5	0.84	IE3	92.5 92	8.1	2.9 2.2	138	1110
DRP180L4	15	97	1475	27.5	28.5	0.84	IE3	93.1 92.7	7.7	2.7 2	152	1300
DRP180LC4	18.5	119	1480	35	36	0.82	IE3	93.4 93.2	8	2.6 2	161	1680
DRP200L4	18.5	119	1483	34.5	36	0.83	IE3	93.5 93.3	7.8	2.6 2.2	260	2360
DRP200L4	22	142	1482	41	42.5	0.83	IE3	93.5 93.4	7.9	2.7 2.3	260	2360
DRP225S4	30	194	1480	55	57	0.85	IE3	94.3 93.9	7.4	2.6 2.2	290	2930
DRP225M4	37	240	1482	69	71	0.83	IE3	94.1 94	8.4	2.9 2.6	315	3430
DRP315K4	90	580	1484	159	169	0.86	IE3	95.1 95.2	6.7	2.4 1.9	850	18400
DRP315S4	110	710	1486	192	200	0.87	IE3	95.6 95.5	6.7	2.3 1.8	930	22500
DRP315M4	132	850	1488	230	240	0.87	IE3	95.6 95.6	8.1	2.5 2	1090	27900
DRP315L4	160	1030	1488	275	280	0.88	IE3	96.0 96.1	8.0	2.8 2.2	1170	31900

1) **Efficiency levels according to IEC 60034-2-1 Ed.1 (2007) / PLL from Residual Losses**

2) **Applies for foot-mounted motor (DRP.../FI..)**

Motor type DRP	P_N [kW]	M_N [Nm]	n_N [rpm]	BE..	Z_0 BG[1)] BGE[2)] [1/h]	M_B [Nm][3)]	m_B [kg][4)]	J_{Mot_BE} [10^{-4} kgm^2]
DRP90M4	0.75	4.95	1450	BE1	2900 7500	10	22.5	37.0
DRP90L4	1.1	7.3	1440	BE2	2300 5600	14	26	48.4
DRP100M4	1.5	9.9	1440	BE2	1800 8500	20	30.5	61
DRP100L4	2.2	14.6	1440	BE5	- 7600	28	35	74
DRP112M4	3	19.7	1455	BE5	- 3100	40	50	151
DRP132M4	4	26	1465	BE11	- 2000	55	75	265
DRP132MC4	5.5	35.5	1475	BE11	- 1500	80	78	355
DRP160S4	5.5	35.5	1475	BE11	- 1100	80	98	390
DRP160M4	7.5	48.5	1470	BE11	- 1000	110	107	470
DRP160MC4	9.2	60	1475	BE20	- 900	150	120	640
DRP180S4	9.2	60	1475	BE20	- 900	150	154	960
DRP180M4	11	71	1475	BE20	- 800	150	170	1170
DRP180L4	15	97	1475	BE20	- 590	200	184	1360
DRP180LC4	18.5	119	1480	BE30	- 520	300	200	1820
DRP200L4	18.5	119	1483	BE30	- 550	300	310	2500
DRP200L4	22	142	1482	BE30	- 550	300	310	2500
DRP225S4	30	194	1480	BE30	- 320	300	340	3070
DRP225M4	37	240	1482	BE32	- 270	400	370	3660
DRP315K4	90	580	1484	BE120	- 65	1200	1000	19500
DRP315S4	110	710	1486	BE122	- 50	1600	1080	23600
DRP315M4	132	850	1488	BE122	- 35	2000	1230	29000
DRP315L4	160	1030	1488	BE122	- 25	2000	1310	33000

1) Operation with BG brake control system

2) Operation with BGE brake control system

3) Standard braking torque for IEC brakemotor

4) Applies for foot-mounted motor (DRP...BE../FI..)

5.4 Technical data of 6-pole energy-efficient motors

DRS: 1000 rpm - S1 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 class	$\eta_{75\%}$ $\eta_{100\%}$ [%][1)]	I_A/I_N	M_A/M_N M_H/M_N	m [kg][2)]	J_{Mot} [10^{-4} kgm^2]
DRS71S6	0.25	2.65	895	0.83	0.86	0.7	-	61.4 62.2	2.7	1.7 1.7	7.8	4.9
DRS71M6	0.37	3.9	905	1.13	1.16	0.71	-	66.4 66.5	3.1	1.9 1.9	9.1	7.1
DRS80S6	0.55	5.7	915	1.64	1.66	0.71	-	68.2 67.9	3.4	1.8 1.8	11.5	14.9
DRS80M6	0.75	7.8	915	2.15	2.15	0.71	IE1	71.6 70.7	3.6	2 1.9	14.3	21.5
DRS90L6	1.1	11.3	930	3.1	3.15	0.68	IE1	76.3 75	4.2	2.3 2.3	21.5	43.5
DRS100M6	1.5	15.5	925	4.25	4.25	0.68	IE1	77.3 75.7	4.2	2.7 2.7	26	56
DRS112M6	2.2	22	955	5.4	5.5	0.74	IE1	80.5 79.3	5.5	2.1 1.8	41.5	146
DRS112M6	3	30.5	945	7	7.2	0.76	IE1	83 81	5.1	1.9 1.6	41.5	146
DRS132S6	4	40.5	640	9.8	10.2	0.76	IE1	84.2 81.7	4.3	2.1 1.9	44	190
DRS160S6	5.5	55	960	12.9	13.1	0.73	IE1	85.4 84.4	5.2	2 1.8	80	520
DRS160M6	7.5	75	955	17.3	17.6	0.73	IE1	87.1 85.9	5.1	2.2 1.9	92	630

1) Efficiency levels according to IEC 60034-2-1 Ed.1 (2007) / PLL from Residual Losses

2) Applies for foot-mounted motor (DRS.../FI..)

DRE: 1000 rpm - S1 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 class	$\eta_{75\%}$ $\eta_{100\%}$ [%][1)]	I_A/I_N	M_A/M_N M_H/M_N	m [kg][2)]	J_{Mot} [10^{-4} kgm^2]
DRE90L6	0.75	7.6	940	2.15	2.2	0.65	IE2	77.8 77.2	4.6	2.4 2.4	21.5	43.5
DRE100M6	1.1	11.2	940	3.1	3.15	0.64	IE2	79.4 78.7	4.7	3 2.9	26	56
DRE100L6	1.5	15.2	940	4	4.05	0.66	IE2	81.5 80.9	5	3.3 3.1	29	68
DRE112M6	2.2	22	955	5.2	5.3	0.74	IE2	84.2 83	5.5	2.1 1.8	41.5	146
DRE132S6	3	30	955	6.8	7	0.74	IE2	85.8 84.4	5.5	2.3 2.1	46.5	190
DRE132M6	4	40	960	9.5	9.6	0.71	IE2	86.2 85.4	6.1	2.8 2.6	60	255
DRE160M6	5.5	54	965	12.6	12.8	0.72	IE2	87.4 86.8	5.8	2.3 2	89	630

1) Efficiency levels according to IEC 60034-2-1 Ed.1 (2007) / PLL from Residual Losses

2) Applies for foot-mounted motor (DRE.../FI..)

5

Motor type DRS	P_N [kW]	M_N [Nm]	n_N [rpm]	BE..	Z_0 BG1) BGE2) [1/h]	M_B [Nm]3)	m_B [kg]4)	J_{Mot_BE} [10^{-4} kgm^2]
DRS71S6	0.25	2.65	895	BE05	7000 16000	5	10.2	9.4
DRS71M6	0.37	3.9	905	BE1	6600 15000	10	11.7	13
DRS80S6	0.55	5.7	915	BE2	6000 14000	14	15.2	19.4
DRS80M6	0.75	7.8	915	BE2	4300 10000	20	18	26
DRS90L6	1.1	11.3	930	BE5	3500 8000	28	27.5	49.5
DRS100M6	1.5	15.5	925	BE5	- 7000	40	32	62
DRS112M6	2.2	22	955	BE11	- 4000	80	56	156
DRS112M6	3	30.5	945	BE11	- 3600	80	56	156
DRS132S6	4	40.5	640	BE11	- 3500	80	59	199
DRS160S6	5.5	55	960	BE11	- 2700	110	98	540
DRS160M6	7.5	75	955	BE20	- 2700	150	118	680

1) **Operation with BG brake control system**
2) **Operation with BGE brake control system**
3) **Standard braking torque for IEC brakemotor**
4) **Applies for foot-mounted motor (DRS...BE../FI..)**

Motor type DRE	P_N [kW]	M_N [Nm]	n_N [rpm]	BE..	Z_0 BG1) BGE2) [1/h]	M_B [Nm]3)	m_B [kg]4)	J_{Mot_BE} [10^{-4} kgm^2]
DRE90L6	0.75	7.6	940	BE2	3500 8000	20	26	48
DRE100M6	1.1	11.2	940	BE5	- 7000	28	32	62
DRE100L6	1.5	15.2	940	BE5	- 6000	40	35	74
DRE112M6	2.2	22	955	BE5	- 4000	55	50	150
DRE132S6	3	30	955	BE11	- 3500	80	61	199
DRE132M6	4	40	960	BE11	- 3300	80	75	260
DRE160M6	5.5	54	965	BE11	- 2700	110	107	650

1) **Operation with BG brake control system**
2) **Operation with BGE brake control system**
3) **Standard braking torque for IEC brakemotor**
4) **Applies for foot-mounted motor (DRE...BE../FI..)**

DRP: 1000 rpm - S1 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 class	$η_{75\%}$ $η_{100\%}$ [%][1)]	I_A/I_N	M_A/M_N M_H/M_N	m [kg][2)]	J_{Mot} [10^{-4} kgm^2]
DRP90L6	0,75	7.6	940	2.05	–[3)]	0.65	IE3	80 79.5	4,6	2,4 2.4	21.5	43.5
DRP100L6	1,1	11,1	950	3,1	–[3]	0.63	IE3	82.4 82.4	5,3	3,6 3.1	29	68
DRP112M6	1.5	14.8	965	3.5	–[3]	0.7	IE3	86.1 85.8	6.2	2.4 1.7	41.5	145
DRP132S6	2.2	22	965	5.1	–[3]	0.72	IE3	86.5 85.6	6	2.5 2.2	46.5	188
DRP132M6	3	29.5	970	7.1	–[3]	0.7	IE3	87.7 87.3	6.6	2.9 2.7	60	250
DRP160M6	4	39	975	9,3	–[3]	0.69	IE3	88.9 88.9	6,4	2,5 2.2	89	630

1) Efficiency levels according to IEC 60034-2-1 Ed.1 (2007) / PLL from Residual Losses

2) Applies for foot-mounted motor (DRP.../FI..)

3) In preparation

Motor type DRP	P_N [kW]	M_N [Nm]	n_N [rpm]	BE..	Z_0 BG[1)] BGE[2)] [1/h]	M_B [Nm][3)]	m_B [kg][4)]	J_{Mot_BE} [10^{-4} kgm^2]
DRP90L6	0,75	7.6	940	BE2	3500 8000	20	26	48
DRP100L6	1,1	11,1	950	BE5	- 6000	28	35	74
DRP112M6	1.5	14.8	965	BE5	- 4000	40	50	150
DRP132S6	2.2	22	965	BE5	- 3500	55	55	193
DRP132M6	3	29.5	970	BE11	- 3300	80	75	260
DRP160M6	4	39	975	BE11	- 2700	80	107	650

1) **Operation with BG brake control system**
2) **Operation with BGE brake control system**
3) **Standard braking torque for IEC brakemotor**
4) **Applies for foot-mounted motor (DRP...BE../FI..)**

5.5 Technical data for pole-changing motors DRS..8/2, 8/4

DRS..8/2

Motor type DRS..	P_N [kW]	n_N [rpm]	I_N 400 V [A]	cosφ	I_A/I_N	M_A/M_N	M_H/M_N	m [kg][1)]	J_{Mot} [10^{-4} kgm^2]
DRS71S8/2	0.06 0.25	685 2870	048 0.91	0.62 0.69	1.7 3.4	1.7 2	1.7 1.6	7.8	4.9
DRS71M8/2	0.1 0.4	670 2850	0.73 1.17	0.62 0.79	1.8 2.9	1.6 2.1	1.6 1.6	9.1	7.1
DRS80S8/2	0.15 0.6	655 2680	0.88 1.6	0.59 0.89	1.9 3	1.7 2.3	1.7 2.1	11.5	14.9
DRS80M8/2	0.22 0.9	680 2780	1.15 2.4	0.6 0.8	2 4	1.7 2.6	1.7 2.4	14.3	21.4
DRS90M8/2	0.3 1.3	710 2880	1.41 3.3	0.55 0.8	2.5 4.6	1.4 1.9	1.4 1.7	18.4	35.4
DRS90L8/2	0.45 1.8	710 2890	2.15 4.3	0.55 0.81	2.5 5	2.5 2	1.5 1.8	21.5	43.7
DRS100M8/2	0.6 2.4	715 2900	2.9 5.3	0.55 0.83	2.5 6.1	1.5 2.5	1.6 1.9	26	56
DRS112M8/2	0.8 3	710 2730	3.6 7.1	0.53 0.83	2.7 4.3	1.5 2.9	1.5 2.1	41.5	146
DRS132M8/2	1.1 4.6	710 2785	4.2 9.4	0.56 0.91	3.1 5.8	1.5 3	1.5 2.1	60	253

1) Applies for foot-mounted motor (DRS.../FI..)

DRS..8/4

Motor type DRS..	P_N [kW]	n_N [rpm]	I_N 400 V [A]	cosφ	I_A/I_N	M_A/M_N	M_H/M_N	m [kg][1)]	J_{Mot} [10^{-4} kgm^2]
DRS112M8/4	1,2 2,2	675 1390	4,2 4,6	0,58 0,87	2,9 4,8	1,9 2,2	1,9 1,9	41,5	146
DRS132S8/4	1,6 3,3	680 1385	5,8 6,8	0,55 0,87	2,9 4,7	2 2,1	2 1,9	44	190
DRS132M8/4	2,1 4,2	680 1390	7 8,6	0,59 0,87	3,3 5	1,9 2,1	1,9 1,9	60	253
DRS160S8/4	2,7 5,5	725 1470	9,2 11	0,54 0,84	4 6,3	2,1 1,9	1,9 1,4	80	370
DRS160M8/4	3,8 7,5	730 1470	12,9 15	0,54 0,84	3,9 6,2	2 1,9	1,9 1,4	92	448
DRS180S8/4	5,5 10	730 1465	17,4 18,7	0,55 0,87	4 6	2,2 1,9	2 1,4	122	895
DRS180L8/4	7,5 15	735 1470	22,5 27,5	0,55 0,87	4,4 6	2,4 1,9	2,1 1,4	152	1300
DRS200L8/4	11 22	735 1475	35,5 41,5	0,52 0,85	4 5,9	2,4 1,8	2 1,4	260	2360
DRS225S8/4	14 28	735 1475	45 52	0,52 0,85	4,1 6,2	2,5 1,9	2,2 1,5	295	2930
DRS225M8/4	18 34	740 1475	57 63	0,53 0,86	4 6,3	2,4 2	2 1,5	315	3430

1) Applies for foot-mounted motor (DRS.../FI..)

Motor type DRS.	P_N [kW]	n_N [rpm]	BE..	Z_0 BG[1)] [1/h]	Z_0 BGE[2)] [1/h]	M_B [Nm][3)]	m_B [kg][4)]	J_{Mot_BE} [10^{-4} kgm^2]
DRS71S8/2	0.06 0.25	685 2870	BE05	15000 6000	20000 90000	1.8	10.2	6.2
DRS71M8/2	0.1 0.4	670 2850	BE05	14000 6000	18000 8000	3.5	11.5	8.4
DRS80S8/2	0.15 0.6	655 2680	BE05	8000 3800	14000 5000	5	14.2	16.4
DRS80M8/2	0.22 0.9	680 2780	BE1	8000 3000	14000 4000	7	17.3	22.9
DRS90M8/2	0.3 1.3	710 2880	BE1	-	11000 3500	10	21.5	36.9
DRS90L8/2	0.45 1.8	710 2890	BE2	-	10000 3300	14	26	48.4
DRS100M8/2	0.6 2.4	715 2900	BE2	-	9000 2600	20	30.5	60.7
DRS112M8/2	0.8 3	710 2730	BE5	-	7000 1500	28	50	150.8
DRS132M8/2	1.1 4.6	710 2785	BE5	-	5000 1000	40	69	257.85

1) **Operation with BG brake control system**
2) **Operation with BGE brake control system**
3) **Standard braking torque**
4) **Applies for foot-mounted motor with brake (DRS...BE../FI..)**

Motor type DRS.	P_N [kW]	n_N [rpm]	BE..	Z_0 BGE[1)] [1/h]	M_B [Nm][2)]	m_B [kg][3)]	J_{Mot_BE} [10^{-4} kgm^2]
DRS112M8/4	1,2 2,2	675 1390	BE5	3800 1800	40	50	150.8
DRS132S8/4	1,6 3,3	680 1385	BE5	3000 1600	55	53	194.8
DRS132M8/4	2,1 4,2	680 1390	BE11	3000 1500	80	75	263.5
DRS160S8/4	2,7 5,5	725 1470	BE11	2600 1400	80	98	392
DRS160M8/4	3,8 7,5	730 1470	BE11	1900 1300	110	110	470
DRS180S8/4	5,5 10	730 1465	BE20	1600 1200	150	154	955
DRS180L8/4	7,5 15	735 1470	BE20	1100 900	200	184	1360
DRS200L8/4	11 22	735 1475	BE30	900 700	300	310	2495
DRS225S8/4	14 28	735 1475	BE32	700 500	400	350	3160
DRS225M8/4	18 34	740 1475	BE32	600 450	500	370	3660

1) **Operation with BGE brake control system**
2) **Standard braking torque**
3) **Applies for foot-mounted motor with brake (DRS...BE../FI..)**

5.6 WPU smooth pole-change unit

Normal pole-changing motors cannot switch from high to low speed without jerks unless special measures are taken. The regenerative braking torque can either be lowered by reducing the voltage at the moment of the switchover using chokes, transformers or additional resistors to a lower value or by switching 2 phases only. All mentioned measures involve additional installation effort and switchgear. A time relay causes the voltage to return to normal voltage conditions. The relay is set empirically. The WPU smooth pole-change unit operates purely electronically.

Function

The switching command inhibits a phase of the supply voltage via a triac and reduces the switch-back torque to about one third. As soon as the synchronous speed of the high-pole winding is reached, the third phase is connected again with optimized current.

The following figure shows the WPU smooth pole-change units.

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Advantages of WPU

- Load independent and wear-free
- No energy loss which means high efficiency
- No restriction on start-up and rated torque and no restriction on the motor starting frequency
- Minimum wiring
- Suitable for any standard motor

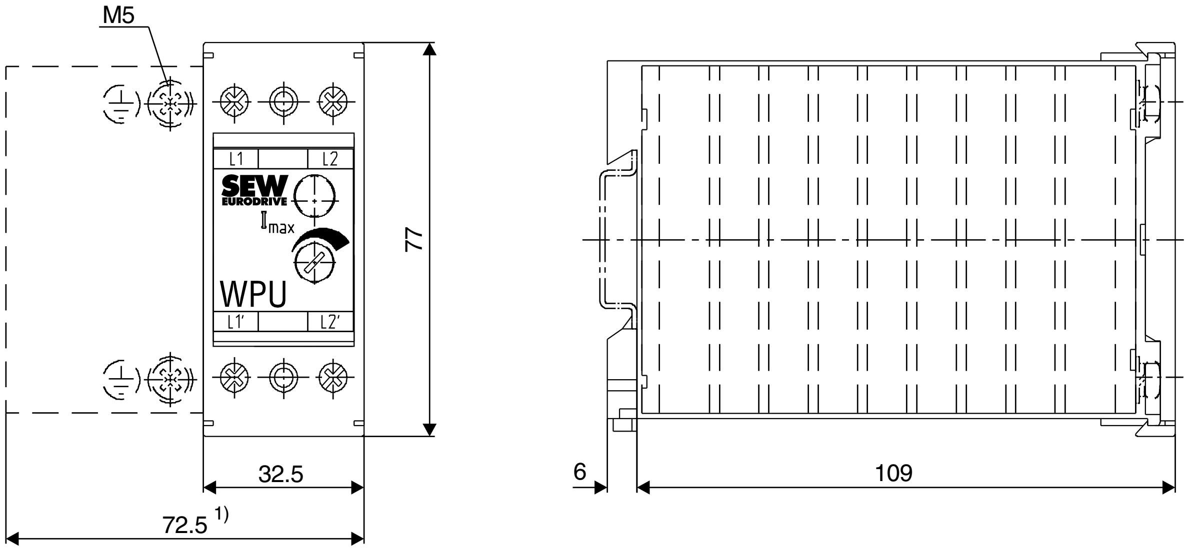
5

Technical data

Type	**WPU 1001**	**WPU 1003**	**WPU 1010**	**WPU 2030**
Part number	825 742 6	825 743 4	825 744 2	825 745 0
For pole-changing motors with rated current at low speed I_N in S1 continuous running duty	0.2 - 1 A_{AC}	1 - 3 A_{AC}	3 - 10 A_{AC}	10 -30 A_{AC}
For pole-changing motors with rated current at low speed I_N in S3 intermittent periodic duty 40/60 % cdf	0.2 - 1 A_{AC}	1 - 5 A_{AC}	3 - 15 A_{AC}	10 - 50 A_{AC}
Rated supply voltage V_{line}	2 × 150-500 V_{AC}			
Line frequency f_{line}	50/60 Hz			
Rated current in S1 continuous running duty I_N	1 A_{AC}	3 A_{AC}	10 A_{AC}	30 A_{AC}
Ambient temperature ϑ_{Umg}	-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

WPU smooth pole-change unit

WPU 1001, 1003, 1010



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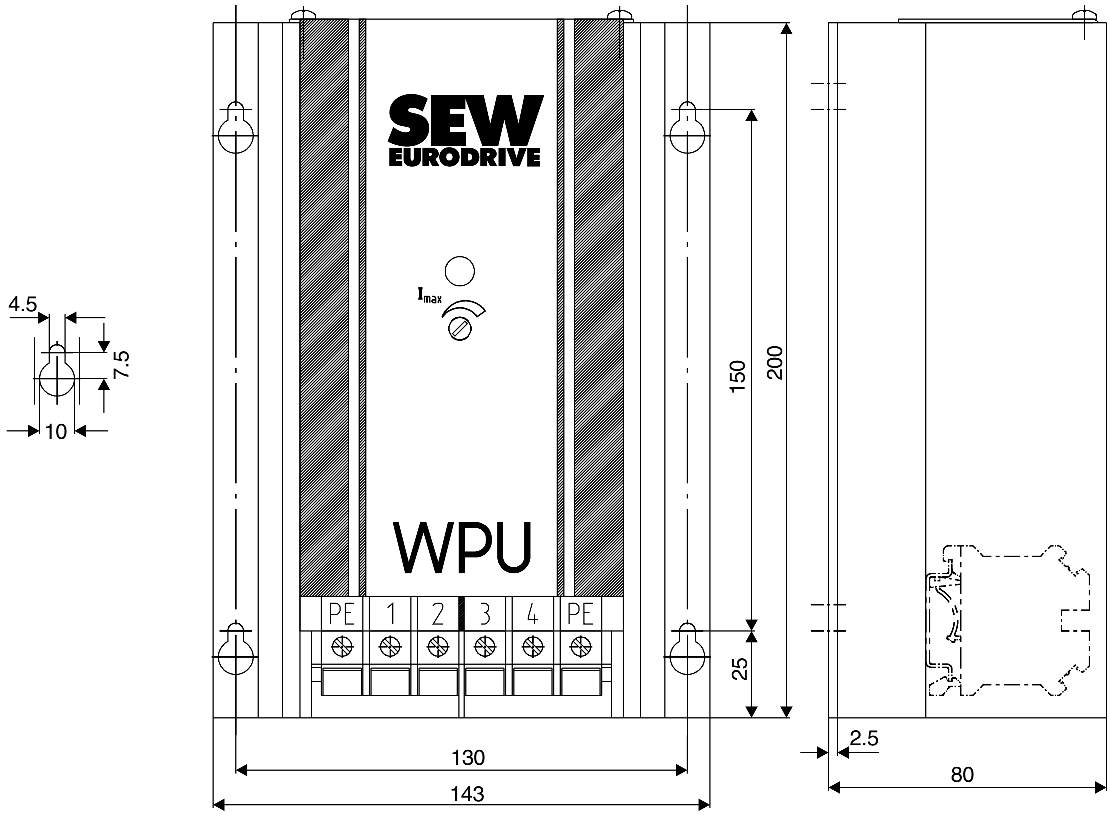
1) Heat sink for WPU 1010 only

WPU 2030



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5.7 Key to the data tables of the 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} Dyn1	Maximum limit torque (dynamics package 1)
M_{pk} Dyn2	Maximum limit torque (dynamics package 2)
m	Mass of the motor
BE..	Brake used
m_B	Mass of the brakemotor
J_{MOT_BE}	Mass moment of inertia of the brakemotor
M_B Dyn1	Braking torque (dynamics package 1)
M_B Dyn2	Braking torque (dynamics package 2)

5.8 Technical data for DRL asynchronous servomotors

System voltage: 400 V

n_N	DRL motor type	M_N [Nm]	IN [A]	M_{pk} Dyn1 [Nm]	M_{pk} Dyn2 [Nm]	m [kg]	J_{Mot} [10^{-4} kgm^2]
1200	**DRL71S4**	2.7	1.18	5	8.5	8.6	4.9
	DRL71M4	4	1.6	7	14	10	7.1
	DRL80M4	9.5	2.9	14	30	15.2	21.5
	DRL90L4	15	4.8	25	46	22.5	43.5
	DRL100L4	26	8.5	40	85	30	68
	DRL132S4	42	12.6	80	150	45.5	190
	DRL132MC4	56	17.6	130	200	65	340
	DRL160M4	85	25.5	165	280	93	450
	DRL160MC4	90	28	185	320	95	590
	DRL180M4	135	38	250	430	143	1110
	DRL180L4	165	47	320	520	154	1300
	DRL180LC4	175	52	420	600	163	1680
	DRL225S4	250	72	520	770	295	2930
	DRL225MC4	290	89	770	1100	330	4330
1700	**DRL71S4**	2.7	1.63	5	8.5	8.6	4.9
	DRL71M4	4	2.2	7	14	10	7.1
	DRL80M4	9.5	4	14	30	15.2	21.5
	DRL90L4	15	6.6	25	46	22.5	43.5
	DRL100L4	26	11.4	40	85	30	68
	DRL132S4	42	17.8	80	150	45.5	190
	DRL132MC4	56	24.9	130	200	65	340
	DRL160M4	85	35	165	280	93	450
	DRL160MC4	90	36	185	320	95	590
	DRL180M4	135	52	250	430	143	1110
	DRL180L4	165	63	320	520	154	1300
	DRL180LC4	175	72	420	600	163	1680
	DRL225S4	245	97	520	770	295	2930
	DRL225MC4	280	130	770	1100	330	4330
2100	**DRL71S4**	2.6	2	5	8.5	8.6	4.9
	DRL71M4	3.8	2.7	7	14	10	7.1
	DRL80M4	9.5	5	14	30	15.2	21.5
	DRL90L4	15	8.4	25	46	22.5	43.5
	DRL100L4	25	14	40	85	30	68
	DRL132S4	41	21.4	80	150	45.5	190
	DRL132MC4	52	28.8	130	200	65	340
	DRL160M4	85	44	165	280	93	450
	DRL160MC4	88	48	185	320	95	590
	DRL180M4	130	64	250	430	143	1110
	DRL180L4	160	78	320	520	154	1300
	DRL180LC4	170	87	420	600	163	1680
	DRL225S4	235	119	520	770	295	2930
	DRL225MC4	265	142	770	1100	330	4330

Table continued on page 66.

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n_N	Motor type DRS	M_N [Nm]	IN [A]	BE..	M_B Dyn1 [Nm]	M_B Dyn2 [Nm]	m_B [kg][1)]	J_{Mot_BE} [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
	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
	DRL180M4	135	38	BE30	200	300	183	1250
	DRL180L4	165	47	BE30	300	300	194	1440
	DRL180LC4	175	52	BE32	400	400	210	1910
	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
	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
	DRL180M4	135	52	BE30	200	300	183	1250
	DRL180L4	165	63	BE30	300	300	194	1440
	DRL180LC4	175	72	BE32	400	400	210	1910
	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
	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
	DRL180M4	130	64	BE30	200	300	183	1250
	DRL180L4	160	78	BE30	300	300	194	1440
	DRL180LC4	170	87	BE32	400	400	210	1910
	DRL225S4	235	119	BE32	500	500	350	3160
	DRL225MC4	265	142	BE32	600	600	385	4560

Table continued on page 67.

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

n_N	DRL motor type	M_N [Nm]	IN [A]	M_{pk} Dyn1 [Nm]	M_{pk} Dyn2 [Nm]	m [kg]	J_{Mot} [10^{-4} kgm^2]
3000	**DRL71S4**	2.5	2.68	5	8.5	8.6	4.9
	DRL71M4	3.6	3.55	7	14	10	7.1
	DRL80M4	8.8	6.5	14	30	15.2	21.5
	DRL90L4	14	11	25	46	22.5	43.5
	DRL100L4	21	16.6	40	85	30	68
	DRL132S4	35	25.5	80	150	45.5	190
	DRL132MC4	42	34.8	130	200	65	340
	DRL160M4	79	57	165	280	93	450
	DRL160MC4	83	59	185	320	95	590
	DRL180M4	105	73	250	430	143	1110
	DRL180L4	130	90	320	520	154	1300
	DRL180LC4	140	105	420	600	163	1680
	DRL225S4	195	139	520	770	295	2930
	DRL225MC4	220	188	770	1100	330	4330

n_N	Motor type DRS	M_N [Nm]	IN [A]	BE..	M_B Dyn1 [Nm]	M_B Dyn2 [Nm]	m_B [kg][1)]	J_{Mot_BE} [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
	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
	DRL180M4	105	73	BE30	200	300	183	1250
	DRL180L4	130	90	BE30	300	300	194	1440
	DRL180LC4	140	105	BE32	400	400	210	1910
	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..)

5.9 Amortization calculation for energy-efficient motors

Project planning for energy-efficient motors

DRE, DRP

Due to their higher costs and mass moment of inertia of the rotor, energy efficient motors are not suitable for any application.

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

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.

Additional documentation

In addition to the information provided in this catalog, the sections "Project Planning of AC Motors" and "Technical Data and Dimension Sheets for AC Motors" in the Gearmotors catalog contain more detailed information.

You will find additional links to a wide selection of our documentation in many languages for download on the SEW-EURODRIVE homepage (http://www.sew-eurodrive.com).

Amortization calculation for 100% motor load in shift operation

Comparison calculation

Motor data

	DRS100M4	DRE112M4
P_n	3 kW	3 kW
Load factor	100 %	100 %
η	82.4 %	87 %

Actual power consumed

$$P_{in} = \frac{P_n \times \text{Load factor}}{\text{Eta}}$$

	DRS100M4	DRE112M4
P_{in}	3.64 kW	3.46 kW

Operating time

Annual operating time = daily operating time x annual operating days

Shift operation	Operation	
	DRS100M4	DRE112M4
1-shift	2000 h/a	2000 h/a
2-shift	4000 h/a	4000 h/a
3-shift	6000 h/a	6000 h/a

Power consumption

Energy per year = P_{in} x operating time

Shift operation	Energy		
	DRS100M4 E1	DRE112M4 E2	Difference E1 - E2
1-shift	7280 kWh/a	6920 kWh/a	360 kWh/a
2-shift	14560 kWh/a	13840 kWh/a	720 kWh/a
3-shift	21840 kWh/a	20760 kWh/a	1080 kWh/a

Energy cost difference

Cost difference = energy difference x energy price

Energy price = 0.12 €/kWh

Shift operation	Cost difference
1-shift	43.20 € / a
2-shift	86.40 € / a
3-shift	129.60 € / a

Cost savings/ amortization

Savings in the year X = expenses in the year X - (cost difference in the year X)

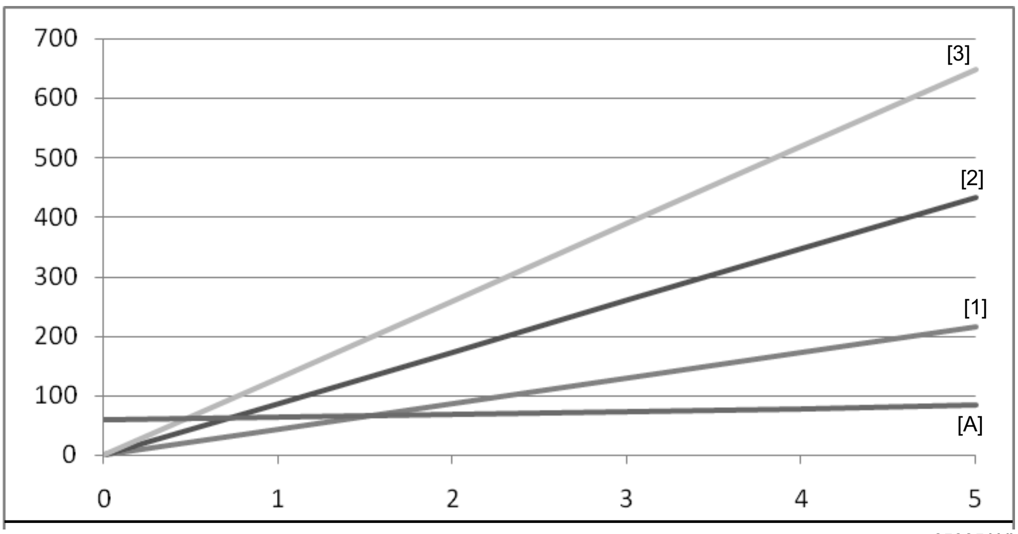
Option pricing for energy-efficient motor DRE112M4 = 75 €

Interest rate per year = 7.0 %

Years	Savings			Expendi-ture	Expenditure
	1-shift	2-shift	3-shift	Gross price	with 20 % discount
0	0 €	0 €	0 €	75 €	60 €
1	43.20 €	86.40 €	129.60 €	80.25 €	64.20 €
2	86.40 €	172.80 €	259.20 €	85.87 €	68.69 €
3	129.60 €	259.20 €	388.80 €	91.88 €	73.50 €
4	172.80 €	345.60 €	518.40 €	98.31 €	78.65 €
5	216 €	432 €	648 €	105.19 €	84.15 €

Amortization/years

The following diagram "Saved energy costs" shows the investment calculation for 100% motor load.



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Key:

[A] Expenses with a discount of 20 %
[2] 2-shift with 100 % motor load
[1] 1-shift with 100 % motor load
[3] 3-shift with 100 % motor load

Amortization calculation for 75 % motor load in shift operation

Comparison calculation

Motor data

	DRS100M4	DRE112M4
P_n	3 kW	3 kW
Load factor	75 %	75 %
h	84.7 %	87.6 %

Actual power consumed

$$P_{in} = \frac{P_n \times \text{Load factor}}{\text{Eta}}$$

	DRS100M4	DRE112M4
P_{in}	2.66 kW	2.57 kW

Operating time

Annual operating time = daily operating time x annual operating days

Shift operation	Operation	
	DRS100M4	DRE112M4
1-shift	2000 h/a	2000 h/a
2-shift	4000 h/a	4000 h/a
3-shift	6000 h/a	6000 h/a

Power consumption

Energy per year = P_{in} x operating time

Shift operation	Energy		
	DRS100M4 E1	DRE112M4 E2	Difference E1 - E2
1-shift	5310 kWh/a	5140 kWh/a	170 kWh/a
2-shift	10630 kWh/a	10270 kWh/a	360 kWh/a
3-shift	15940 kWh/a	15410 kWh/a	530 kWh/a

Energy cost difference

Cost difference = energy difference x energy price

Energy price = 0.12 €/kWh

Shift operation	Cost difference
1-shift	20.40 € /a
2-shift	43.20 € / a
3-shift	63.60 € / a

Cost savings/ amortization

Savings in the year X = expenses in the year X - (cost difference in the year X)

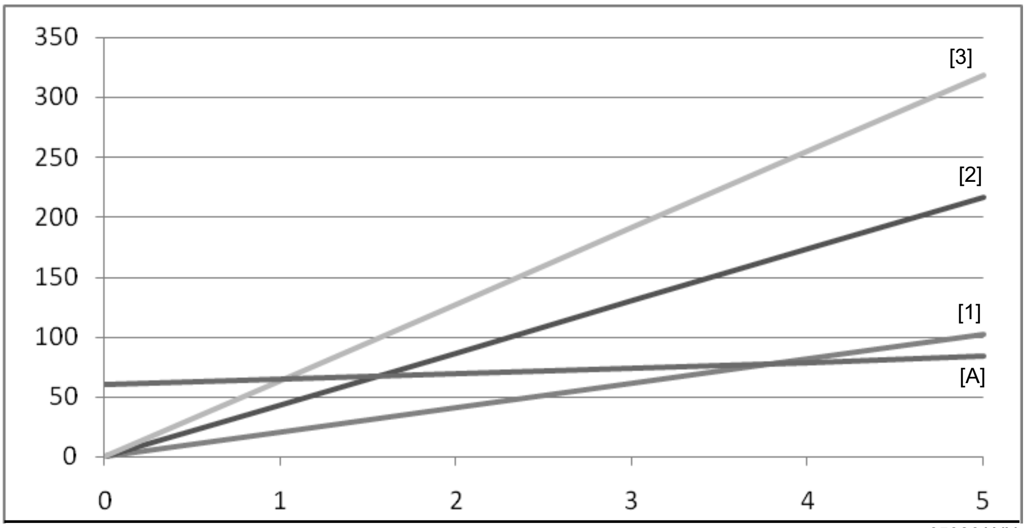
Option pricing for energy-efficient motor DRE112M4 = 75 €

Interest rate per year = 7.0 %

Years	Savings			Expenditure	Expenditure for
	1-shift	2-shift	3-shift	Gross price	20 % discount
0	0 €	0 €	0 €	75 €	60 €
1	20.40 €	43.20 €	63.60 €	80.25 €	64.20 €
2	40.80 €	86.40 €	127.20 €	85.87 €	68.69 €
3	61.20 €	129.60 €	190.80 €	91.88 €	73.50 €
4	81.60 €	172.80 €	254.40 €	98.31 €	78.65 €
5	102 €	216 €	318 €	105.19 €	84.15 €

Amortization/years

The following diagram "Saved energy costs" shows the investment calculation for 75 % motor load.



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Key

[A] Expenses with a discount of 20 %

[1] 1-shift with 75 % motor load

[3] 2-shift with 75 % motor load

[4] 3-shift with 75 % motor load

6 Project Planning

6.1 Electrical characteristics

Suitable for inverter operation

DR series AC (brake) motors can be operated on inverters thanks to the high quality winding with which they are equipped as standard.

Frequency

On request, AC motors from SEW-EURODRIVE are designed for a supply frequency of 50 Hz or 60 Hz. As standard, the technical data in this motor catalog is based on a supply frequency of 50 Hz.

There are also special DRS and DRE motor variants that can be operated on both 50 Hz and 60 Hz supply systems. Different regional electrical regulations can be met by one motor. Especially the different national regulations about minimum efficiency levels (see chapter "Energy-efficient motors of the DR motor series" on page 13 ff) are combined in an ideal way. Please contact SEW-EURODRIVE for these motors.

Motor voltage

AC motors in the standard and energy efficient design are available for rated voltages of 220 - 720 V.

2, 4 and 6-pole motors

Motors with power ratings up to 5.5 kW are usually available in the following designs:

- For voltage range 220 - 242 V △ / 380 - 420 V ⅄ , 50 Hz
- Or for rated voltage 230 V △ / 400 V ⅄, 50 Hz.

Motors with power ratings from 7.5 kW are usually available in the following designs:

- For voltage range 380 - 420 V △ / 690 - 720 V ⅄, 50 Hz
- Or for rated voltage 400 V △ / 690 V ⅄, 50 Hz.

If not specified in the order, the motors are designed for the above mentioned voltages for 50 Hz.

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

For 50 Hz power supply

The **standards voltages** are:

Motors		Motor sizes up to 5.5 kW	Motor sizes from 7.5 kW	
4-pole motors				
Standard High Premium		**DRS71S4 - 132S4 DRE80M4 - 132M4 DRP90M4 - 160S4**	**DRS132M4 - 225MC4 DRE132MC4 - 225M4 DRP160MC4 - 225M4**	**DRS315K4 - 315L4 DRE315K4 - 315L4 DRP315K4 - 315L4**
2-pole motors				
Standard High Premium		**DRS71S2 - 132S2 DRE80M2 - 132M2 DRP80M2 - 132M2**	**DRS132M2 - 132MC2 DRE132MC2 -**	**- - -**
6-pole motors				
Standard High Premium		**DRS71S6 - 160S6 DRE90L6 - 160M6 DRP90L6 - 160M6**	**DRS160M6 - -**	**- - -**
Voltage range	△/⅄	**AC 220 - 242 / 380 - 420 V**	**AC 380 - 420 / 690 - 720 V**	
Rated voltage	△/⅄ △/⅄ △/⅄ △/⅄	**AC 230 / 400 V AC 290 / 500 V AC 400 / 690 V AC 500 / -**		**- AC 290 / 500 V AC 400 / 690 V AC 500 / -**

For the table listing the brake voltages, see page 75.

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 changes only slightly.

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

Motor voltage for pole-changing motors

The standard pole-changing AC motors are available for rated voltages from 220 V to 720 V.

If not specified otherwise in the order, the motors are designed for the above mentioned voltages for 50 Hz.

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

Motors Standard	**8/2-pole motors DRS71S8/2 - 132M8/2**	**8/4-pole motors DRS132M8/4 - 225M8/4**
Voltage range	AC 380 - 420 V ⅄/⅄	AC 380 - 420 V △/⅄⅄
Rated voltage	AC 400 V ⅄/⅄	AC 400 V △/⅄⅄

8/2-pole motors

The pole-changing motors with separate winding are usually available in the following variants:

- For the voltage range 380 - 420 ⅄/⅄ V 50 Hz,
- Rated voltage 400V ⅄/⅄ 50 Hz.

8/4-pole motors

The pole-changing motors with Dahlander winding are usually available in the following variants:

- For the voltage range 380 - 420 △/⅄⅄ 50 Hz,
- Rated voltage 400 V △/⅄⅄, 50 Hz.

Forced cooling fan voltage

Forced cooling fan voltage		
Motors	**DR.71 - 225**	**DR.315**
Voltage range	1 × AC 230 - 277 V△ (with capacitor) 3 × AC 200 - 290 V△ 3 × AC 346 - 500 V⅄	- 3 × AC 200 - 290 V△ 3 × AC 346 - 500 V⅄

Brake voltage

Brake voltage		
Brakes	**BE05 - BE20**	**BE30 - BE122**
Voltage range	AC 220 - 242 V AC 380 - 420 V	
Rated voltage	DC 24 V AC 230 V AC 400 V	- AC 230 V AC 400 V

Standard connections 50 Hz motors

Number of poles	Synchronous speed n_{syn} at 50 Hz [rpm]	Connection
2-pole 4-pole 6-pole	3000 1500 1000	⅄ / △ ⅄ / △ ⅄ / △
8/2-pole 8/4-pole	750 / 3000 1500 / 3000	⅄⅄ △ / ⅄⅄

50 Hz motor on 60 Hz supply system

The rated data of motors designed for 50 Hz supply systems are slightly different when the motors are operated on 60 Hz supply systems.

Motor voltage At 50 Hz	Motor connection	U [V] at 60 Hz	Modified rated data			
			n_N	P_N	M_N	M_A/M_N
AC 230 / 400 V △/⅄	△	230	+20%	0%	-17%	-17%
AC 230 / 400 V △/⅄	⅄	460	+20%	+20%	0%	0%
AC 400 / 690 V △/⅄	△					

If you want to operate motors designed for 50 Hz supply systems with a 60 Hz supply system, please consult SEW-EURODRIVE.

60 Hz motors

This motor catalog contains the technical data of DR motors for supply systems with a frequency of 50 Hz.

The DR motors can also be supplied for supply systems with a frequency of 60 Hz. They are also available as standard and energy-efficient variants.

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

The power assignment of the 60 Hz variants is different for some sizes from that of 50 Hz.

Power ratings with a local market significance outside the IEC series are also provided for, e.g. with a 3.7 kW / 5 hp motor or a 4.5 kW / 6 hp motor.

6.2 Thermal characteristics - DR, DRL

Thermal classification according to IEC 60034-1 (EN 60034-1)

Single-speed AC motors/AC brakemotors 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 IEC62114 and IEC 60034-1 (EN 60034-1).

Thermal classification		Overtemperature limit [K]
New	Old	
130	B	80 K
155	F	105 K
180	H	125 K

Power reduction

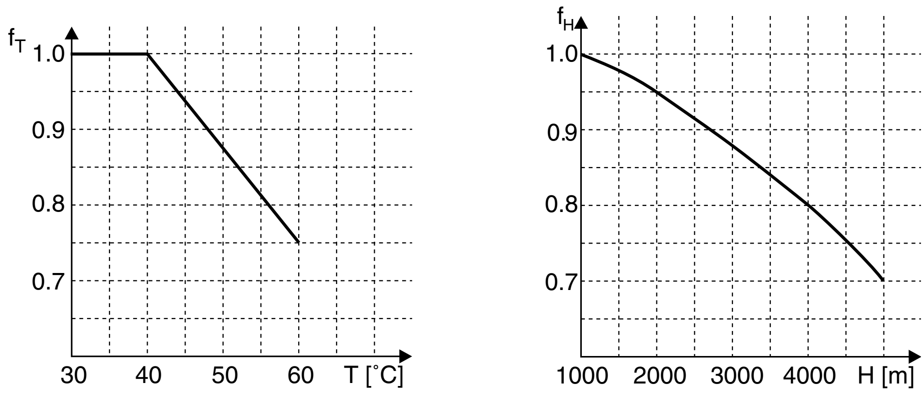
The rated power P_N of a motor depends on the ambient temperature and the altitude. The rated power stated on the nameplate applies to an ambient temperature of 40 °C and a maximum altitude of 1,000 m above sea level. The rated power must be reduced according to the following formula in the case of higher ambient temperatures or altitudes:

$$\mathbf{PNred = PN \times fT \times fH}$$

AC motors

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

They list the factors f_T and f_H for AC motors:



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T = Ambient temperature
H = Installation altitude above sea level

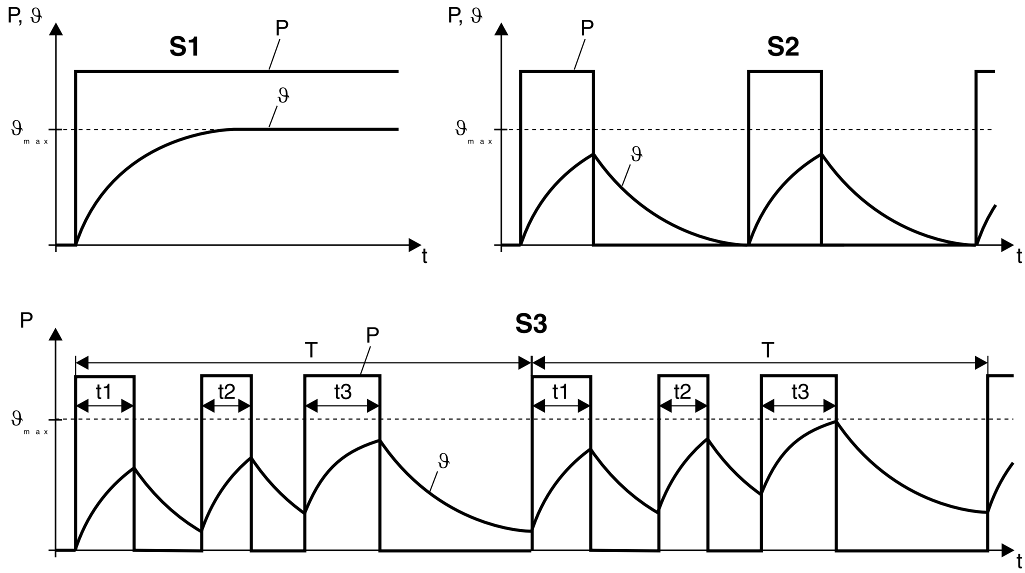
Operating modes According to IEC60034-1 (EN60034-1), the following duty types are defined:

Operating mode	Explanation
S1	**Continuous duty:** Operation at a constant load; the motor reaches thermal equilibrium.
S2	**Short-time duty:** Operation at constant load for a given time followed by a time at rest. The motor returns to ambient temperature during the rest period.
S3	**Intermittent periodic duty:** The starting current does not significantly affect the temperature rise. Characterized by a sequence of identical duty cycles, each including a time of operation at constant load and a time at rest. Described by the "cyclic duration factor (cdf)" in %.
S4-S10	**Intermittent periodic duty:** The switch-on sequence affecting the temperature rise. Characterized by a sequence of identical duty cycles, each including a time of operation at constant load and a time at rest. Described by the "cyclic duration factor (cdf)" in % and the number of cycles per hour.

TIP

S1 continuous duty is usually assumed for inverter operation. In the case of a high number of cycles per hour, it might be necessary to assume S9 intermittent duty.

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



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Cyclic duration factor (cdf) The cyclic duration factor (cdf) is the ratio between the period of loading and the duration of the duty cycle. The duration of the duty cycle is the sum of times of operation and times at rest and de-energized. A typical value for the duration of the duty cycle is ten minutes.

$$\mathbf{CDF} = \frac{\textbf{sum of times of operation (t1 + t2 + t3)}}{\textbf{duty cycle duration (T)}} \bullet \mathbf{100\ [\%]}$$

Power increasing factor K

Unless specified otherwise, the rated power of the motor refers to duty type S1 (100 % cdf) according to IEC60034 (EN60034). If a motor designed for S1 and 100 % cdf is operated in mode S2 "short-time duty" or S3 "intermittent periodic duty", the rated power can be multiplied by the power increasing factor K specified on the nameplate.

Operating mode			Power increasing factor K
S2	Operating time	60 min 30 min 10 min	1.1 1.2 1.4
S3	Cyclic duration factor (cdf)	60% 40% 25% 15%	1.1 1.15 1.3 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, starting 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.

6.3 Switching 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 % cdf). The power demand calculated from the load torque of the driven machine is the same as the rated motor power.

High switching frequency

Many applications call for a high switching frequency at low counter-torque, such as in travel drives. 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 section "Thermal characteristics - DR, DRL" on page 76).

No-load switching frequency Z_0

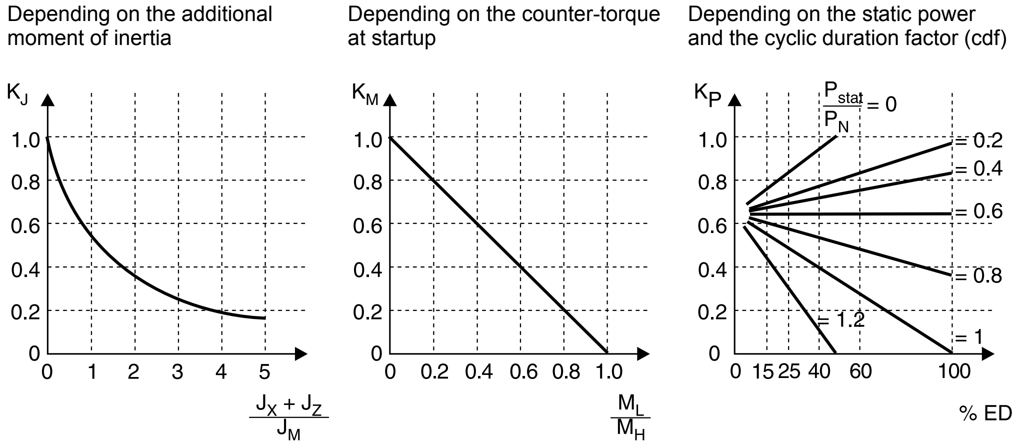
SEW-EURODRIVE specifies the permitted switching frequency of a motor as the no-load switching frequency Z_0 at 50 % cdf. This value indicates the number of times per hour that the motor can accelerate the mass moment of inertia of its rotor up to speed without counter-torque at 50 % cdf. If an additional mass moment of inertia has to be accelerated or if an additional load torque occurs, the starting time of the motor will increase. Increased current flows during this acceleration time. This means the motor is subjected to increased thermal load and the permitted switching frequency is reduced.

Permitted motor switching frequency

You can determine the permitted switching frequency Z of the motor in cycles/hour [1/h] using the following formula:

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

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



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

Example

Brakemotor: DRS71M4 BE1

No-load switching frequency Z_0 = 11000 per 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 is 6.3 s, the operating time 3.8 s.

Permitted brake switching frequency

If you are using a brakemotor, you have to check whether the brake is approved for use with the required switching frequency "Z". Refer to the information in section "Permitted braking work of the BE brake in hoist applications" on page 274 ff and in section "Permitted braking work of the BE brake in hoist applications" on page 278 ff.

6.4 Mechanical characteristics

Degrees of protection to EN 60034 (IEC 60034-5)

AC motors and AC brakemotors are available with degree of protection IP54 as standard. Enclosures 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 ∅ 50 mm and larger	Protection against dripping water
2	Protected against access to hazardous parts with a finger	Protection against solid foreign objects ∅ 12 mm and larger	Protection against dripping water if the housing is tilted by up to 15°
3	Protected against access to hazardous parts with a tool	Protection against solid foreign objects ∅ 2.5 mm and larger	Protection against spraying water
4	Protected against access to hazardous parts with a wire	Protection against solid foreign objects ∅ 1 mm and larger	Protection against splashing water
5		Dust-proof	Protection against water jets
6		Dust-proof	Protection against powerful water jets
7	-	-	Protected against temporary immersion in water
8	-	-	Protected against permanent immersion in water

Vibration class of motors

The rotors of AC motors are dynamically balanced with a half key. The motors are in vibration class "A" according to IEC 60034-14:2003 or vibration level "N" according to DIN ISO 2373 (EN60034-14:1997). For special requirements on the mechanical running smoothness, single-speed motors without options installed (without brake, forced cooling fan, encoder, etc.) are available in a low-vibration design, vibration class "B" according to IEC 60034-14:2003 or vibration level "R" according to DIN ISO 2373.

Corrosion protection KS

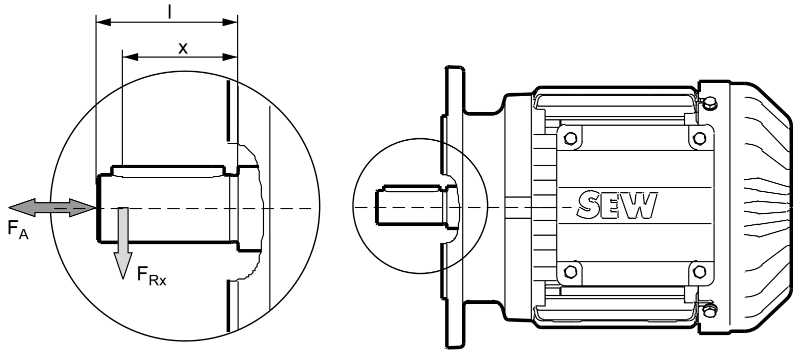
If the motors are exposed to the weather, e.g. outdoor use without roof, the KS corrosion protection variant must be used.

6.5 Overhung loads - DR, DRL

Permitted overhung load for DR motors

Refer to the following diagrams for the permitted overhung load F_{Rx} for DR AC (brake) motors. 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.

The following figure shows the application point of the overhung load.



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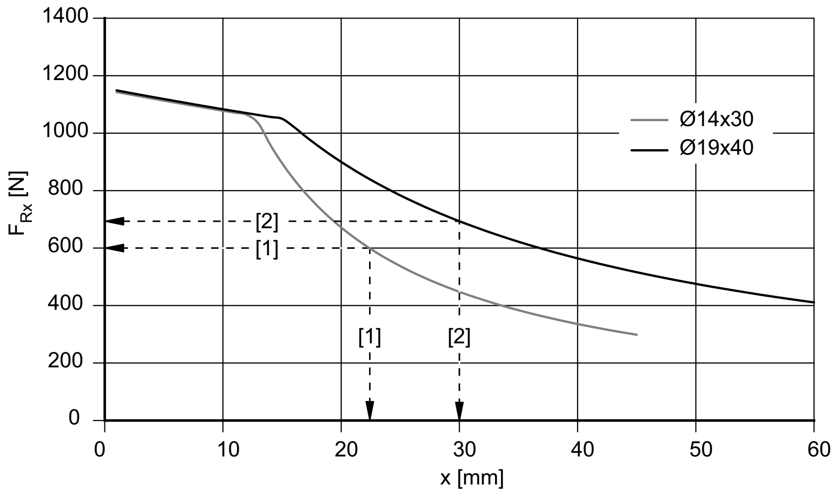
l	= Length of the shaft end
x	= Distance between overhung load application point and shaft shoulder
F_{Rx}	= Overhung load at force application point
F_A	= Axial force

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

Permitted axial load for DRL motors

The determined value F_{Rx} for the DR motors is reduced by 0.8 to calculate the permitted overhung load $F_{Rx\text{-}DRL}$ for the DRL motors:

$F_{Rx\text{-}DRL} = 0.8 \times F_{Rx}$

Permitted axial load for DR and DRL motors

You can then determine the permitted axial force F_A by means of the previously determined overhung load F_{Rx}:

$F_A = 0.2 \times F_{Rx}$

$F_{A\text{-}DRL} = 0.2 \times F_{Rx\text{-}DRL}$

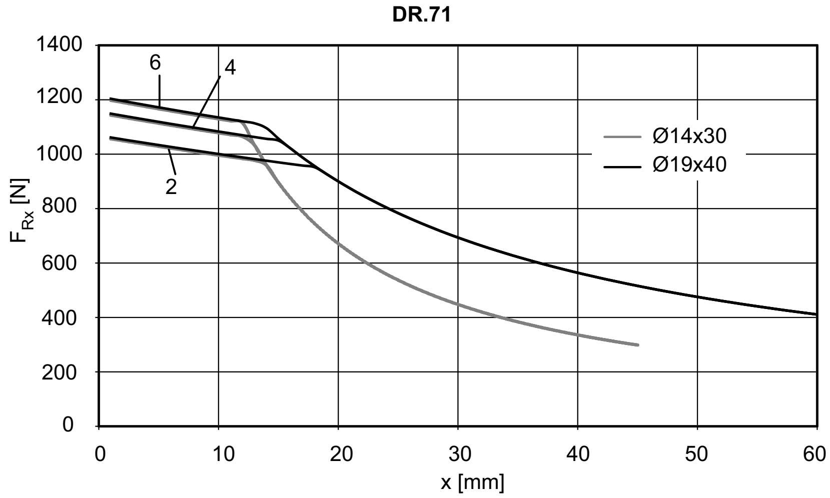
Permitted overhung loads of pole-changing motors

The permitted overhung loads for pole-changing motors are the same as those for 4-pole motor.

Overhung load diagrams of 2, 4 and 6-pole DR motors

Overhung load diagram for DR.71

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



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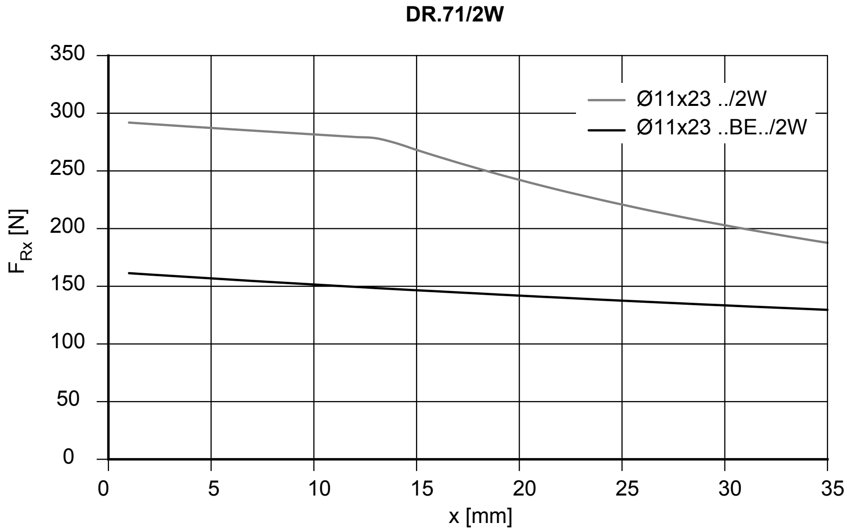
2 2-pole 4 4-pole 6 6-pole

Overhung load diagram DR.71 at second shaft end

Overhung load diagram for 2, 4, 6-pole DR.71 motors on the 2nd shaft end:



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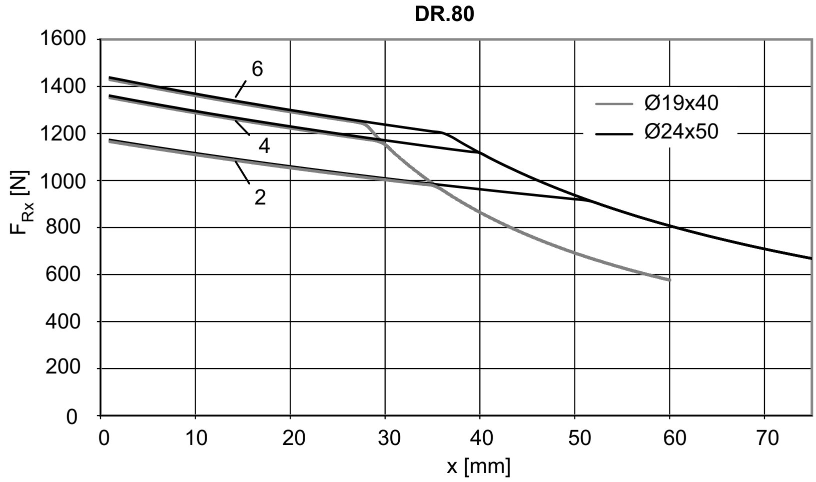
Overhung load diagram for DR.80

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



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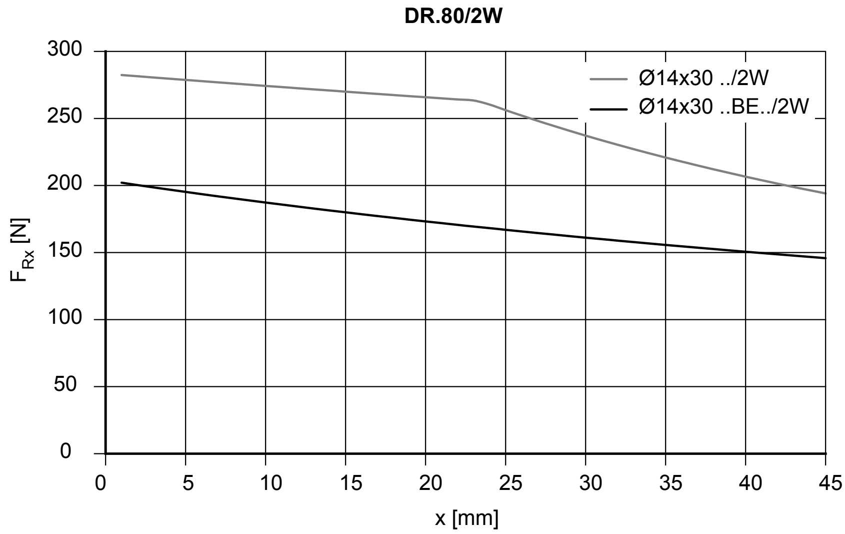
2	2-pole	4	4-pole	6	6-pole

Overhung load diagram DR.80 at second shaft end

Overhung load diagram for 2, 4, 6-pole DR.80 motors on the 2nd shaft end:



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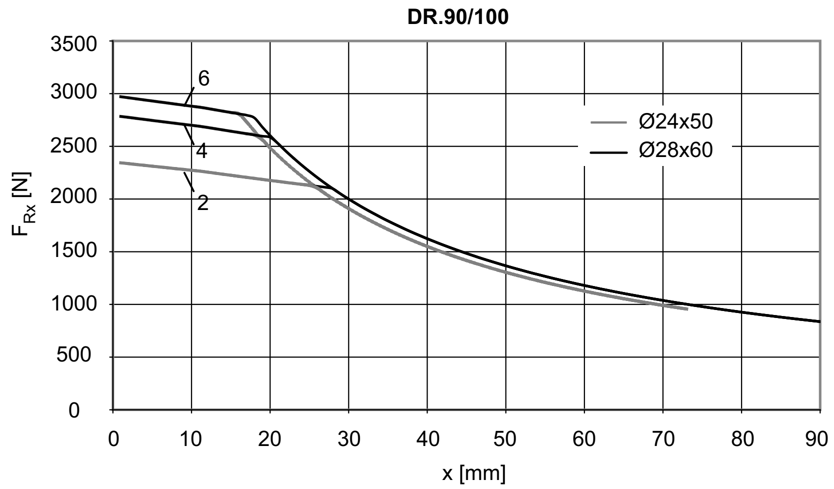
Overhung load diagram DR.90 and DR.100

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



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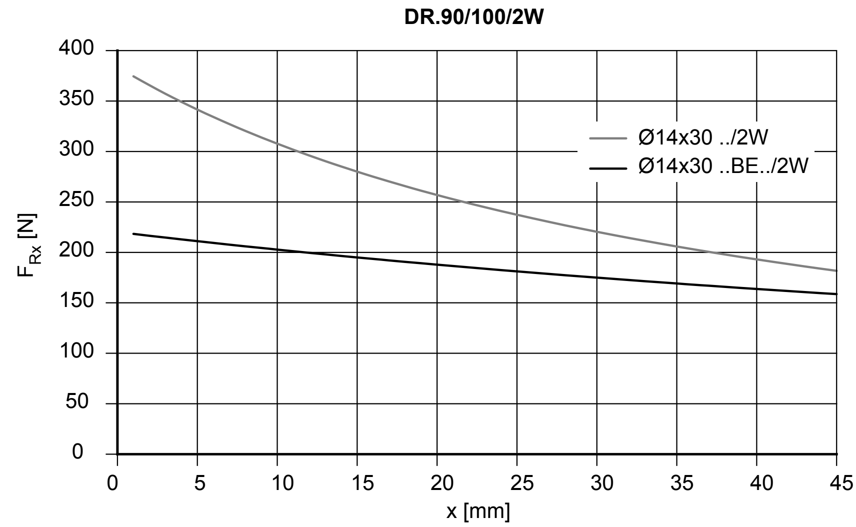
2 2-pole 4 4-pole 6 6-pole

Overhung load diagram DR.90 and DR.100 at second shaft end

Overhung load diagram for 2, 4, 6-pole DR.90 and DR.100 motors on the 2nd shaft end:



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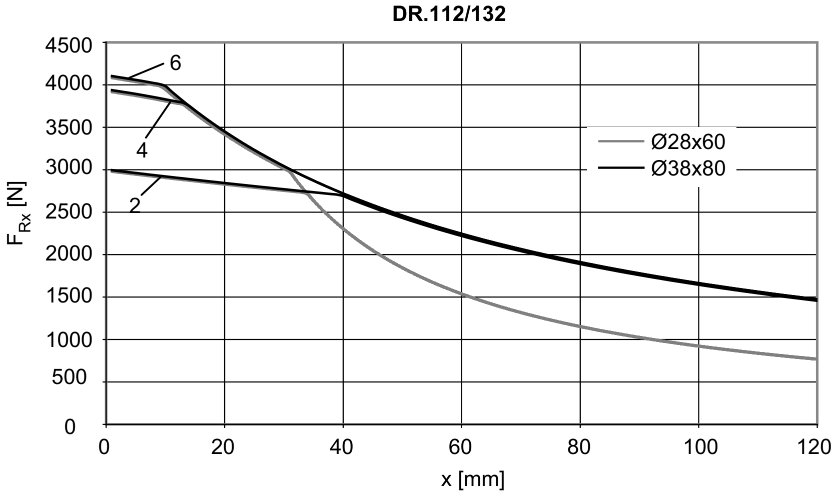
Overhung load diagram DR.112 and DR.132

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



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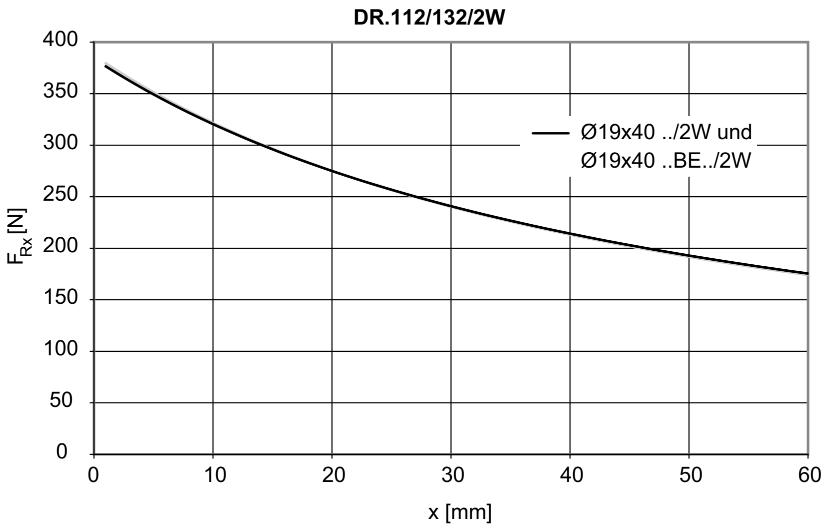
2 2-pole 4 4-pole 6 6-pole

Overhung load diagram DR.112 and DR.132 at second shaft end

Overhung load diagram for 2, 4, 6-pole DR.112 and DR.132 motors on the 2nd shaft end:



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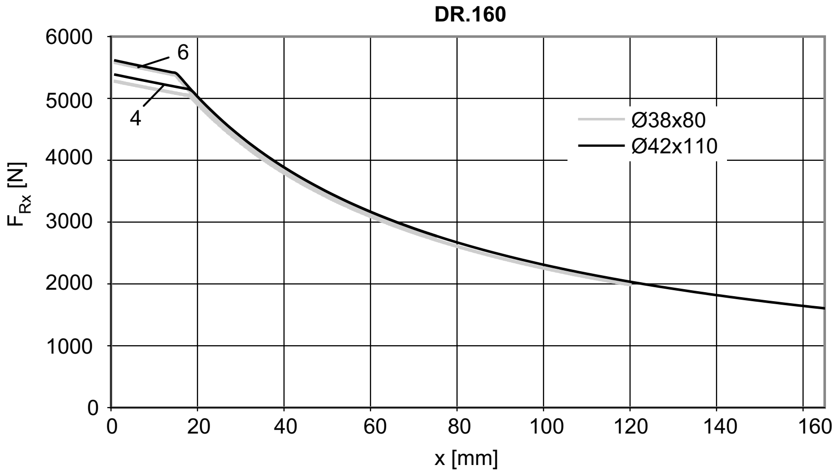
Overhung load diagram DR.160

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



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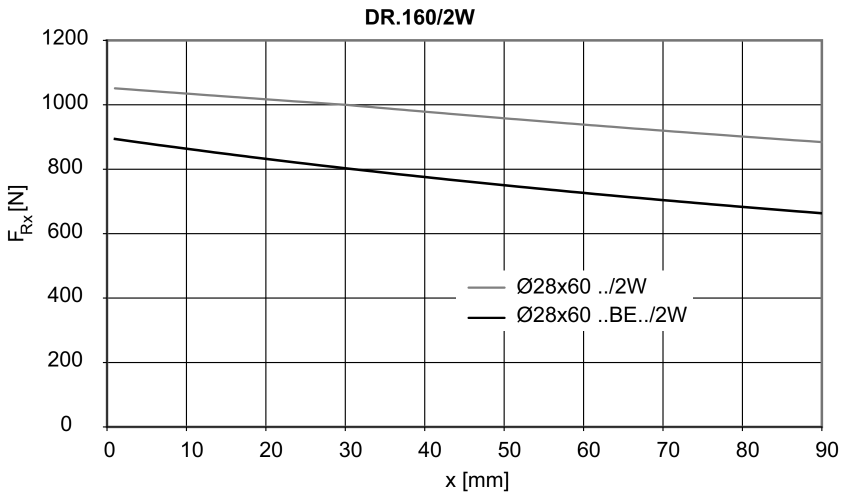
4 4-pole 6 6-pole

Overhung load diagram DR.160 at second shaft end

Overhung load diagram for 4, 6-pole DR.160 motors at second shaft end:



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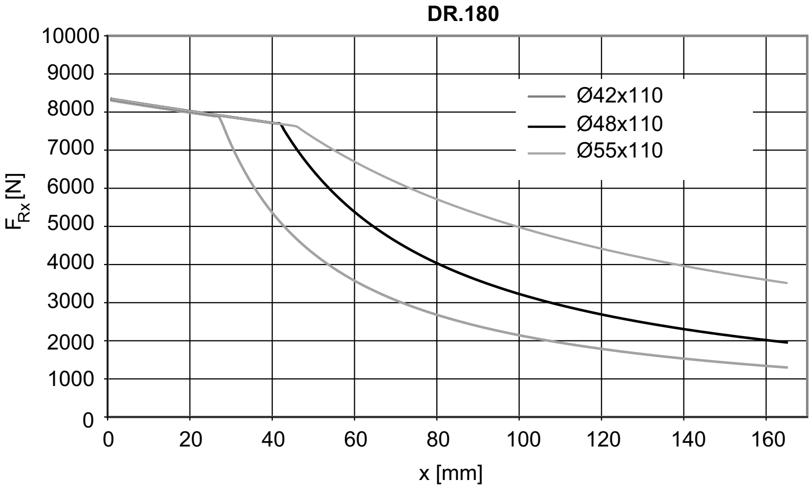
Overhung load diagram DR.180

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



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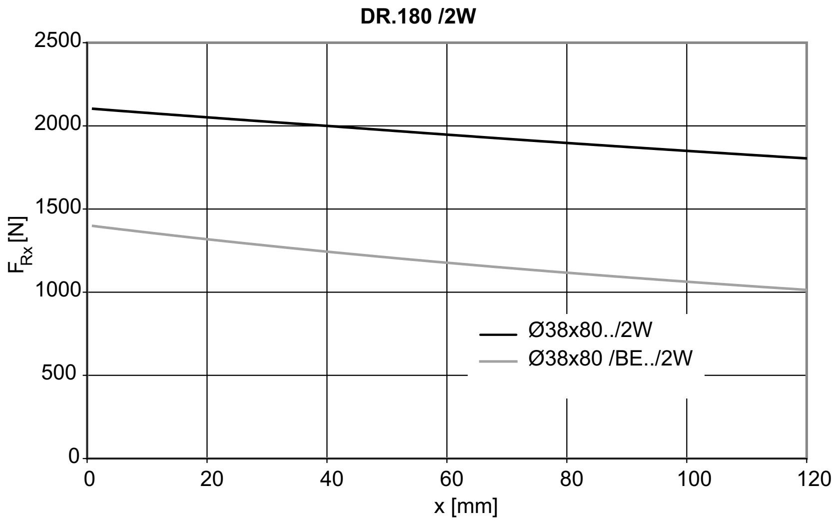
Overhung load diagram DR.180 at second shaft end

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



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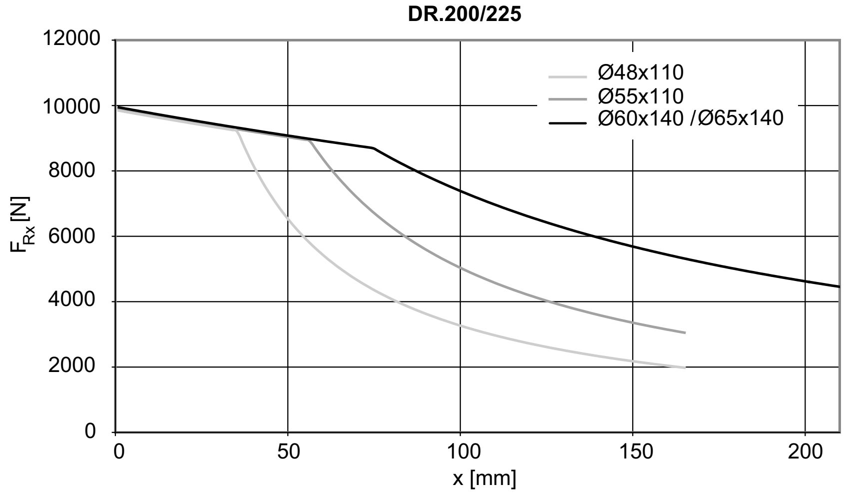
Overhung load diagram DR.200 and DR.225

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



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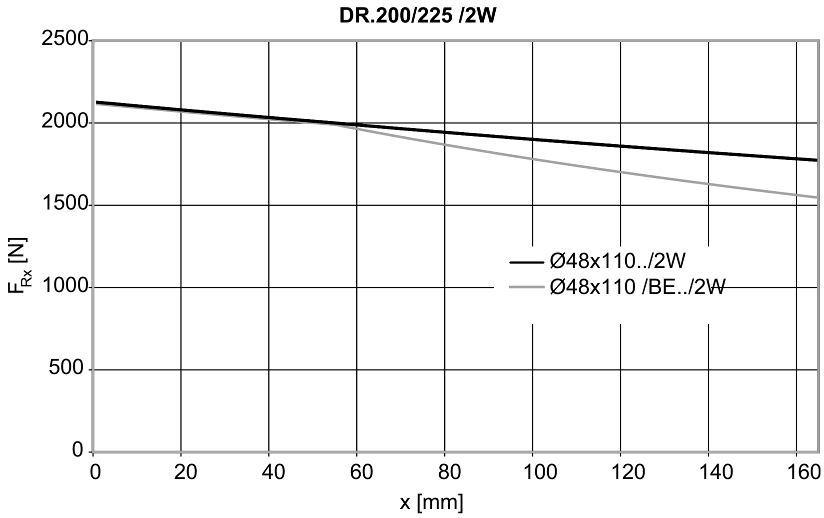
Overhung load diagram DR.200 and DR.225 at second shaft end

Overhung load diagram for 4-pole DR.200 and DR.225 motors at second shaft end:



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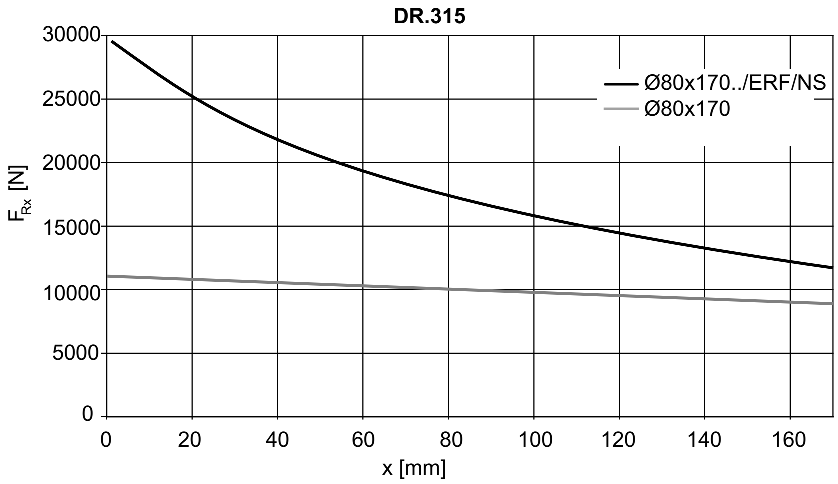
Overhung load diagram DR.315

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



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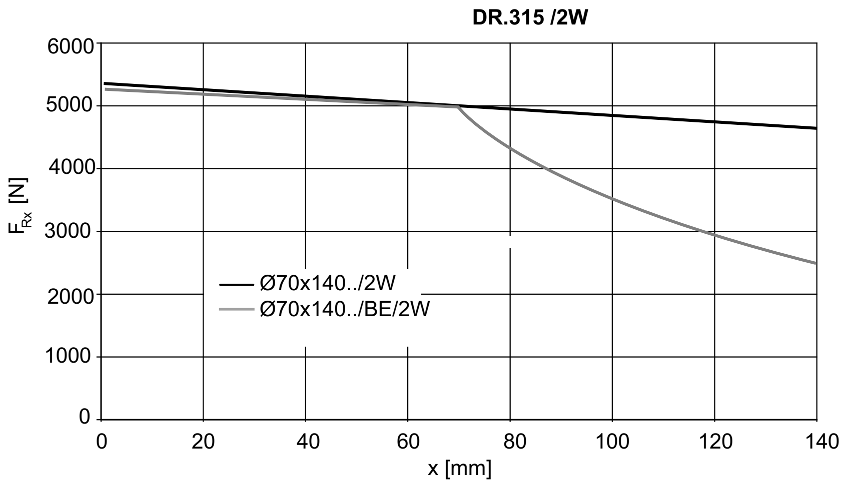
	TIP
	Conversion of the overhung load into the axial load as described on page 83 must not be used with reinforced bearings (../ERF).

Overhung load diagram DR.315 at second shaft end

Overhung load diagram for 4-pole DR.315 motors at second shaft end:



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Permitted ball bearing types

The following table shows the permitted ball bearing types:

Motor type	A-side bearing		B-side bearing	
	IEC motor	Gearmotor	AC 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-DR.100	6306-2Z-J-C3		6205-2Z-J-C3	6205-2RS-J-C3
DR.112-DR.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-DR.225	6314-2Z-J-C3		6314-2Z-J-C3	6314-2RS-J-C3

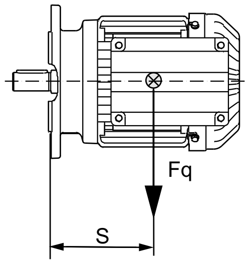
Motor type	A-side bearing		B-side bearing	
	IEC motor	Gearmotor	IEC motor	Gearmotor
DR.315K /315S	6319-J-C3	6319-J-C3	6319-J-C3	6319-J-C3
DR.315M /315L		6322-J-C3		6322-J-C3
DR.315K /315S /ERF[1)]	NU319E		6319-J-C3	6319-J-C3
DR.315M /315L /ERF[1)]				6322-J-C3

1) Reinforced bearing

6.6 Center of gravity of the DR. motors

The center of gravity of a motor is a theoretical variable which assumes that the entire mass of the motor (see technical data page 44 ff) is concentrated in one point and acts on this point with the weight F_q.

Please take this into account when combining IEC motors with gear units that are mounted using adapters.



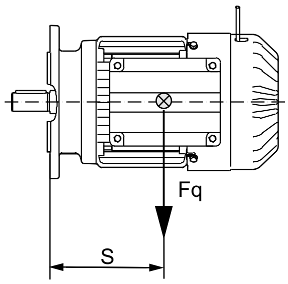
63823axx

Motor type	Center of gravity S [mm]
DR.71S	86
DR.71M	92
DR.80S	106
DR.80M	119
DR.90M	118
DR.90L	124
DR.100M	137
DRP100M	140
DR.100L / LC	153
DR.112M	153
DR.132S	167
DR.132M / MC	193
DR.160S / M / MC	205
DR.180S / M	224
DR.180L / LC	237
DR.200L	228
DR.225S	250
DR.225M / MC	264
DR.315K / S	419
DR.315M / L	505

6.7 Center of gravity of the DR. brakemotors

The center of gravity of a brakemotor is a theoretical variable which assumes that the entire mass of the brakemotor (see technical data page 44 ff) is concentrated in one point and acts on this point with the weight F_q.

Please take this into account when combining IEC motors with gear units that are mounted using adapters.



63824axx

Motor type	Brake	Center of gravity S [mm]
DR.71S	BE05	108
DR.71M	BE1	112
DR.80S	BE1	148
DR.80M	BE2	150
DR.90M	BE2	142
DR.90L	BE5	151
DR.100M	BE5	165
DR.100L / LC	BE5	180
DR.112M	BE5	179
DR.132S	BE11	202
DR.132M / MC	BE11	226
DR.160S	BE20	265
DR.160M / MC	BE20	255
DR.180S	BE20	287
DR.180M / L	BE30	302
DR.180LC	BE32	318
DR.200L	BE32	340
DR.225S	BE32	340
DR.225M	BE32	363
DRS225MC	BE32	354
DR.315K / S	BE122	489
DR.315M / L	BE122	550

6.8 Project planning notes for asynchronous servomotors

You can tap the full potential of the asynchronous servomotor just by projecting it appropriately.

The schematic process is shown on page 96 .

Dynamics package D1 or D2

You must decide during project planning which dynamics package is required and will be implemented.

This will affect the dimensioning, especially the size of the inverter.

The higher mass moments of inertia of the motor compared to the synchronous servomotor, roughly factor 10 or more, offer advantages for controlling loads with high intrinsic inertia, also when considering the reduced ratio through the gear unit reduction ratio.

For detailed information, refer to page 17.

For motors at a glance, see page 22 ff.

Sine encoder

/ES7S /EG7S

The sine encoder included in the drive package has a resolution of 1024 sine periods.

In a closed-loop control system with inverter, the inverter evaluates and details this 10 bit speed signal with a factor of 3 bits. This allows for a speed setting range of 1:5000. Speeds below 1 rpm can be realized with great precision.

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

For detailed information, refer to page 285 ff.

Absolute encoder

/AS7. /AG7.

Instead of the sine encoder, you can install an absolute encoder in the same place without additional length.

In addition to the absolute information, the RS485 encoder also offers better motor control (by one bit = 2048 sine periods).

The SSI encoder establishes the connection to the safety elements in the control cabinet.

For detailed information, refer to page 285 ff.

Forced cooling fan

/V

The optional use of a forced cooling fan prevents torque reduction at low speed.

The relationship is even reversed, that means the permitted standstill torque at speed "0" with a forced cooling fan is 10 - 15% higher that the rated torque.

For detailed information, refer to page 311 ff.

For limit characteristic curves, see "AC Motors" manual.

Inverter utilization

DRL with MDx and MX

During project planning for an asynchronous servomotor, you determine

- an average speed and the average torque,
- the maximum speed and 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.

For technical data of DRL motors, see page 64.

For combinations of DRL-MDx, combinations of DRL-MX, limit characteristic curves, see "AC Motors" manual.

6.9 *Project planning procedure - DR, DRL*

The following flow diagram illustrates the project planning 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

↓

Calculate the relevant application data Travel diagram Speeds Static, dynamic torques Regenerative power

↓

Gear unit selection Definition of gear unit size, gear unit reduction ratio and gear unit type Check the positioning accuracy Check for gear unit utilization ($M_{a\ max} \geq M_{a\ (t)}$). Check the input speed (churning losses)

↓

Motor selection Maximum torque For dynamic drives: Effective torque at medium speed Maximum speed Observe dynamic and thermal torque curves Select the correct encoder Motor equipment (brake, plug connector, TF selection, etc.)

↓

Selecting the inverter Motor/inverter assignment Continuous current and peak current in current-controlled inverters/axes.

↓

Selecting the braking resistor based on the calculated regenerative power, cdf and peak breaking power.

↓

Options EMC measures Operation/communication, Additional functions

↓

Make sure that all requirements have been met.

6.10 Project planning example for asynchronous servomotors

In the example, the drive for a trolley is determined.

The following data is provided:

- Weight of the load: m_L = 300 kg
- Weight 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 motion: F_F = 90 N / 1000 kg
- Efficiency of the machine: η = 90 %

Calculated values:

- Maximum output torque: M = 102.2 Nm
- Maximum output speed: n = 477 1/min

Gear unit selection

- Gear unit reduction ratio: $i_{setp.}$ = 6.28
- Selecting the gear unit size and reduction ratio: K47 with i = 5.81

  Caution: The overhung load is too high with the recommended gear rack pinion factor f_z = 2 (see catalog "Synchronous Servo Gearmotors") (F_R = 5437 N). 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

- Converting the torque to the motor side

  $M_{\mathbf{max}}$ = 19.56 Nm at n = 2774 rpm

  $n_{\mathbf{max}}$ = 2774 rpm at M = 19.56 Nm

  M_{max} and n_{max} indicate the maximum operating point; in this case it is identical for M_{max} and n_{max}.

Effective operating point

$M_{\mathbf{eff}}$ = 8.26 Nm at $\bar{n}$ = 1981 rpm

Motor pre-selection

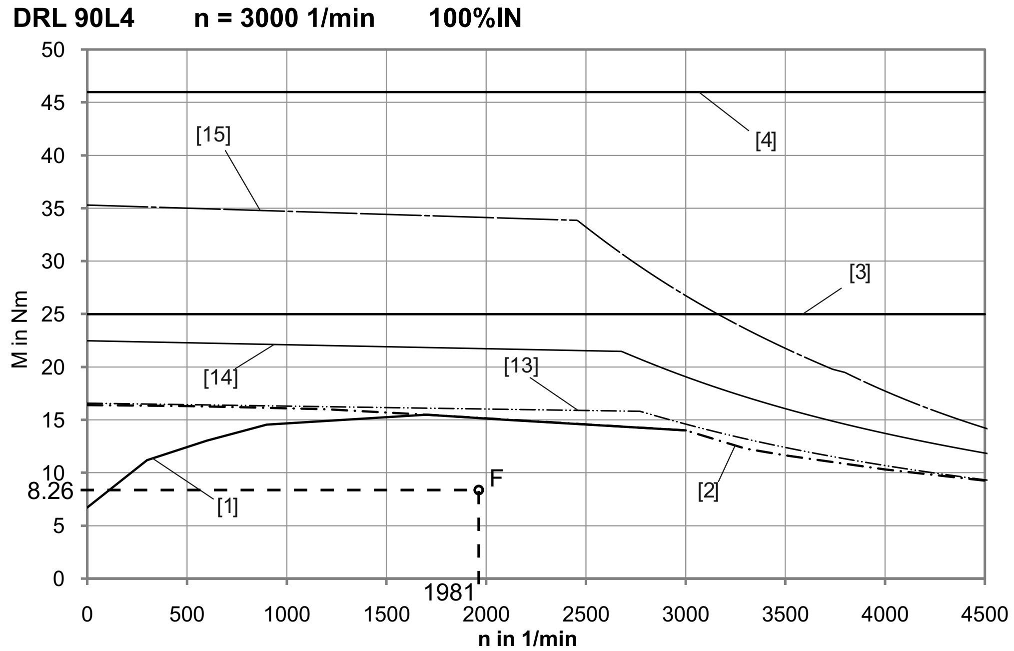
- DRL90L4 with n_{base} = 2683 rpm and M_{max} = 19.9 Nm
- Checking the mass moment of inertia: J_{ext}/J_{mot} = 12.03

MOVIDRIVE® inverter selection

- The effective operating point (F) for the motor must be below the S_1 limit curve. This means the thermal load on the motor is within the permitted range.
- Furthermore, the effective operating point (F) must be below the characteristic curve for the designated motor-inverter combination in the speed/torque diagram for 100% inverter utilization. This means the load on the inverter (continuous duty) is within the permitted range.

DRL90L4, n_N = 3000 rpm, 100% I_N

Determining the effective operating point:



64034axx

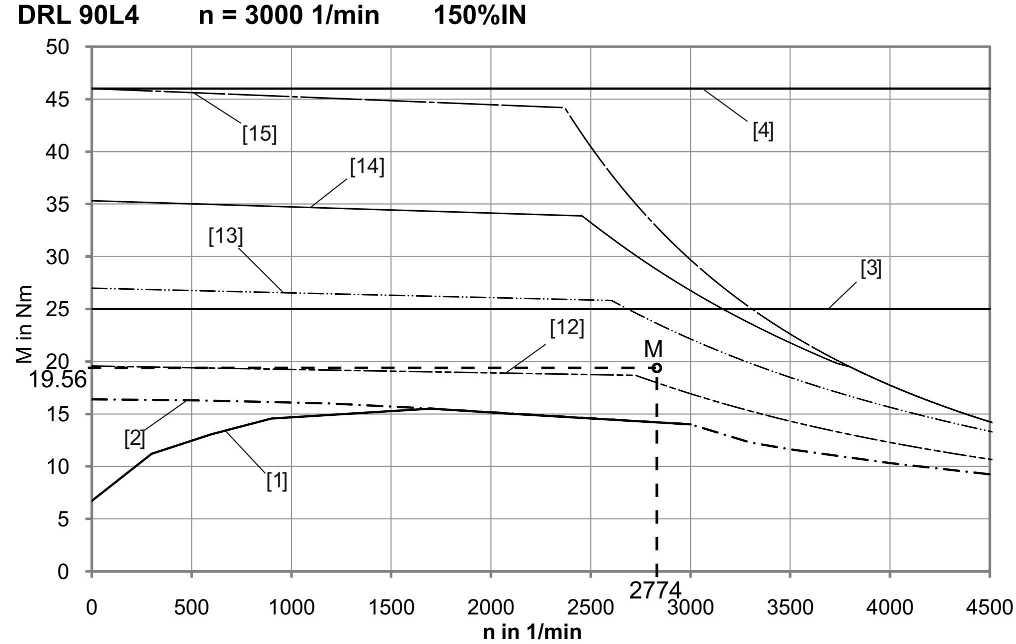
Key

[1]	S1 characteristic curve	[12]	4 kW inverter output
[2]	S1 characteristic curve with forced cooling fan	[13]	5.5 kW inverter output
[3]	Maximum limit torque of dynamics package 1	[14]	7.5 kW inverter output
[4]	Maximum limit torque of dynamics package 2	[15]	11 kW inverter output

- In the speed/torque diagram for 150% inverter utilization, the maximum operating point (M) (probably two different points for maximum speed and maximum torque) must be below the characteristic curve for the designated motor-inverter combination. This means the load on the inverter (maximum operation) is within the permitted range.

DRL90L4, n_N = 3000 rpm, 150% I_N

Determine the maximum operating point:



64035axx

Key

[1]	S1 characteristic curve	[12]	4 kW inverter output
[2]	S1 characteristic curve with forced cooling fan	[13]	5.5 kW inverter output
[3]	Maximum limit torque of dynamics package 1	[14]	7.5 kW inverter output
[4]	Maximum limit torque of dynamics package 2	[15]	11 kW inverter output

TIP

The inverter current at motor standstill should be less than 70% of the rated motor current.

This means the required inverter has been determined:

- MDX61B0055-5A3, 5.5 kW

Project planning result

Selected motor:

- DRL90L4/F./TF/ES7S

Selected drive inverter:

- MDX61B0055-5A3 with 5.5 kW inverter output

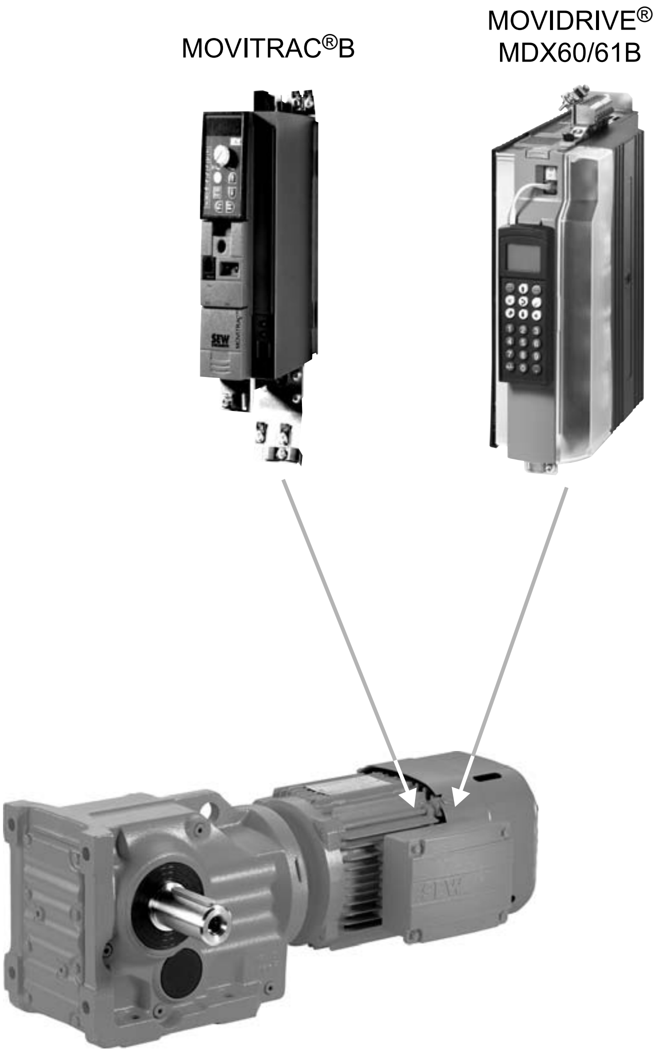
6.11 Operation on inverter

Range of products

The extensive product range of SEW-EURODRIVE inverters is available for designing electronically controlled drives. SEW-EURODRIVE offers the following inverter series:

- MOVITRAC® **B:** Compact and inexpensive frequency inverter for the power range 0.25 – 160 kW. Single-phase and three-phase supply system connection for AC 230 V and three-phase supply system connection for AC 400 – 500 V.
- MOVIDRIVE® **MDX60/61B:** High-performance drive inverter for dynamic drives in the 0.55 – 160 kW power range. Great diversity of applications due to extensive expansion options with technology and communication options. Three-phase supply system connection for AC 230 V and AC 400 – 500 V.
- MOVIAXIS® **MX:** Powerful and versatile multi-axis servo inverter in the power range from 10 kW rated power to 187 kW peak power. Great diversity of applications due to extensive expansion options with technology and communication options. Sinusoidal power regeneration as an option. 3-phase supply system connection for AC 380 – 500 V.

Range of inverters for DRS, DRE, DRP series AC motors:



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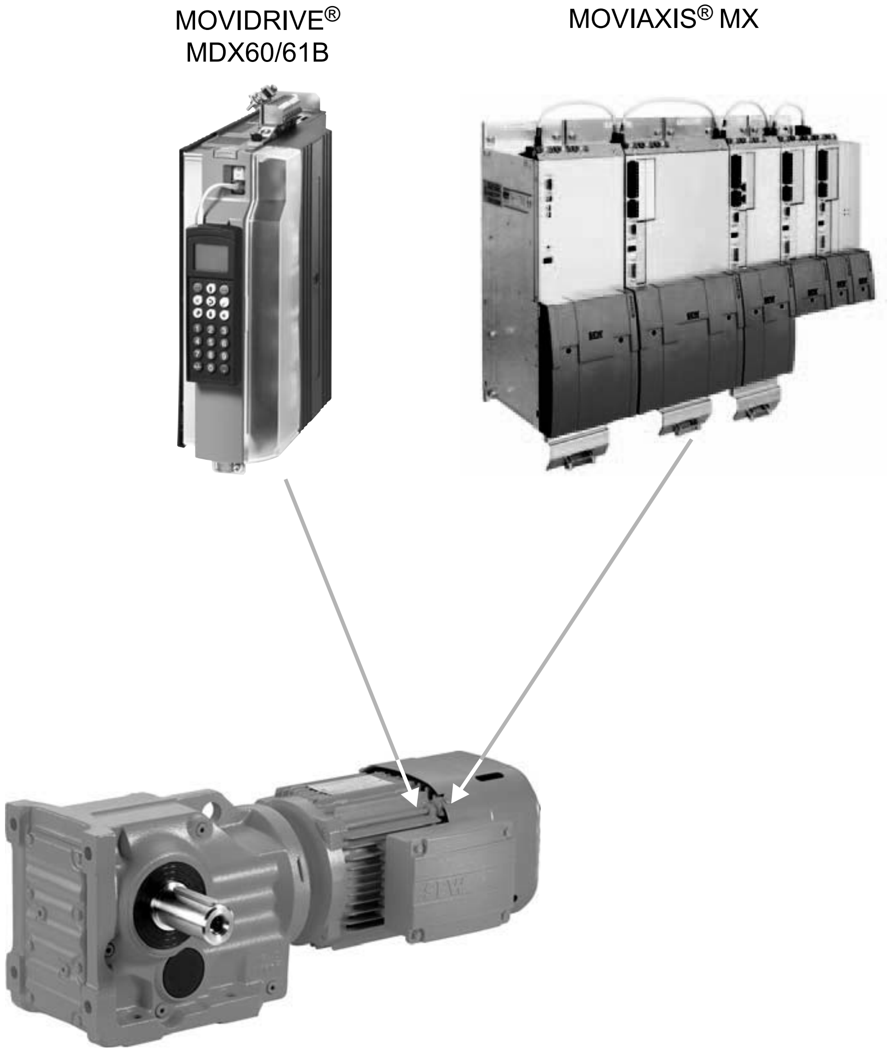
Range of inverters for asynchronous DRL servomotors:



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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 features.

Product features	MOVITRAC® B	MOVIDRIVE® MDX60/61B	MOVIAXIS® MX
Voltage range	1 × AC 200 – 240 V (limited power range) 3 × AC 200 – 240 V (limited power range) 3 × AC 380 – 500 V	3 × AC 200 – 240 V (limited power range) 3 × AC 380 – 500 V	3 × AC 380 – 500 V
Power range	0.25 – 160 kW	0.55 – 250 kW	10 – 75 kW
Rated current range of the axis modules		4 – 250 A	2 – 133 A
Overload capacity	150% I_N[1)] briefly and 125% I_N permanently during operation without overload		250% for max. 1 second
4Q capable	Yes, with integrated brake chopper as standard.		
Integrated line filter	At 1 × AC 200 - 240 V: according to class B limit At 3 × AC 200 - 240 V and 3 × AC 380 - 500 V: sizes 0, 1 and 2 according to class A limit	Sizes 0, 1 and 2 According to limit class A	External line filter
TF input	Yes		
Control modes	V/f or voltage-controlled flux vector control (VFC)	V/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	No	Option	Integrated in basic unit
Integrated positioning and sequence control system	No	Standard	Standard
Serial interfaces	System bus (SBus) and RS-485		CAN-based system bus, optional EtherCAT-based system bus
Fieldbus interfaces	Optional via gateway PROFIBUS, INTERBUS, CANopen, DeviceNet, Ethernet	Optional PROFIBUS-DP, INTERBUS, INTERBUS LWL, CANopen, DeviceNet, Ethernet	Optional PROFIBUS-DP, EtherCAT,
Application options	IEC-61131 control	Input/output card Synchronous operation Absolute encoder card IEC-61131 control	Synchronous operation, electronic gear, touch probe, event control, electronic cam, virtual encoder, single-axis positioning
Max. speed		6000 rpm	10000 rpm
Safe stop	Yes	Yes	Option
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% I_N.

6.12 Torque limit curves for DRS, DRE, DRP motors operated on an inverter

Thermally approved torque

Note thermally approved torque in project planning for operation of DR asynchronous AC motors with inverter. The following factors determine the thermally permitted torque:

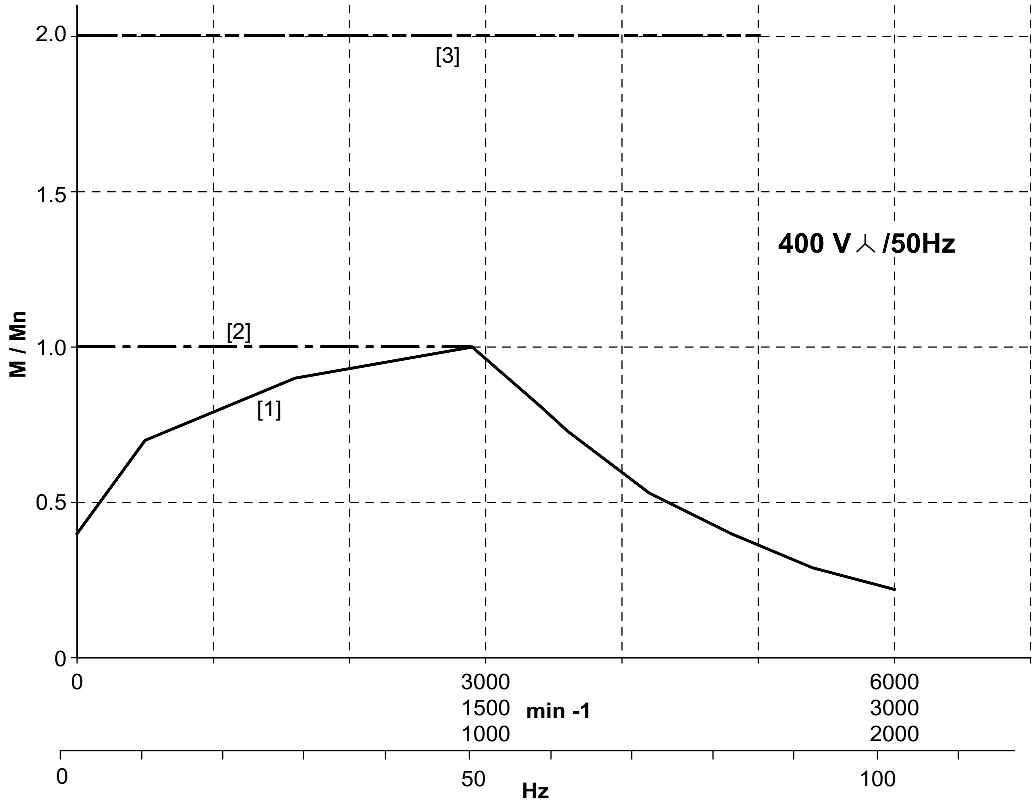
- Duty cycle
- Type of cooling: Self-ventilation or forced cooling
- Base frequency: f_{base} = 50 Hz (400 V ⅄) or f_{base} = 87 Hz (230 V △)

Use the torque limit curves to determine the thermally permitted torque. The projected, effective torque has to be less than the limit curve value. The following illustration shows the limit curves of 4-pole asynchronous DR AC motors with f_{base} = 50 Hz and f_{base} = 87 Hz. The following peripheral conditions apply to the shown limit curves:

- Duty type S1
- Supply voltage of the inverter V_{line} = 3 × AC 400 V
- Motor in thermal class 155 (F)

f_{base} = 50 Hz (400 V ⅄/50 Hz)

The following diagram shows the limit curves for operation at f_{base} = 50 Hz. The curves are different for those motors with self-ventilation and those with forced cooling (= optional forced cooling fan).



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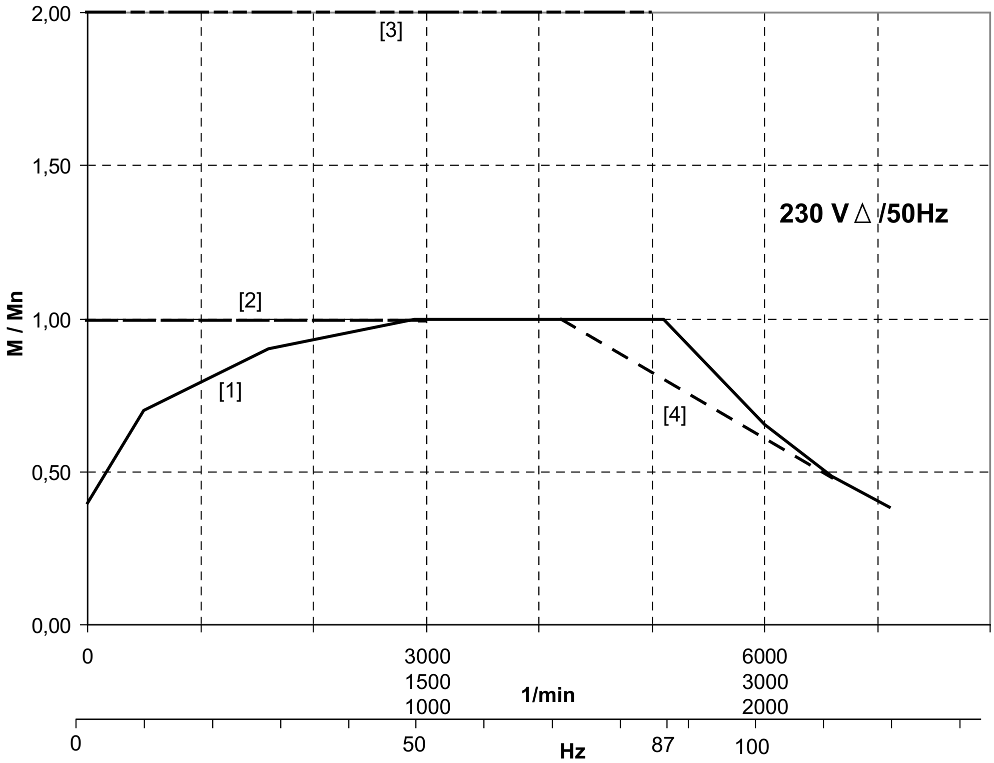
[1] S1 operation with self-ventilation (= without forced cooling fan)

[2] S1 operation with forced cooling (= with forced cooling fan)

[3] Mechanical limitations for gearmotors

f_{base} = 87 Hz (230 V △/50 Hz)

The following diagram shows the limit curves for operation at f_{base} = 87 Hz. The curves are different for those motors with self-ventilation and those with forced cooling (= optional forced cooling fan).



62582axx

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

[2] S1 operation with forced cooling (= with forced cooling fan)

[3] Mechanical limitation for gearmotors

[4] Limitation for shaft heights 280 – 315

Mechanical limit

For electric machines operated on a frequency inverter, the maximum torque and the maximum speed must be regarded as the mechanical limit.

The maximum torque is based on the mechanical limit (curve [3]) in the diagrams. Only DRL motors can be operated with a higher torque for a short time due to their design.

Additional loads caused by the customer system, such as overhung or axial loads due to belt drives, must be taken into account for all motors.

Do not exceed the maximum speed of the motor. The following table lists these values for the standard motors. They refer to motors with FKM (fluoroelastomers) oil seals.

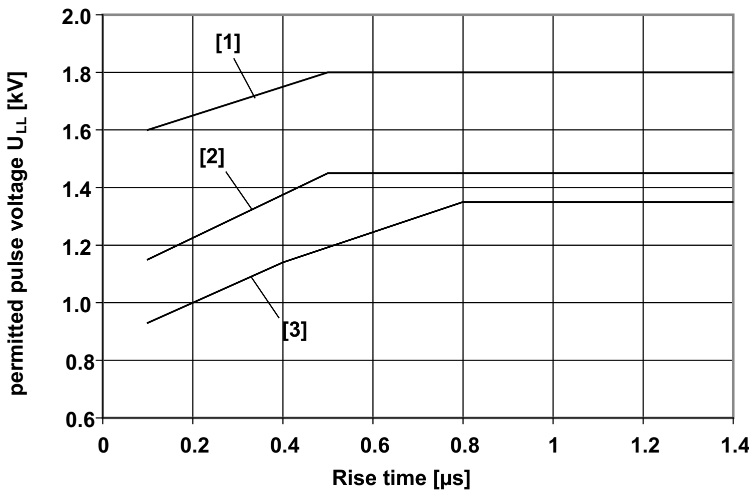
Additional motor options influence these speeds. Contact SEW-EURODRIVE in such cases. For brakemotors, additional project planning guidelines for the braking work must be observed.

Size	n_{max} [rpm]	
	Normal motor	Brakemotor
56	6000	4500
63	6000	4500
71	6000	4500
80	6000	4500
90	6000	4500
100	5200	4500
112	5200	3600
132	4500	3600
160	4500	3600
180	4500	3600
200/225	4000	3600
250/280	2600	2500
315	2500	2500

6.13 DR series AC motors operated on non-SEW inverters

When motors are powered from inverters, you must adhere to the wiring instructions issued by the inverter manufacturer. It is essential to observe the operating instructions for the frequency inverter.

Operation 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 DR motors with reinforced insulation (../RI)

[2] Permitted pulse voltage for DR standard

[3] Permitted pulse voltage according to IEC60034-17

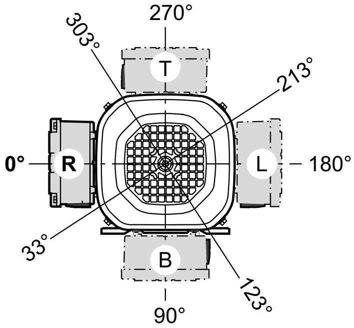
	TIP
	Compliance with the following limit values must be checked and considered: • The supply voltage level at the non-SEW inverter • The threshold of the brake chopper voltage • The operating mode of the motor (motive/regenerative) If the permitted pulse voltage is exceeded, you must install limiting measures, such as filters, chokes or special motor cables. You should also consult the manufacturer of the frequency inverter.

7 Dimension Sheets for DR./DRL Series AC Motors/Brakemotors

7.1 Notes on the dimension sheets

Observe the following notes regarding dimension sheets for 4-pole DR 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..
- Leave a clearance of at least half the fan guard diameter to provide unhindered air access.
- For brakemotors, do not forget to add the space required for removing the fan guard (= fan guard diameter).
- Different positions are possible for the manual brake release, see following figure. The four positions 33°, 123°, 213° or 303° are basically possible.



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- The manual brake release is located at an angle of 303° to the terminal box as standard. 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°. The forced cooling fan option (/V) limits the possible positions of the manual brake release.

  Brakemotors with forced cooling fan:

Motor sizes	Possible position of the manual brake release for terminal box position			
	0° (R)	90° (B)	180° (L)	270° (T)
71..BE../V	213°, 303°	33°, 303°	33°, 123°	123°, 213°
80..BE../V				
90..BE../V				
100..BE../V				
112..BE../V				
132..BE../V				
160..BE../V				
180..BE../V				
200..BE../V				
225..BE../V				
315..BE../V				

Software support

Not any cable entry position [X, 1, 2, 3] and terminal box position [0°(R), 90°(B), 180°(L), 270°(T)] can be chosen. Some additional features 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.

For a thorough check of the possible positions of your drive, you can use the DRIVECAD software in DriveGate on the SEW-EURODRIVE website.

- If you are already a registered DriveGate user: https://portal.drivegate.biz/drivecad.
- If you are not yet a registered DriveGate user: www.sew-eurodrive.de → DriveGate login.

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:

∅	≤ 28 mm	→ ISO j6
∅	≤ 50 mm	→ ISO k6
∅	> 50 mm	→ ISO m6

Center bores according to DIN 332, shape DR:

∅	= 7 - 10 mm	→ M3	∅	> 30 - 38 mm	→ M12
∅	> 10 - 13 mm	→ M4	∅	> 38 - 50 mm	→ M16
∅	> 13 - 16 mm	→ M5	∅	> 50 - 85 mm	→ M20
∅	> 16 - 21 mm	→ M6	∅	> 85 - 130 mm	→ M24
∅	> 21 - 24 mm	→ M8	∅	> 130 mm	→ M30
∅	> 24 - 30 mm	→ M10			

Keys: according to DIN 6885 (domed type)

Flanges

Centering shoulder tolerance:

∅	≤ 230 mm (flange sizes A120 – A300)	→ ISO j6
∅	> 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.

Motor dimensions

Additional motor features

The motor dimensions may change when installing additional motor features. Refer to the dimension drawings of the additional motor features.

Special designs

In case of special designs or comprehensive additional features connected in the terminal boy, the terminal box dimensions might deviate from the standard.

Observe the notes in the order confirmation from SEW-EURODRIVE.

EN50347

European standard EN50347 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 IEC72-1 standard.

The new dimension designations according to EN50347/IEC72-1 are used for the relevant dimensions in the dimension sheet tables.

8/2 and 8/4-pole motors

The pole-changing DRS motors with 8/2 or 8/4 poles have the same dimensions as the standard 4-pole DRS motor.

2 and 6-pole motors

EN 50347 contains suggested dimensions based on the power rating and the number of poles. As a result of the new efficiency requirements for AC motors, these dimensions cannot always be complied with completely.

The 2- and 6-pole motors therefore might have different flange, foot or output shaft dimensions compared to EN 50347.

The tables on page 194 ff show the dimensions:

- The standard dimensions of the 4-pole motor are market in bold.
- The gray fields show the suggested value of EN 50347.

Notes on the dimension sheets of the DRL motors

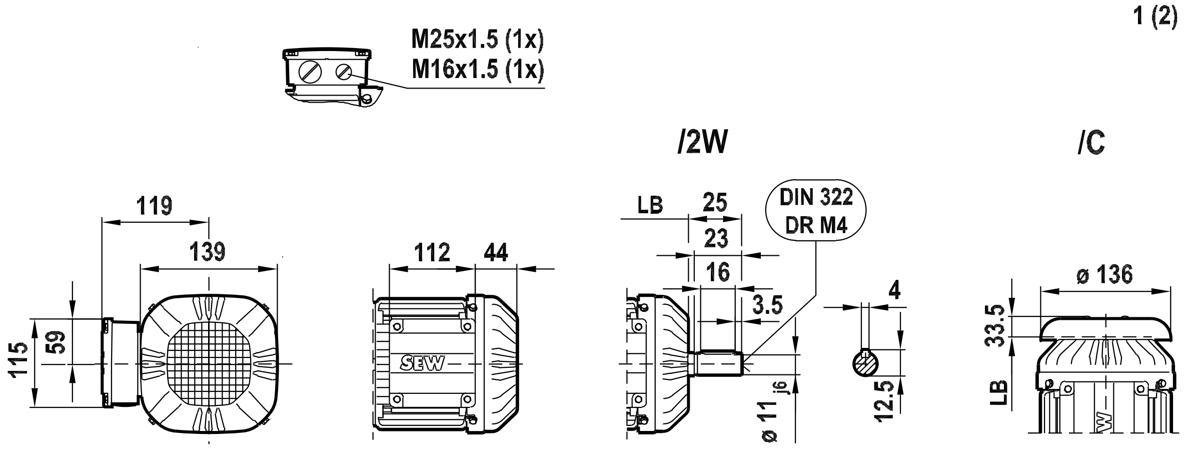
Special designs

The DRL motor dimension sheets show the standard motors/brakemotors. For other designs, please refer to the dimension sheets of the DR. series AC (brake)motors on page 110 ff.

7.2 Dimension sheets for DR. AC motors

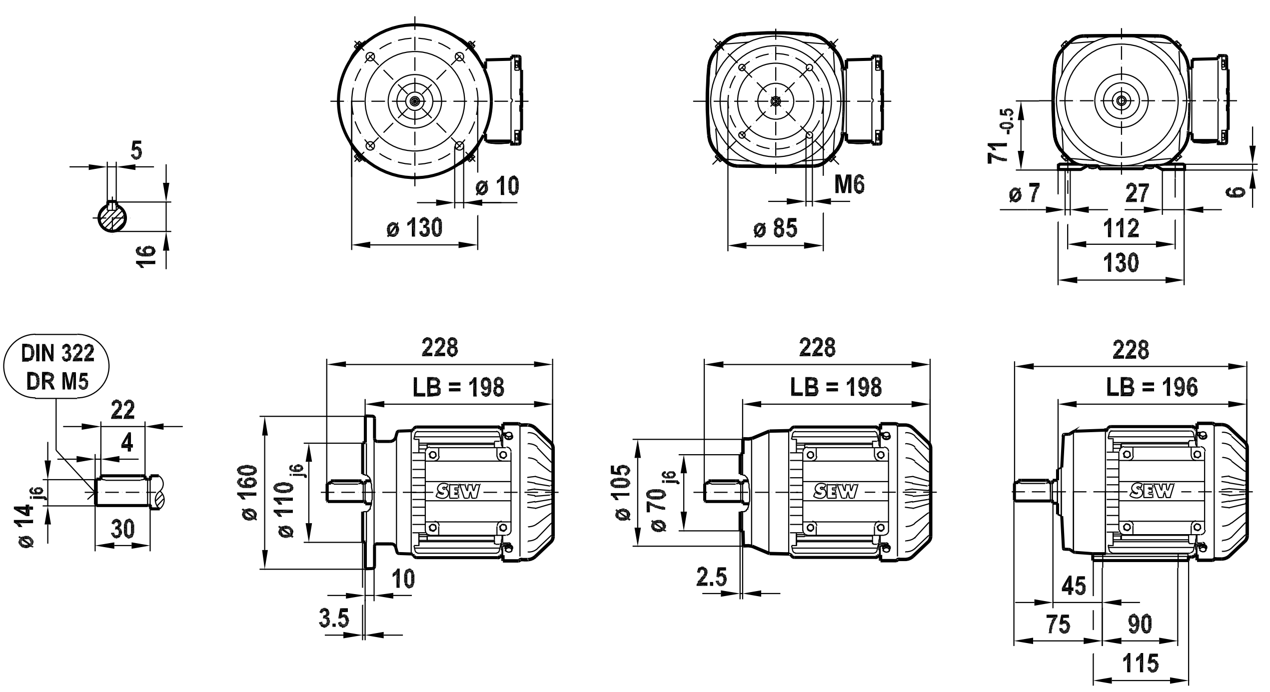
DR.71S

08 191 02 06
1 (2)



DRS71S

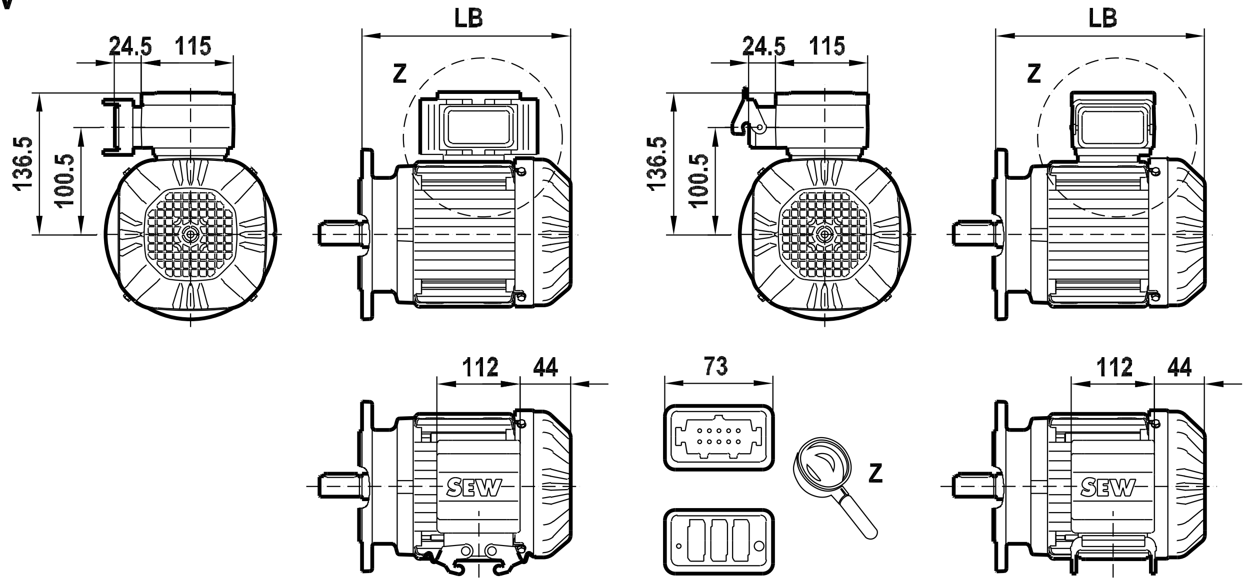
/FF (B5) FF130 — /FT (B14) FT85 — /FI.. (B3)



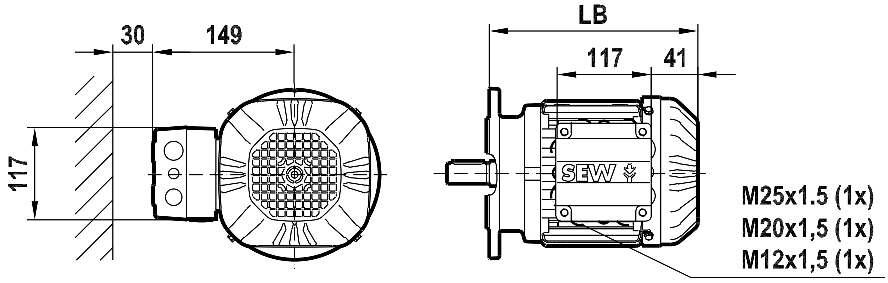
DR.71S

08 191 03 06
2 (2)

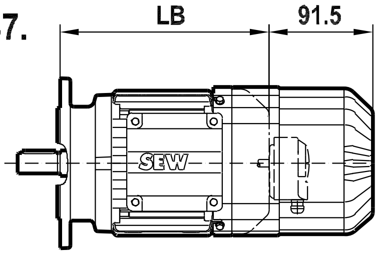
/IV



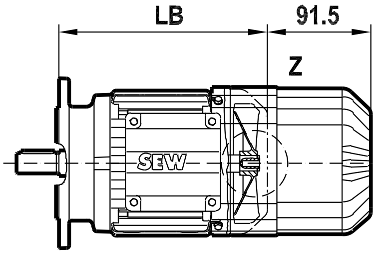
/IS

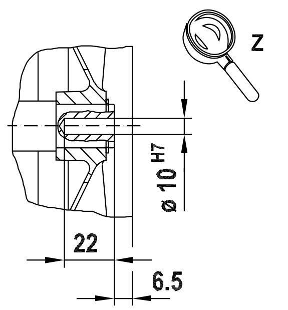


/ES7.
/AS7.



/ES7A





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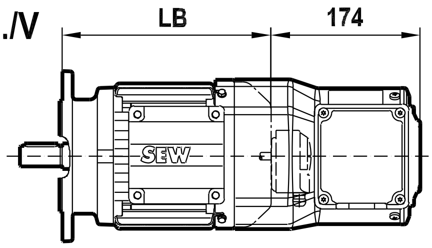

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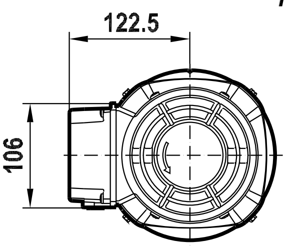

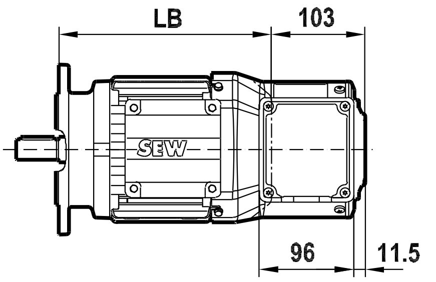

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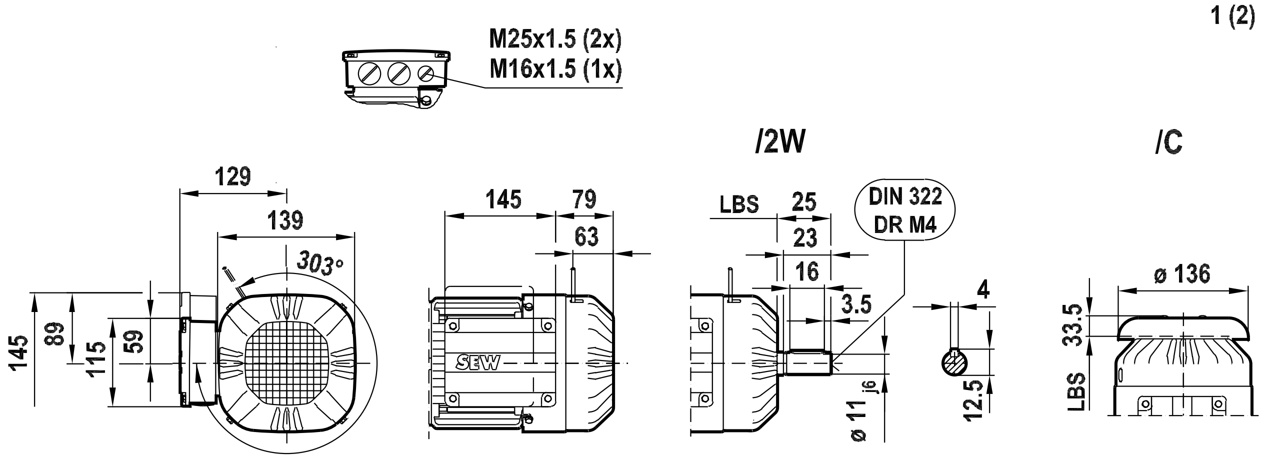

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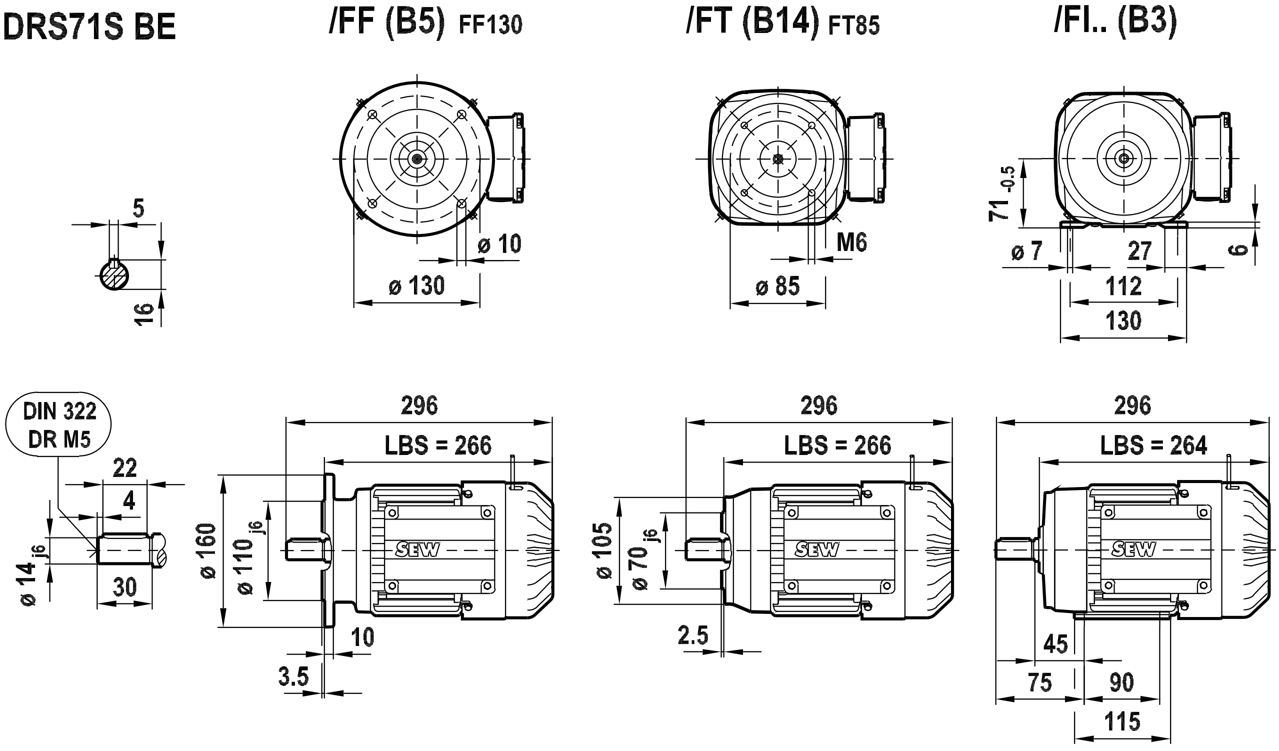

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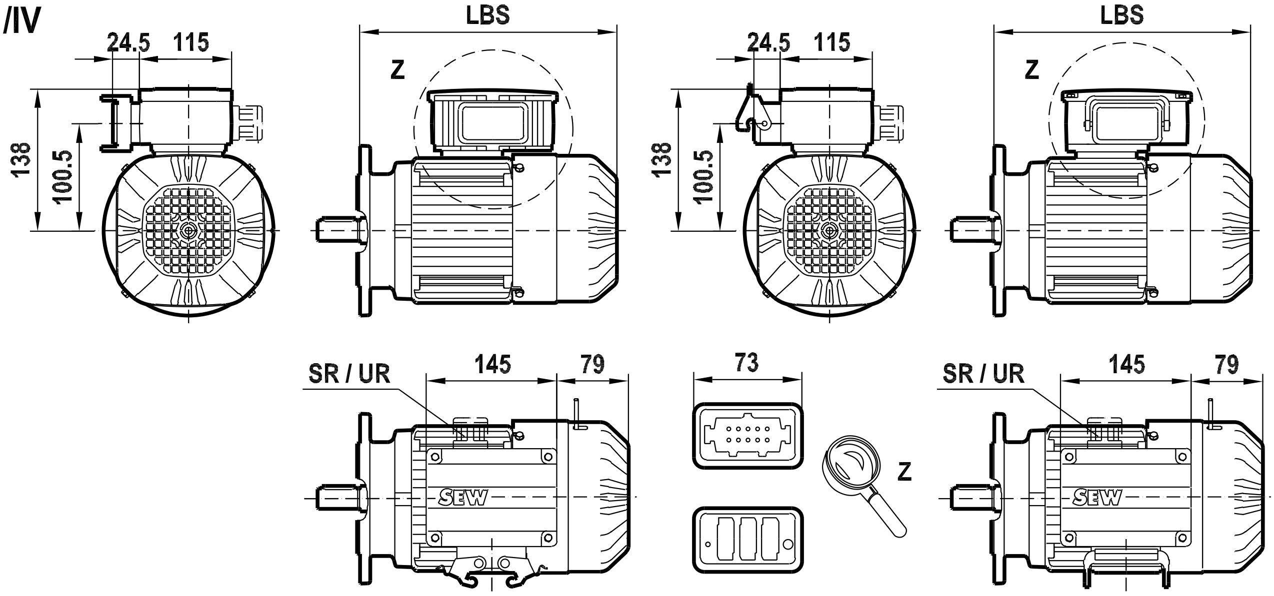

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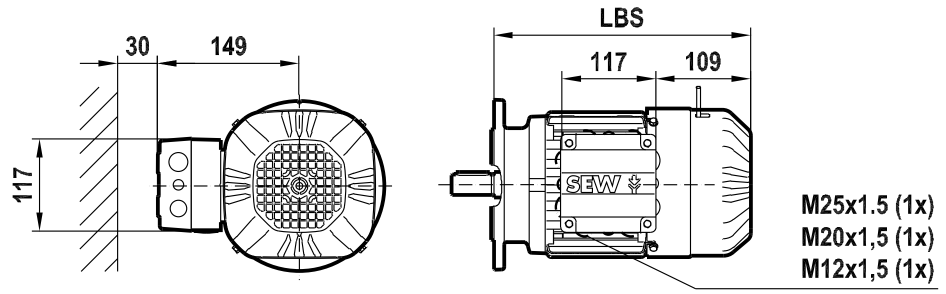

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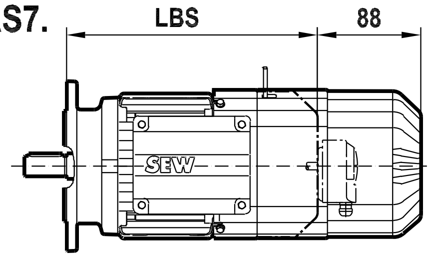

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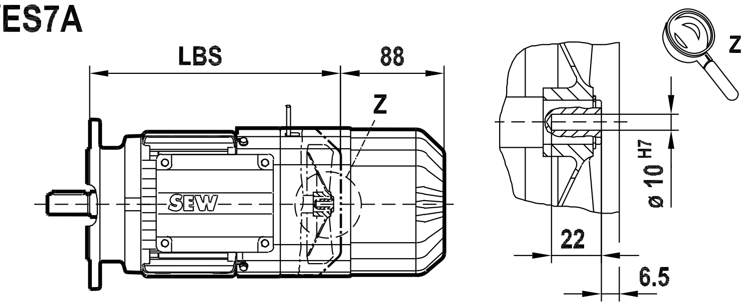

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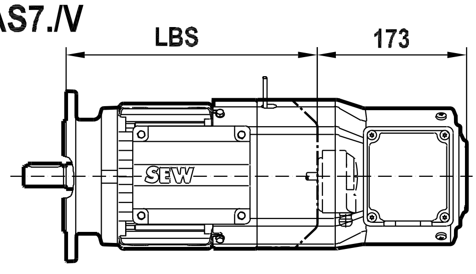

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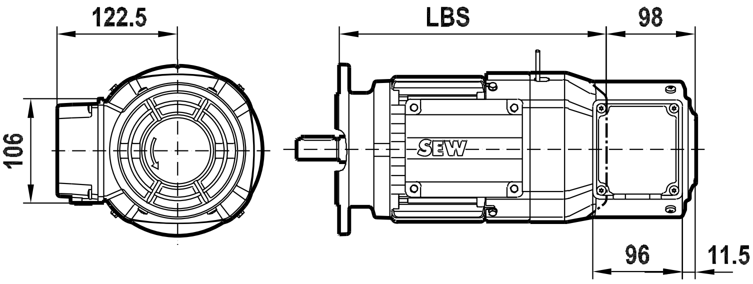

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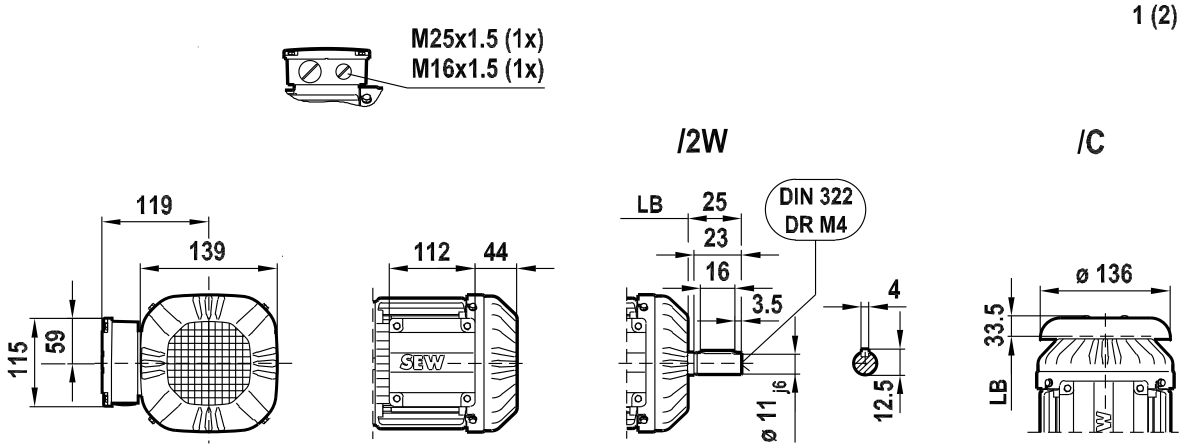

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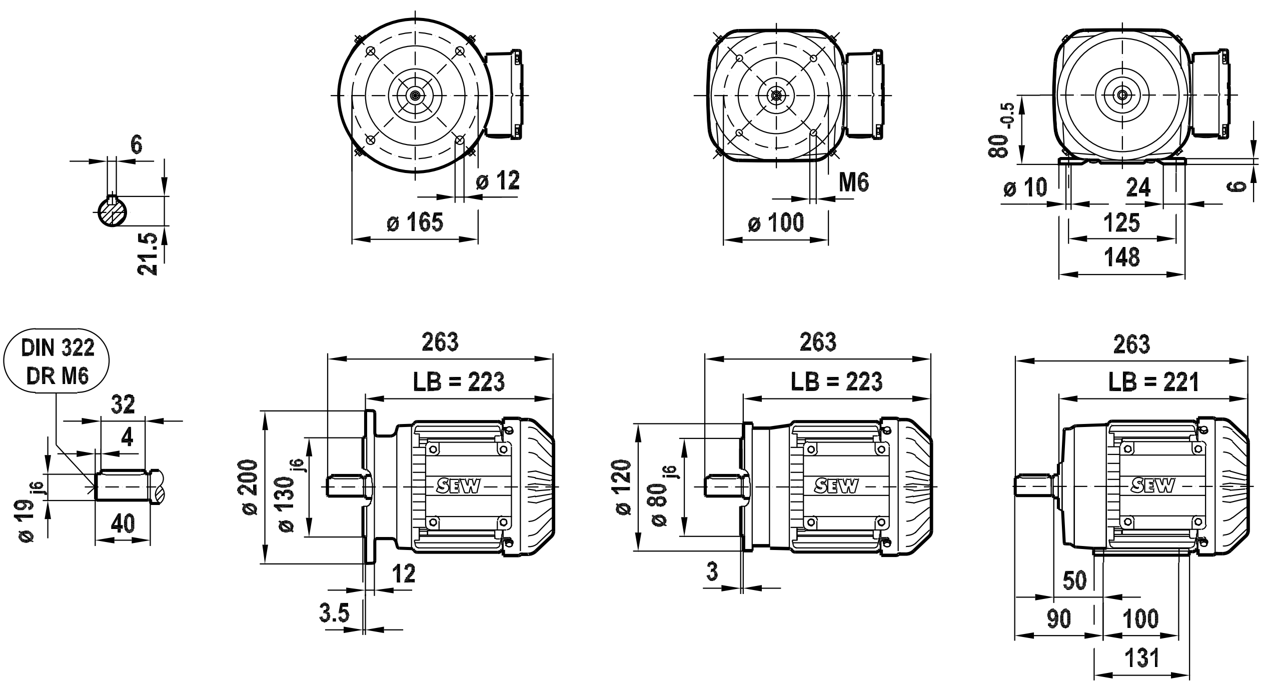

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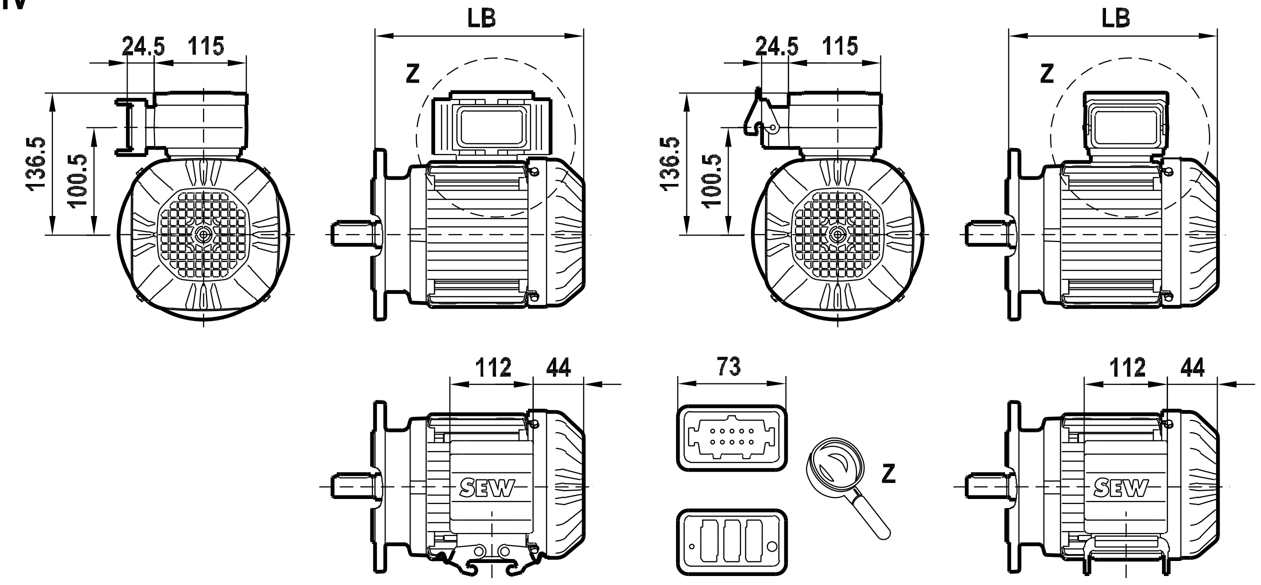

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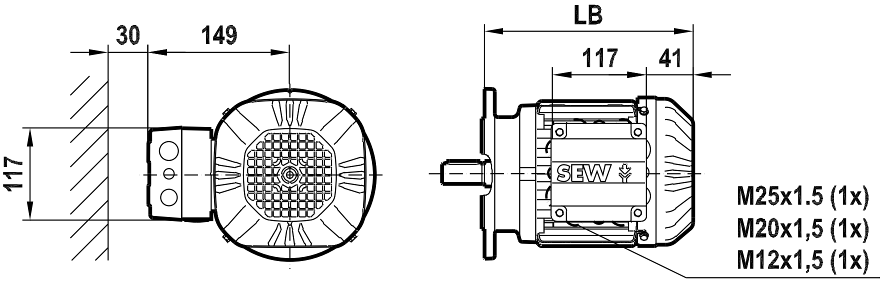

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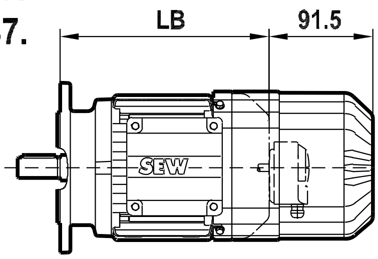

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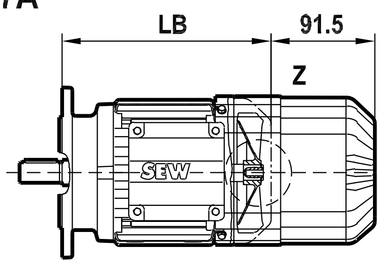

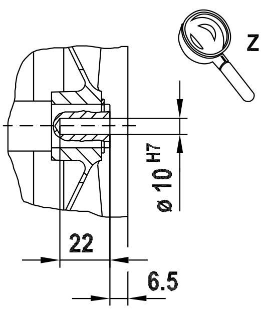

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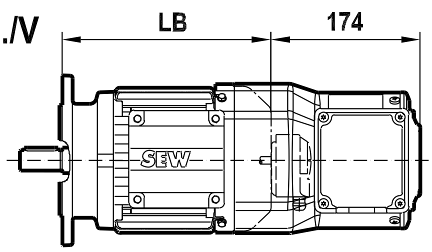

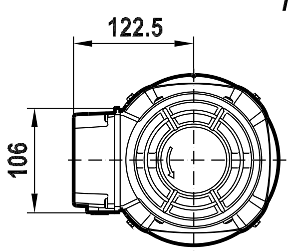

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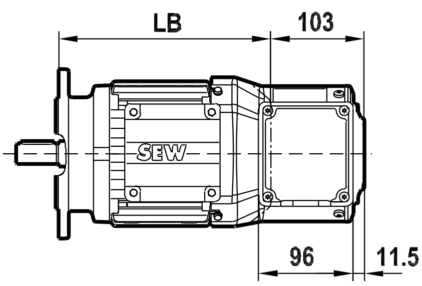

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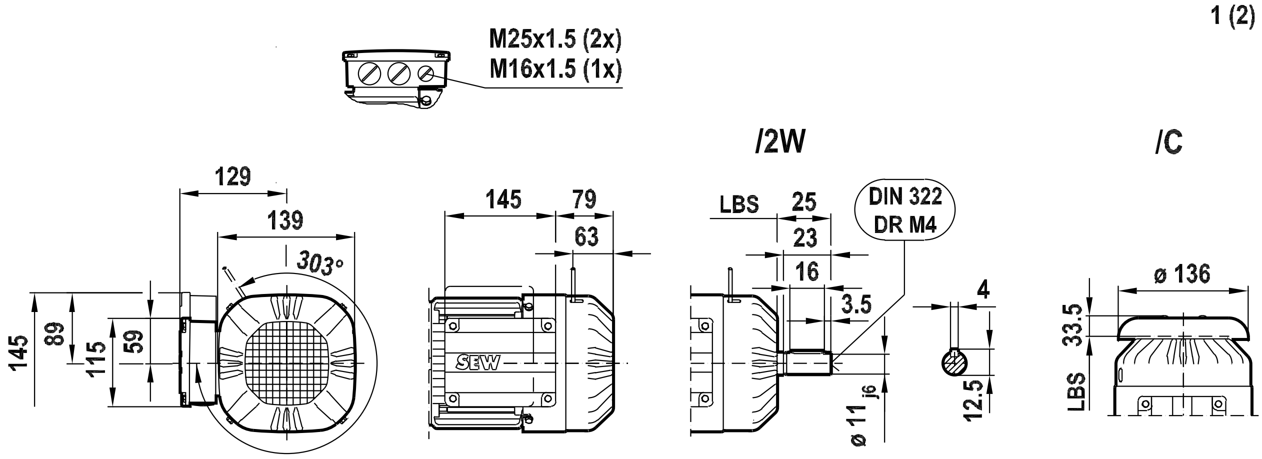

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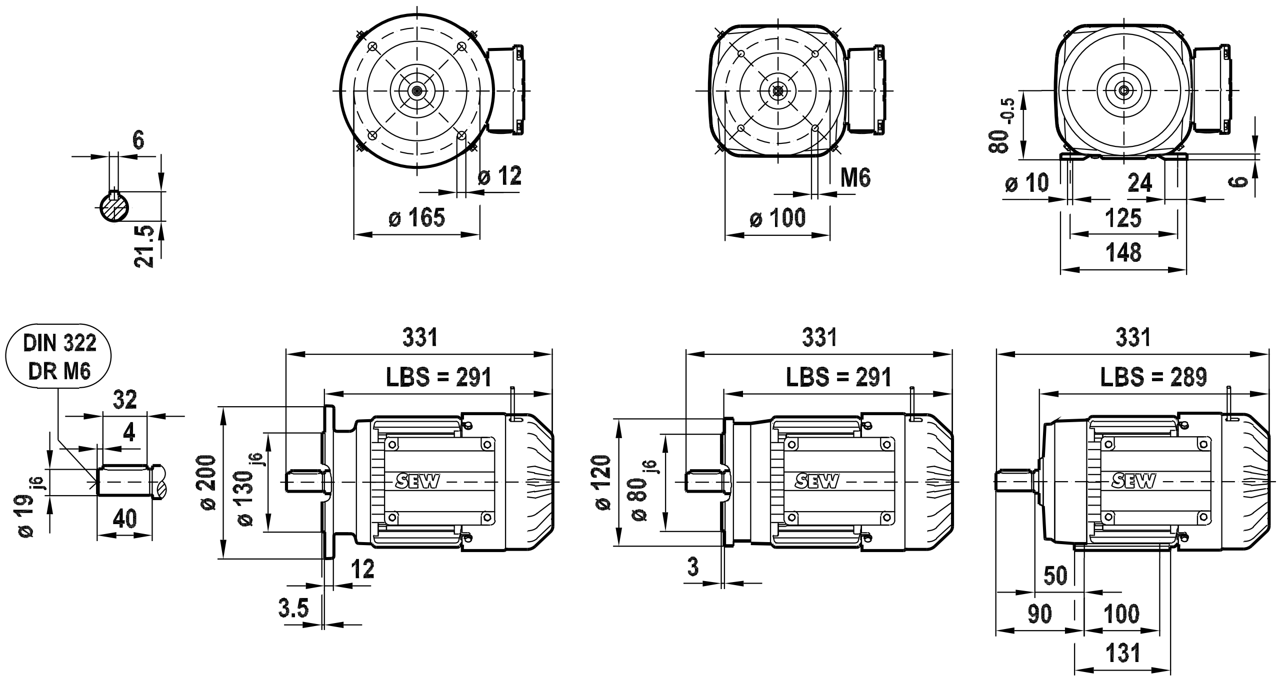

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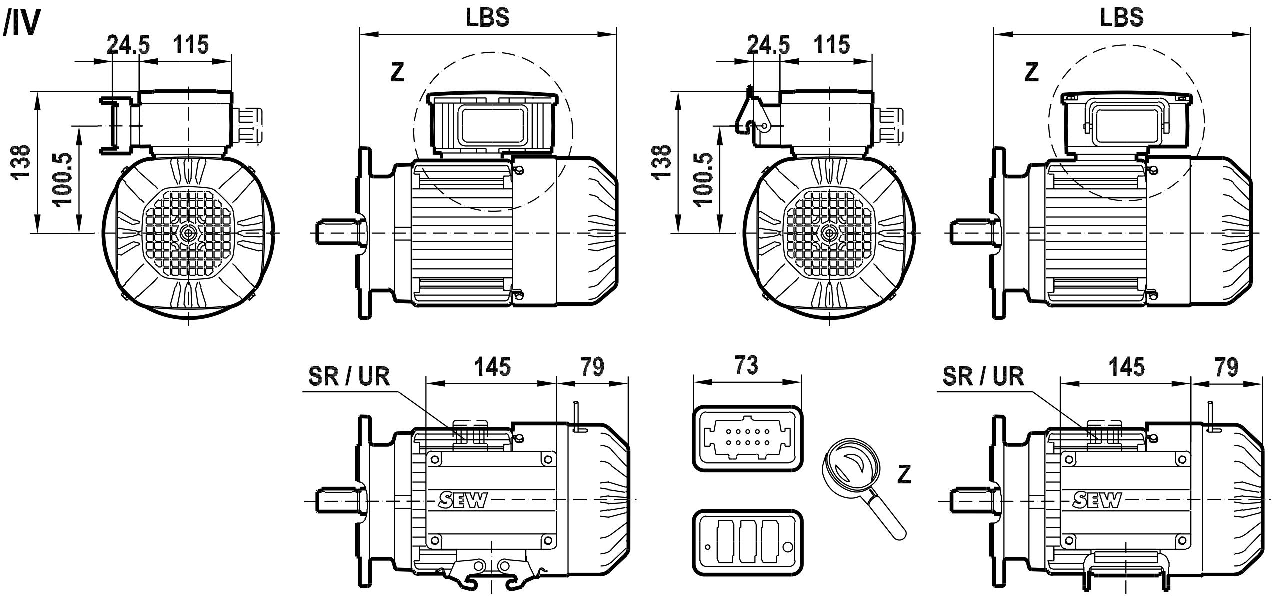

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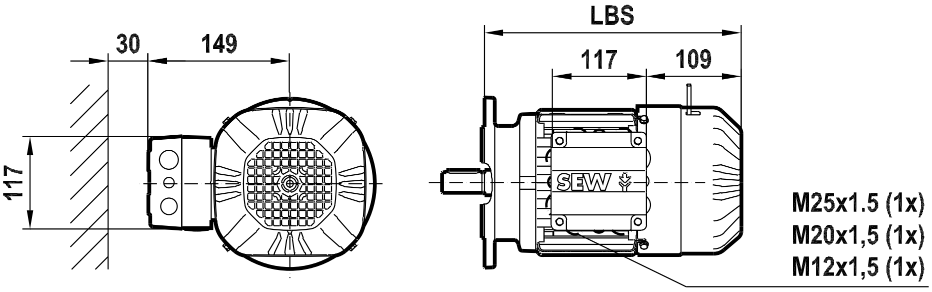

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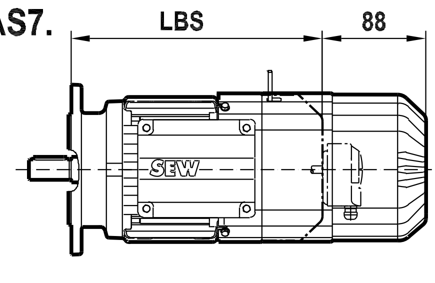

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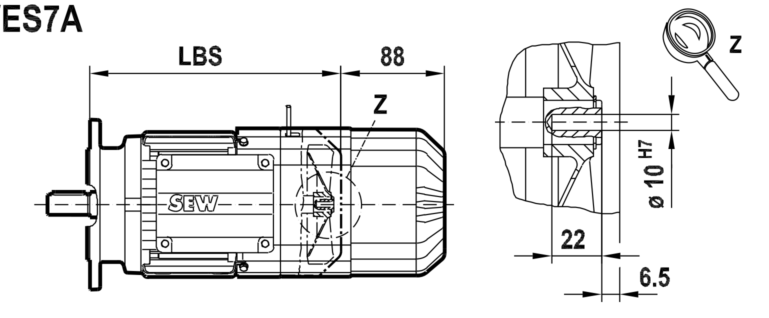

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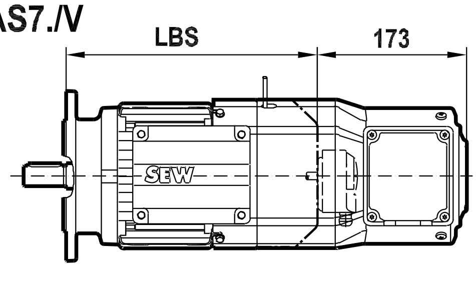

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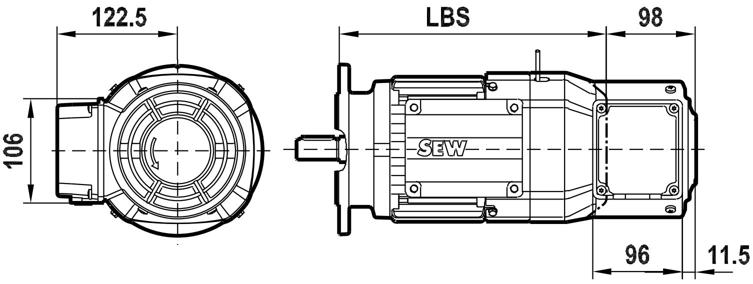

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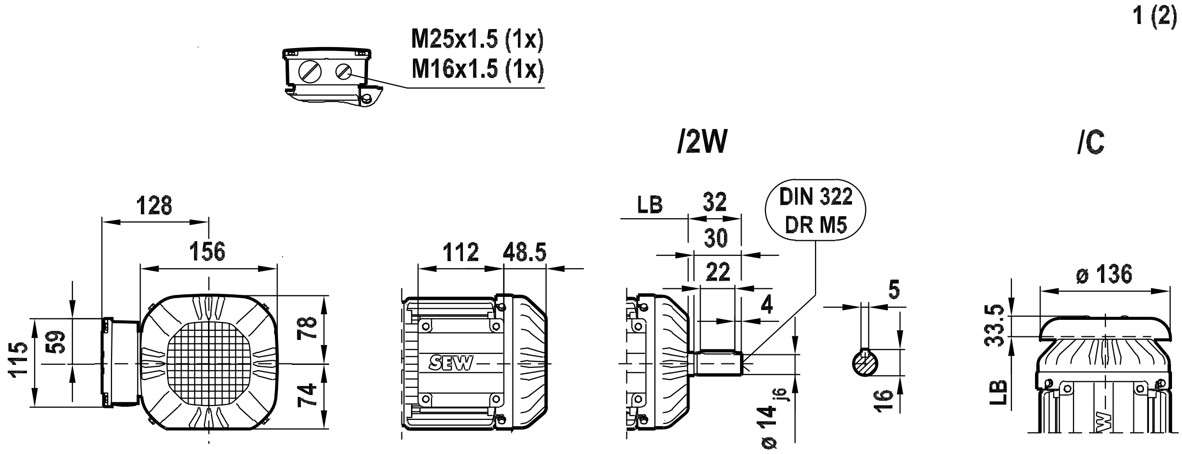

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DRE80S

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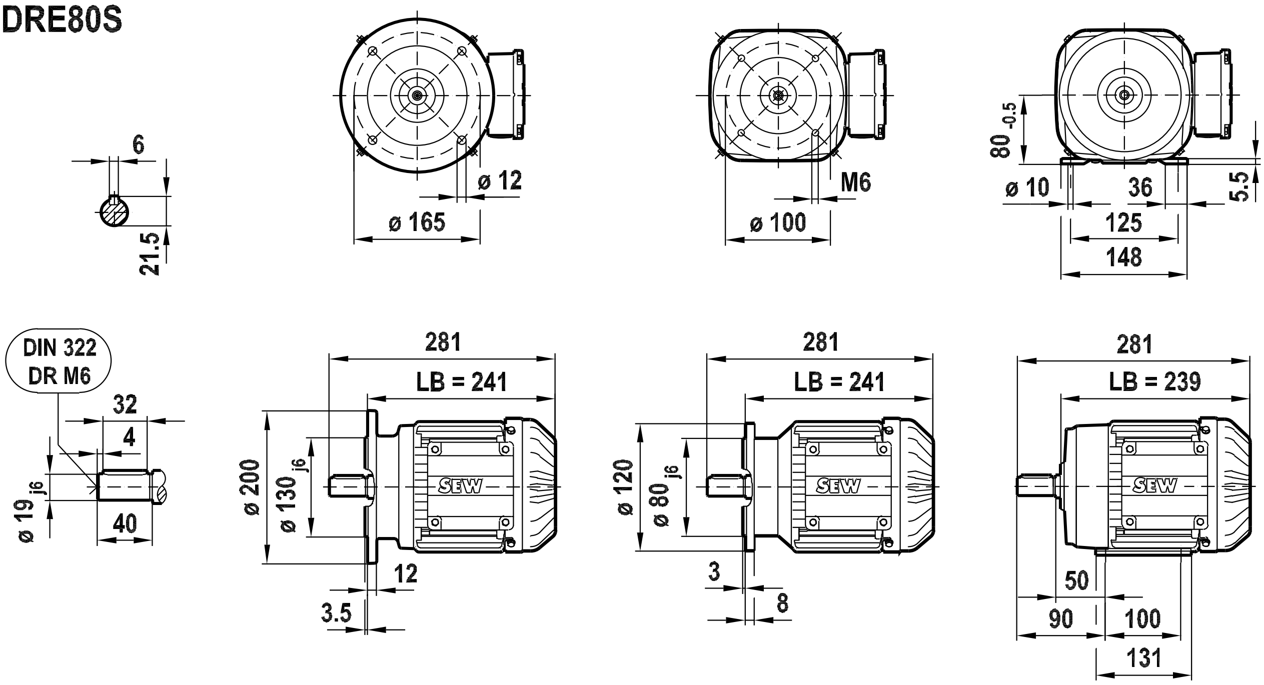

DR.80S

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2 (2)

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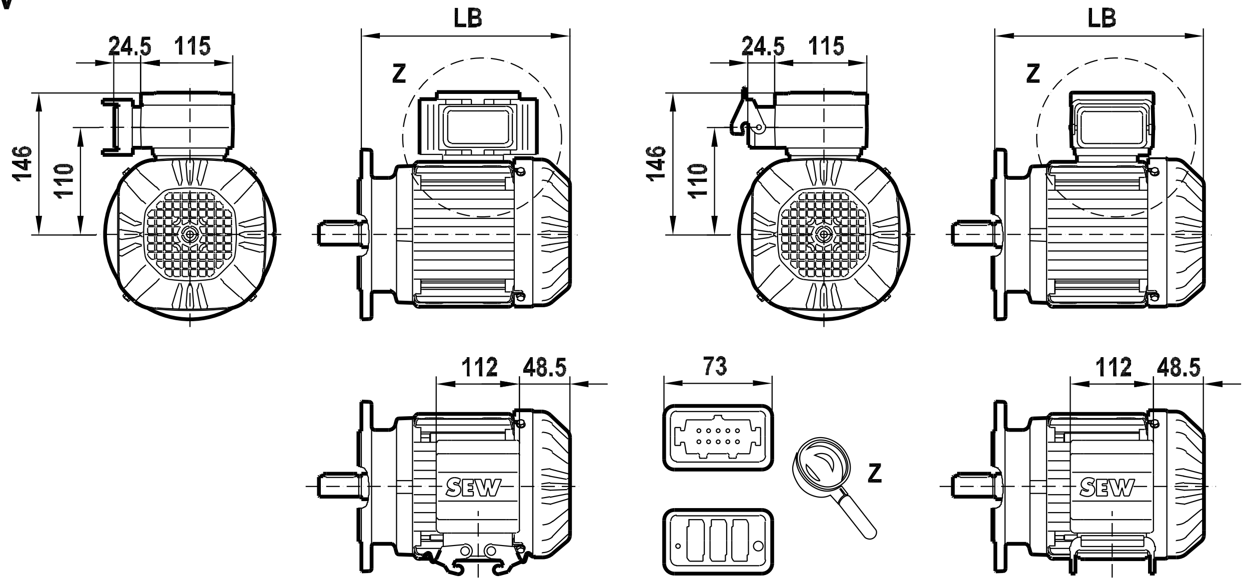

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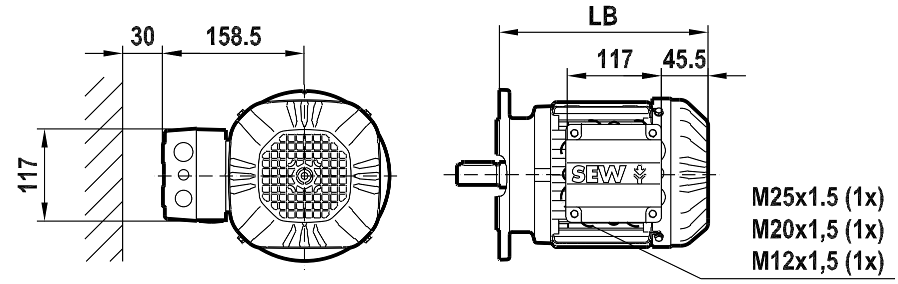

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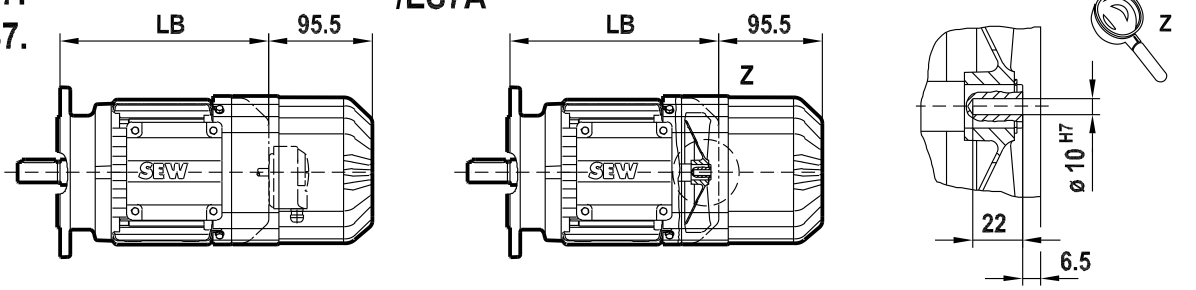

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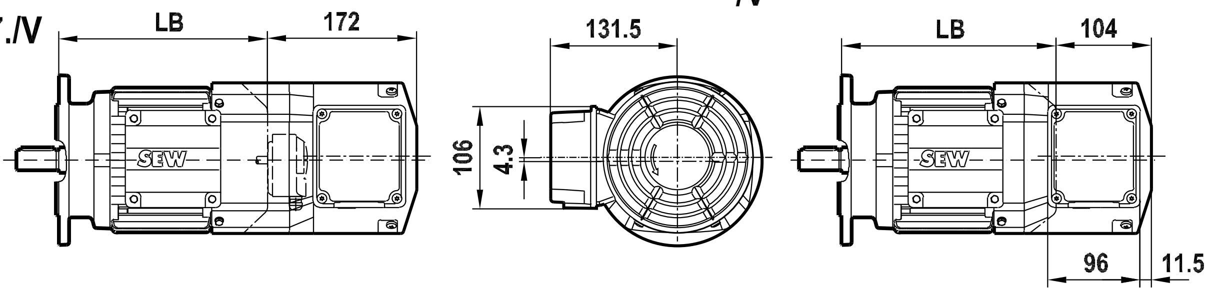

DR.80S BE

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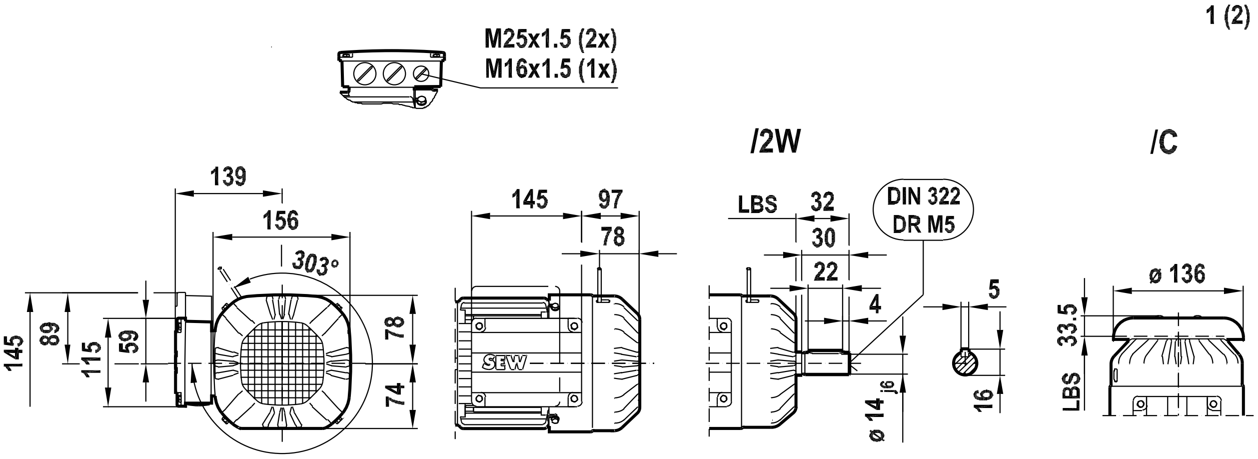

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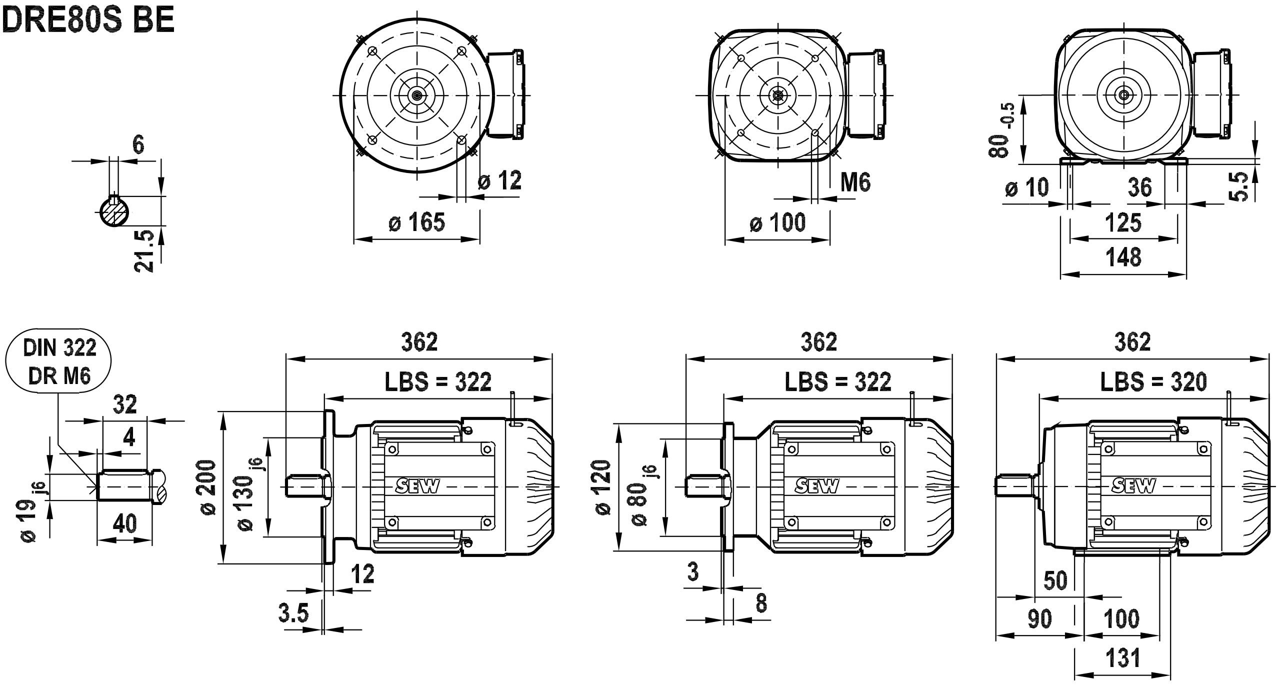

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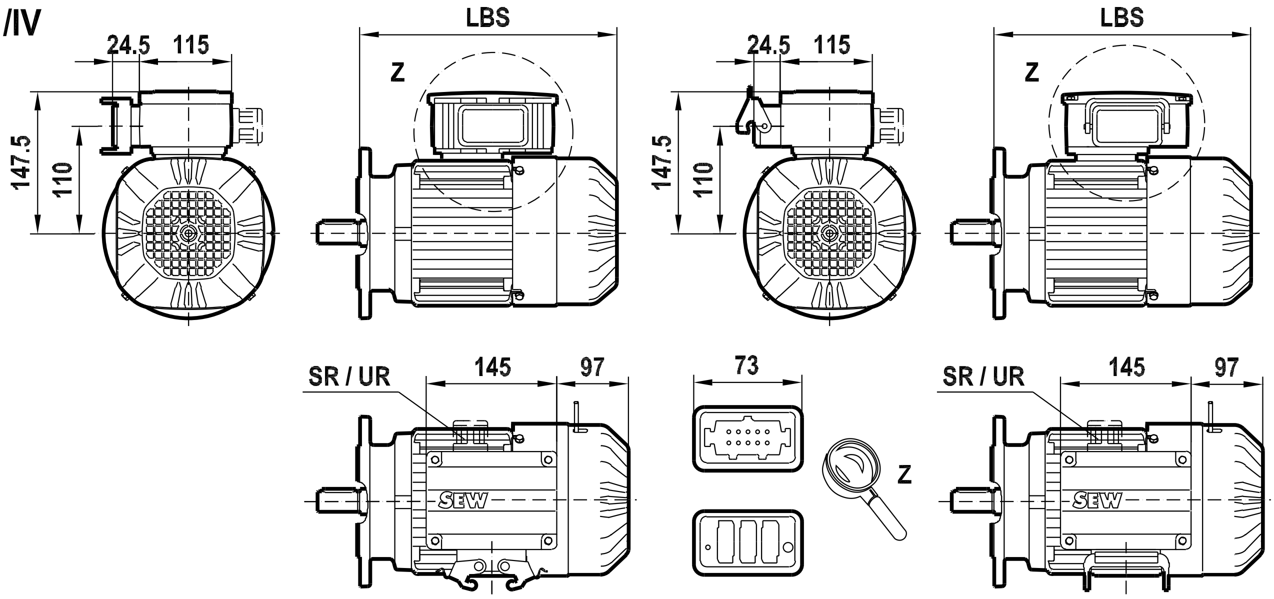

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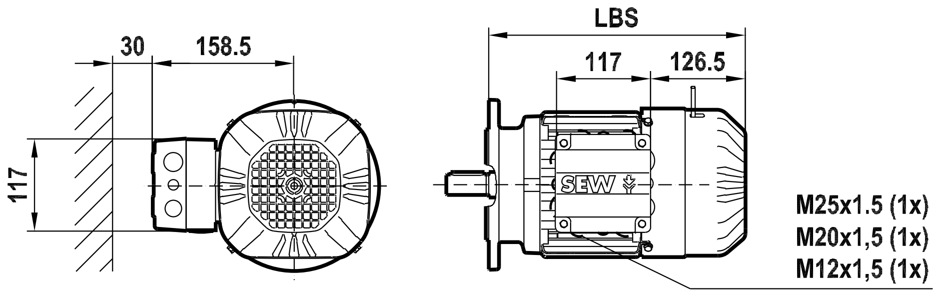

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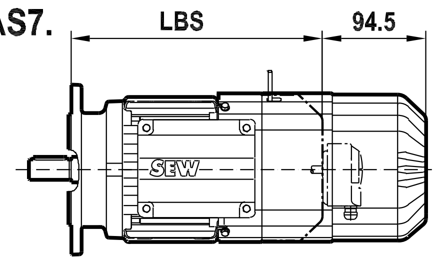

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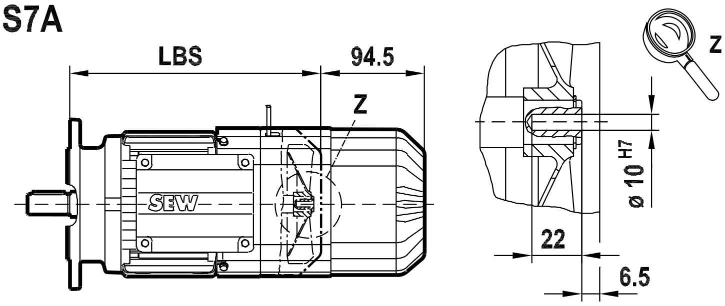

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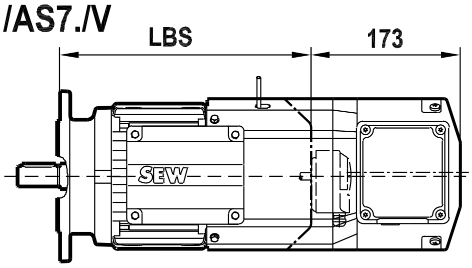

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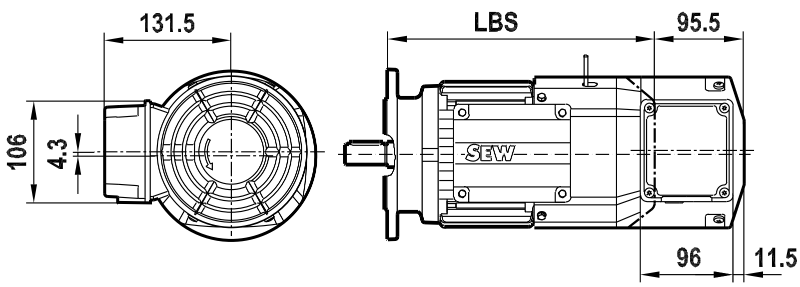

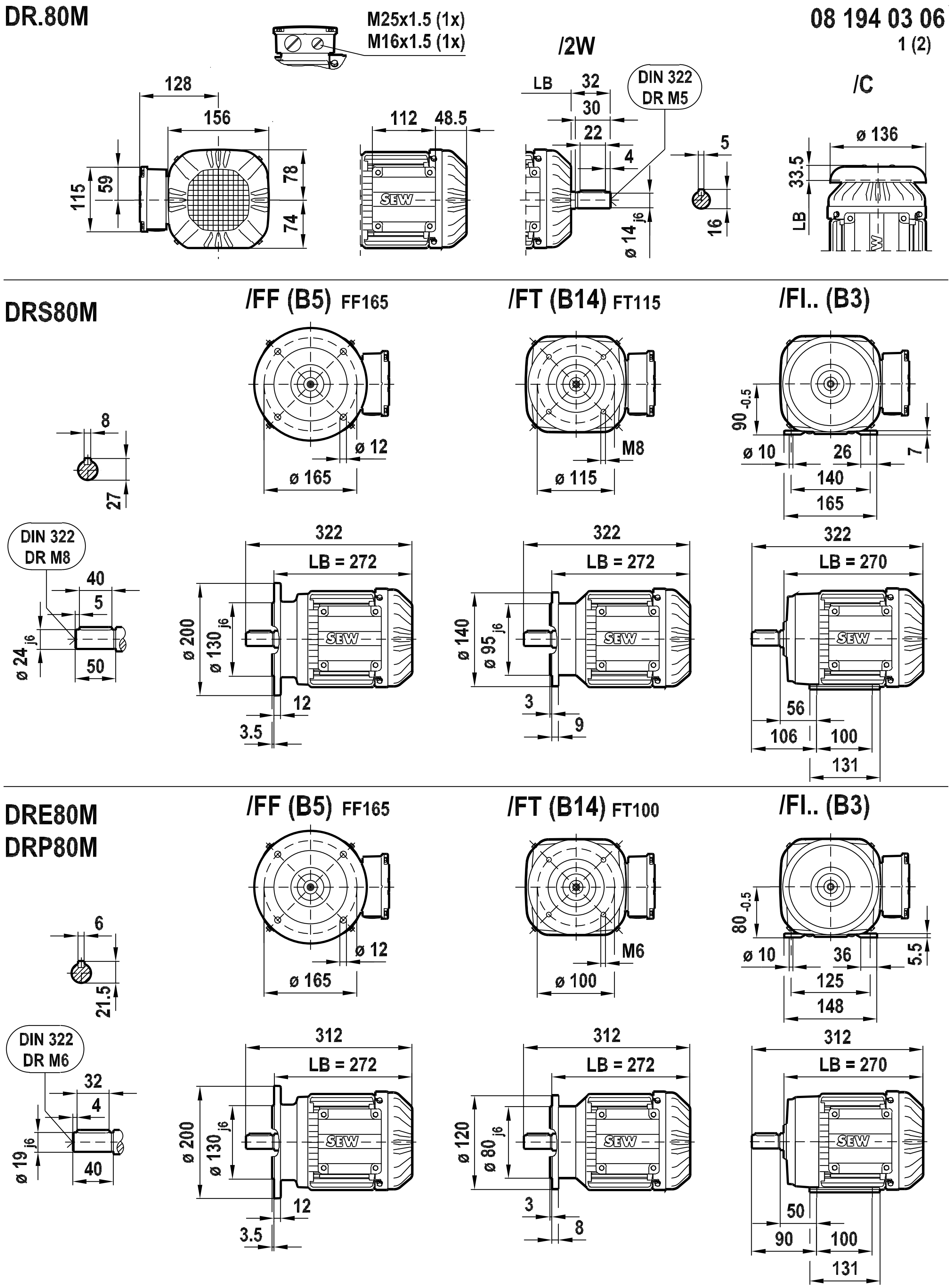
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74
112
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LB
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22
4
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DR M5
ø 14 j6
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16
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LB
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ø 165
M8
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ø 200
ø 130 j6
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ø 200
ø 130 j6
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DR.80M

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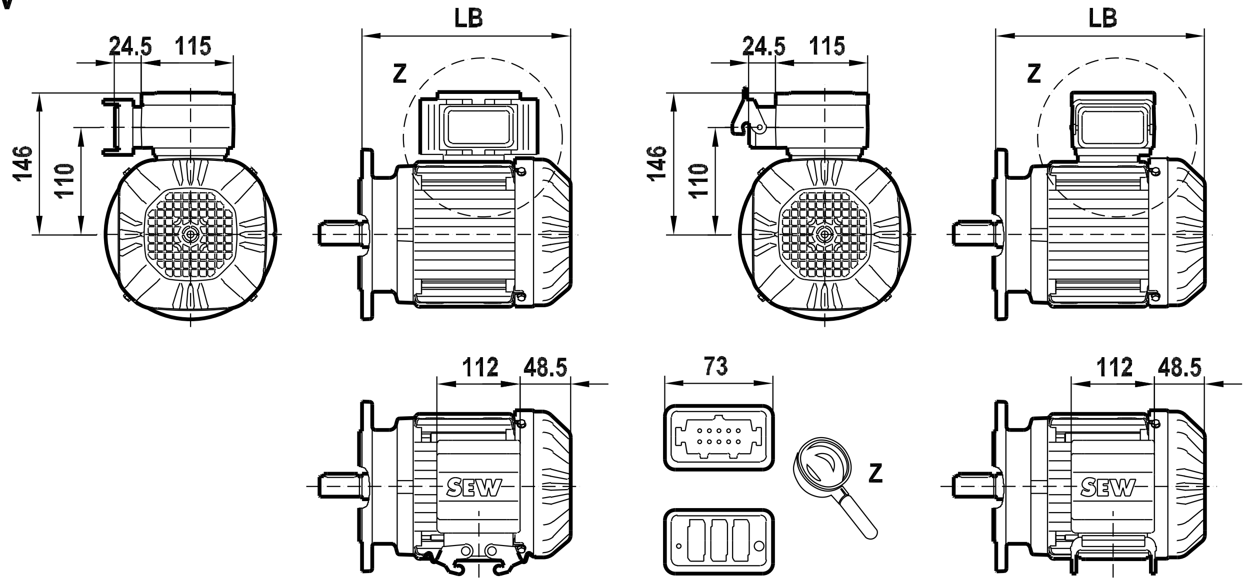

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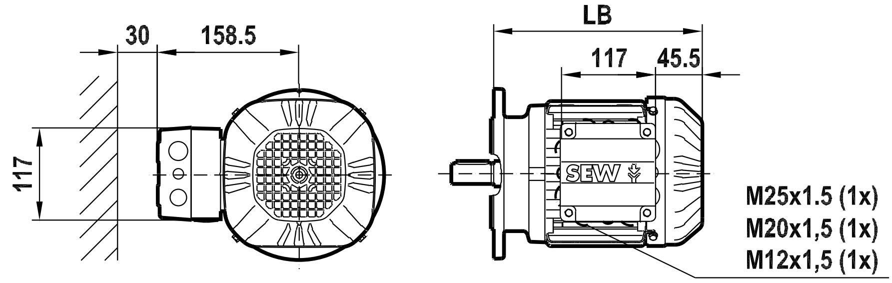

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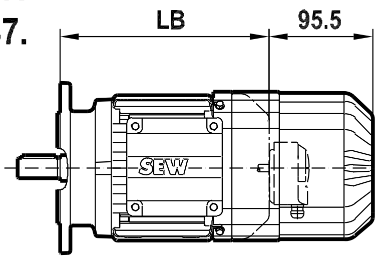

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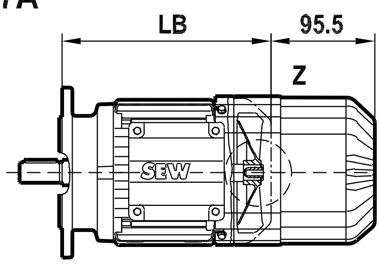

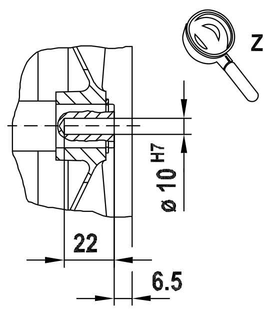

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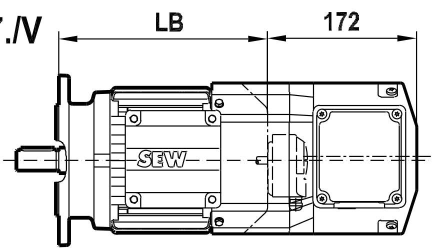

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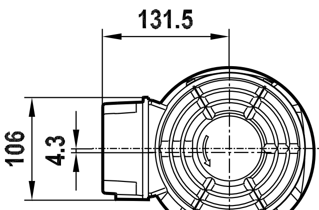

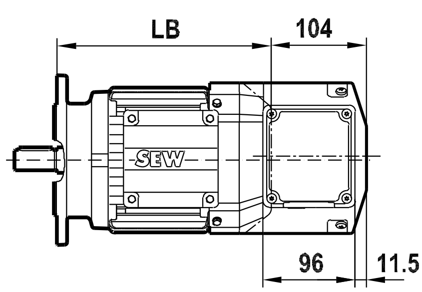

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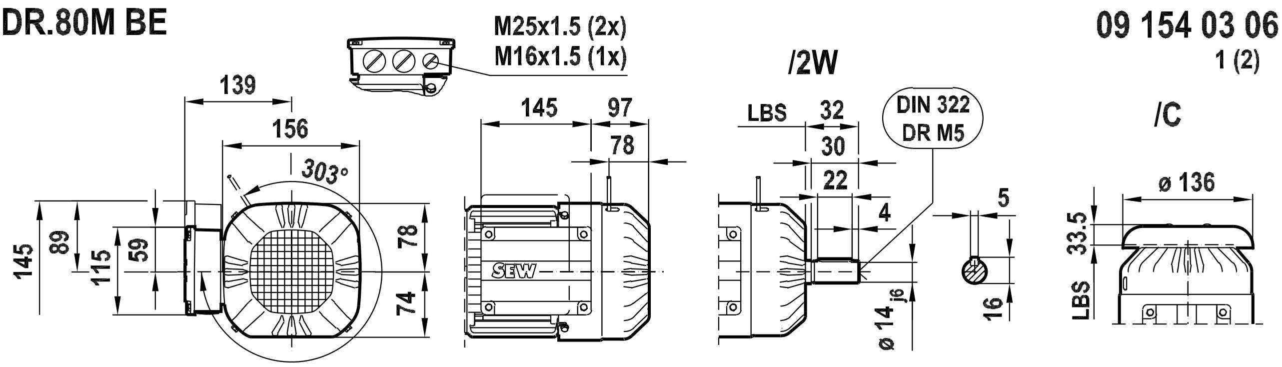

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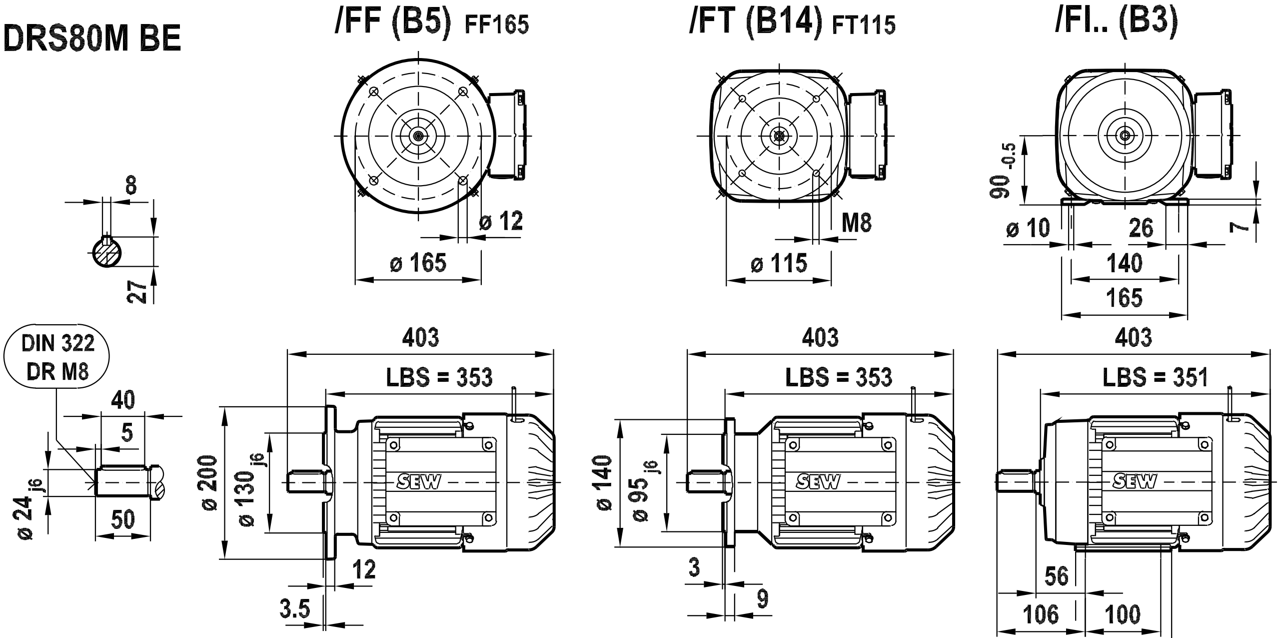

DRE80M BE
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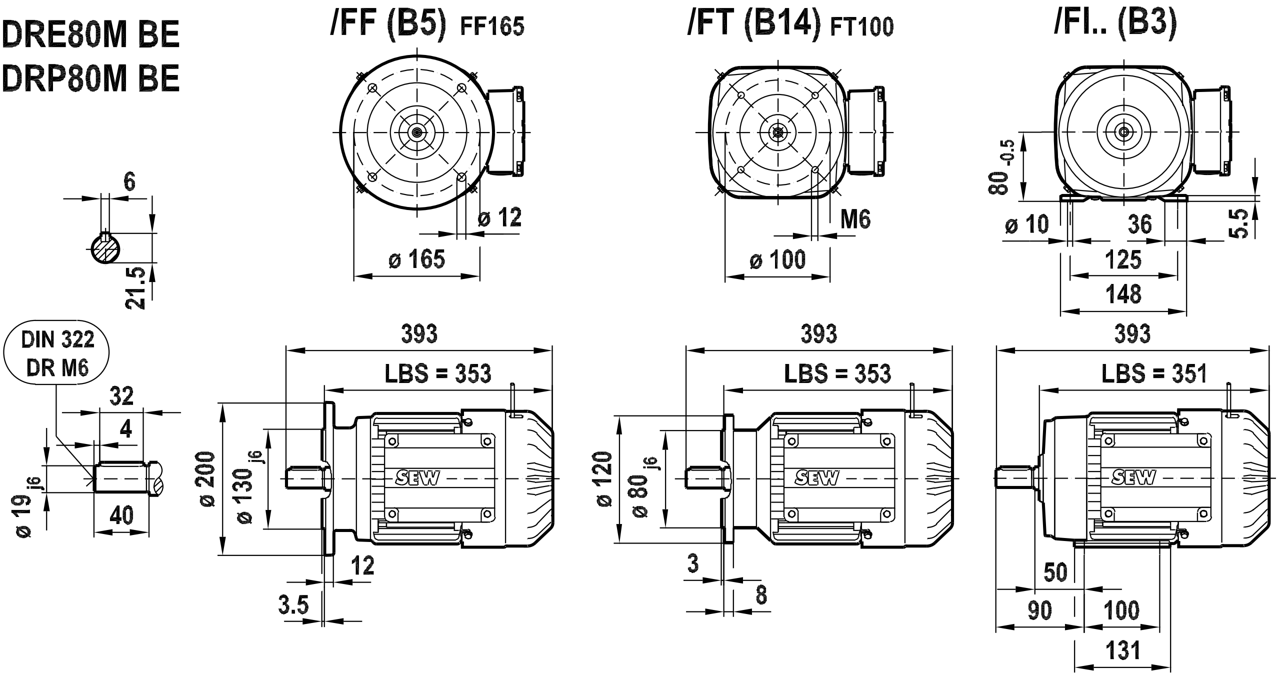

DR.80M BE

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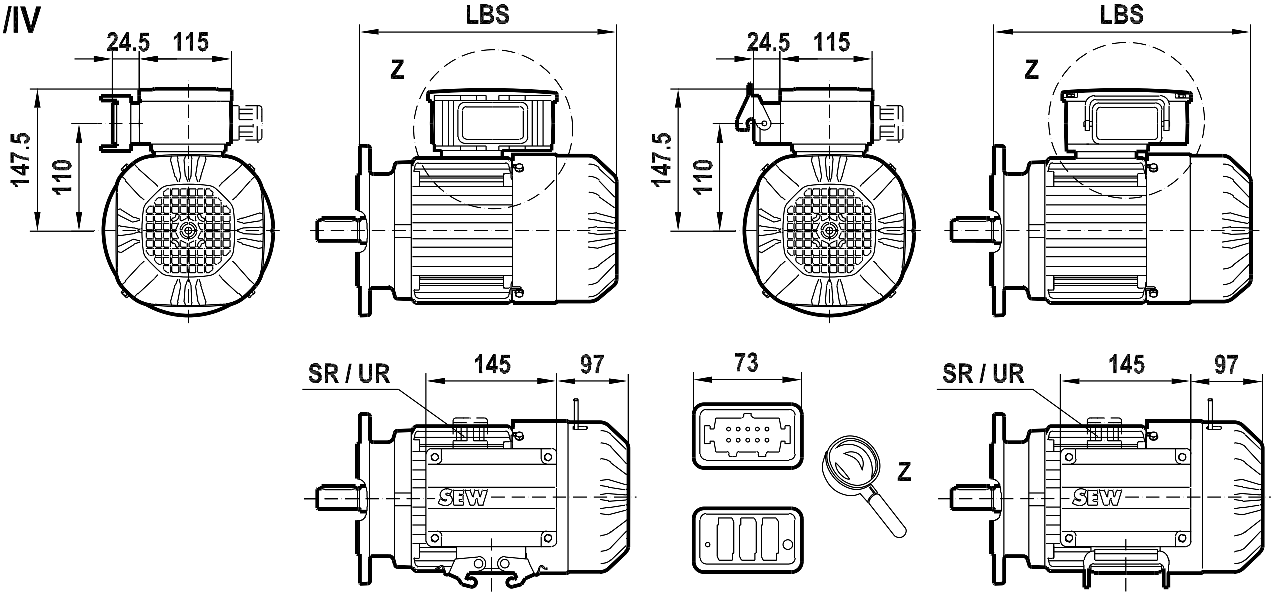

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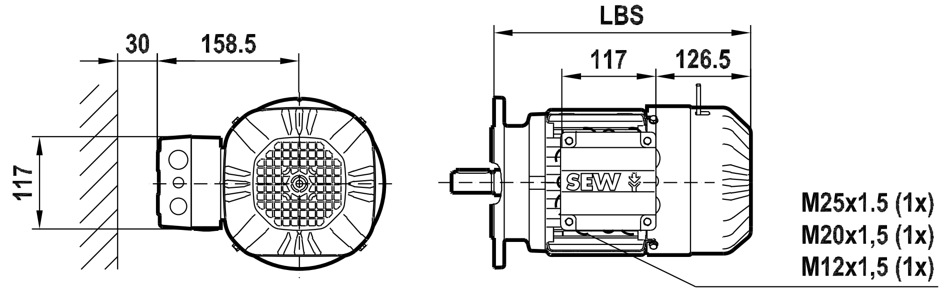

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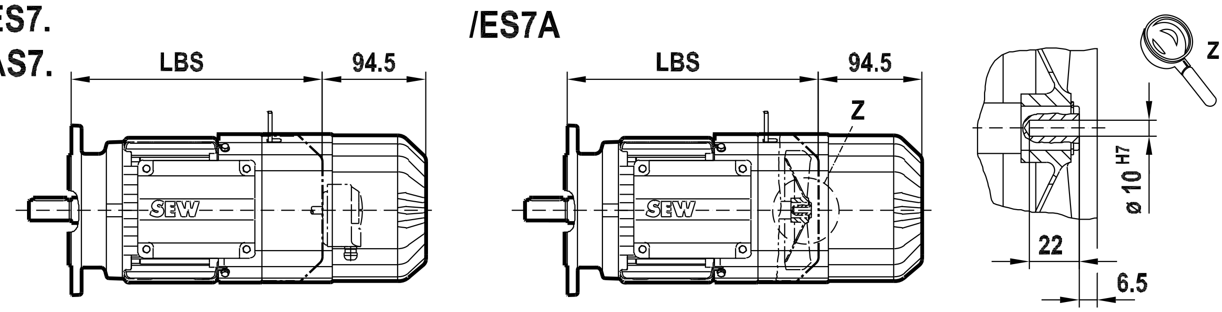

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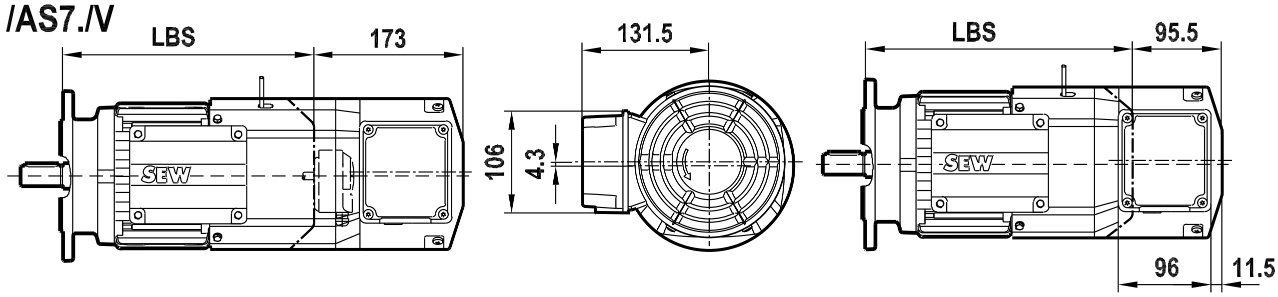

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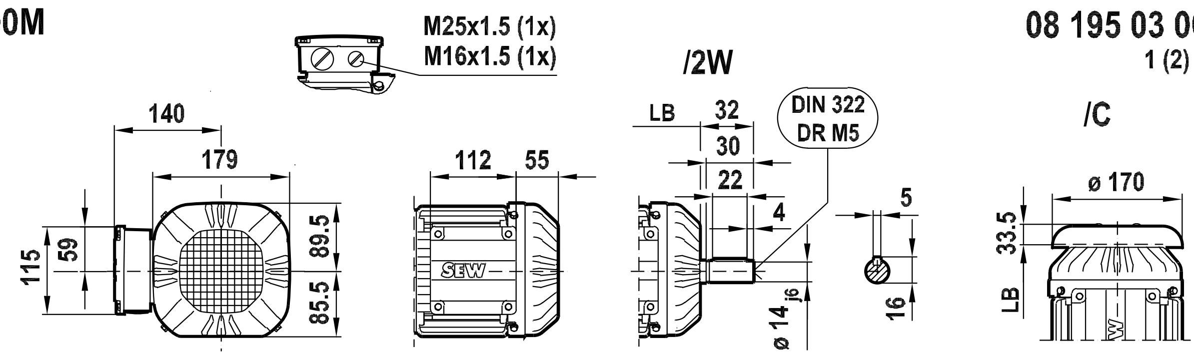

DRS90M
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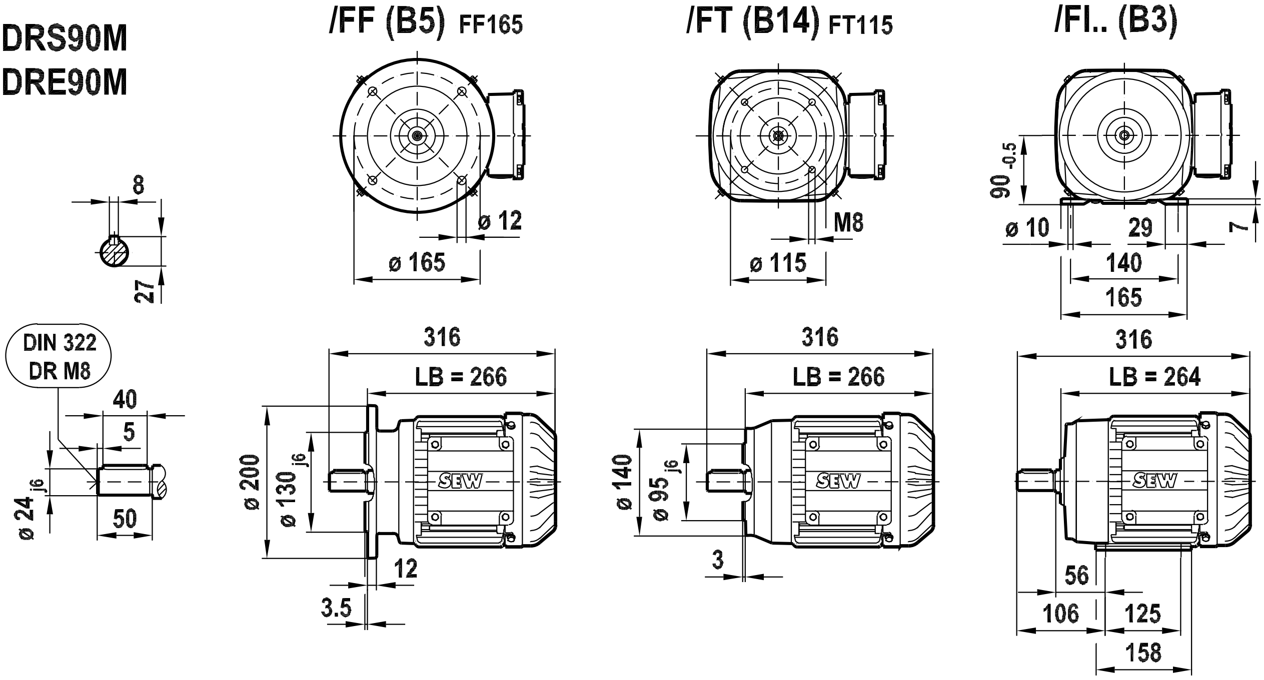

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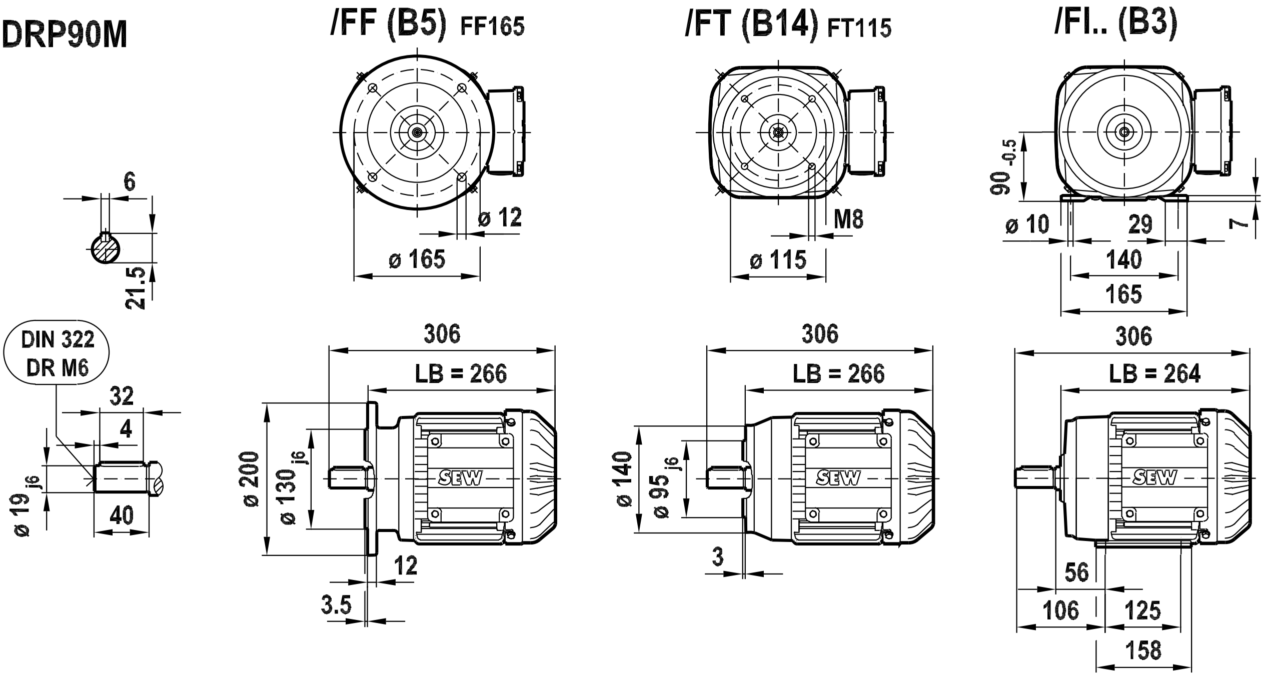

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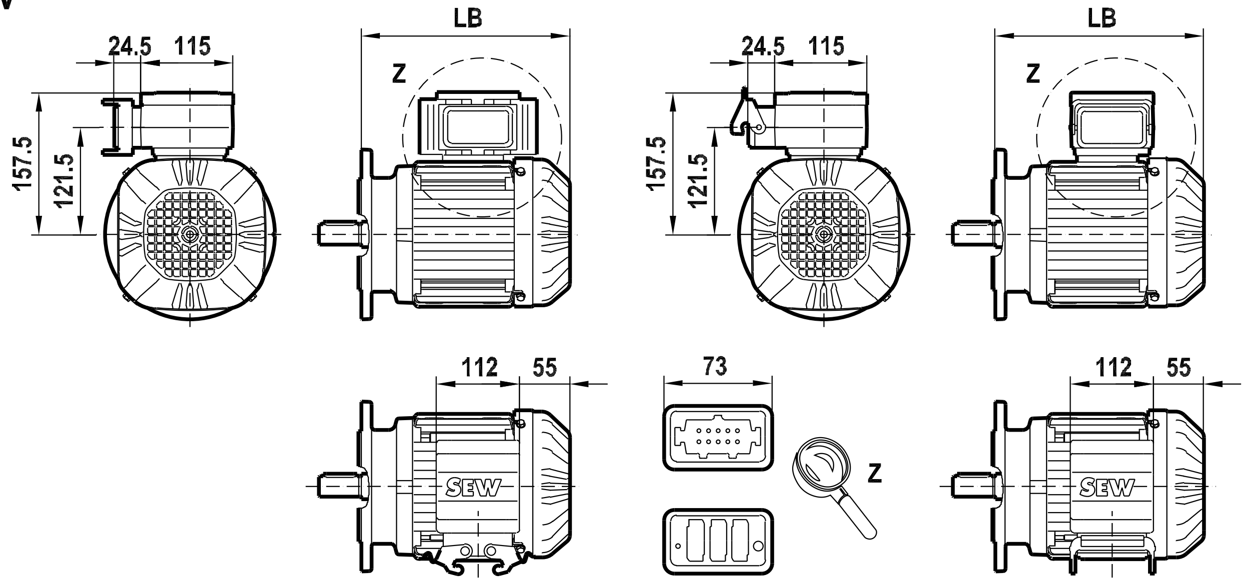

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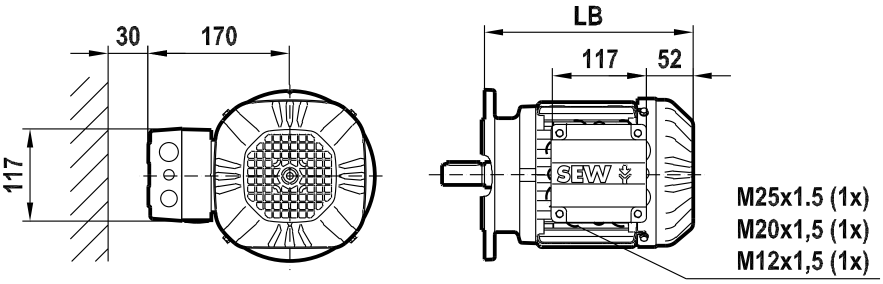

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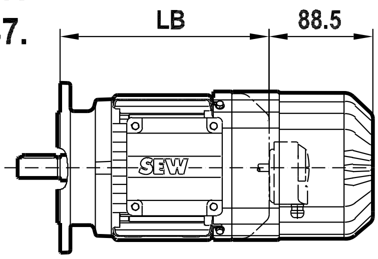

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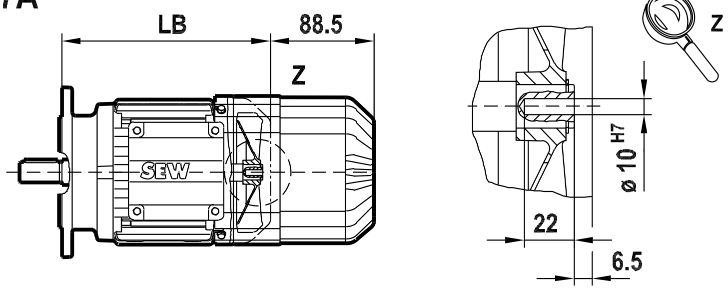

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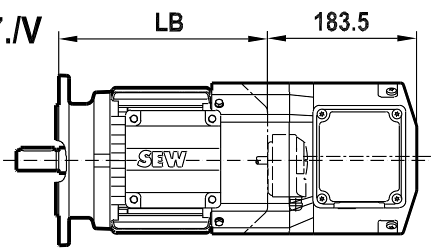

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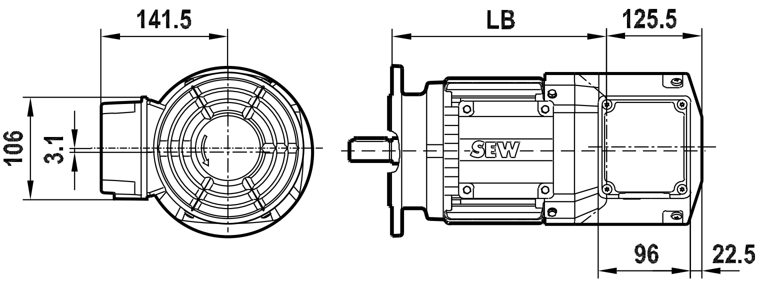

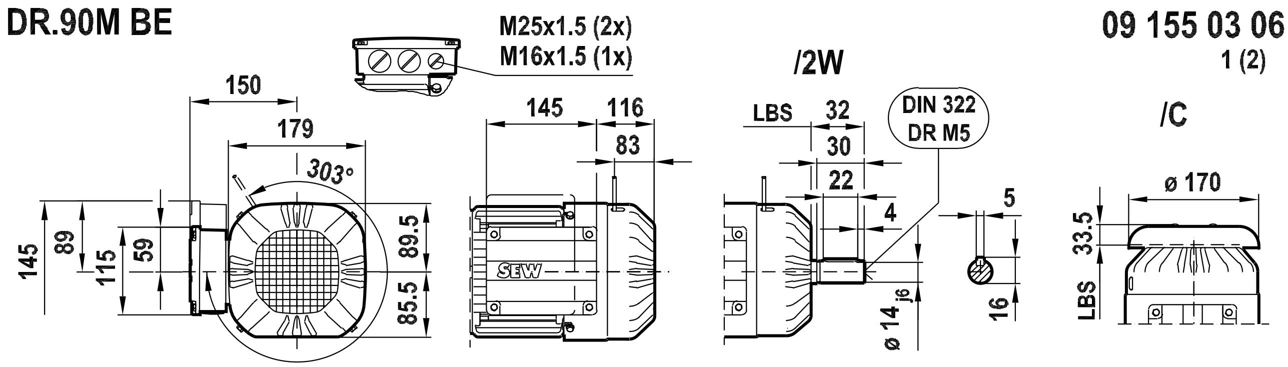
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M16x1.5 (1x)
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1 (2)
/2W
/C
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179
303°
145
89
115
59
89.5
85.5
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LBS
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DIN 322
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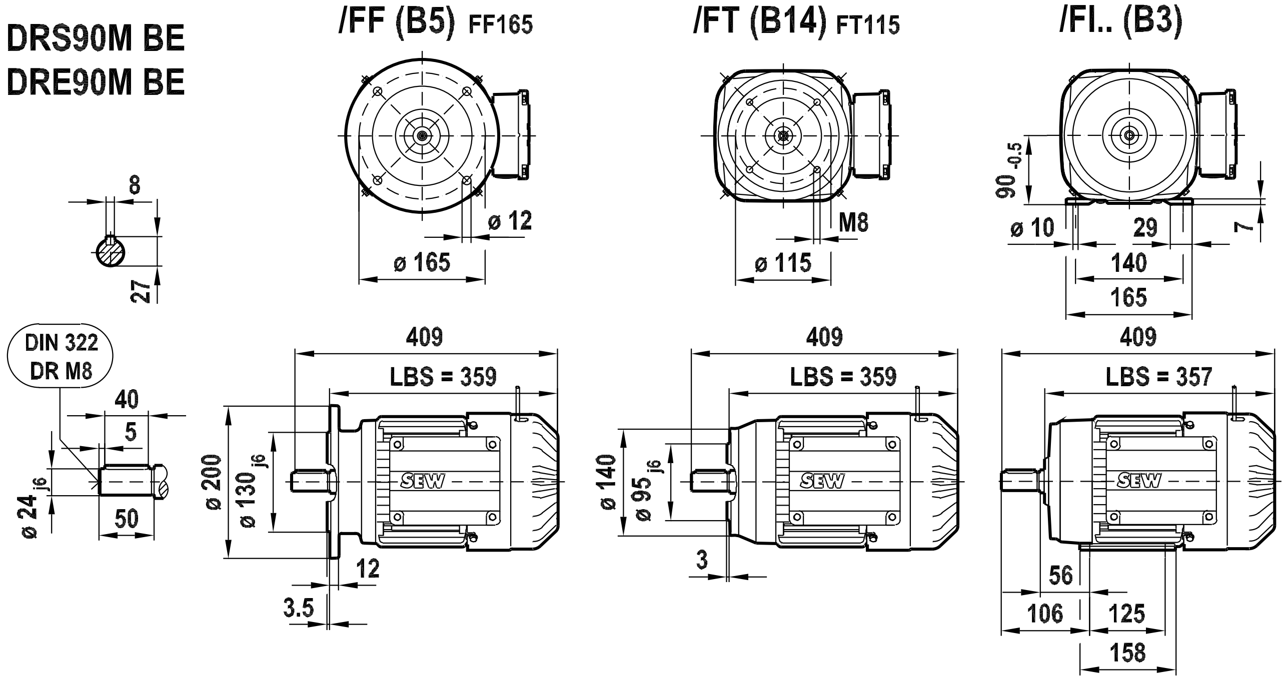
ø 14 j6
5
16
ø 170
33.5
LBS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DRE90M BE
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/FI.. (B3)
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27
ø 12
ø 165
M8
ø 115
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DIN 322
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ø 24 j6
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ø 140
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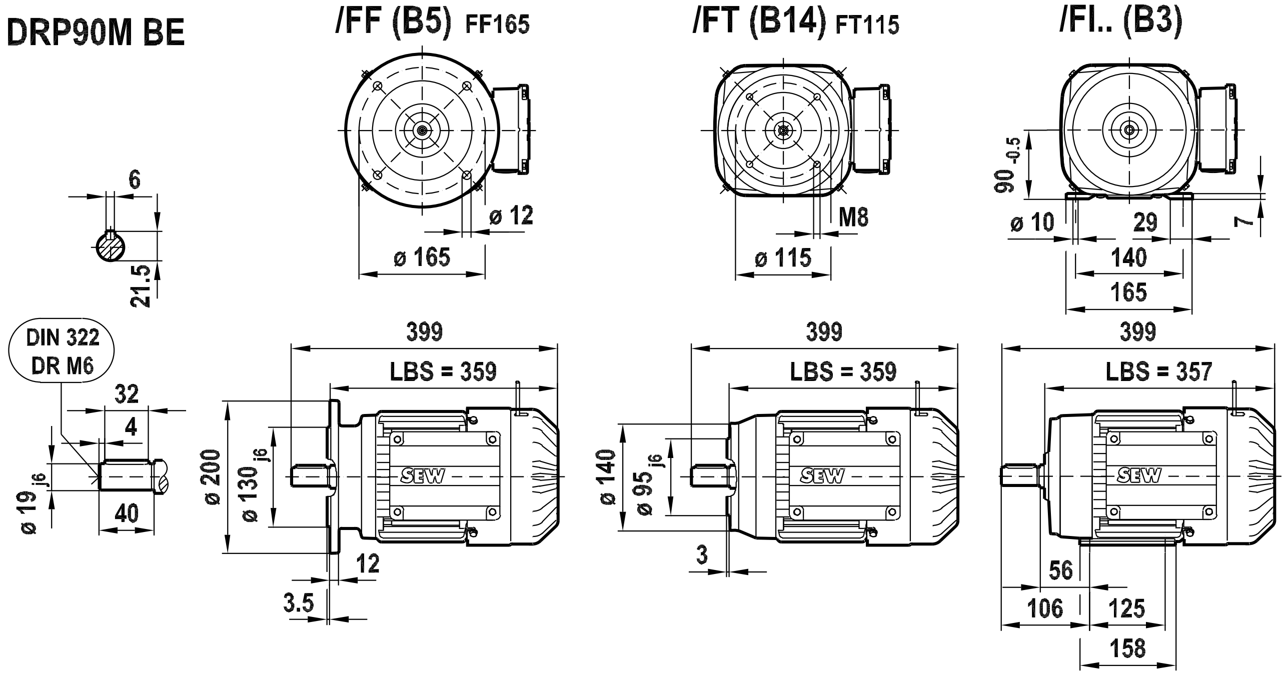
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ø 115
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DIN 322
DR M6
32
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ø 19 j6
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LBS = 359
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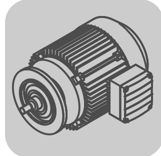

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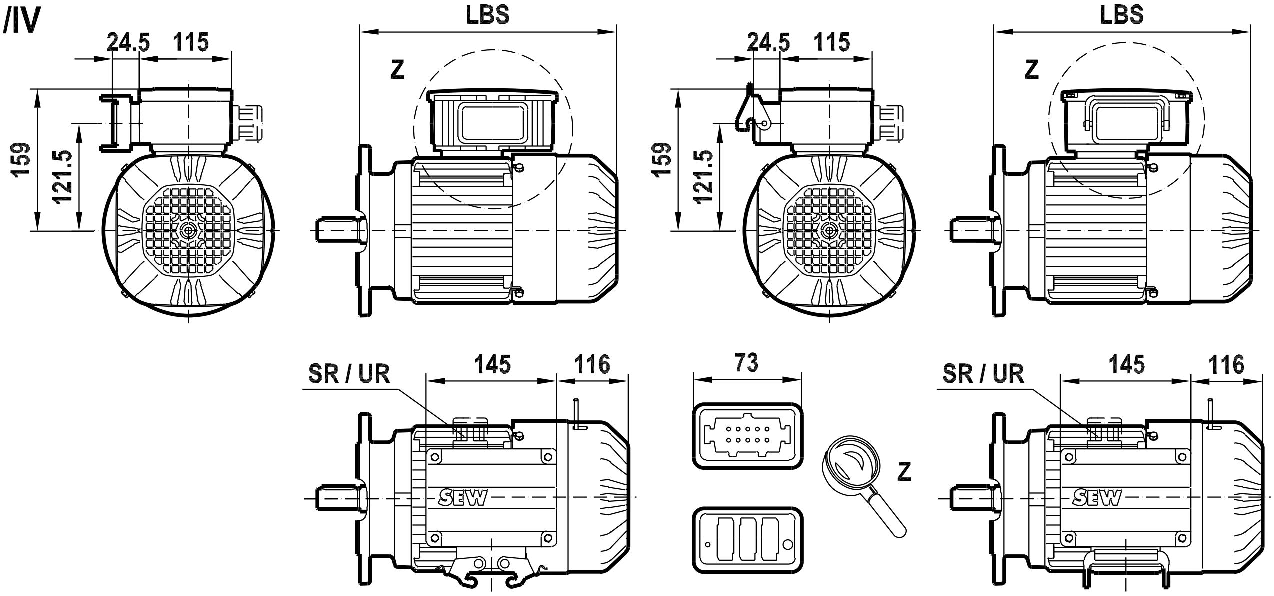

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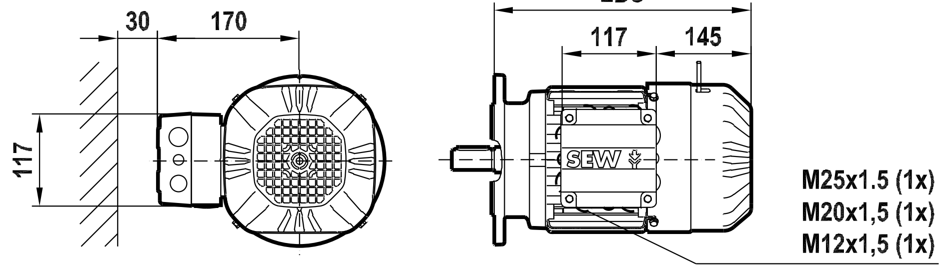

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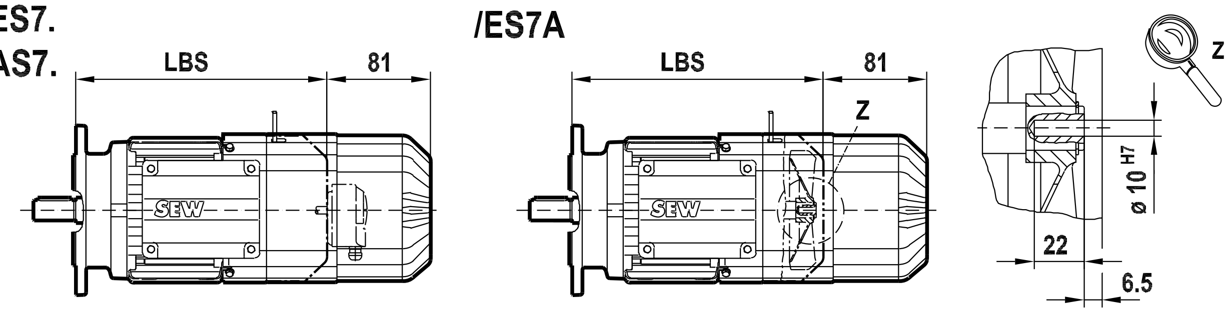

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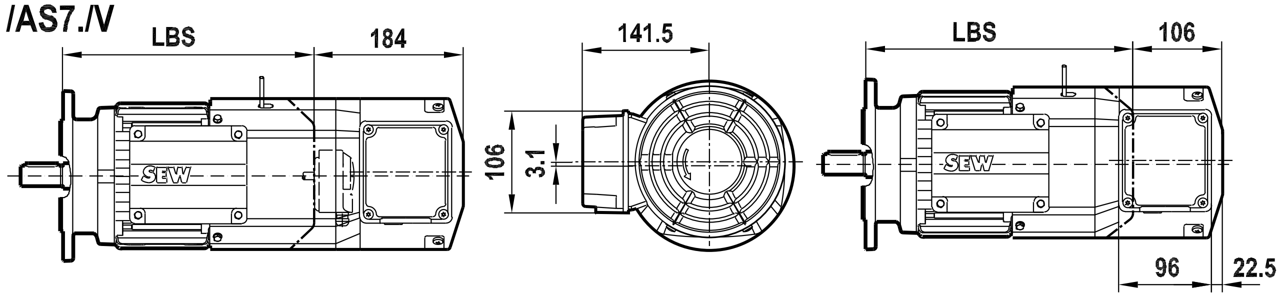

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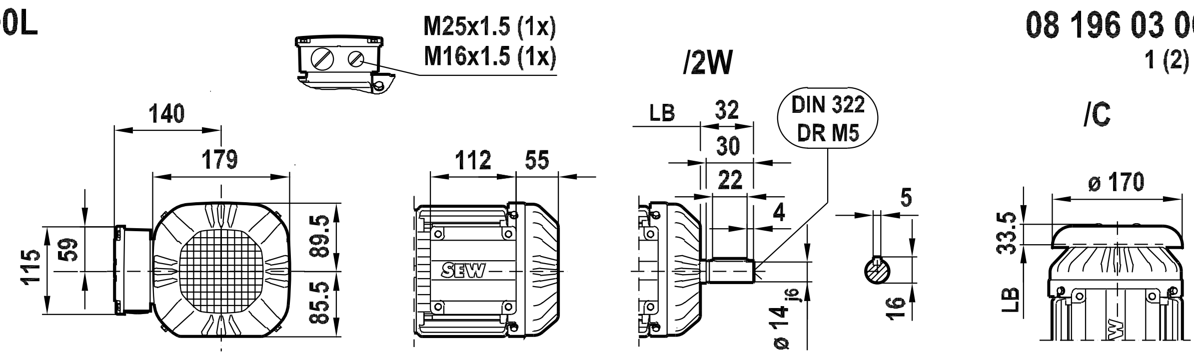

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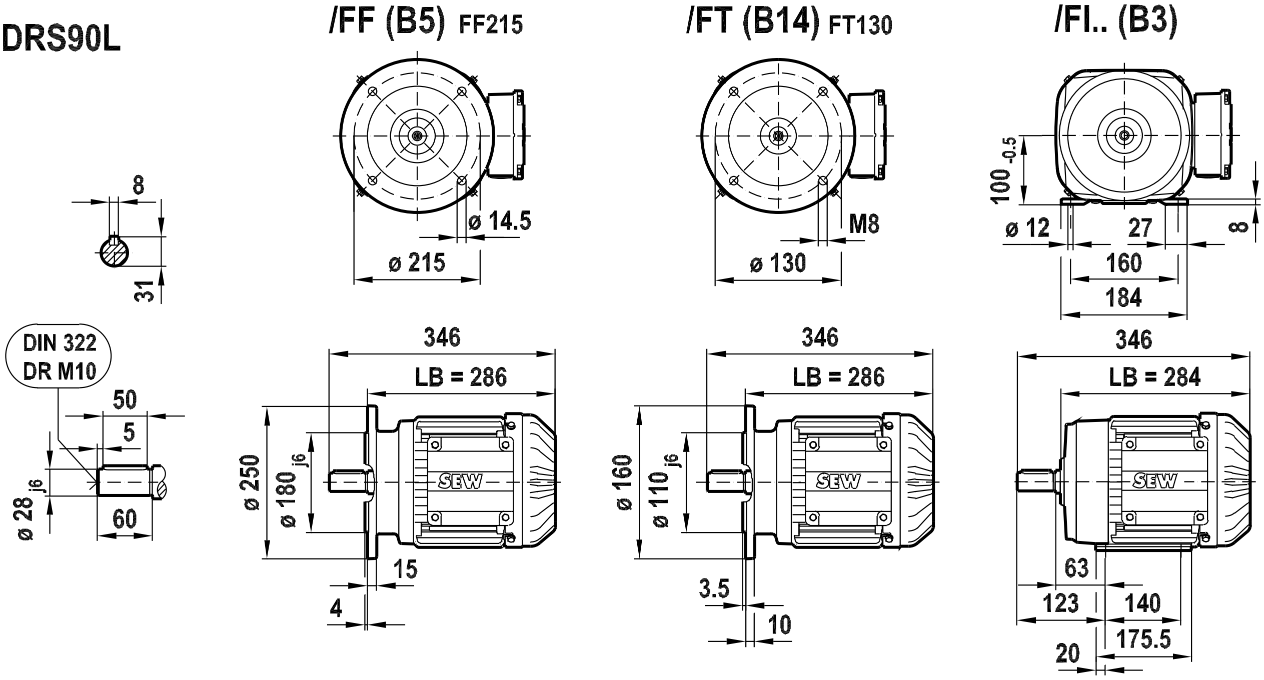

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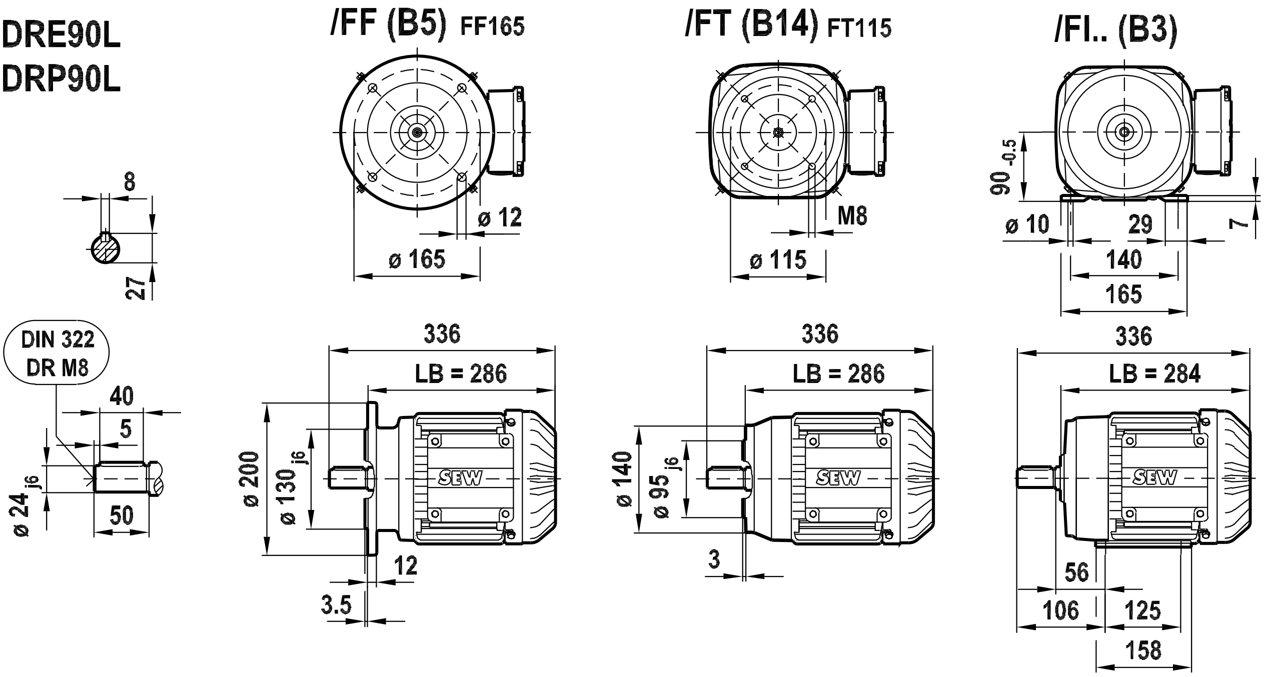

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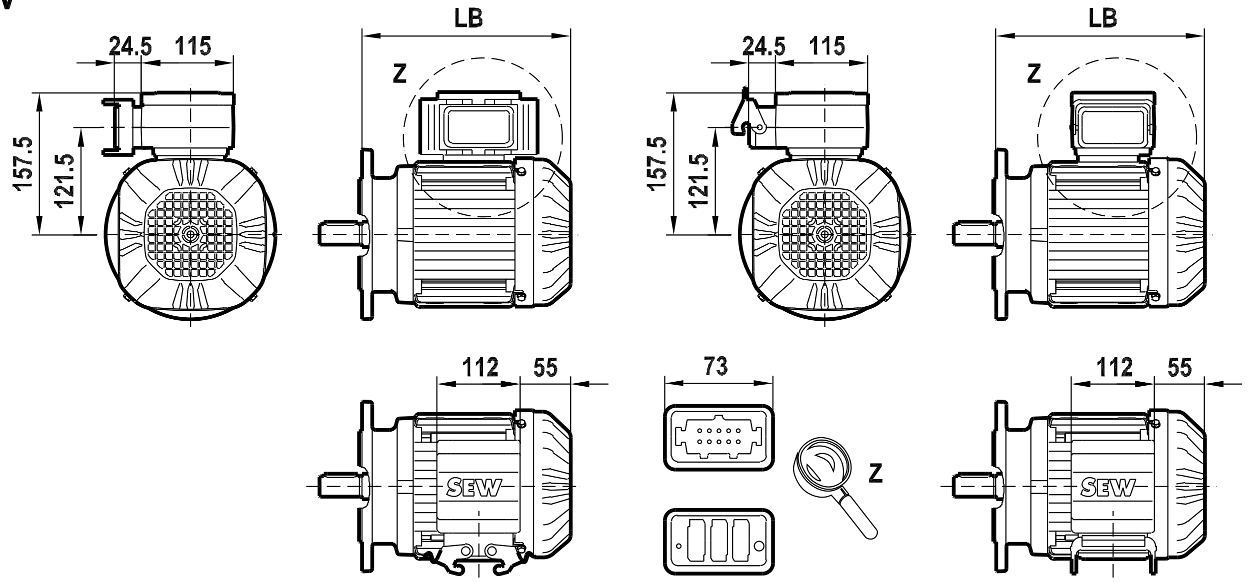

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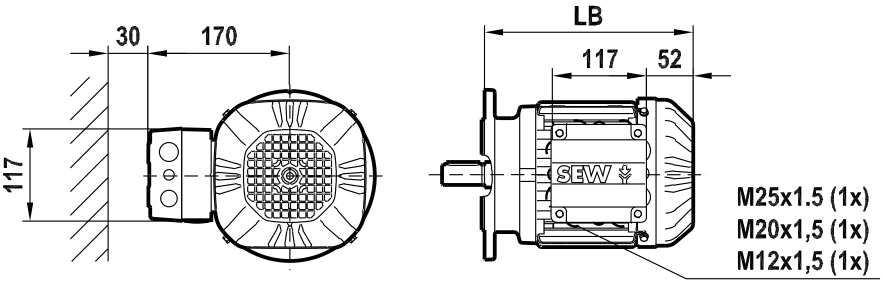

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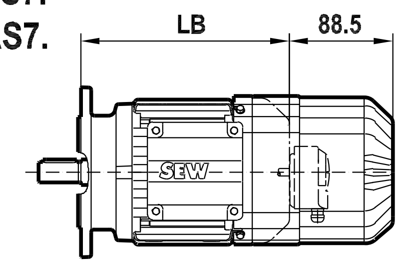

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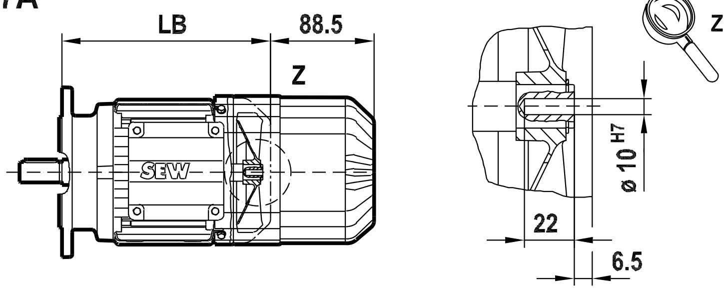

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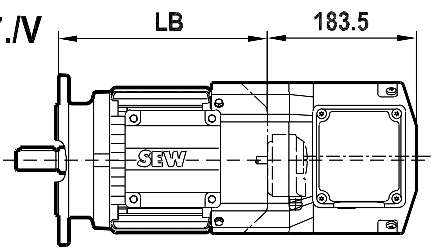

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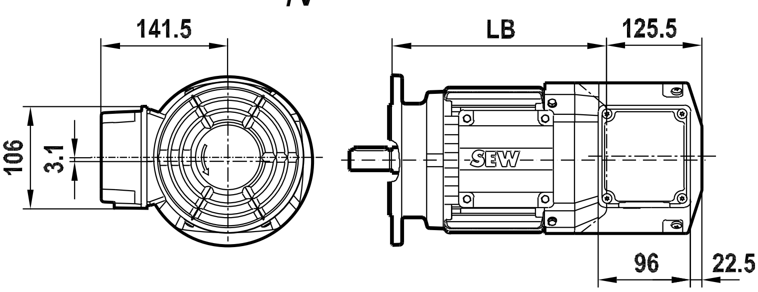

DR.90L BE

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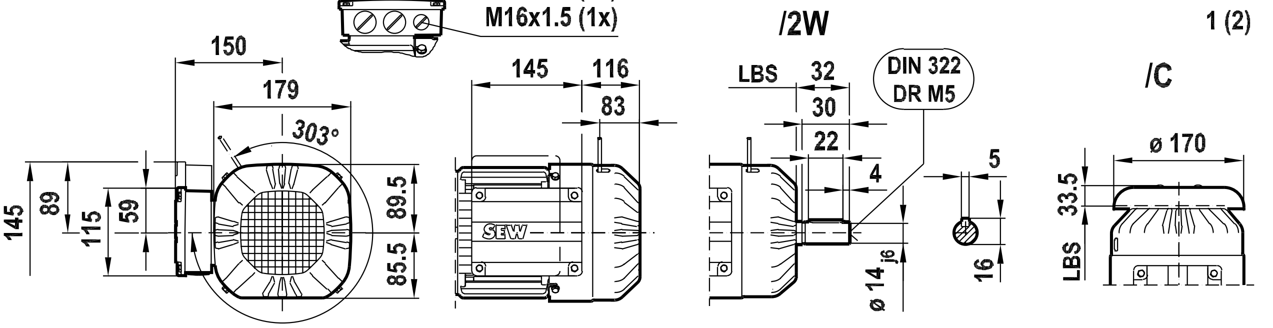

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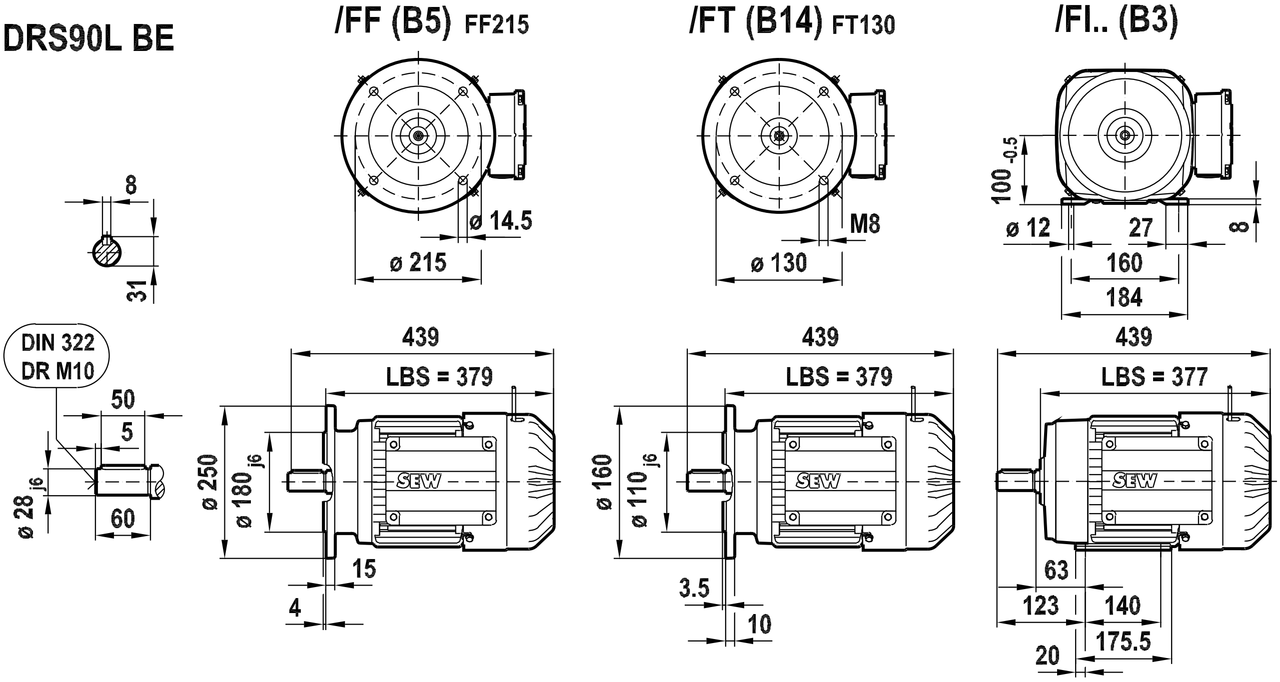

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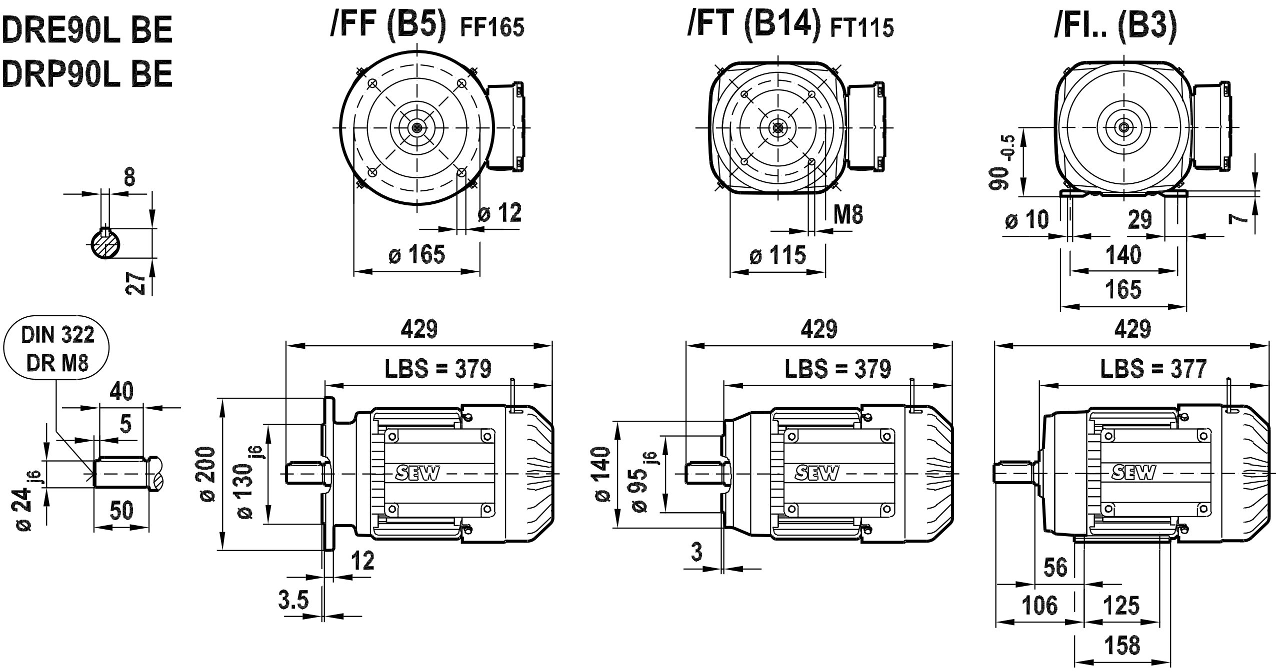

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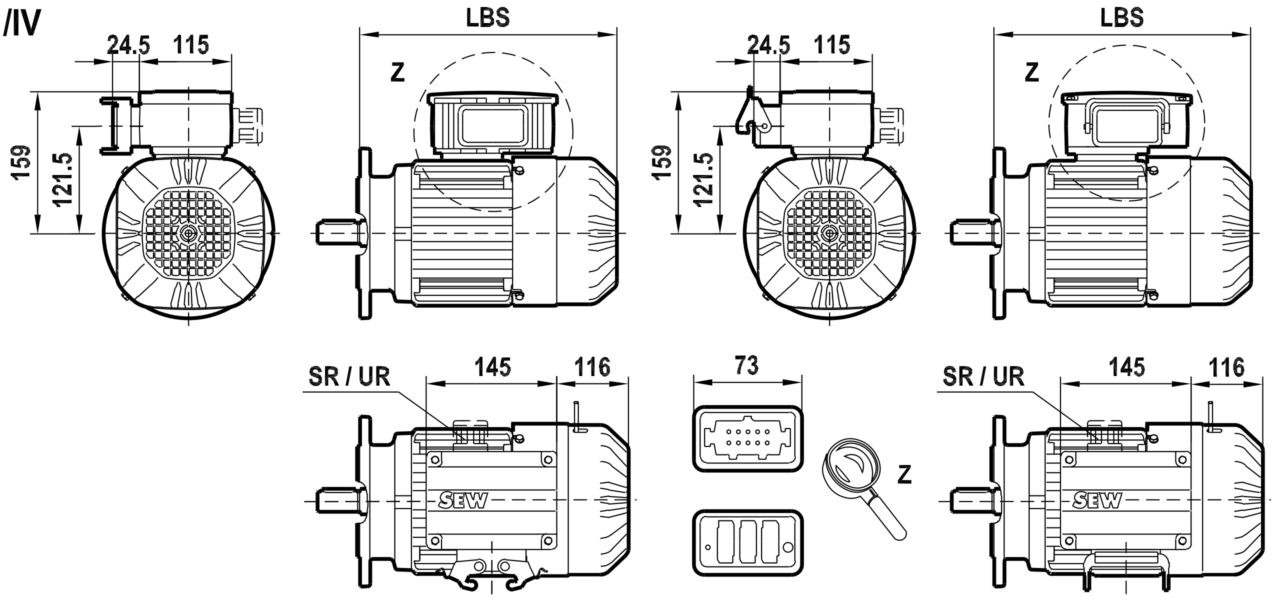

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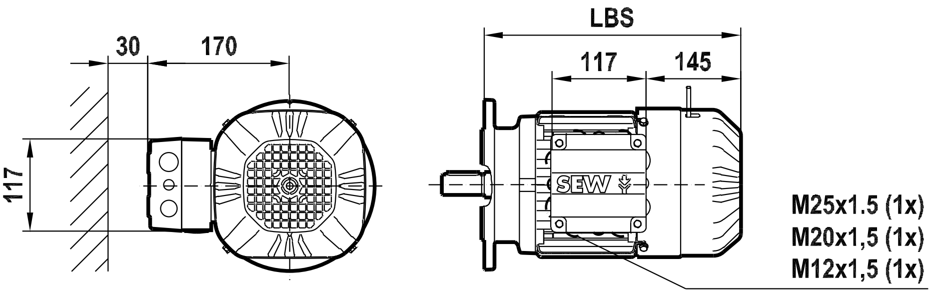

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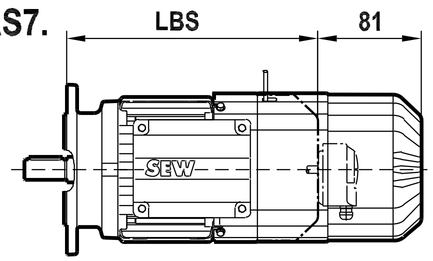

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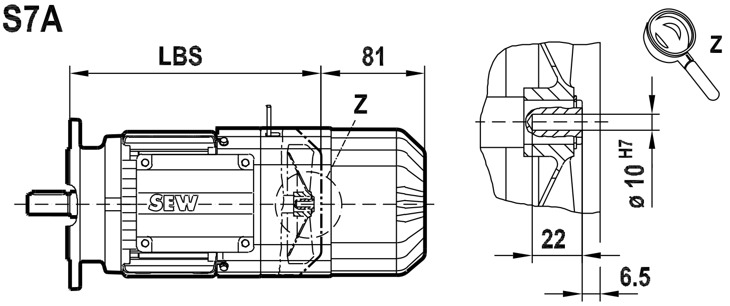

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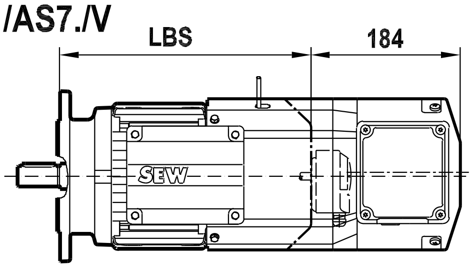

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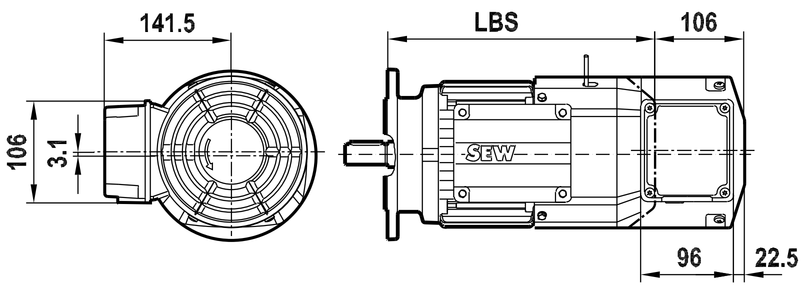

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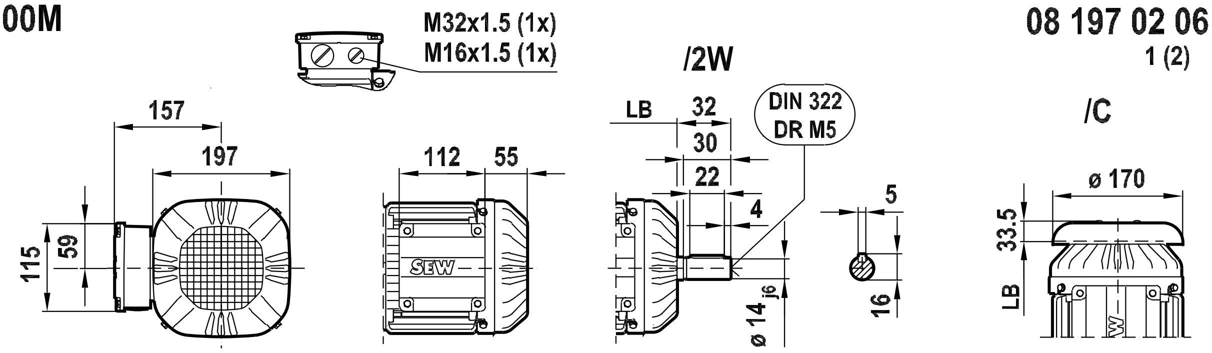

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DRE100M

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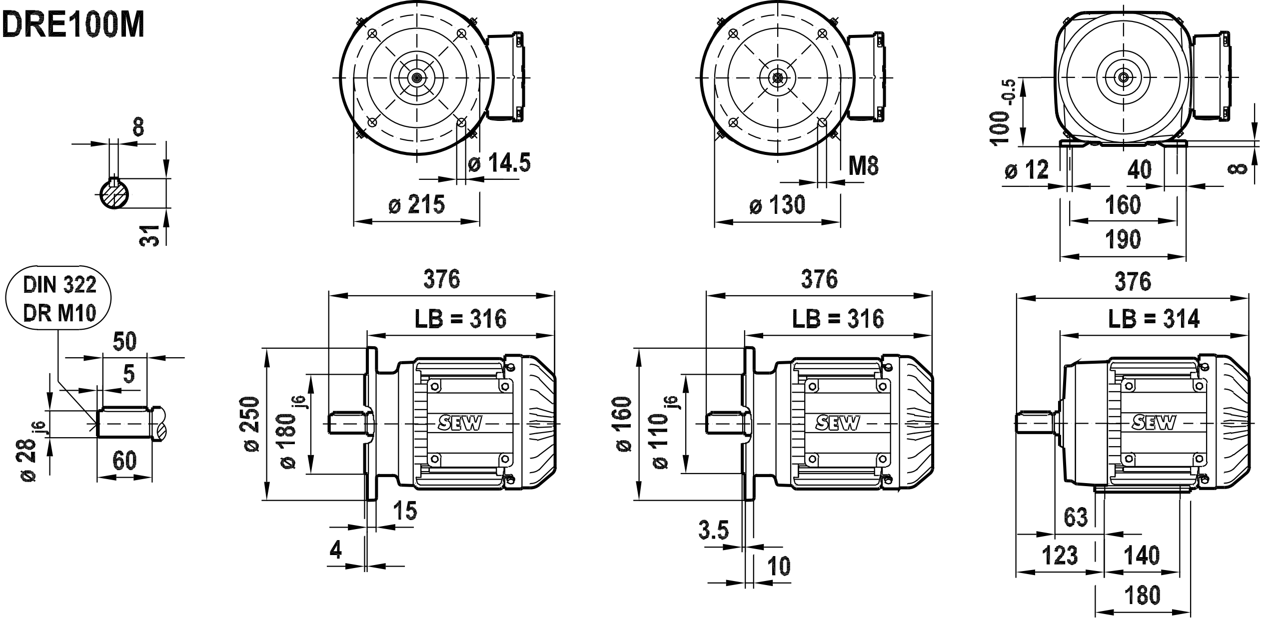

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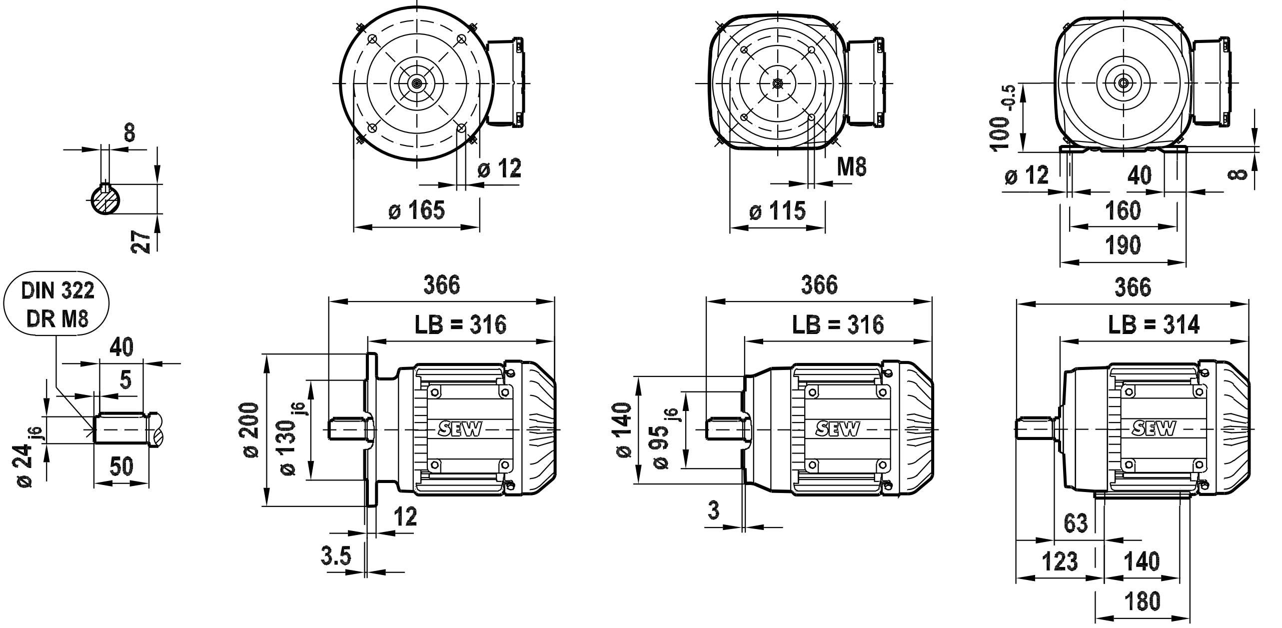

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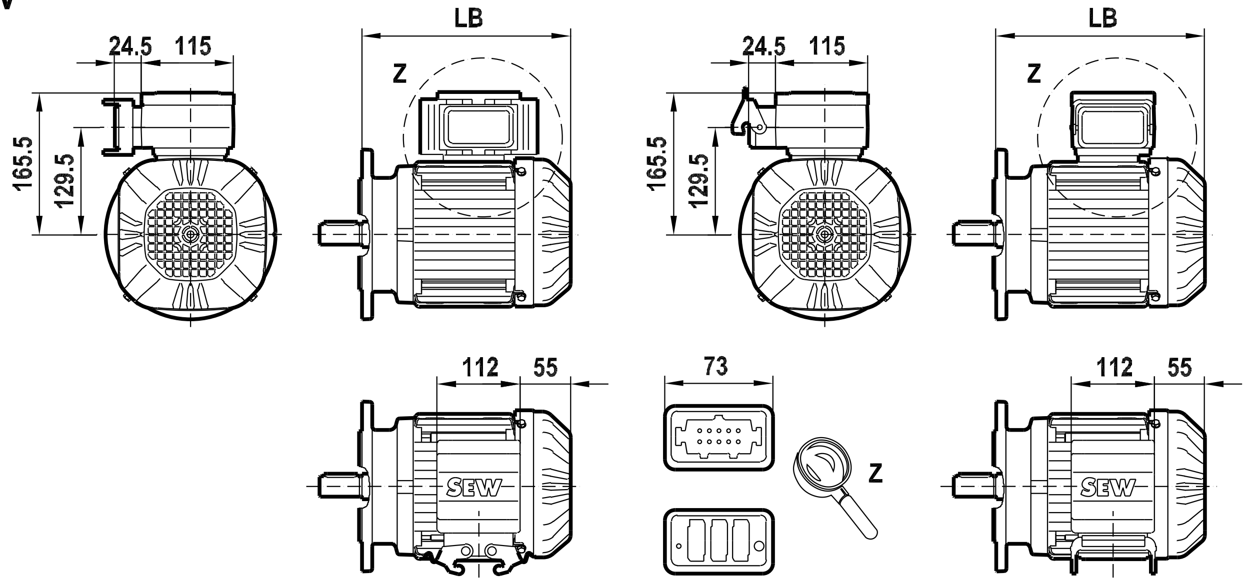

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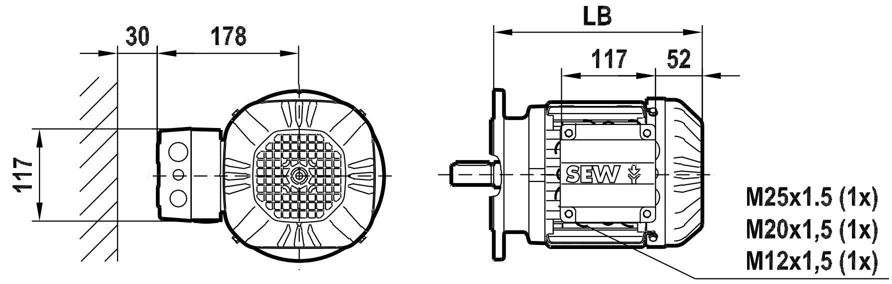

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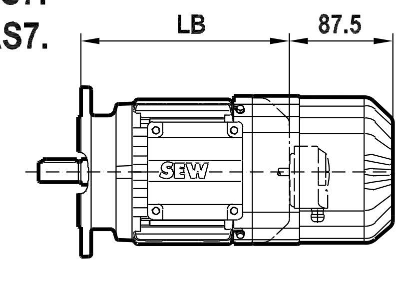

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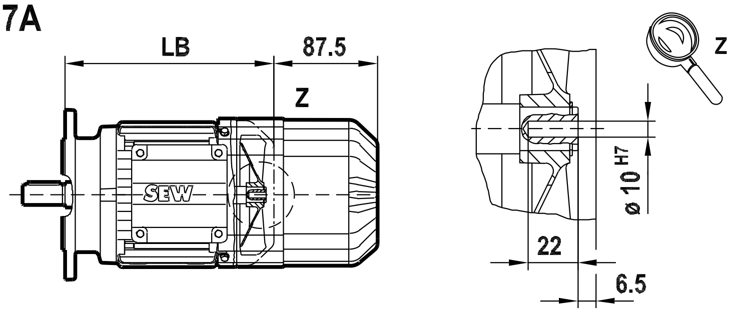

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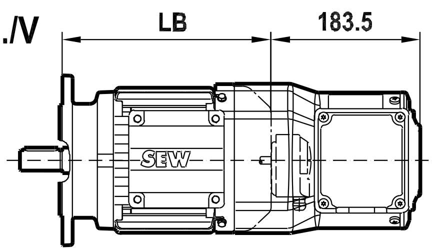

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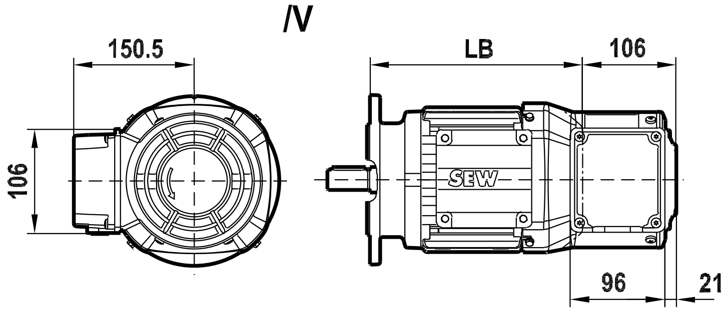

DR.100M BE

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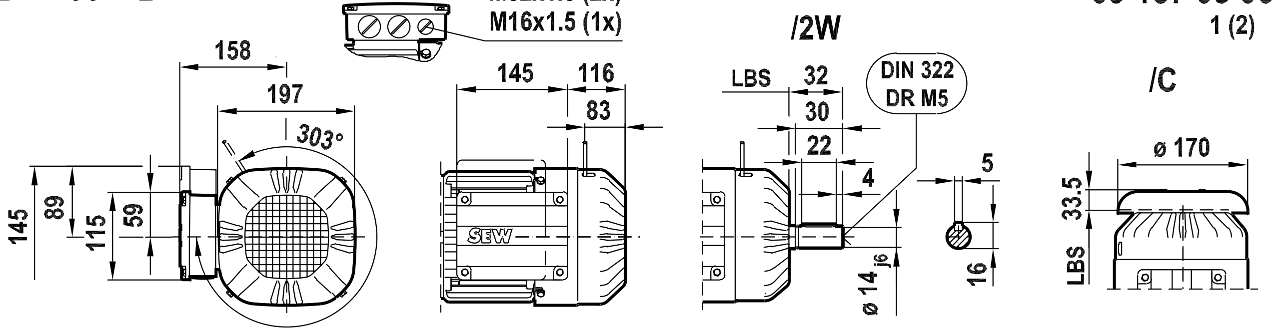

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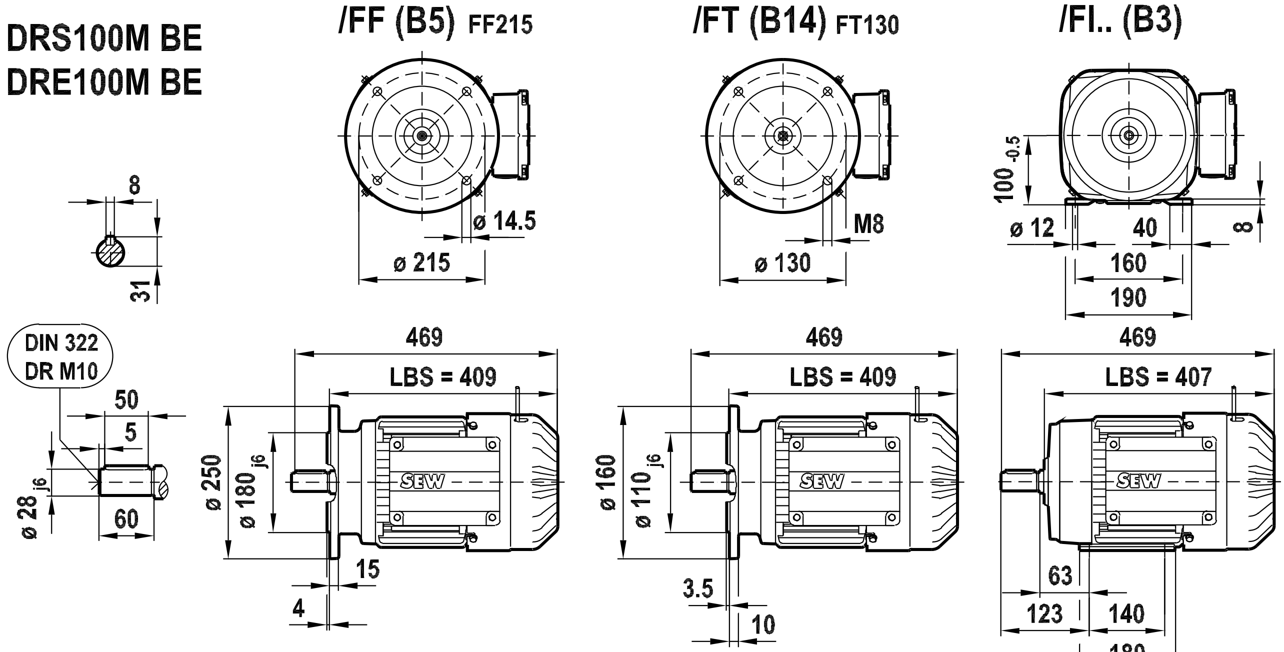

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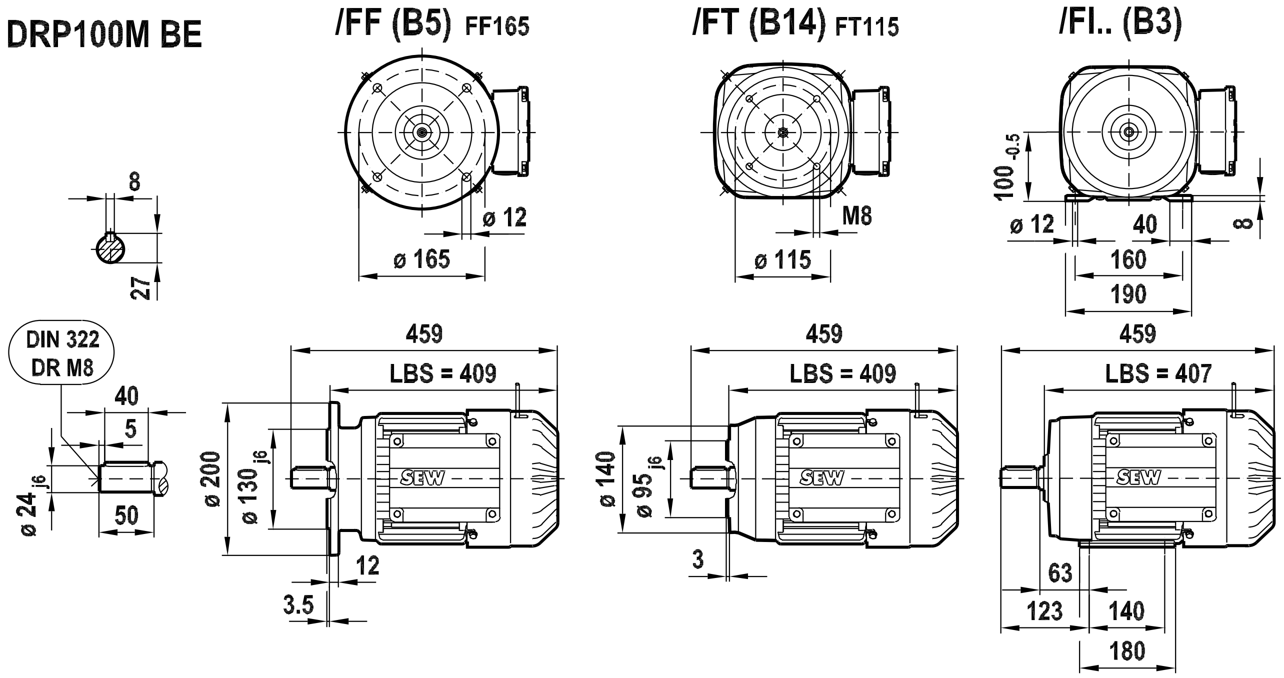

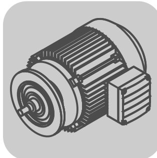

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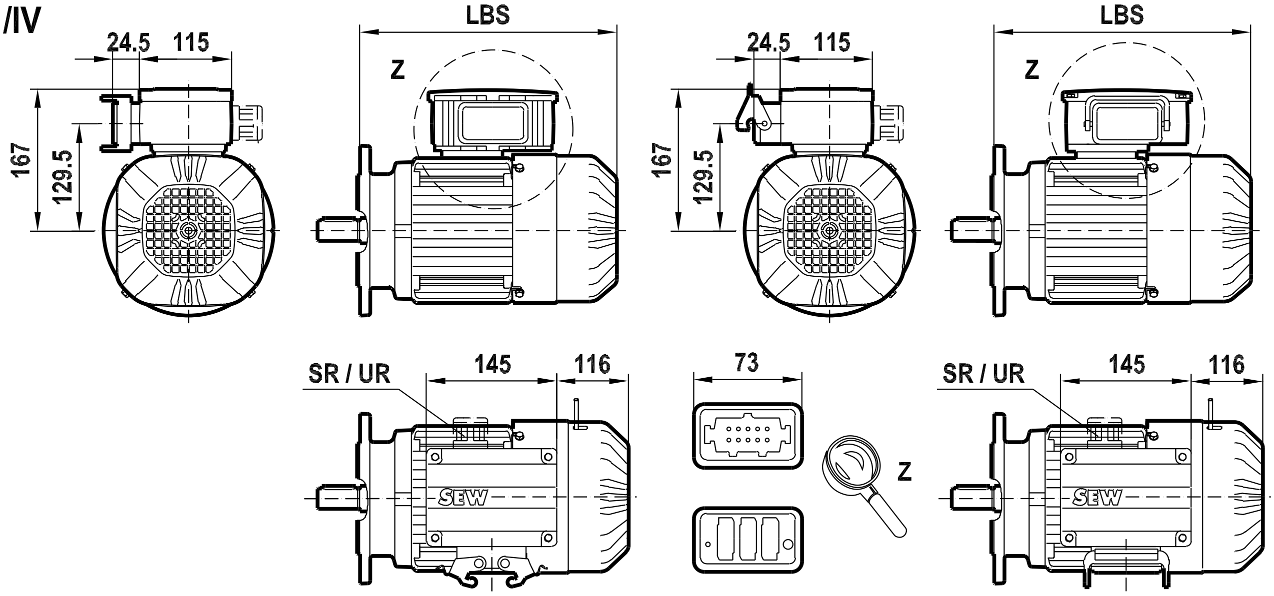

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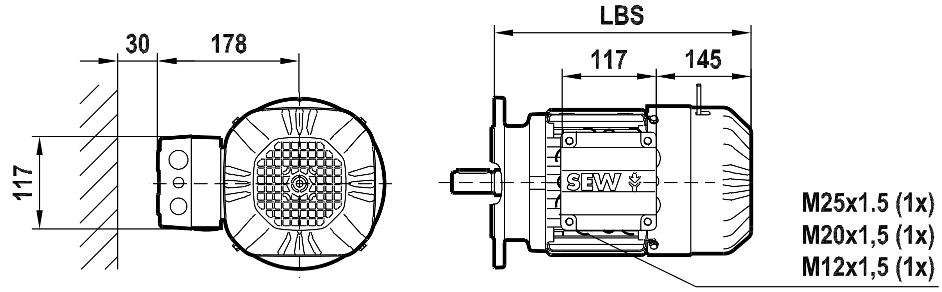

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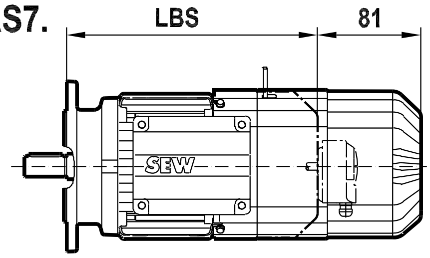

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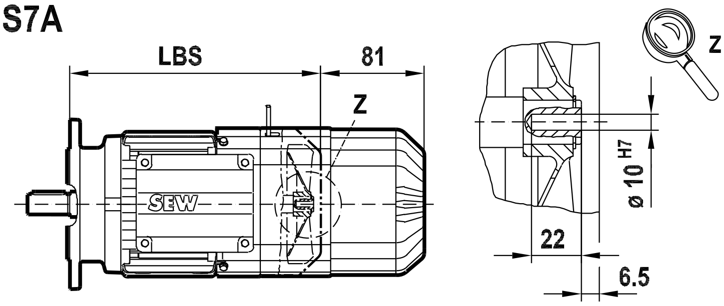

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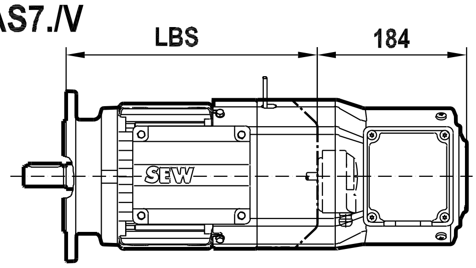

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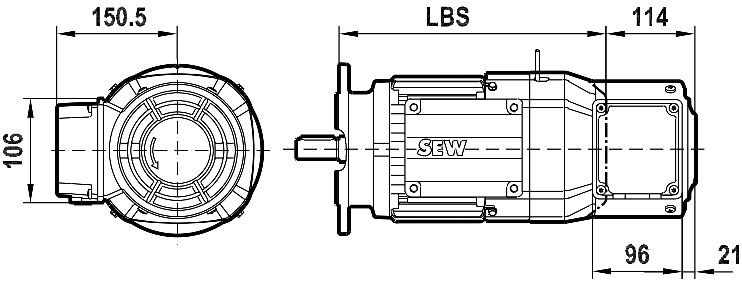

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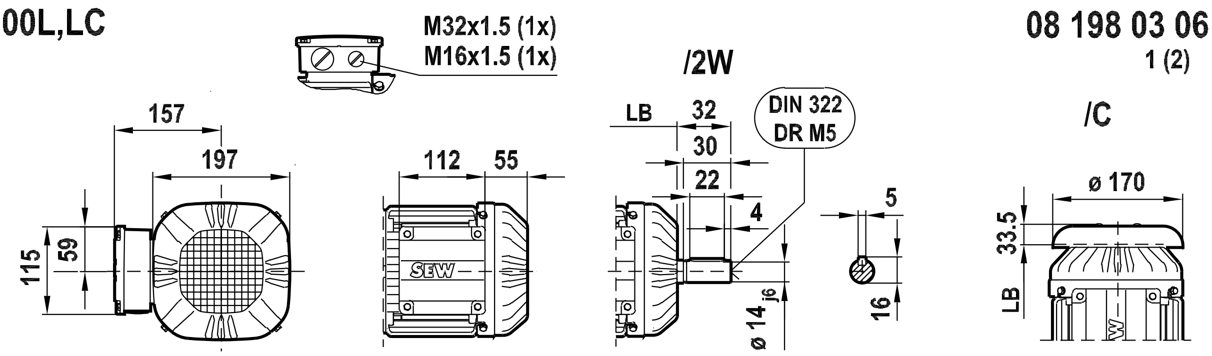

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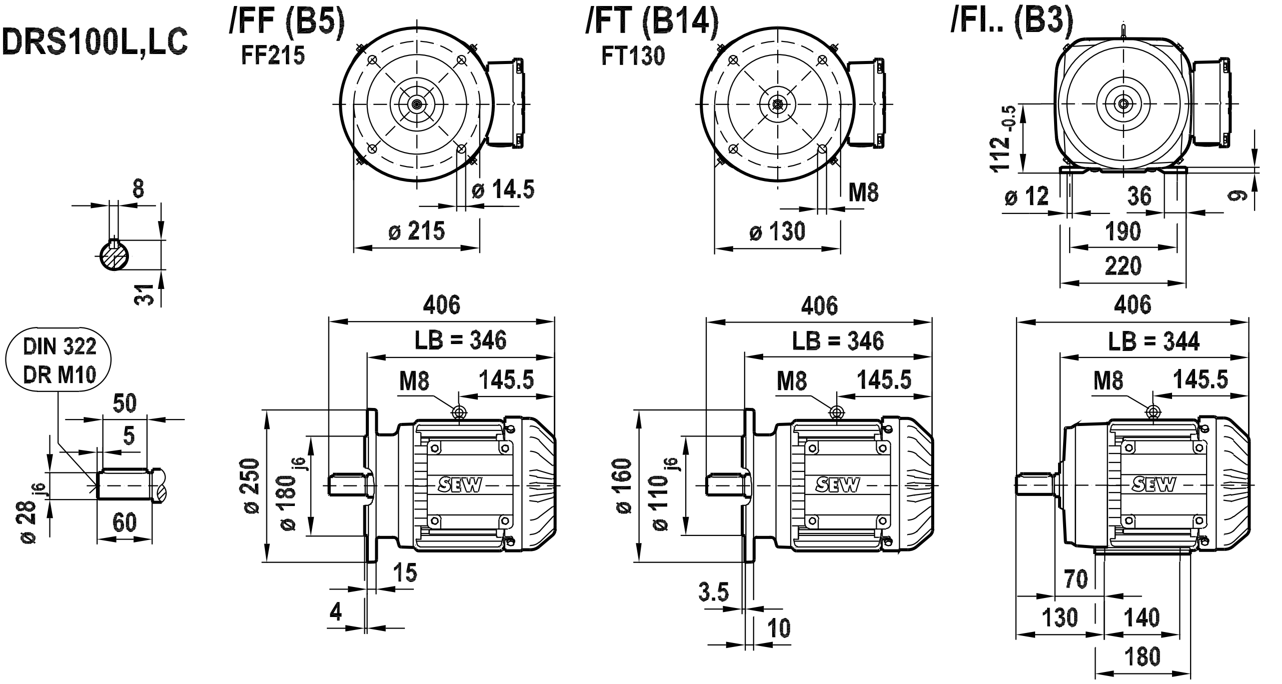
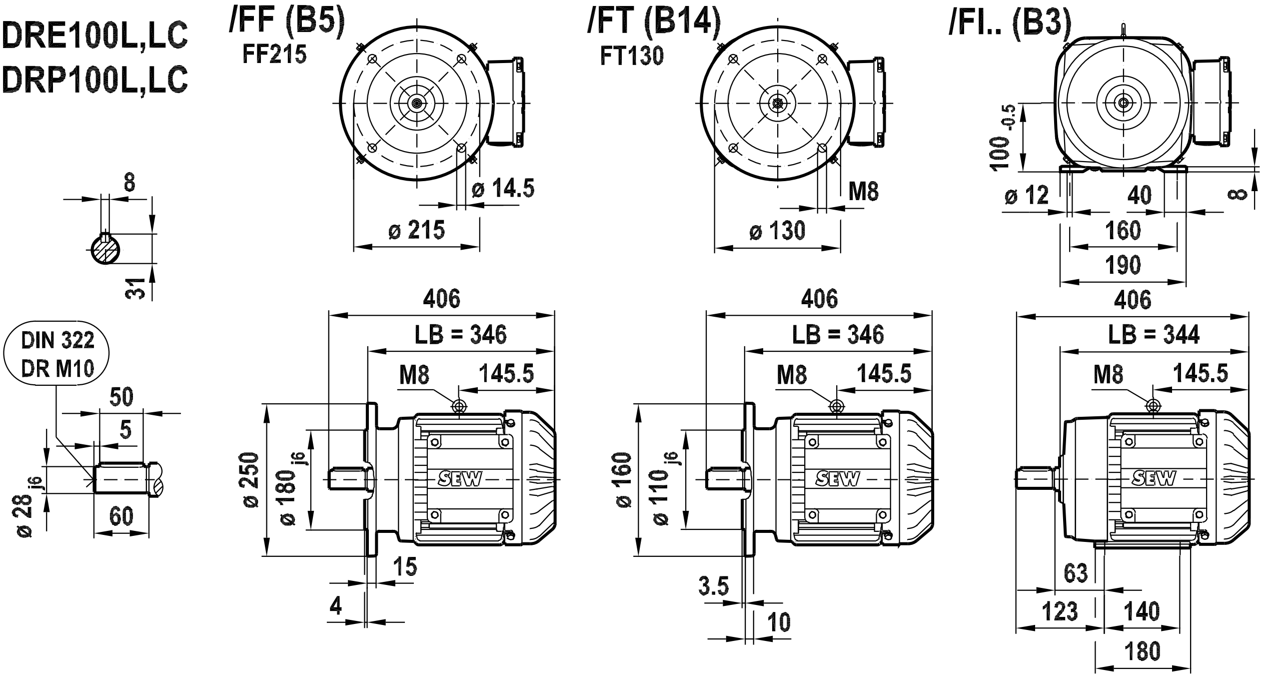


DRE100L,LC
DRP100L,LC



DR.100L,LC

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2 (2)

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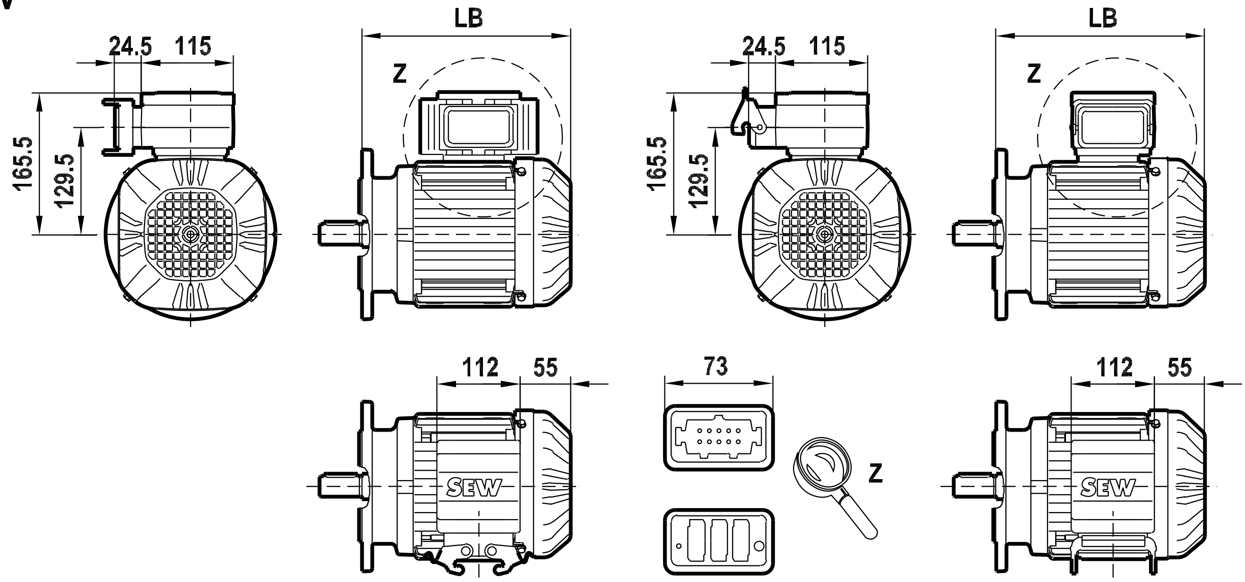

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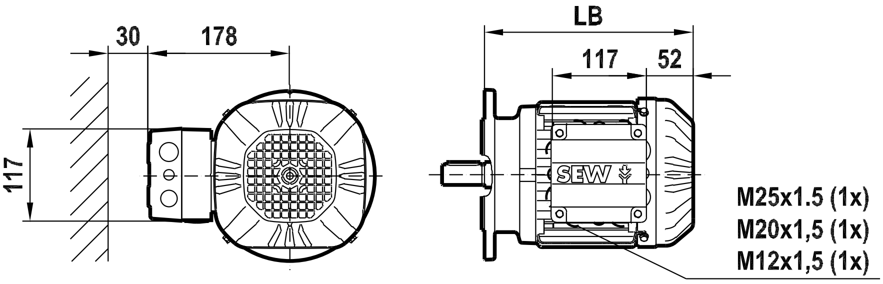

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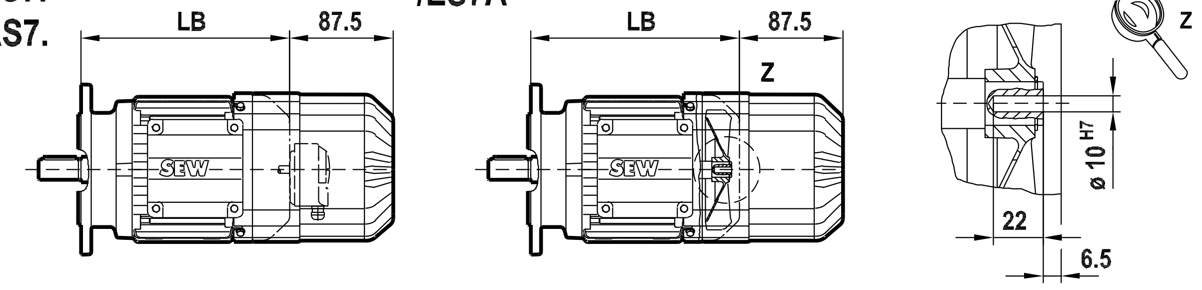

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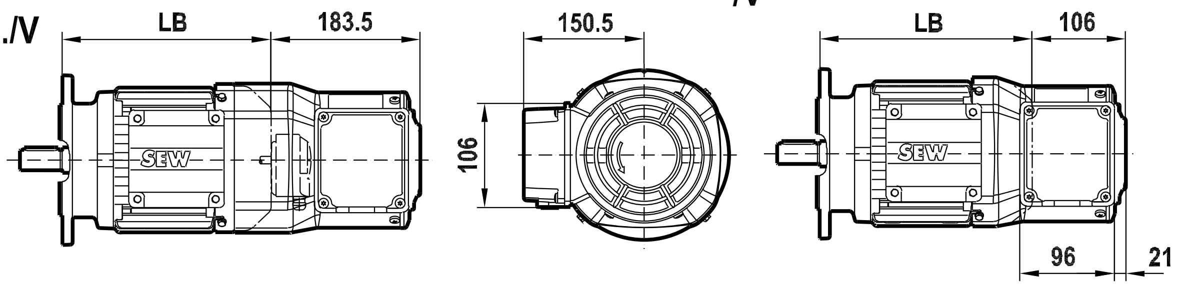

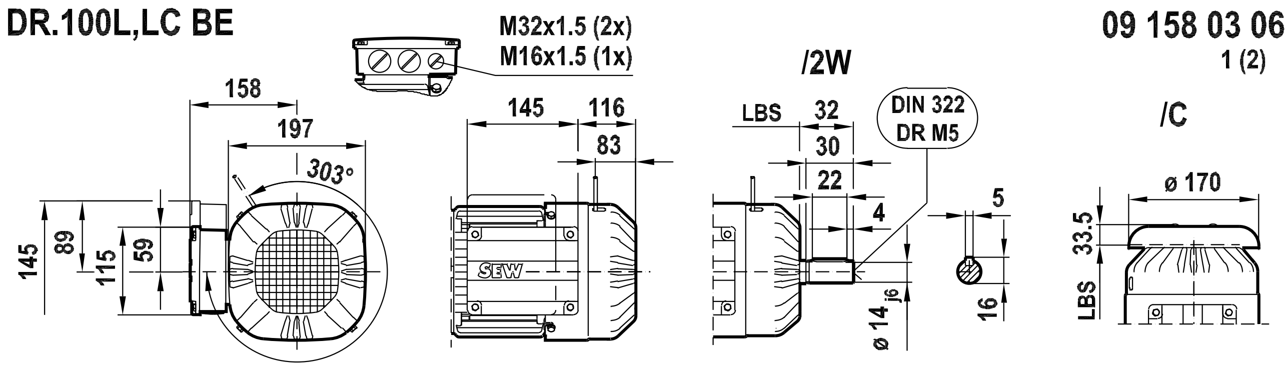
DR.100L,LC BE
M32x1.5 (2x)
M16x1.5 (1x)
09 158 03 06
1 (2)
/2W
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ø 14 j6
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ø 170
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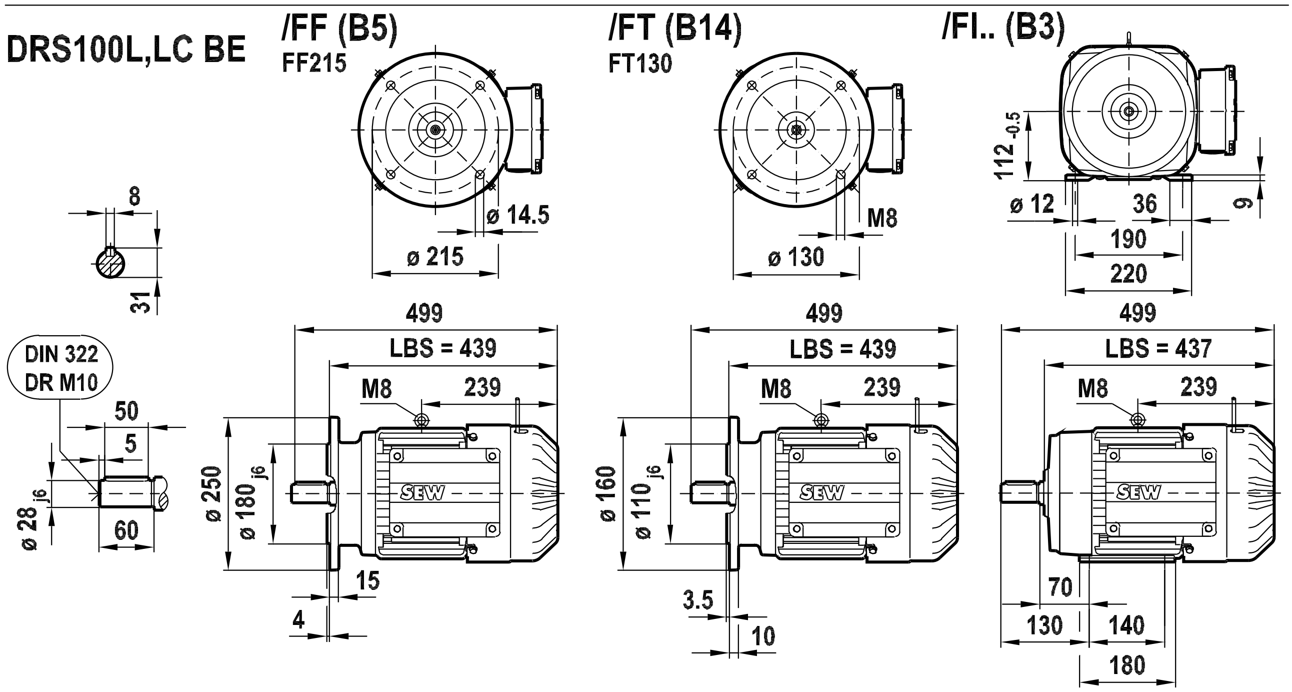
LBS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ø 250
ø 180 j6
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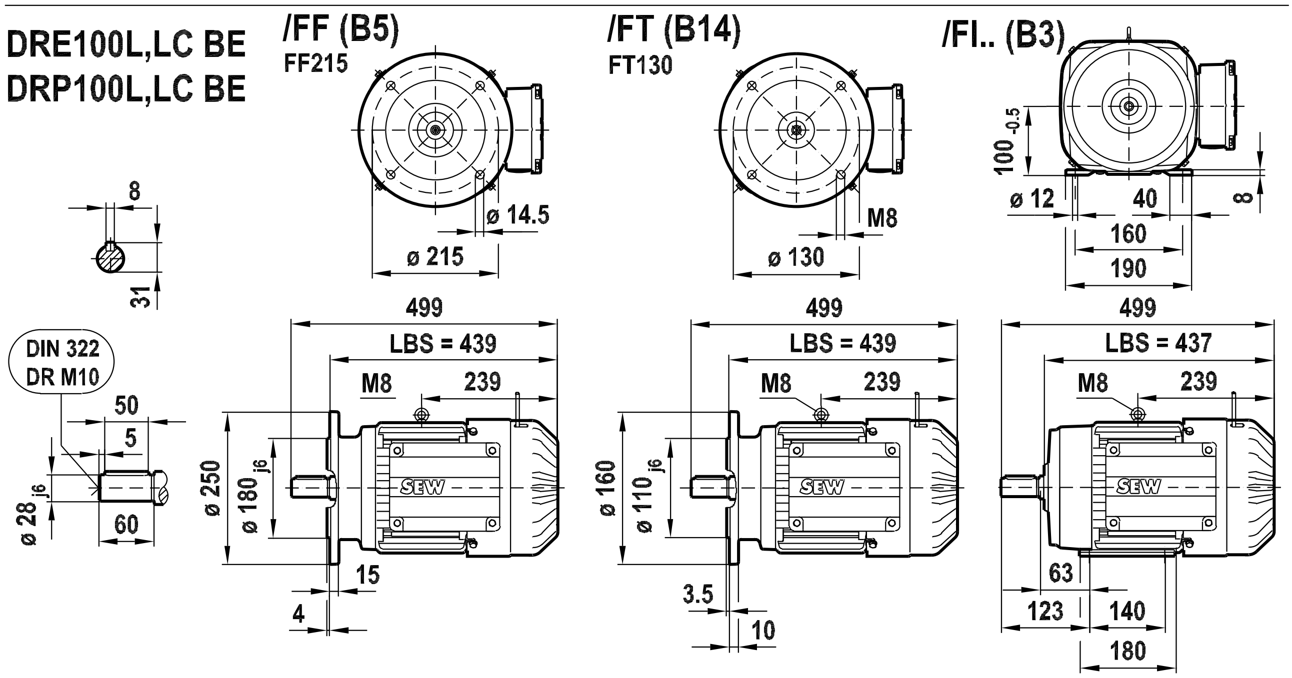
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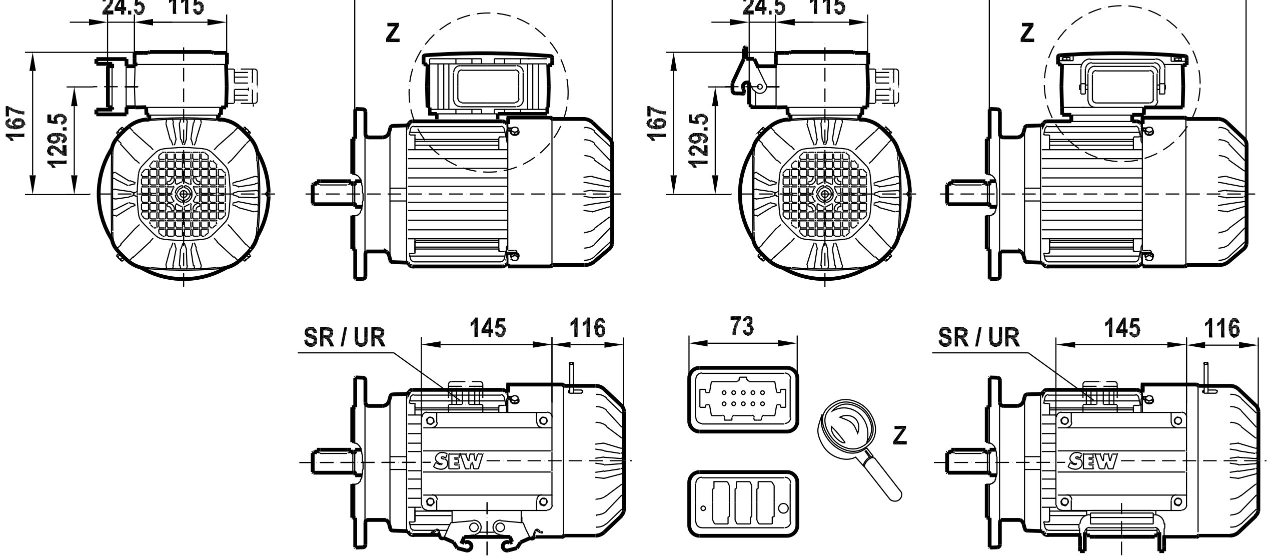
DR.100L,LC BE

09 158 03 06
2 (2)

/IV



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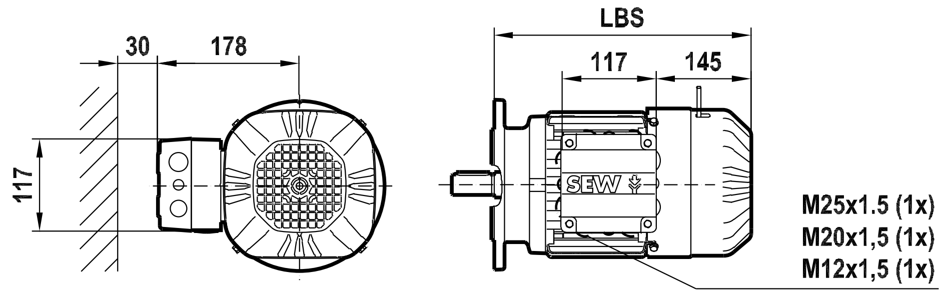

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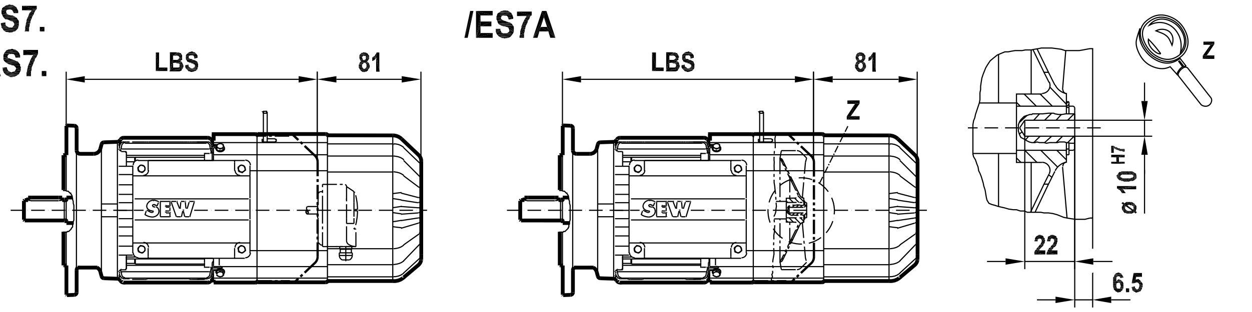

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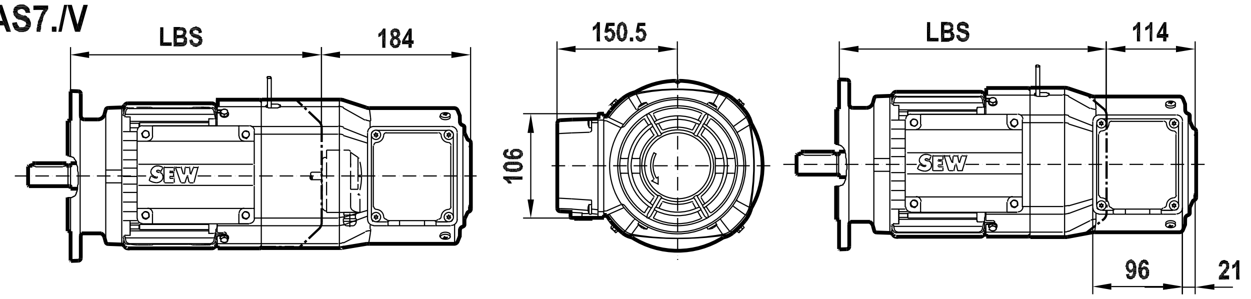

DR.112M

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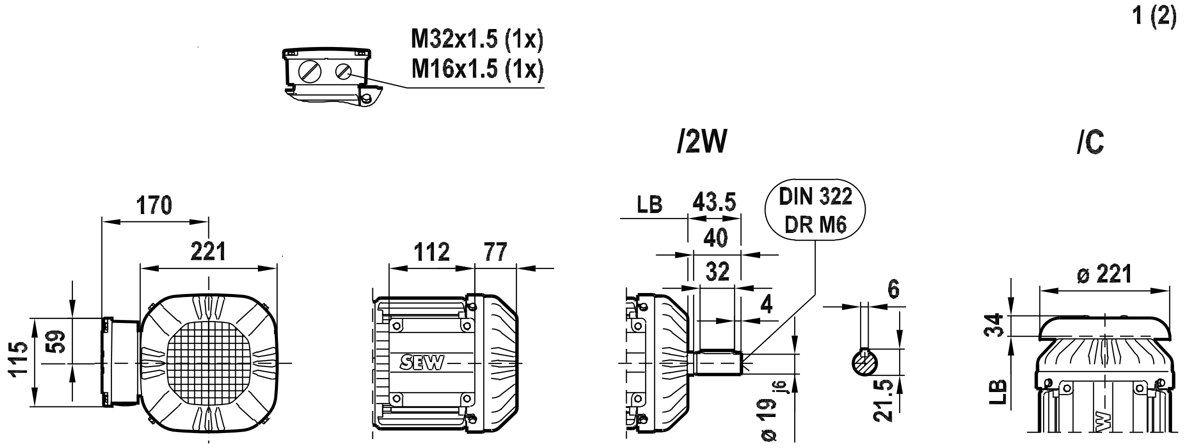
1 (2)



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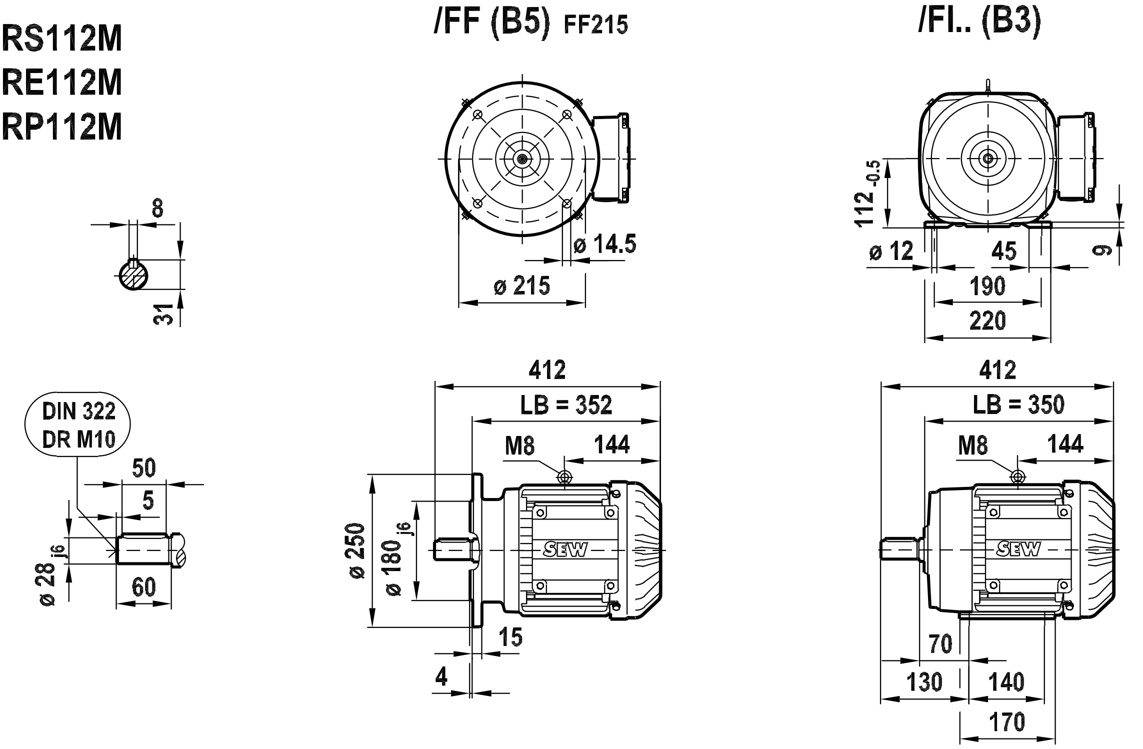
DRP112M



DR.112M

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2 (2)

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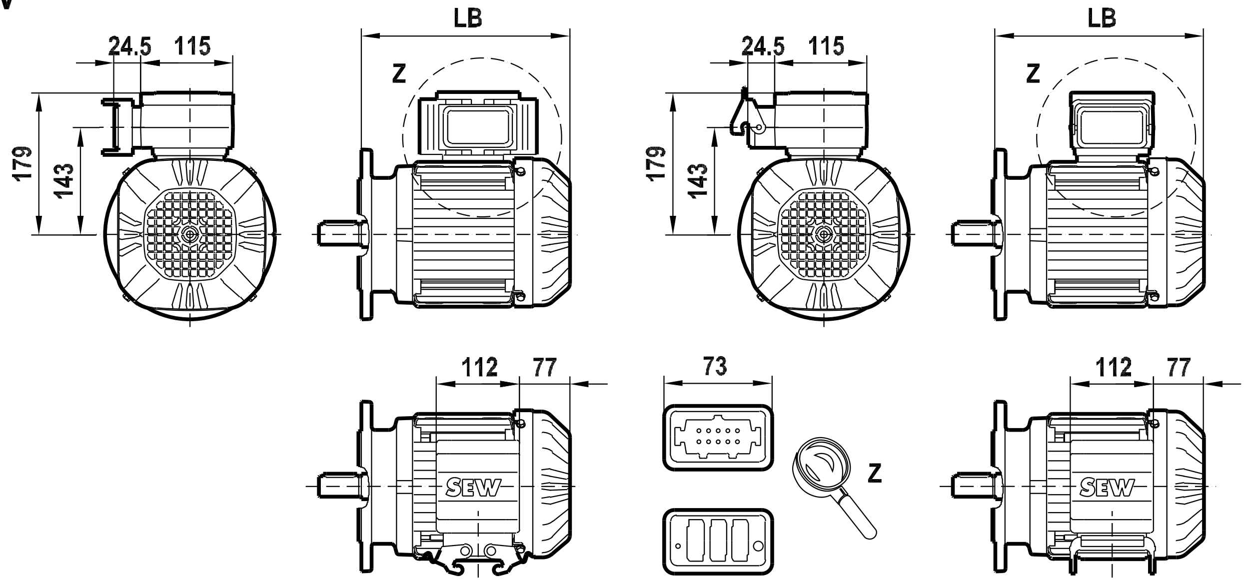

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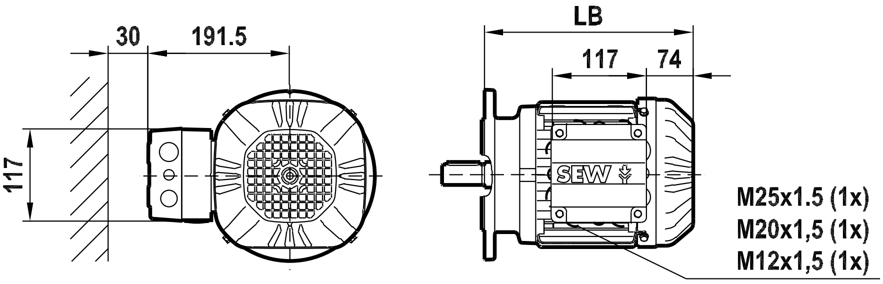

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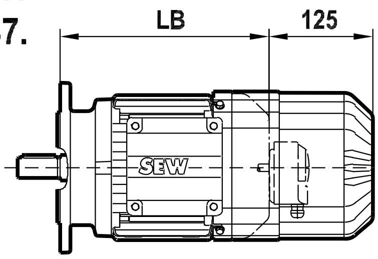

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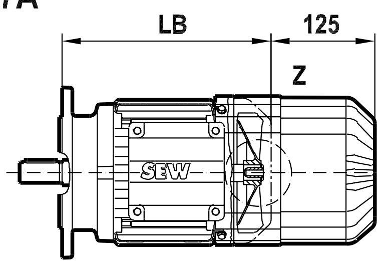

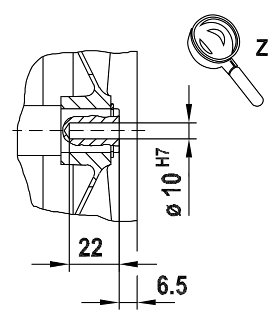

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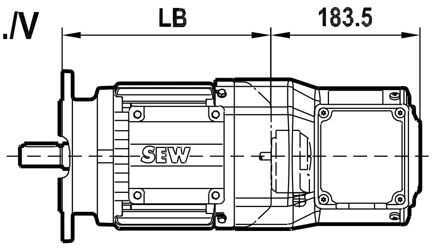

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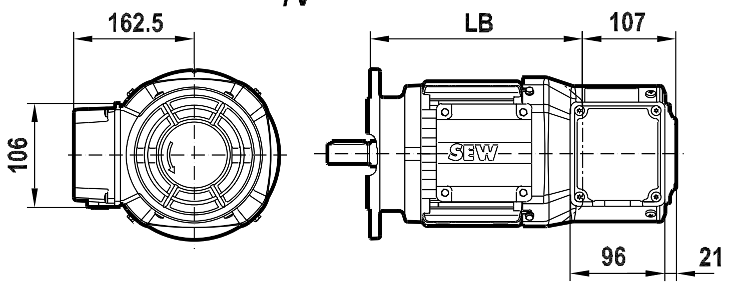

DR.112M BE

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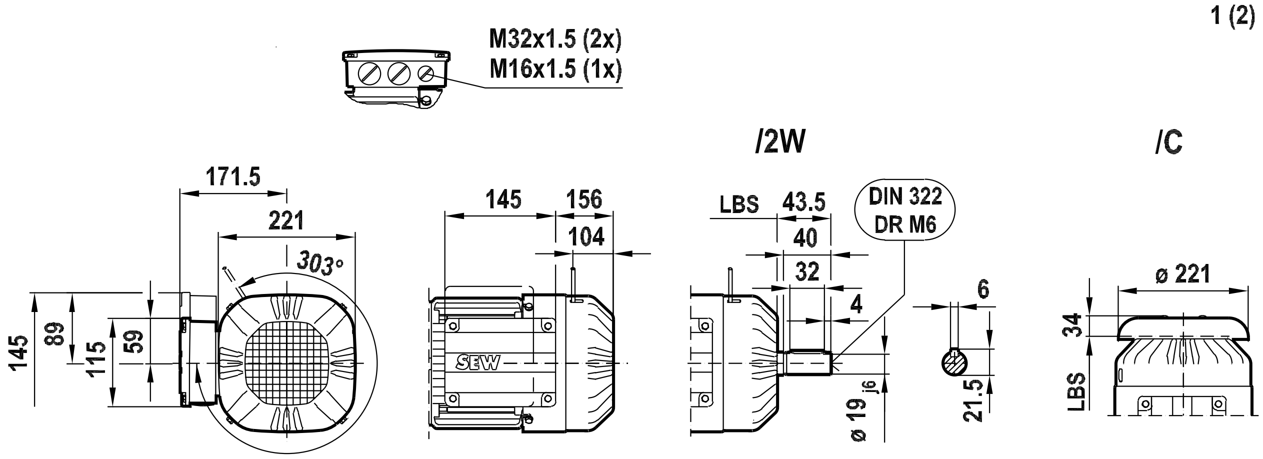

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DRE112M BE
DRP112M BE

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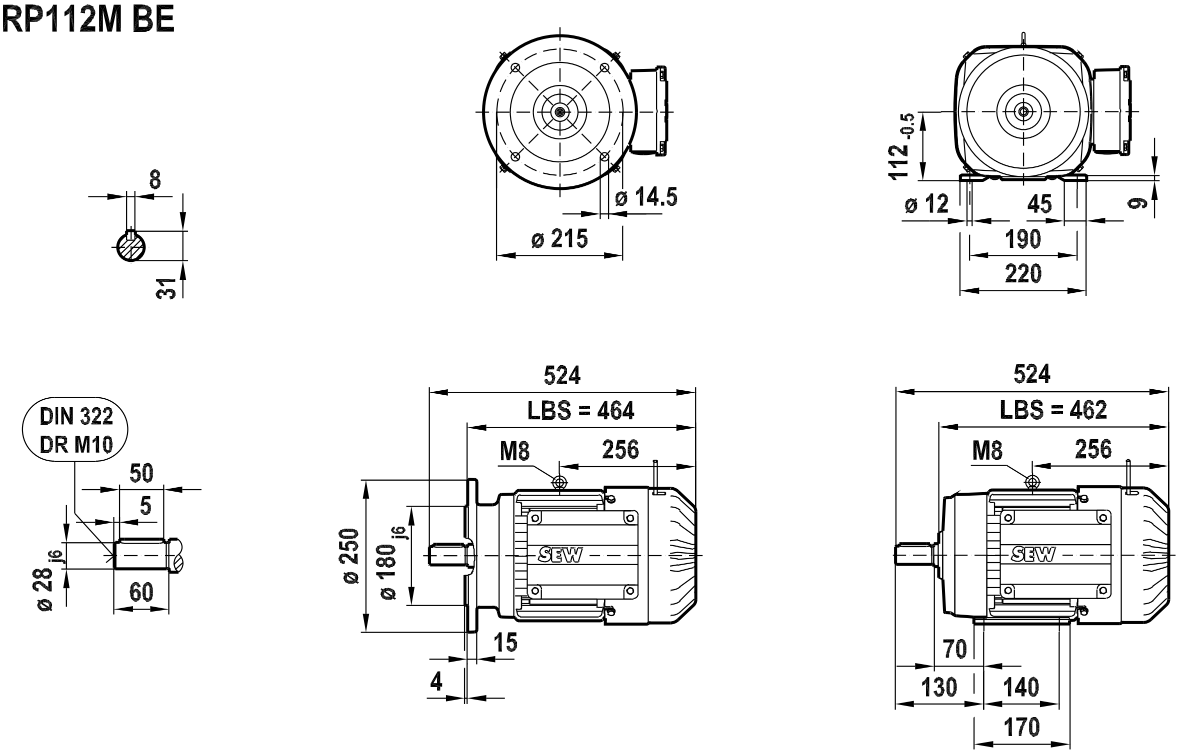

DR.112M BE

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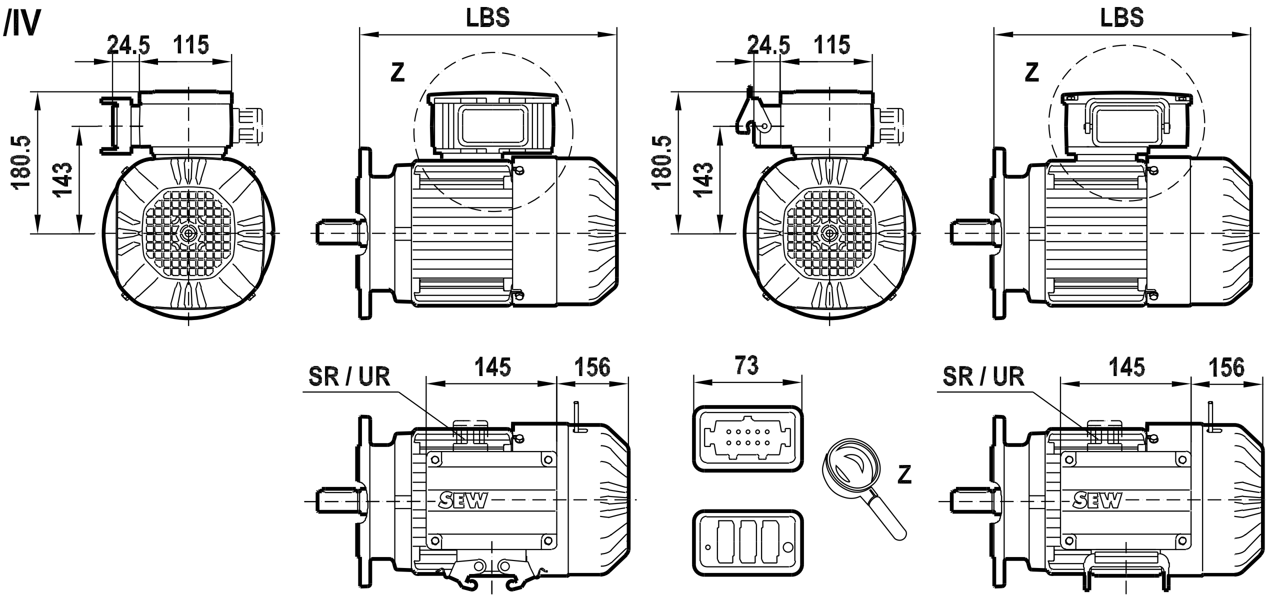

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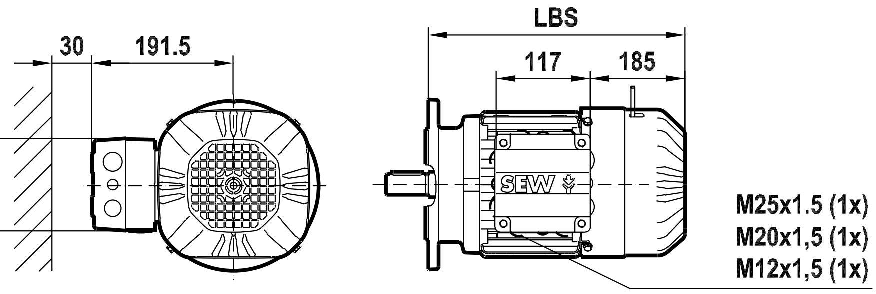

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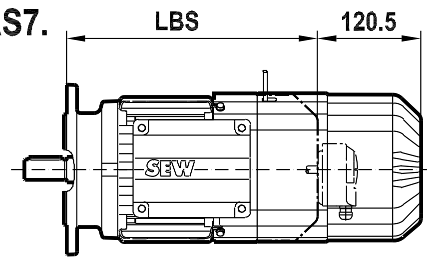

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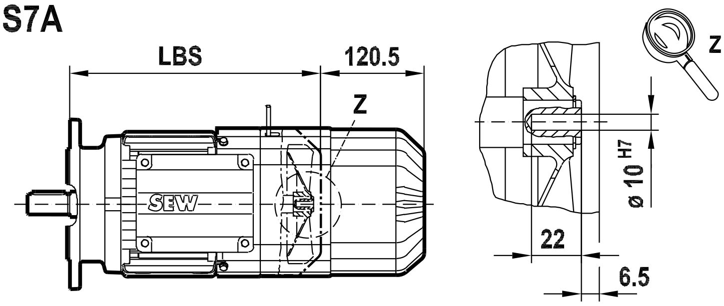

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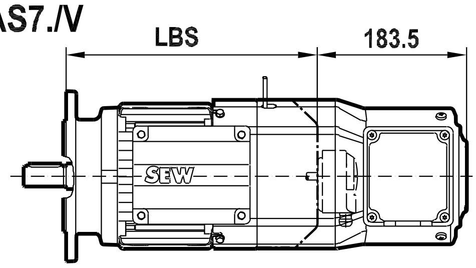

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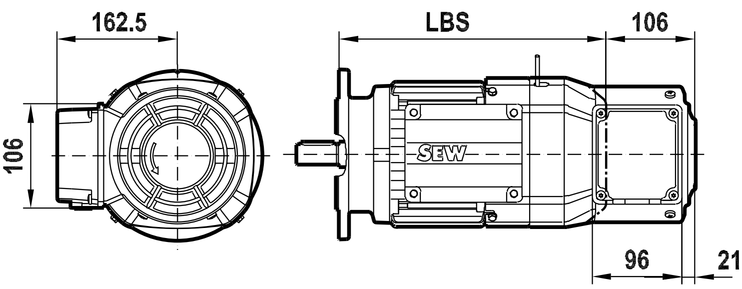

DR.132S

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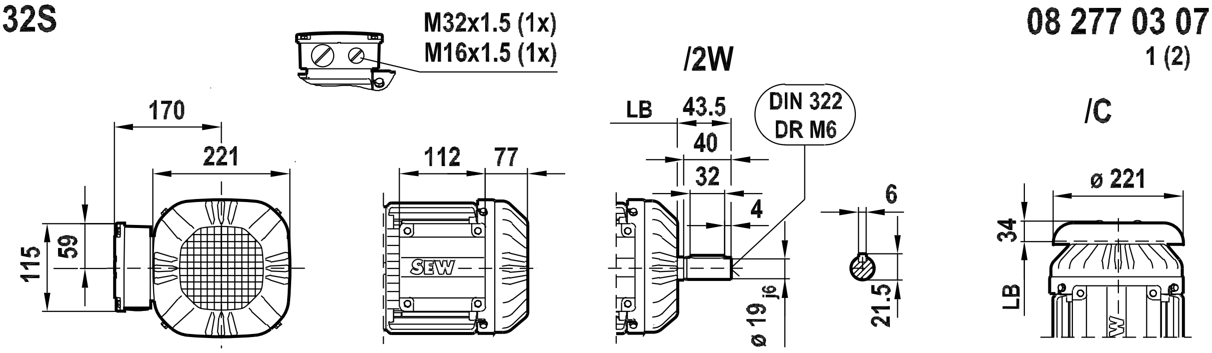
1 (2)



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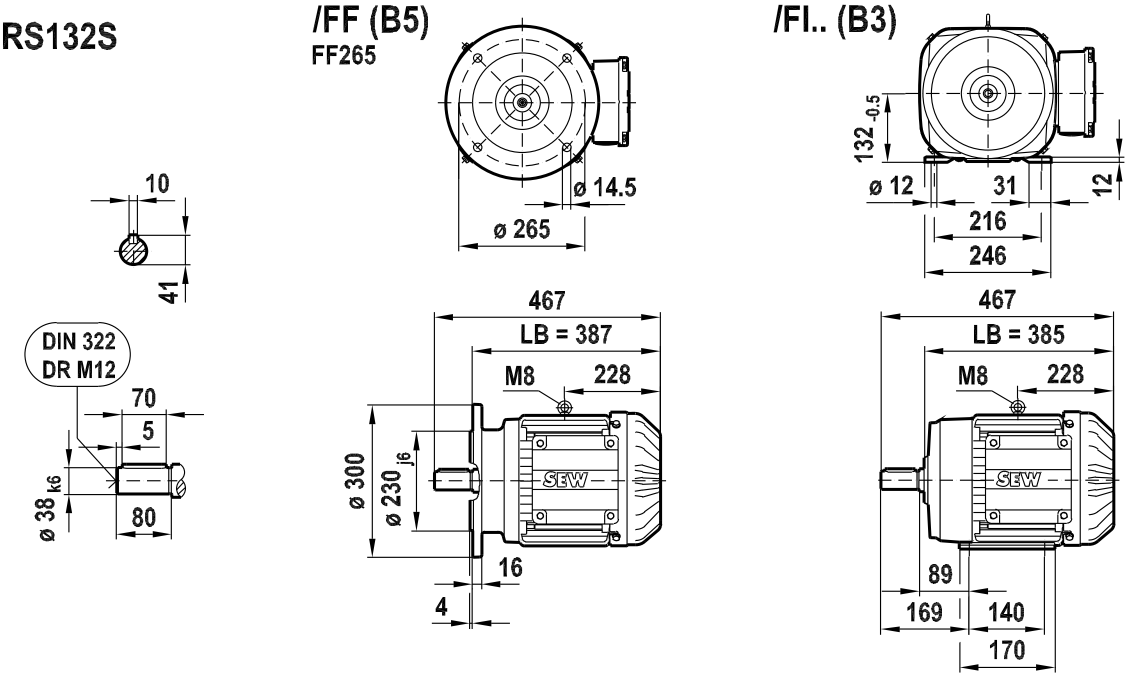

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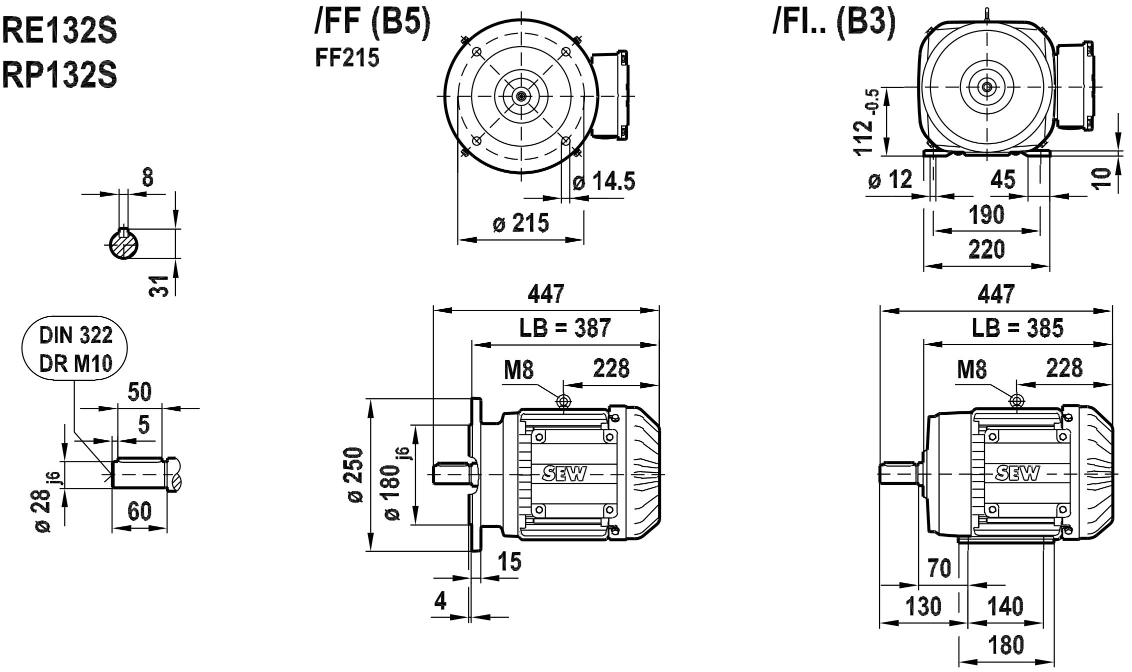

DR.132S

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2 (2)

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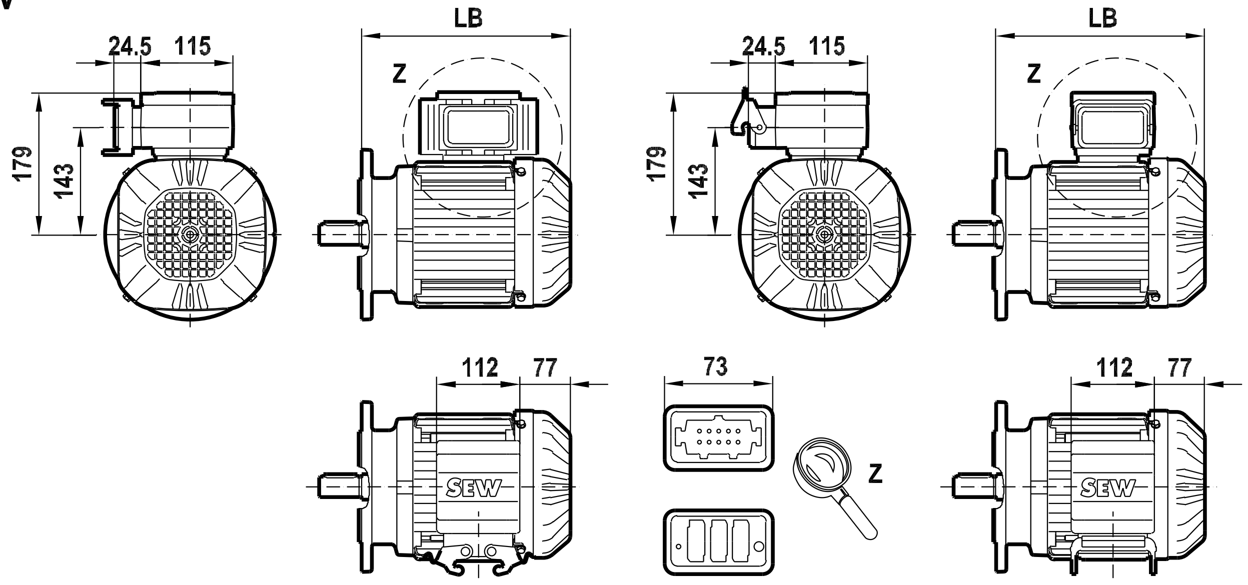

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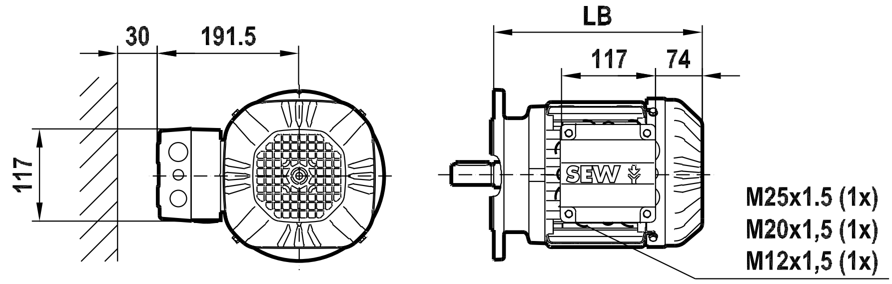

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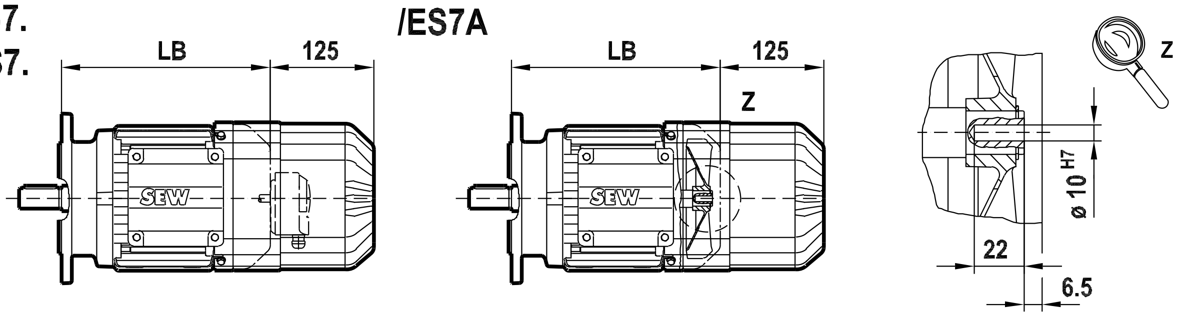

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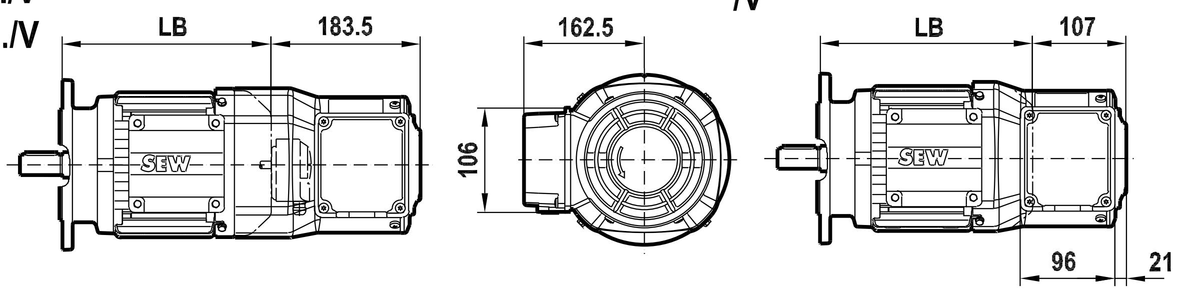
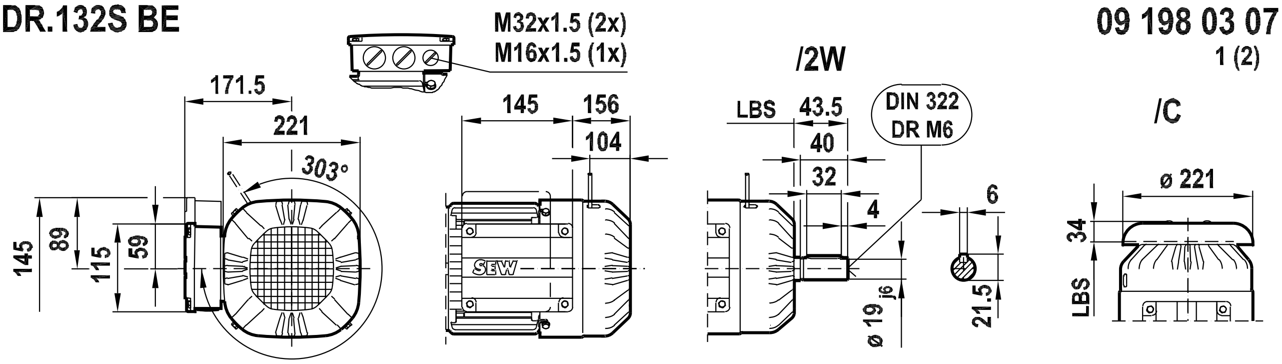


DR.132S BE



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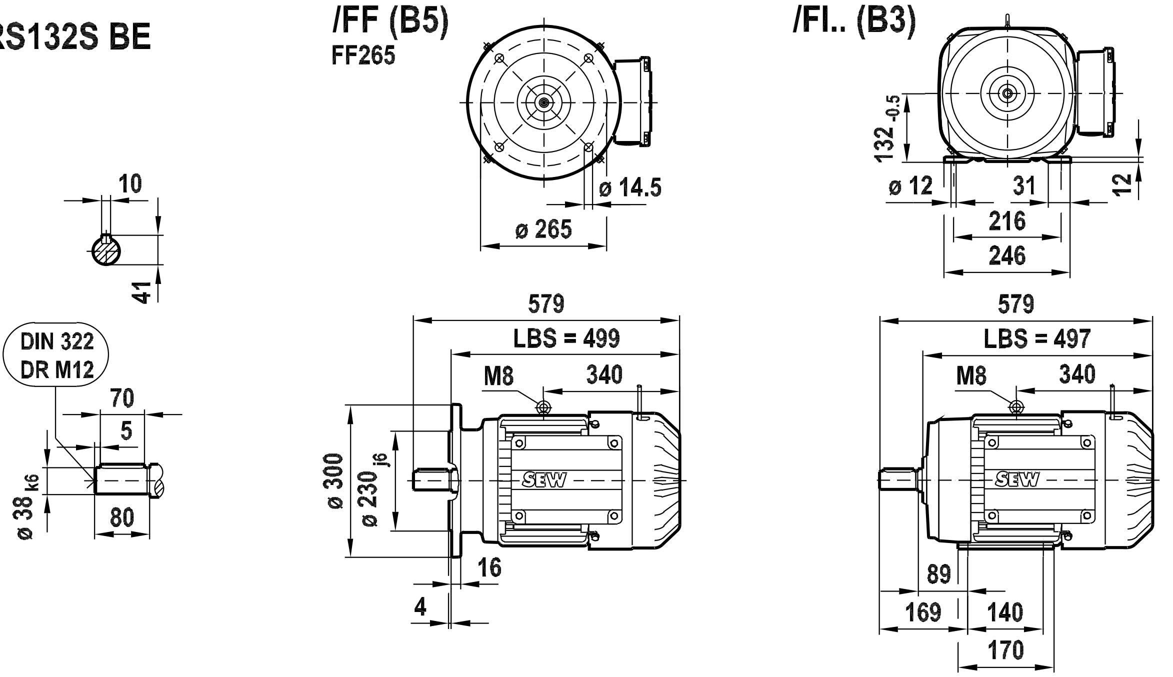
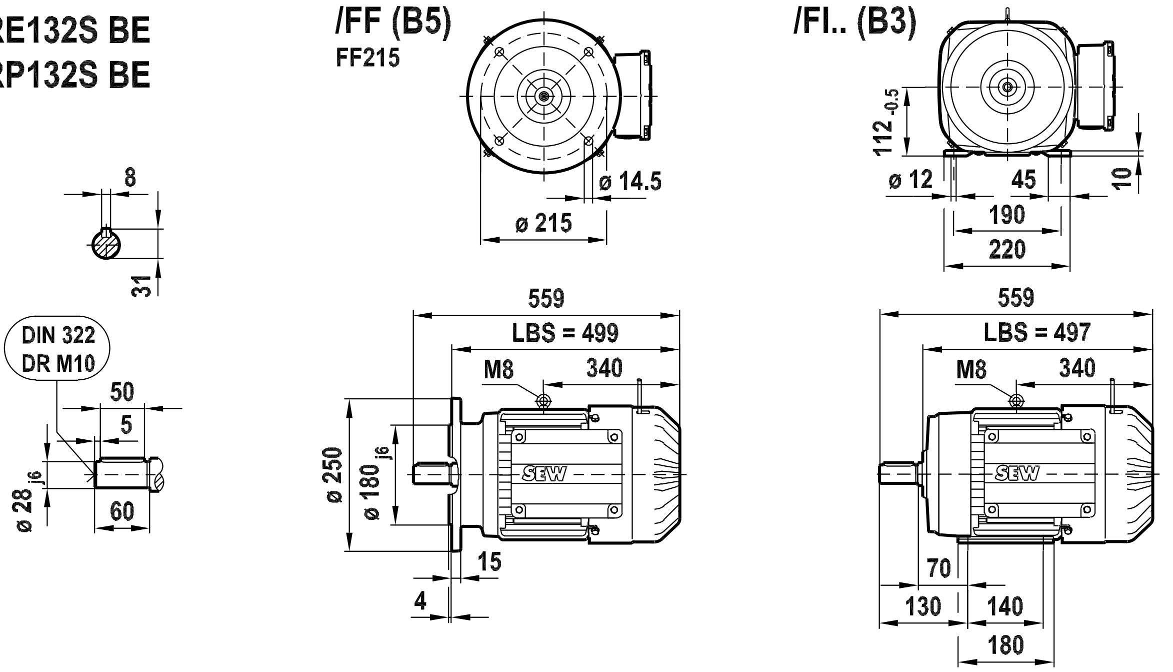


DRE132S BE
DRP132S BE



DR.132S BE

09 198 03 07
2 (2)

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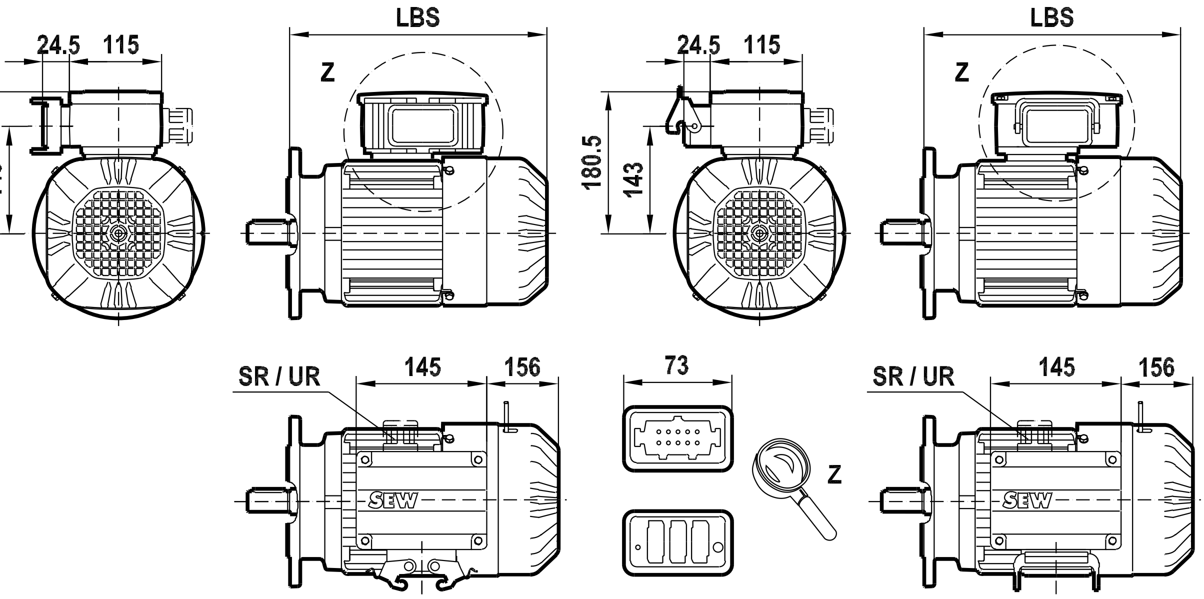

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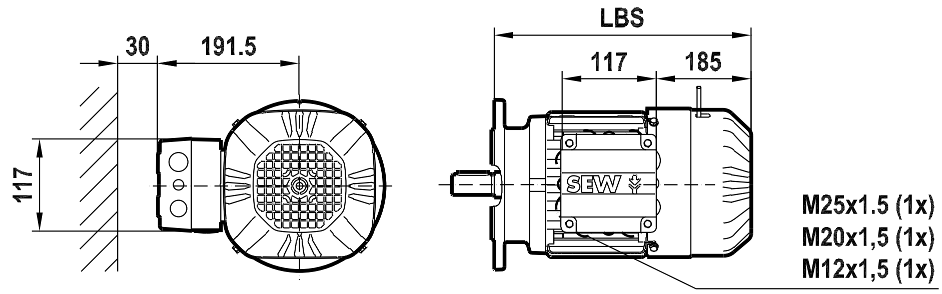

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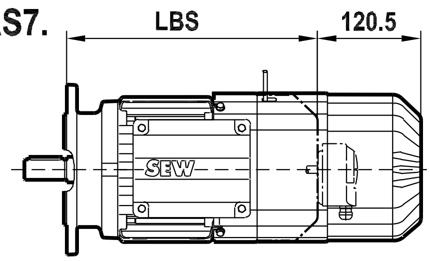

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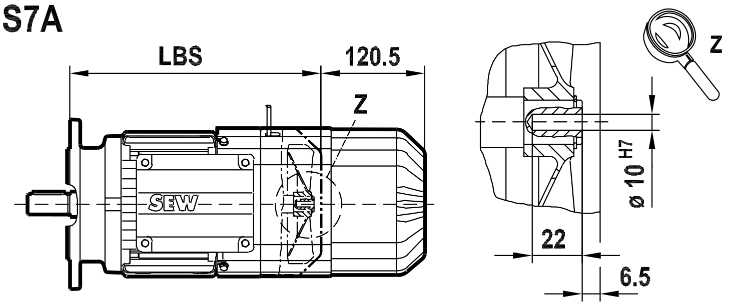

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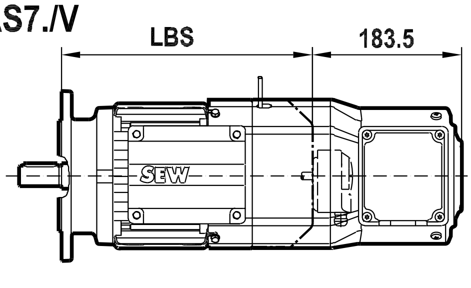

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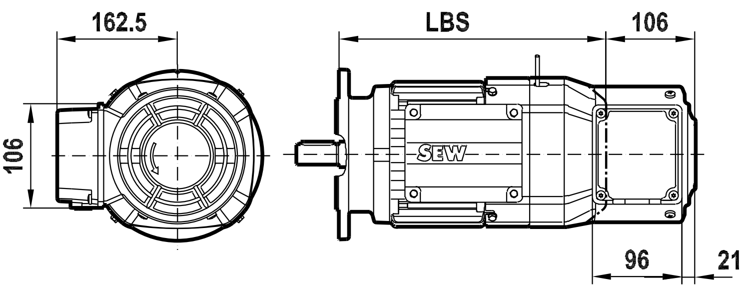

DR.132M,MC

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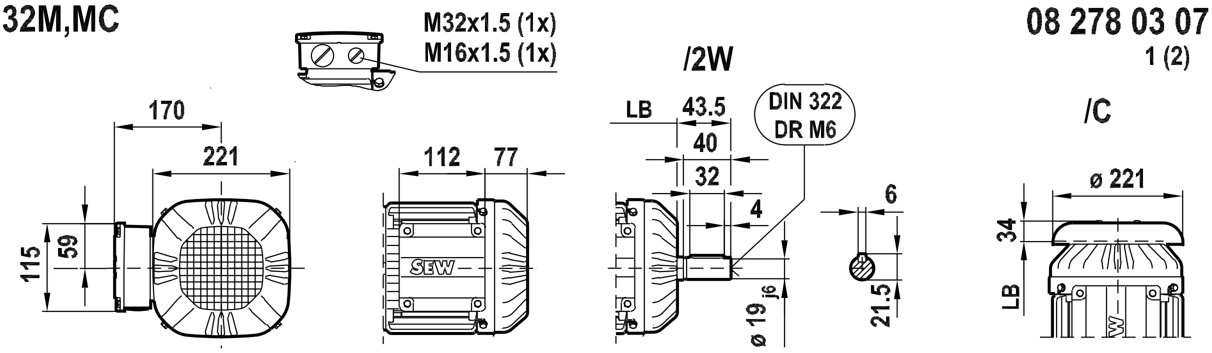
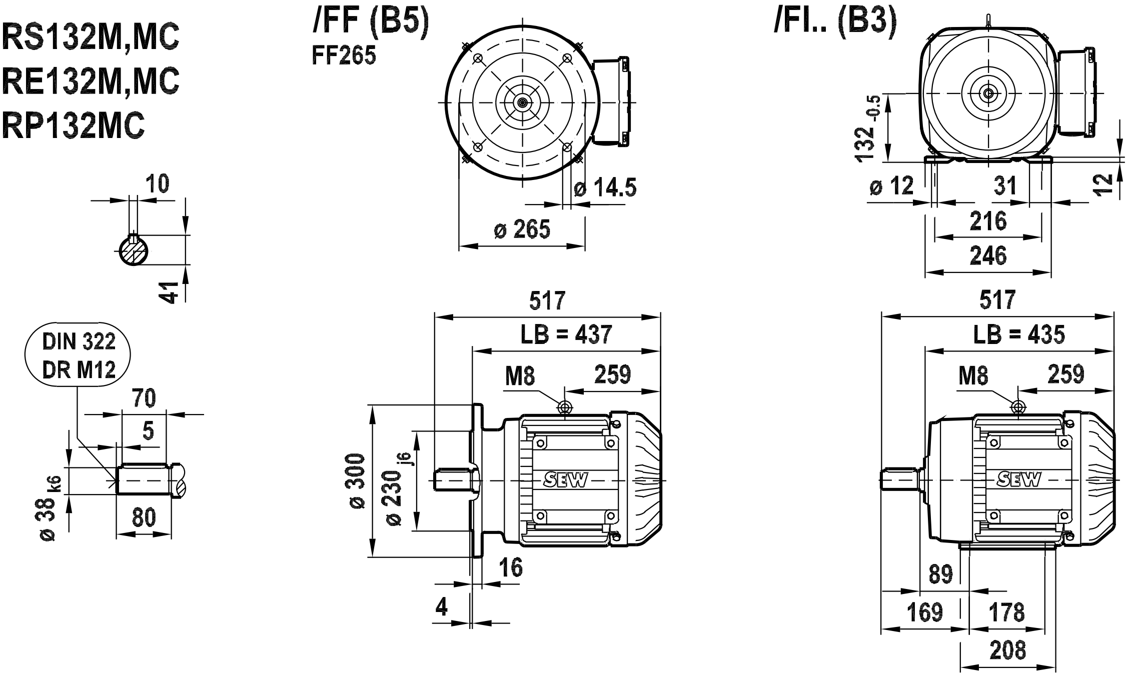


DRS132M,MC
DRE132M,MC
DRP132MC



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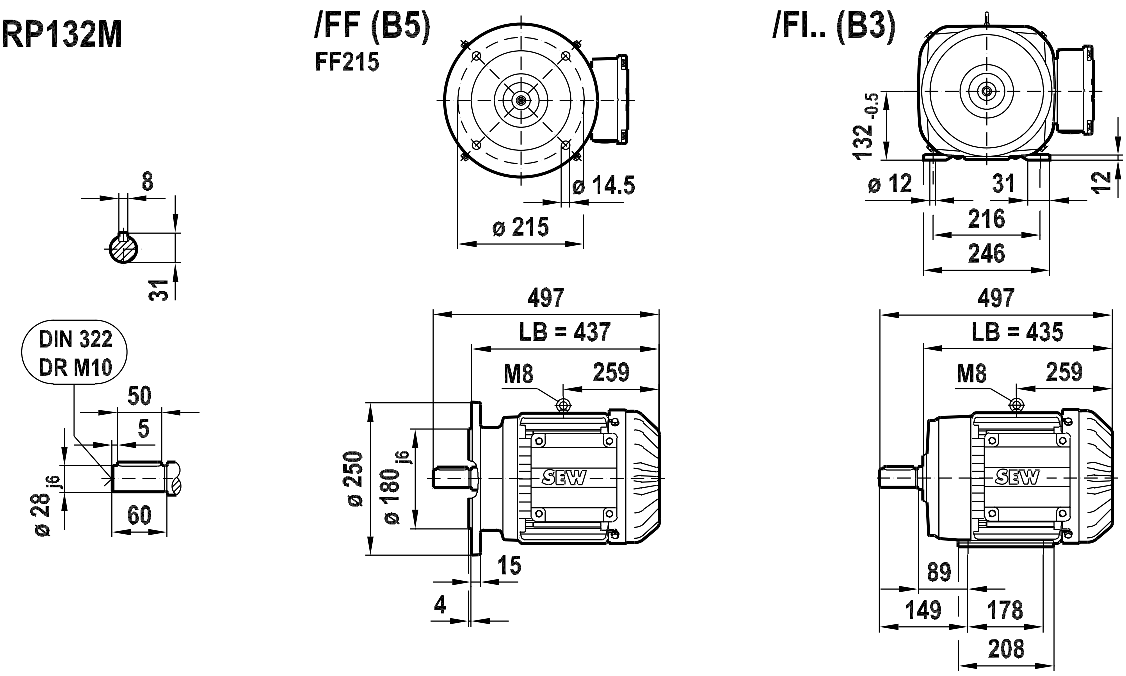

DR.132M,MC

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2 (2)

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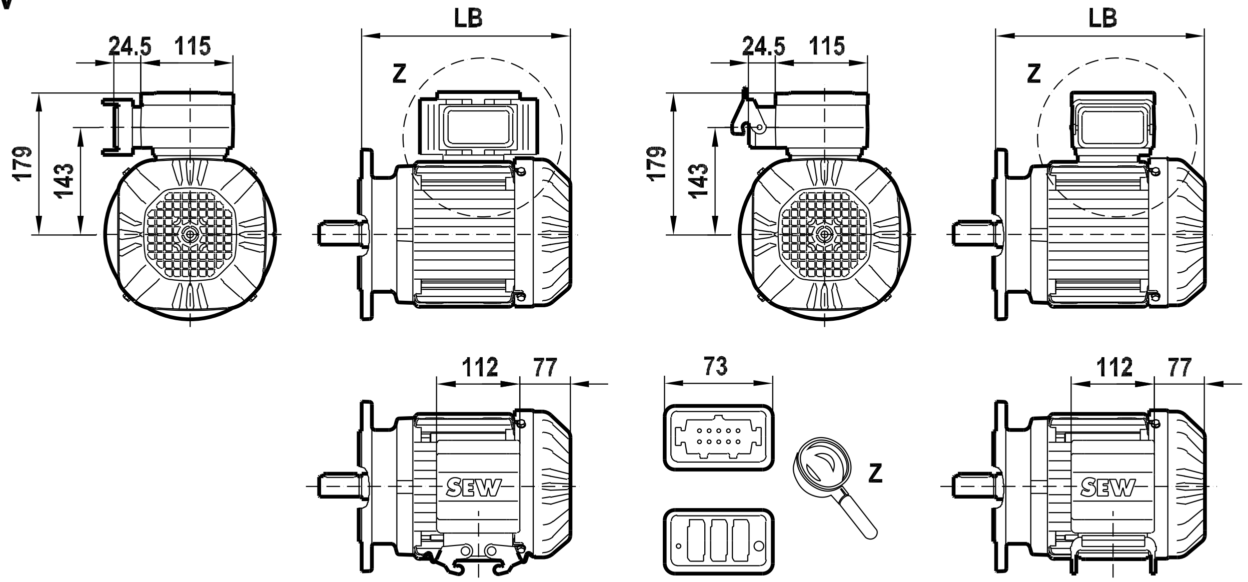

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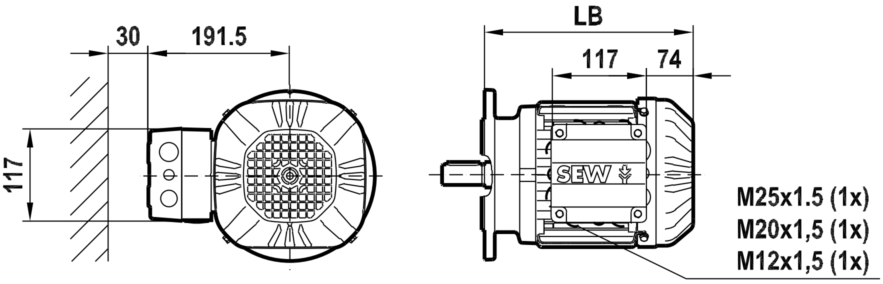

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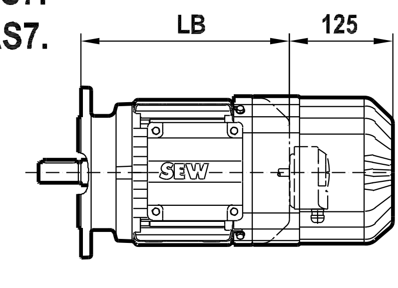

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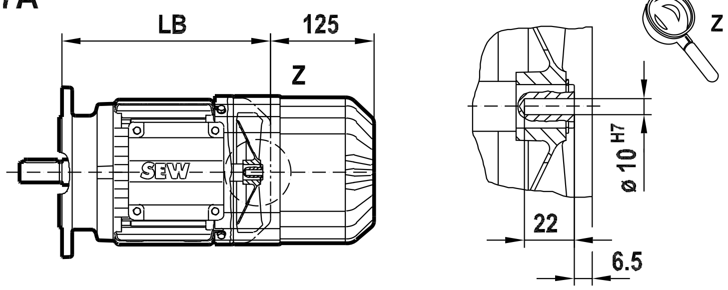

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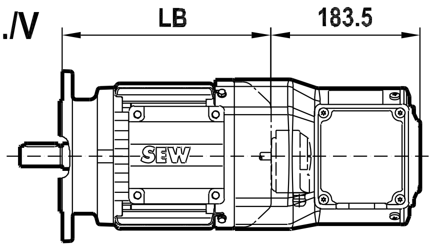

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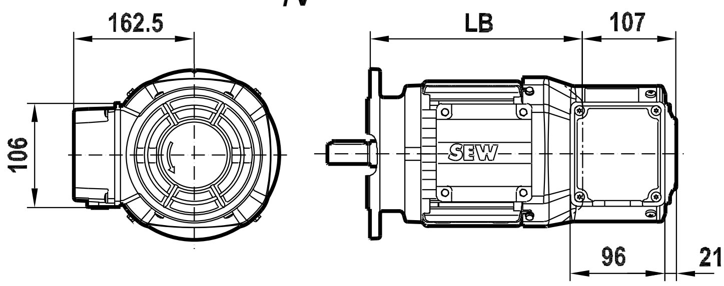

DR.132M,MC BE

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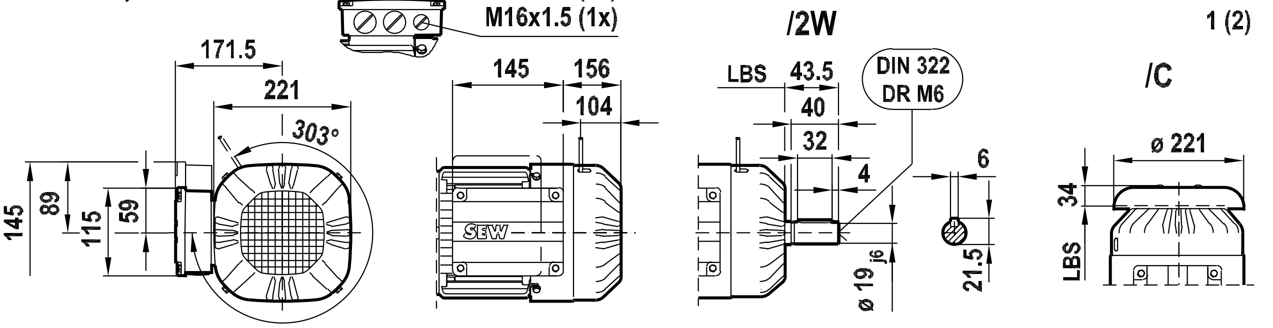
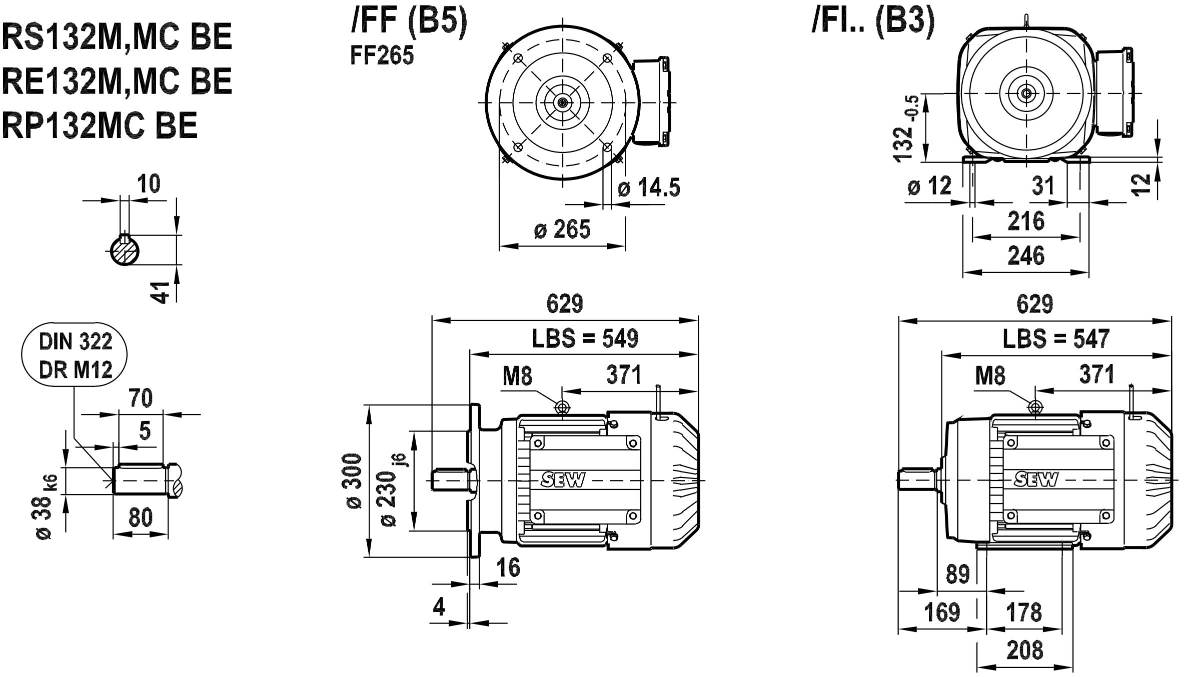


DRS132M,MC BE
DRE132M,MC BE
DRP132MC BE



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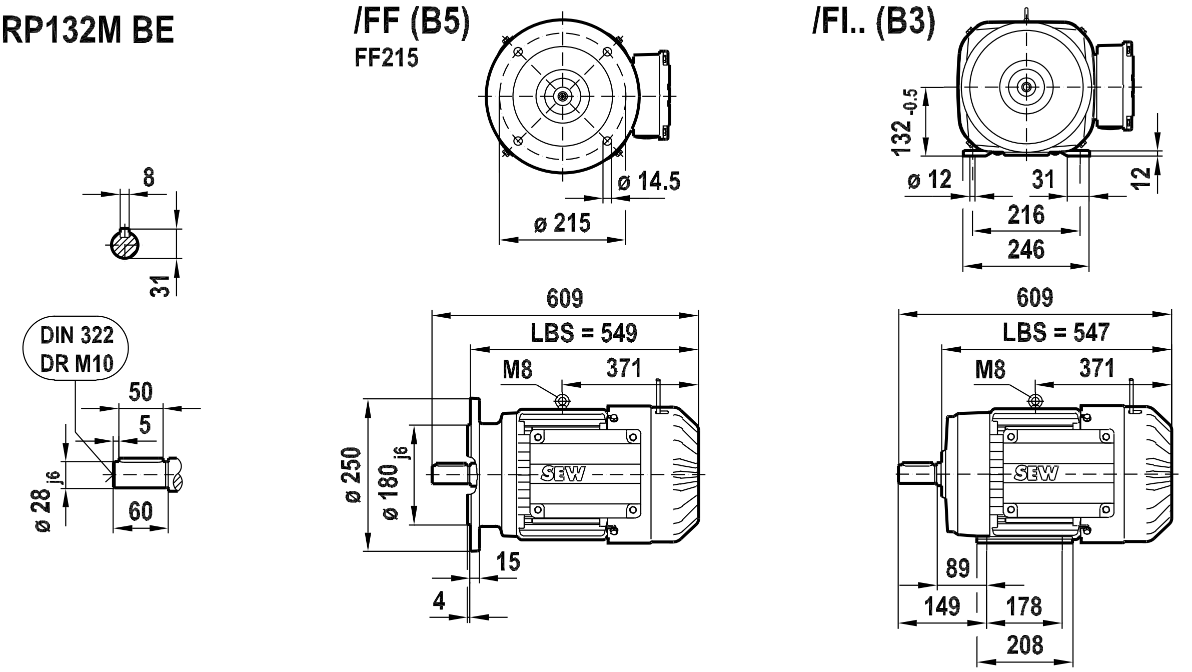

DR.132M,MC BE

09 199 03 07
2 (2)

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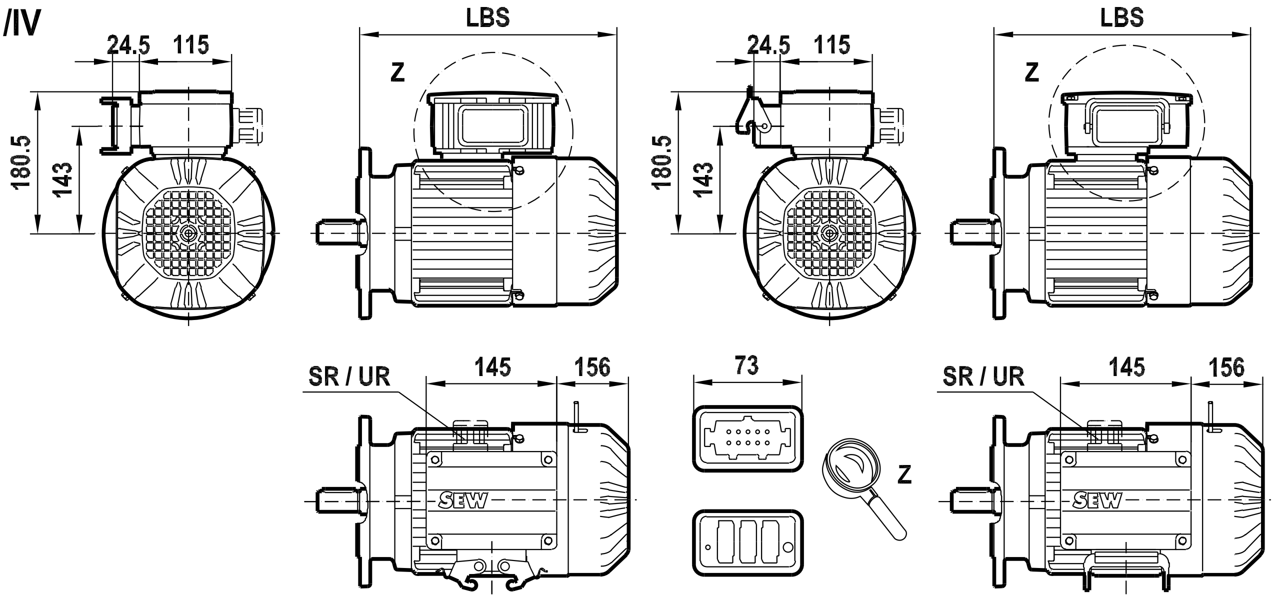

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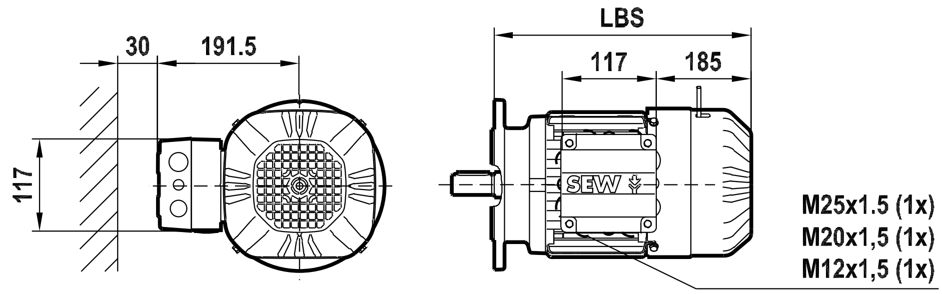

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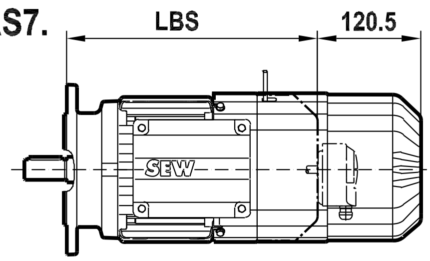

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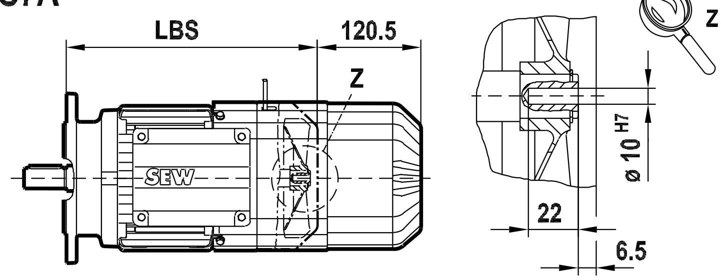

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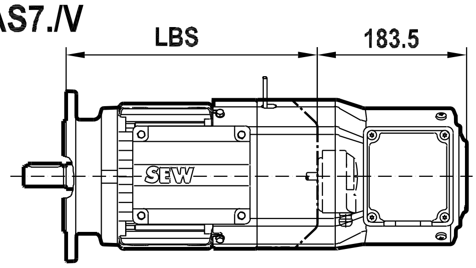

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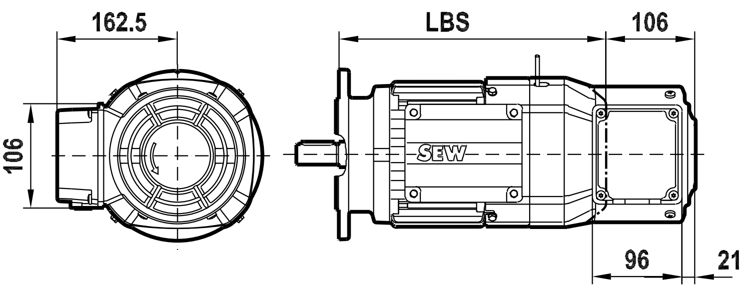

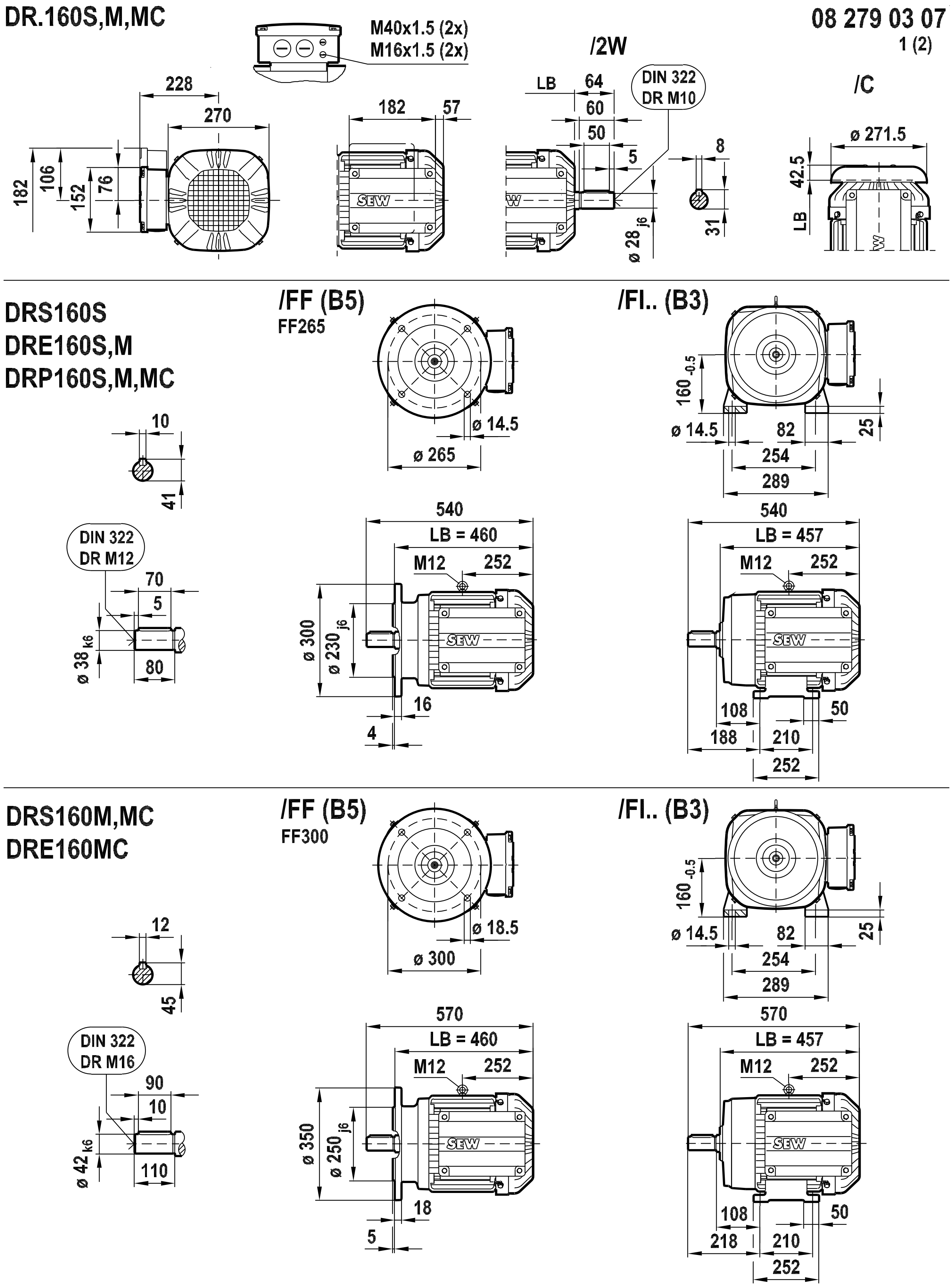
DR.160S,M,MC
08 279 03 07
1 (2)
M40x1.5 (2x)
M16x1.5 (2x)
/2W
/C
228
270
182
106
152
76
182
57
LB
64
60
50
5
DIN 322
DR M10
8
31
ø 28 j6
ø 271.5
42.5
LB
DRS160S
DRE160S,M
DRP160S,M,MC
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FF265
/FI.. (B3)
ø 14.5
ø 265
160 -0.5
ø 14.5
82
25
254
289
10
41
DIN 322
DR M12
70
5
80
ø 38 k6
540
LB = 460
M12
252
ø 300
ø 230 j6
16
4
540
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M12
252
108
50
188
210
252
DRS160M,MC
DRE160MC
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FF300
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ø 18.5
ø 300
160 -0.5
ø 14.5
82
25
254
289
12
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DIN 322
DR M16
90
10
110
ø 42 k6
570
LB = 460
M12
252
ø 350
ø 250 j6
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252
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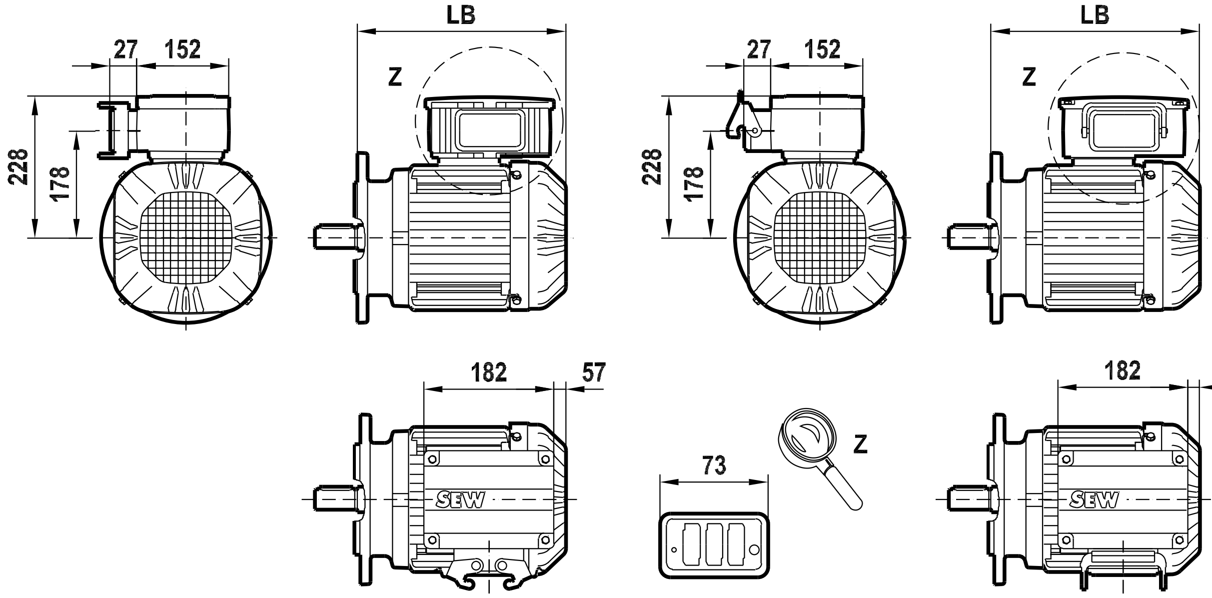
50
218
210
252

DR.160S,M,MC

08 279 03 07
2 (2)

/IV



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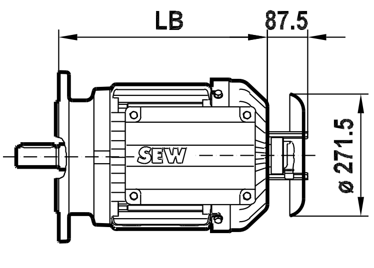

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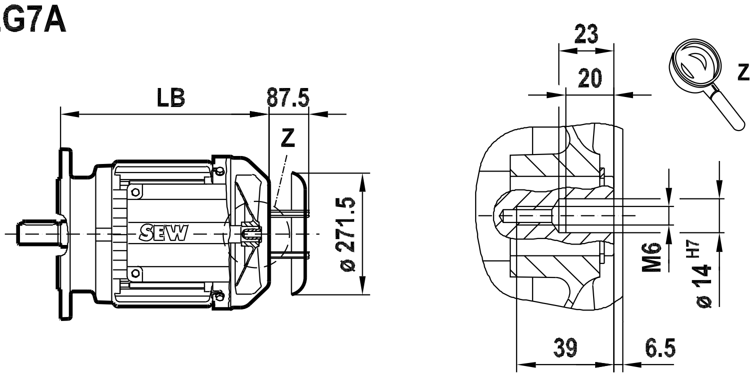

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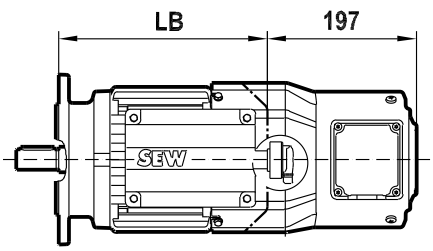

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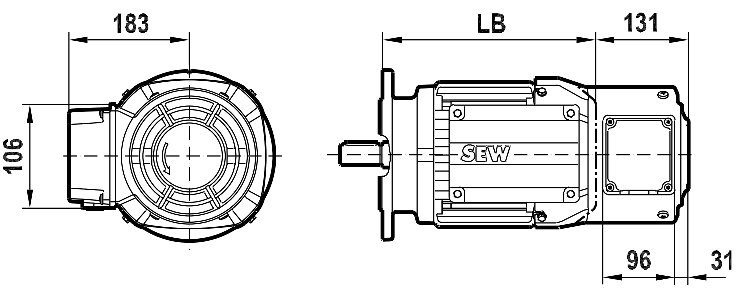
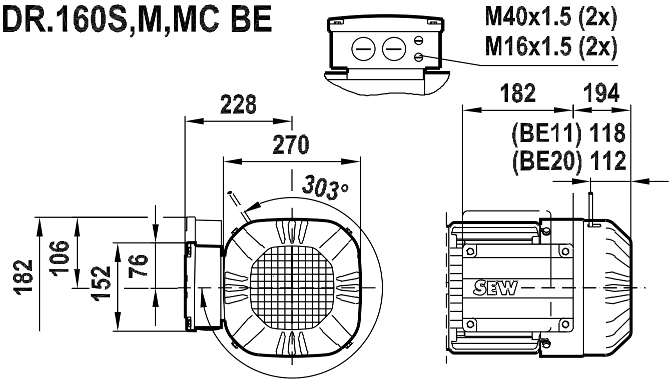
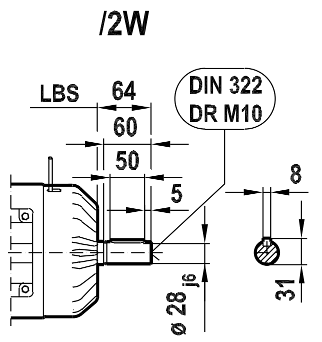
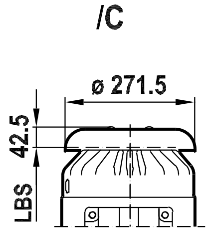


DR.160S,M,MC BE

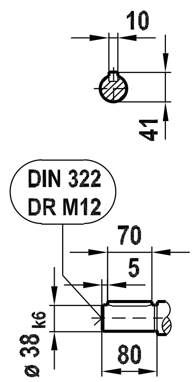
09 200 03 07
1 (2)







DRS160S BE
DRE160S,M BE
DRP160S,M,MC BE



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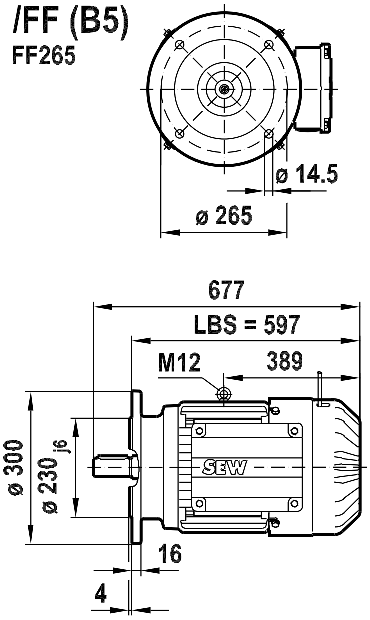
FF265



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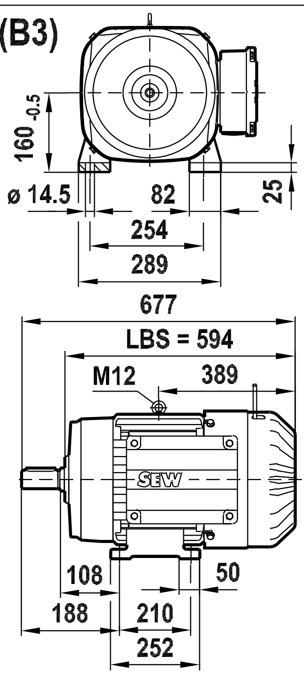

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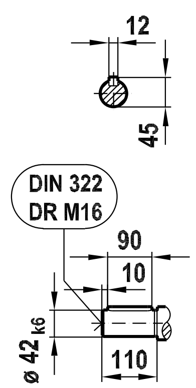

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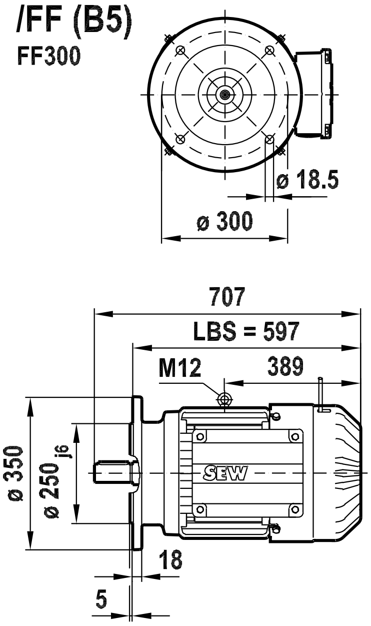

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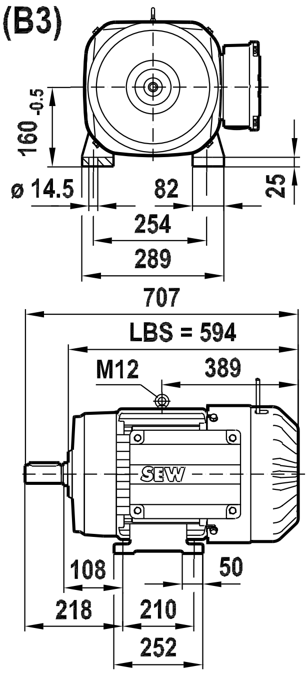

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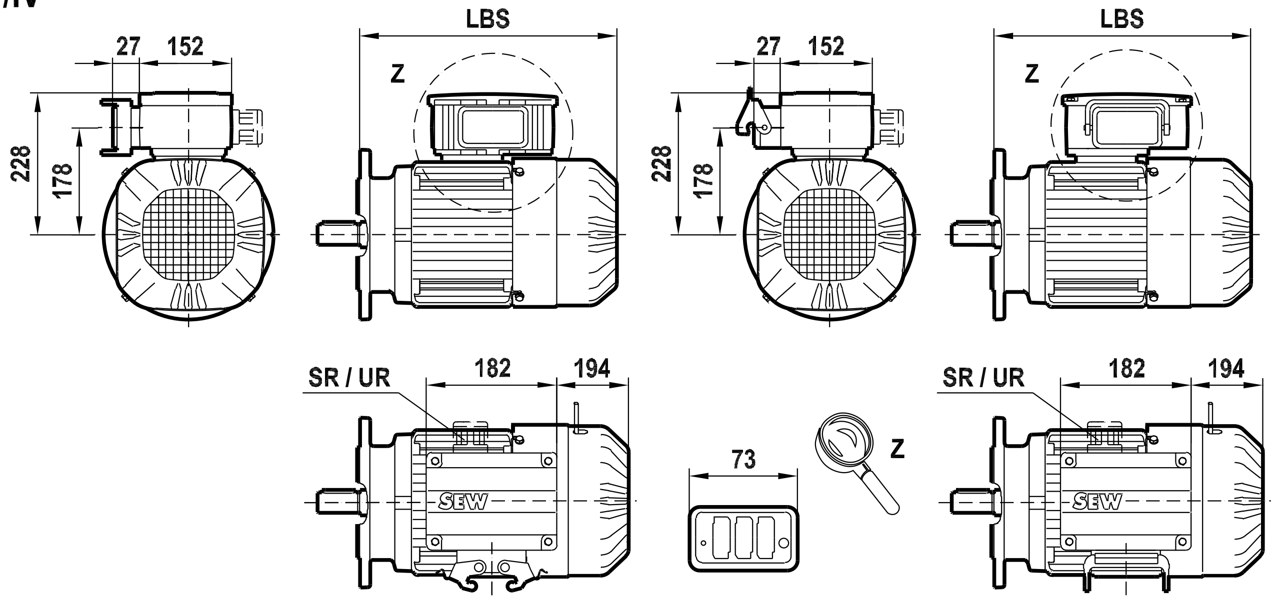

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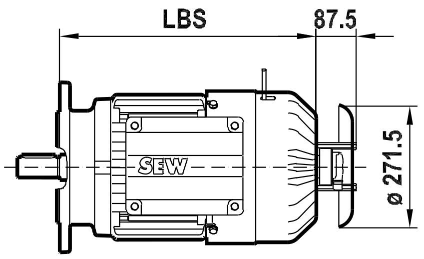

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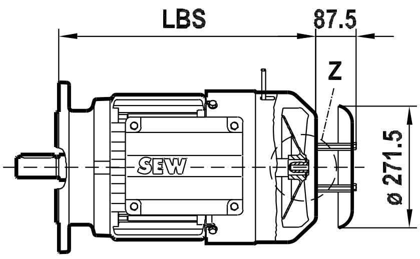

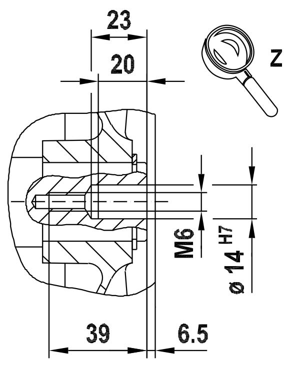

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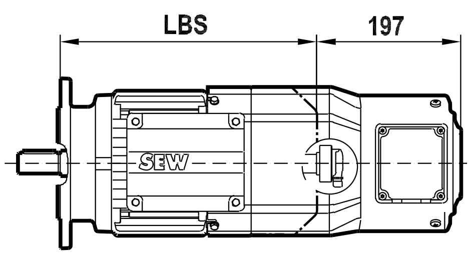

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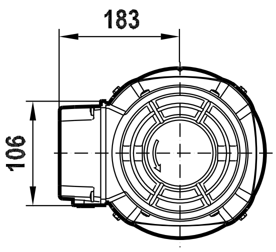

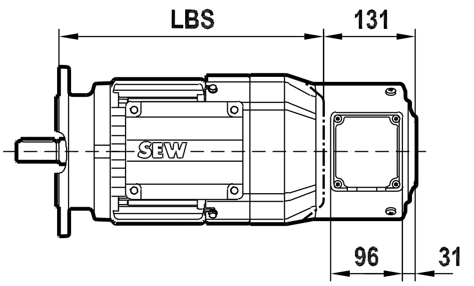

DR.180S

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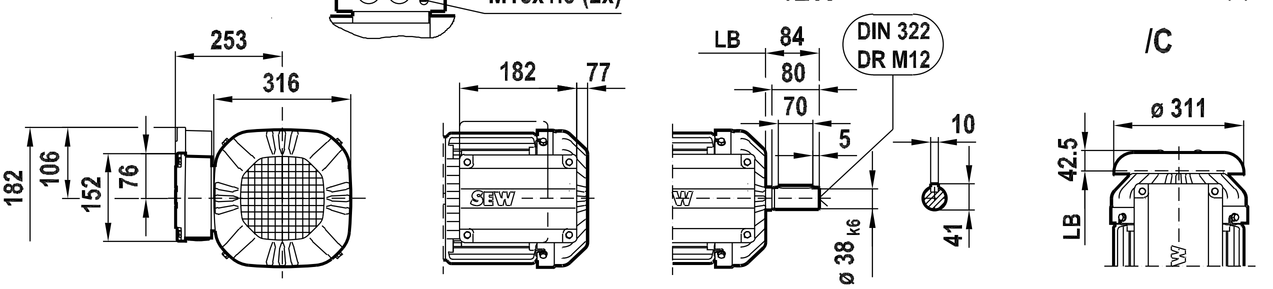

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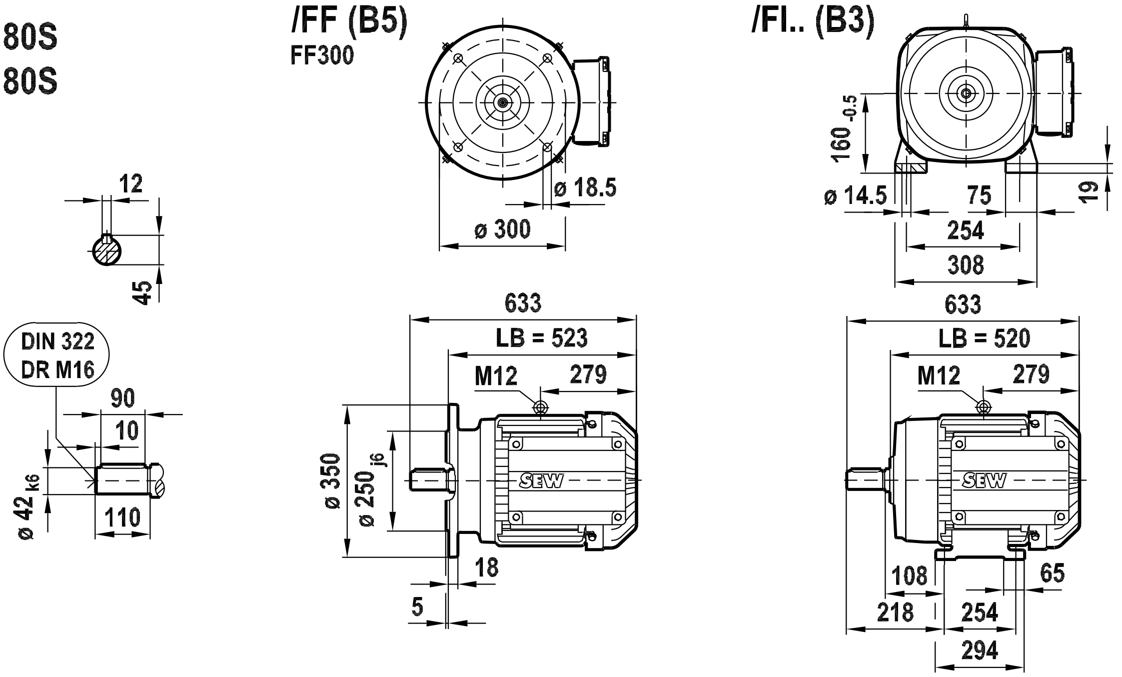

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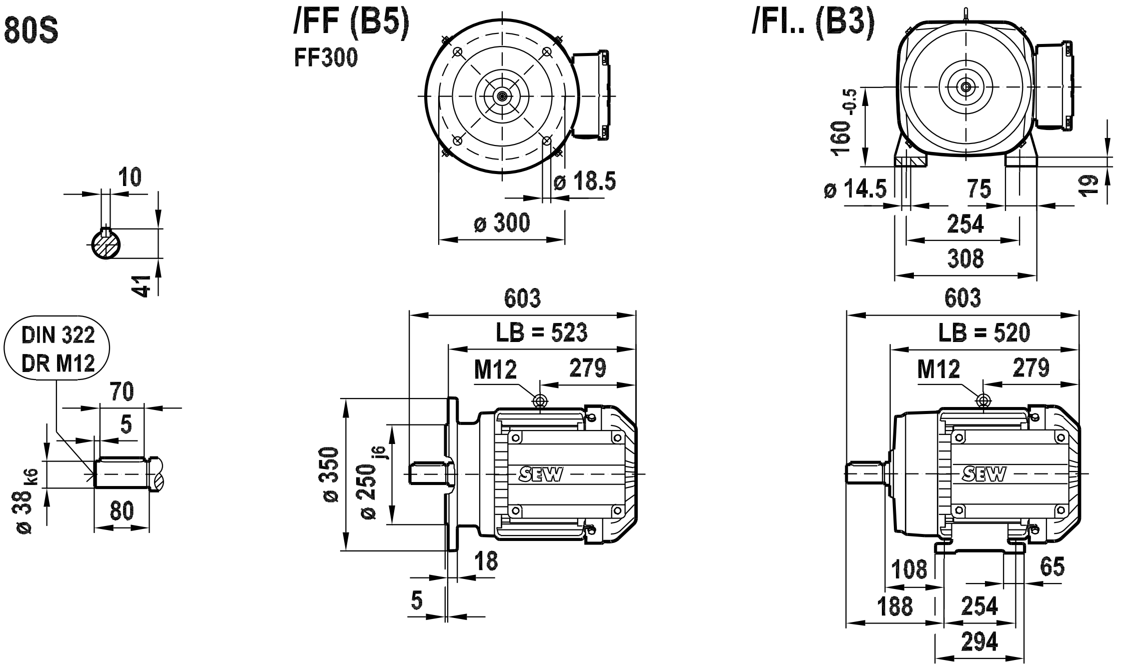

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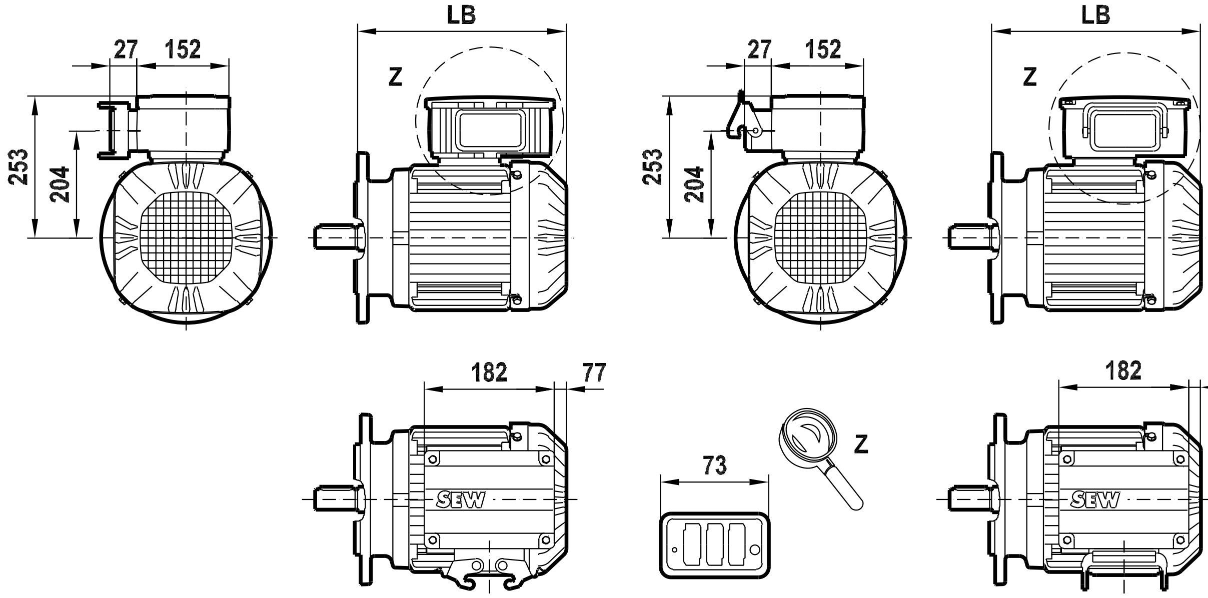

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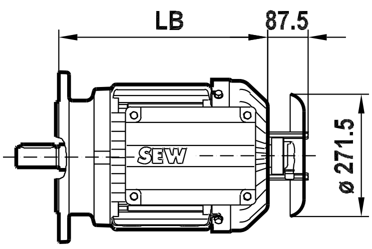

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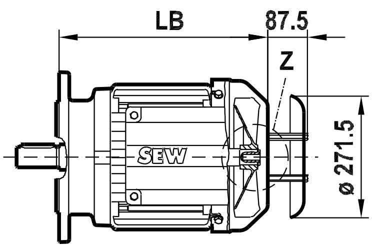

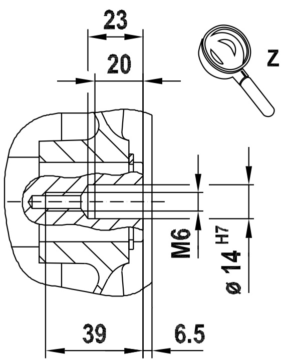

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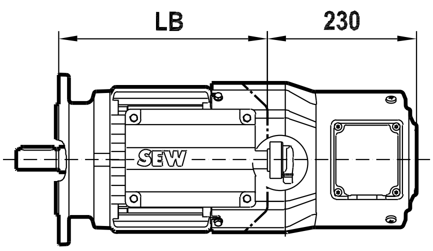

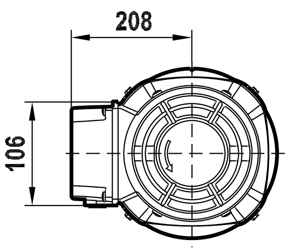

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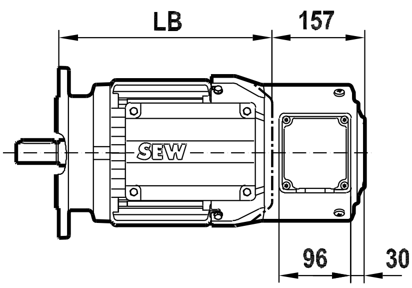

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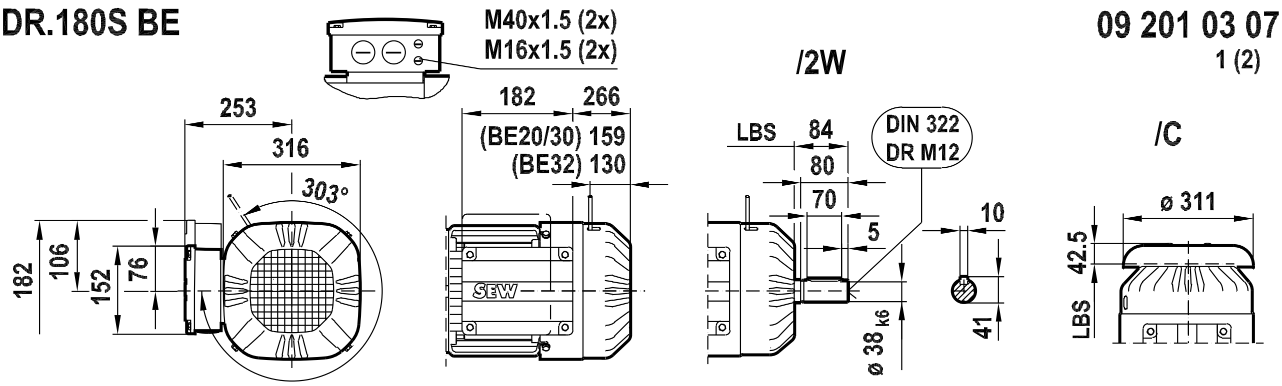

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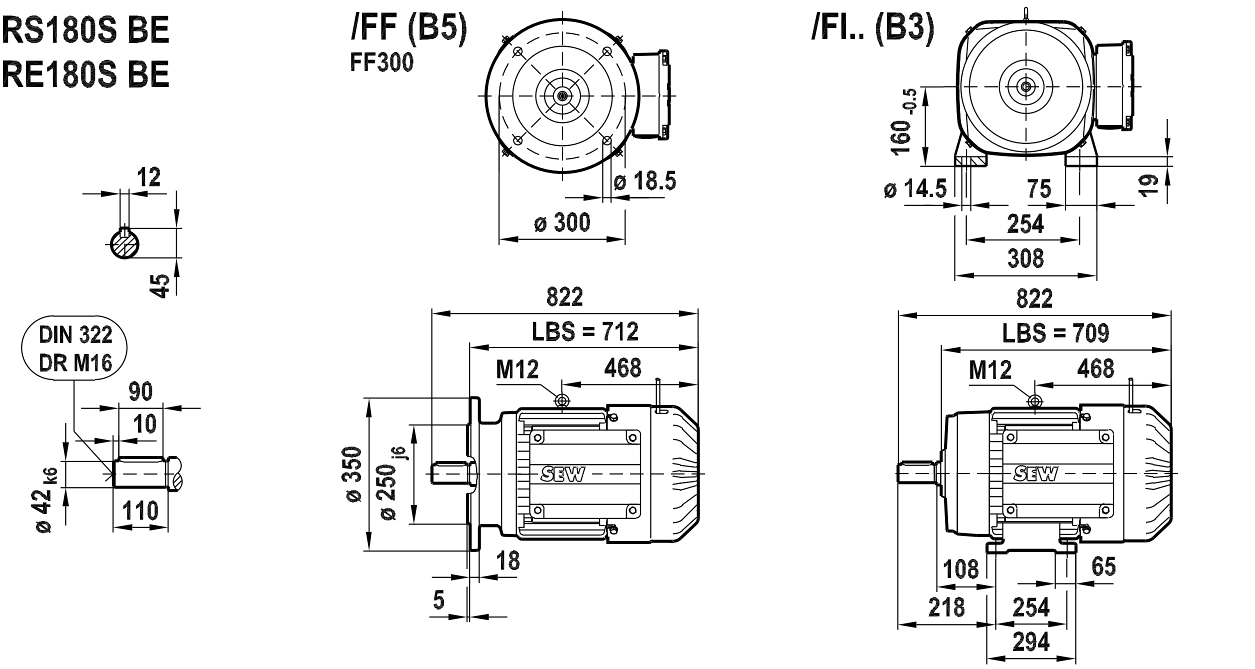

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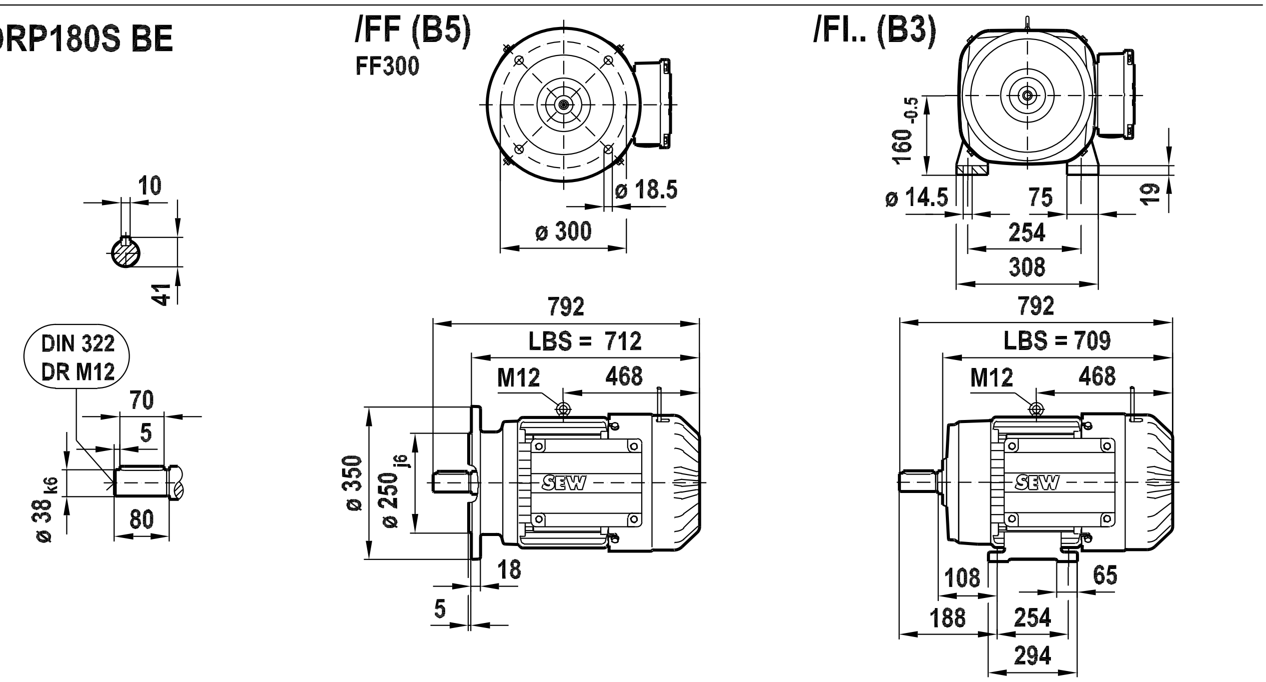

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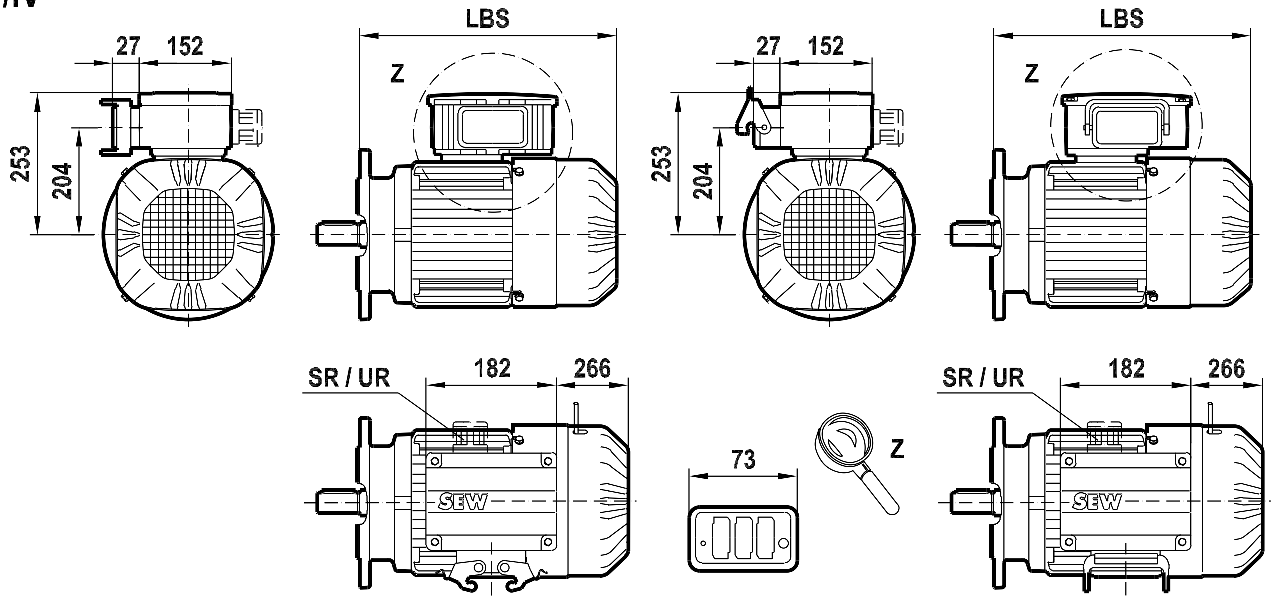

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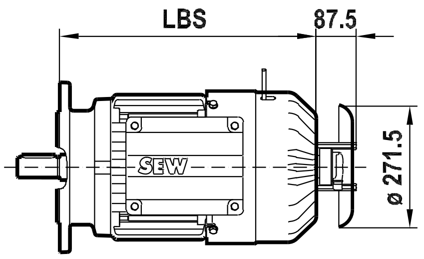

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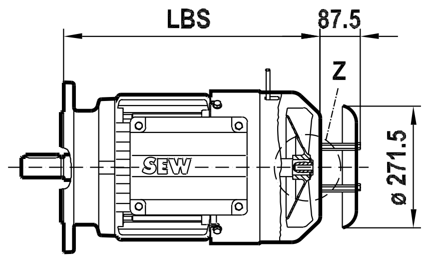

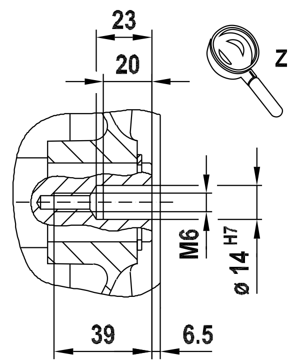

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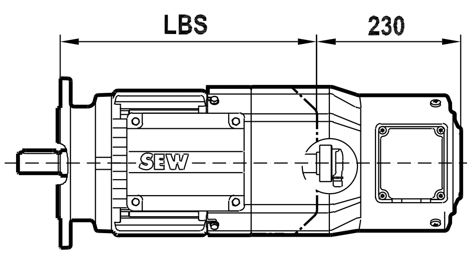

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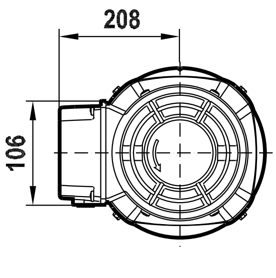

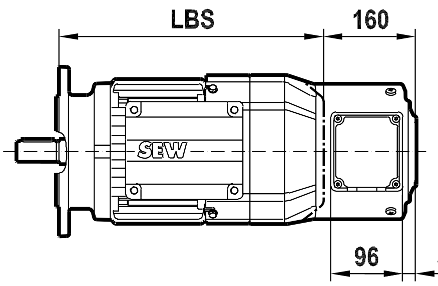

DR.180M

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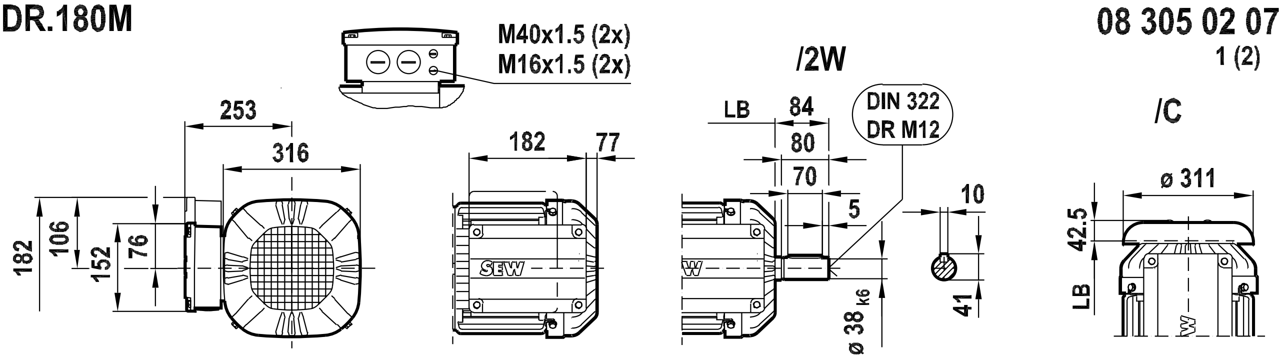

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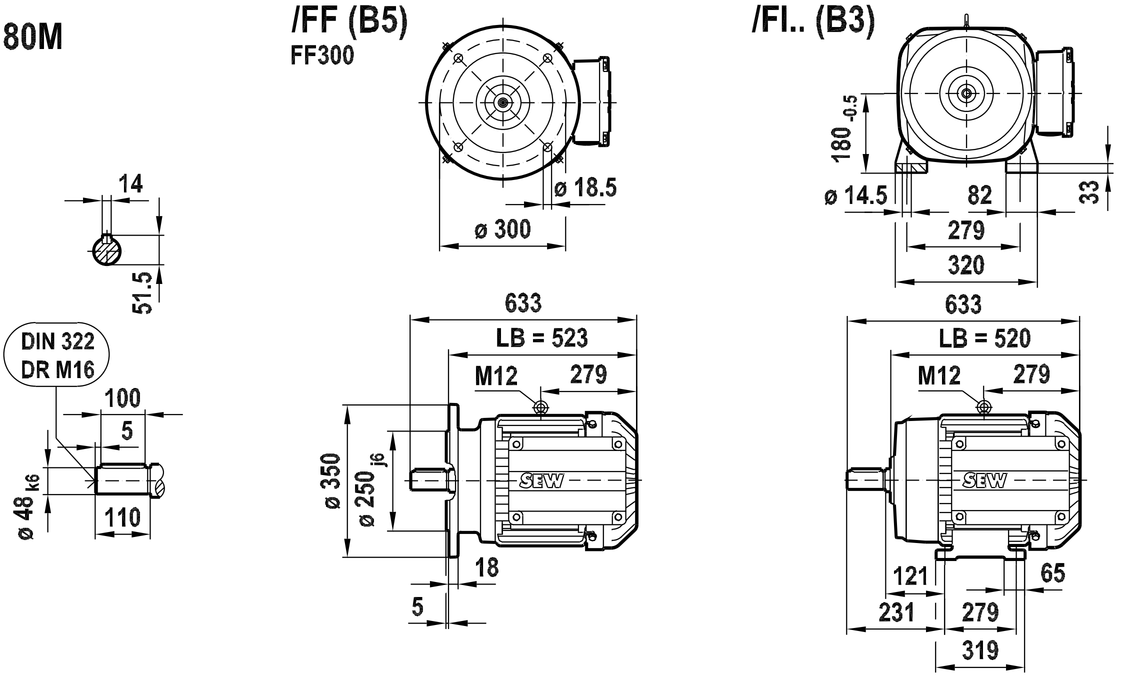

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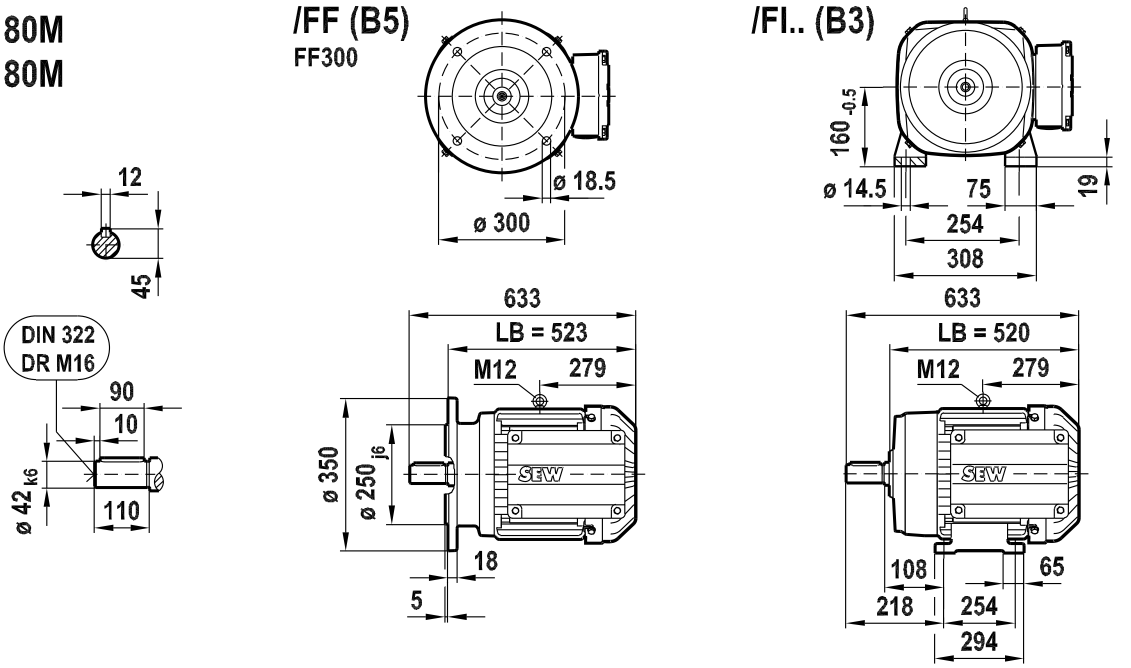

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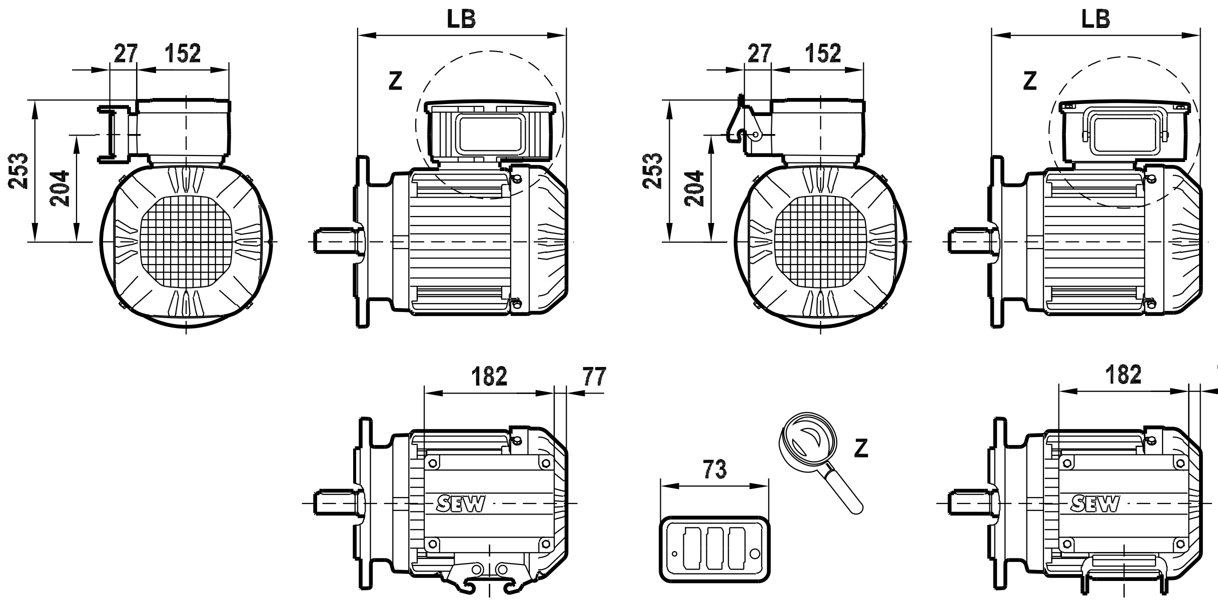

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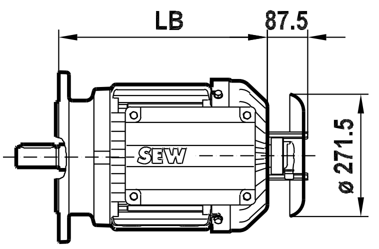

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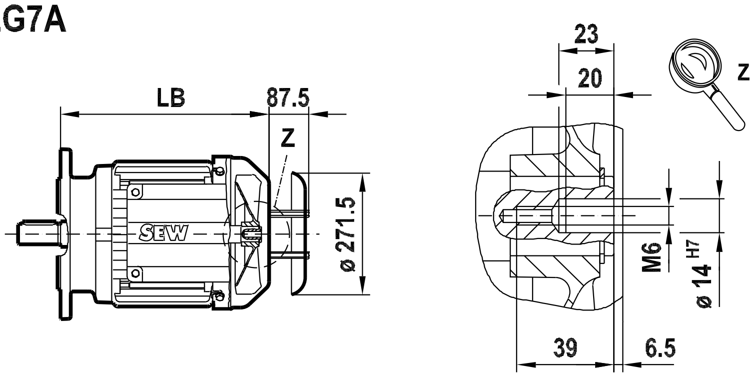

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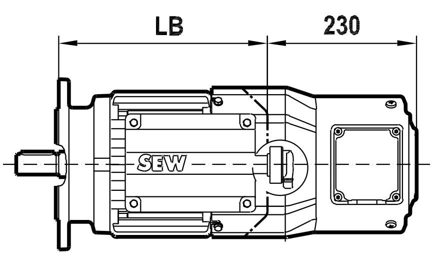

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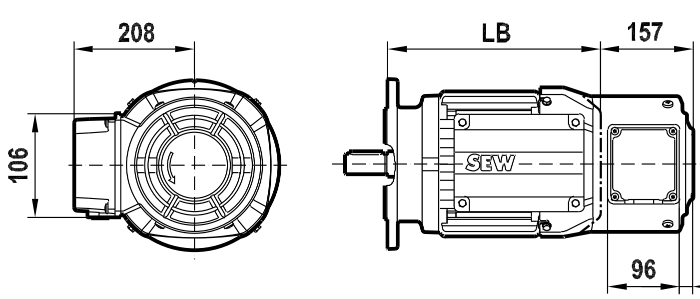

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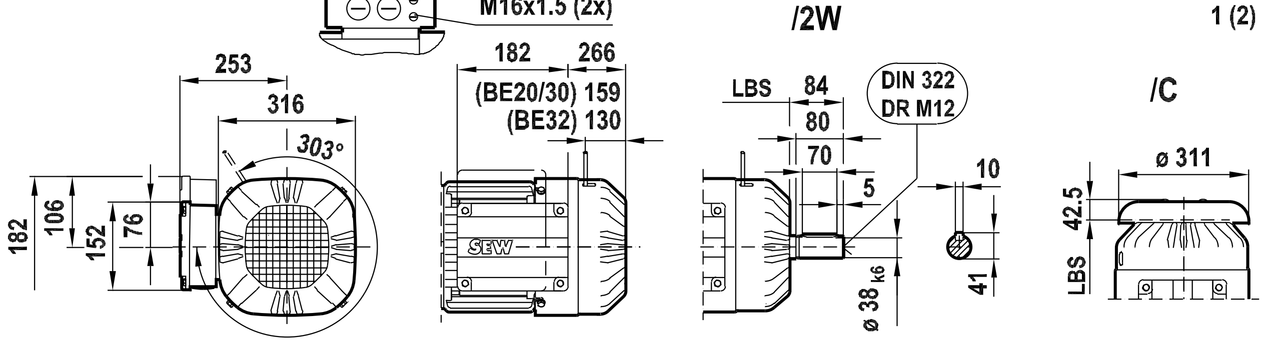

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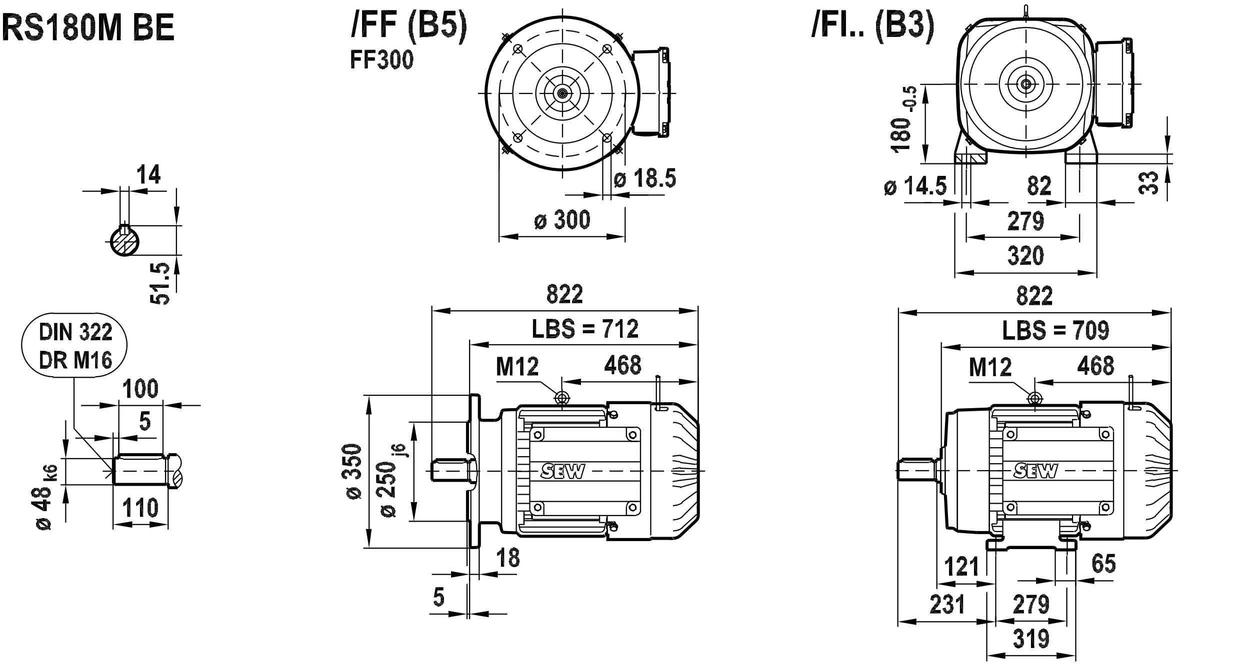

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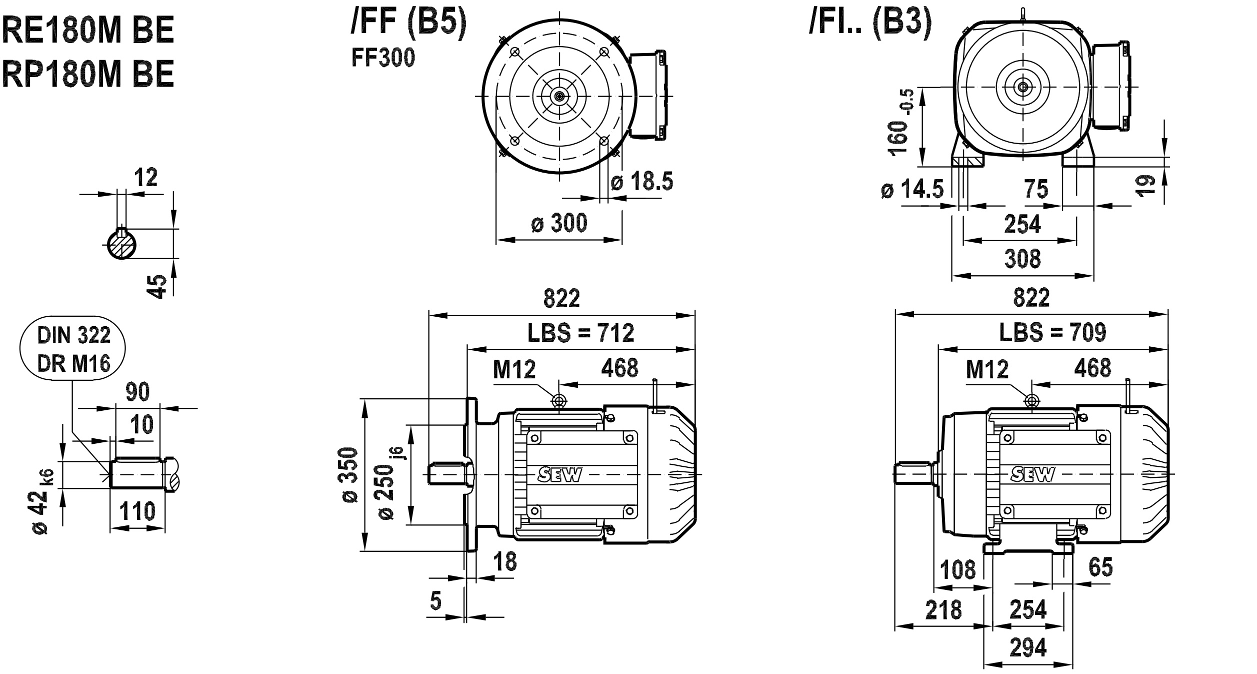
DRP180M BE



DR.180M BE

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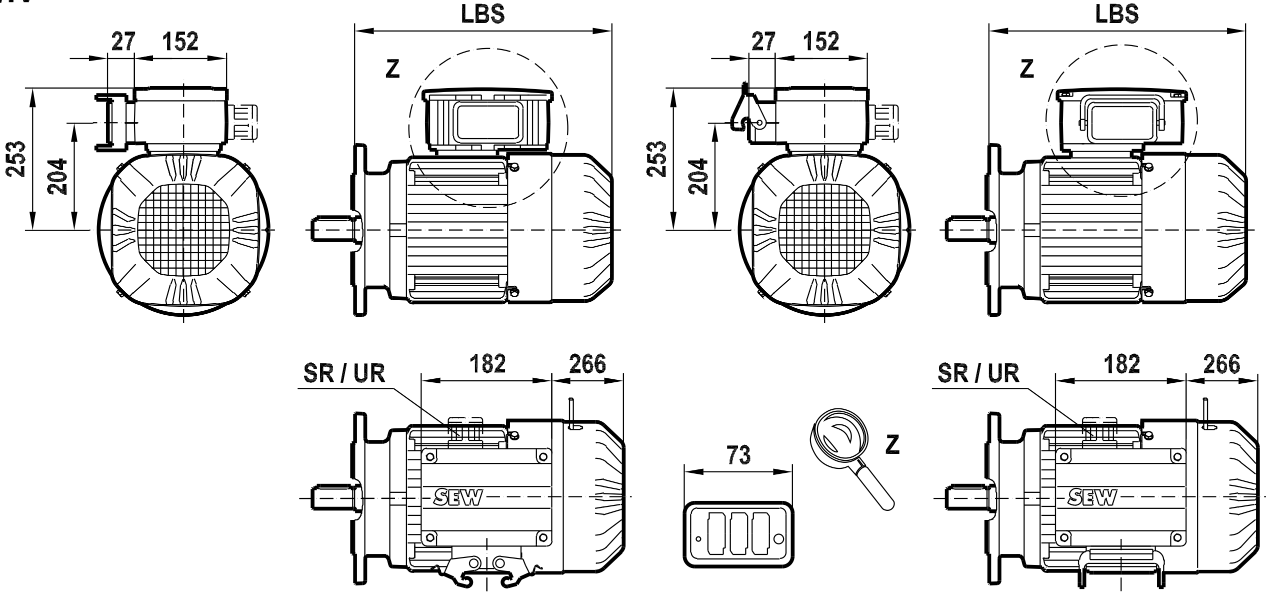

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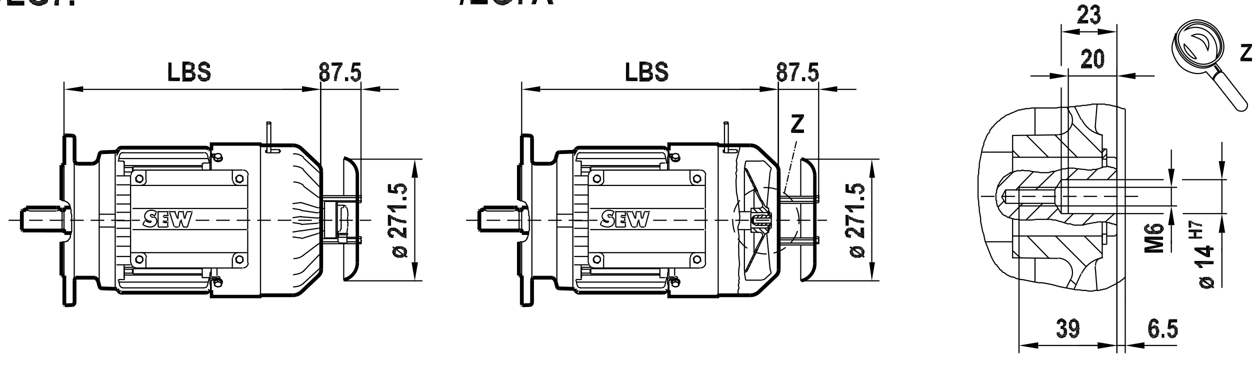

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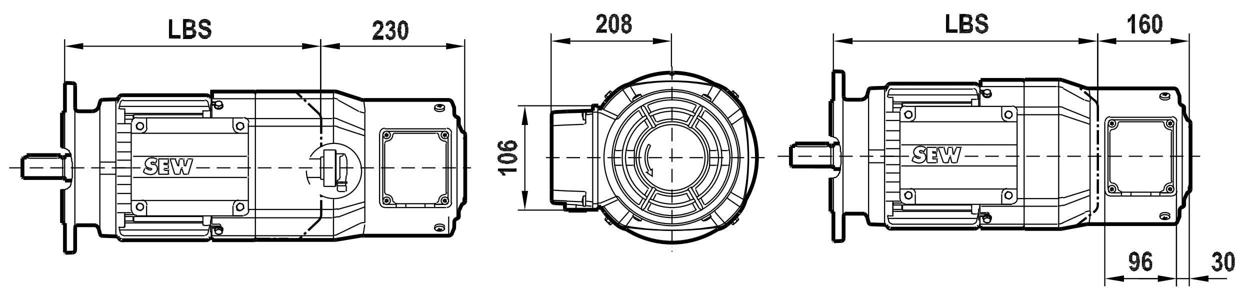

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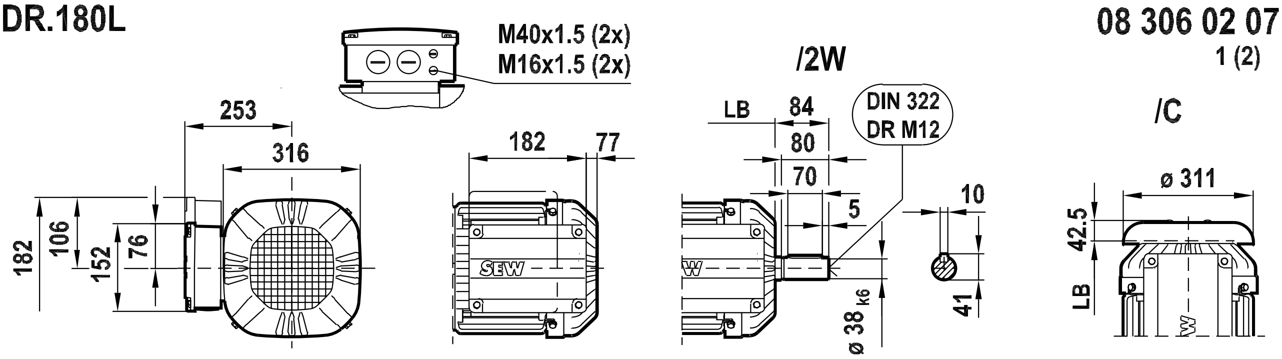

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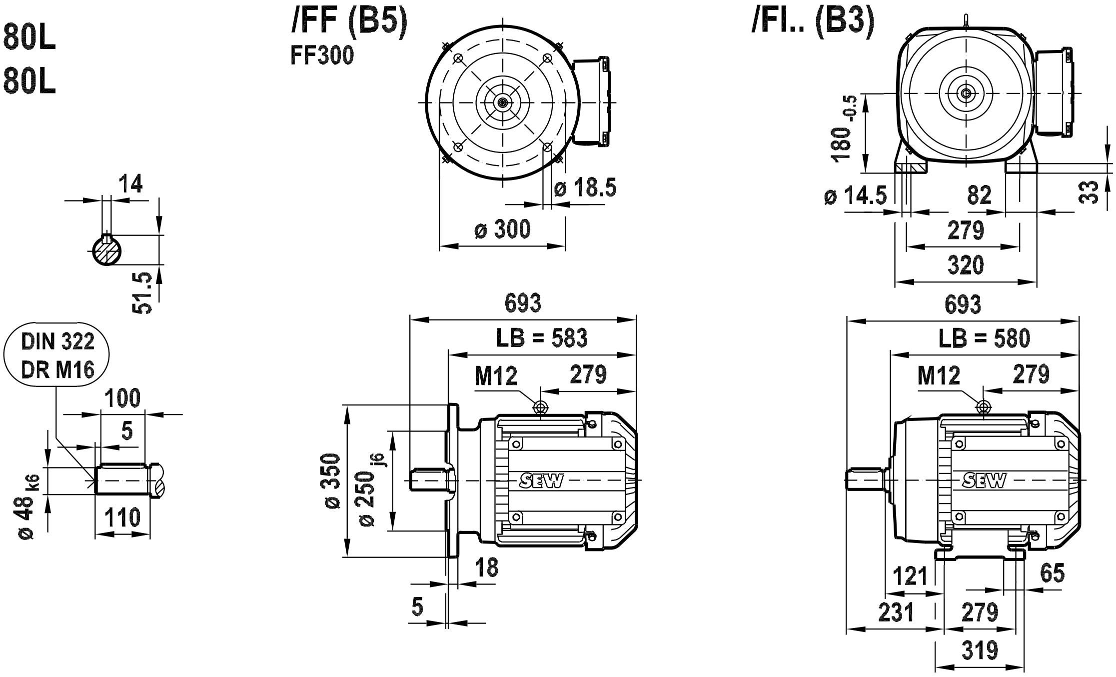

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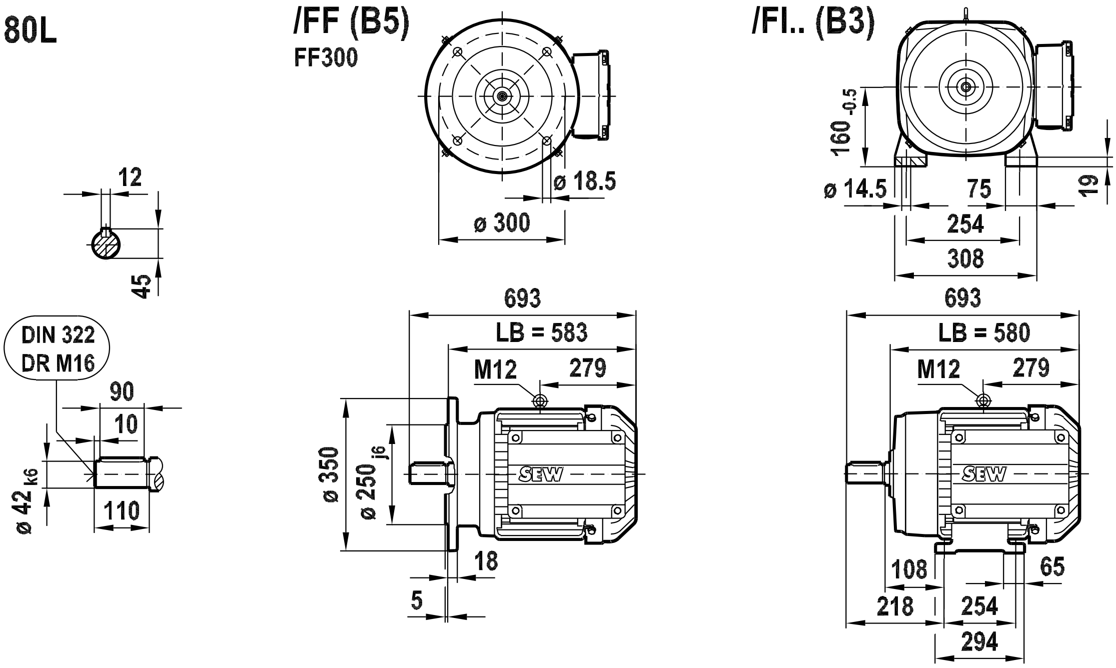

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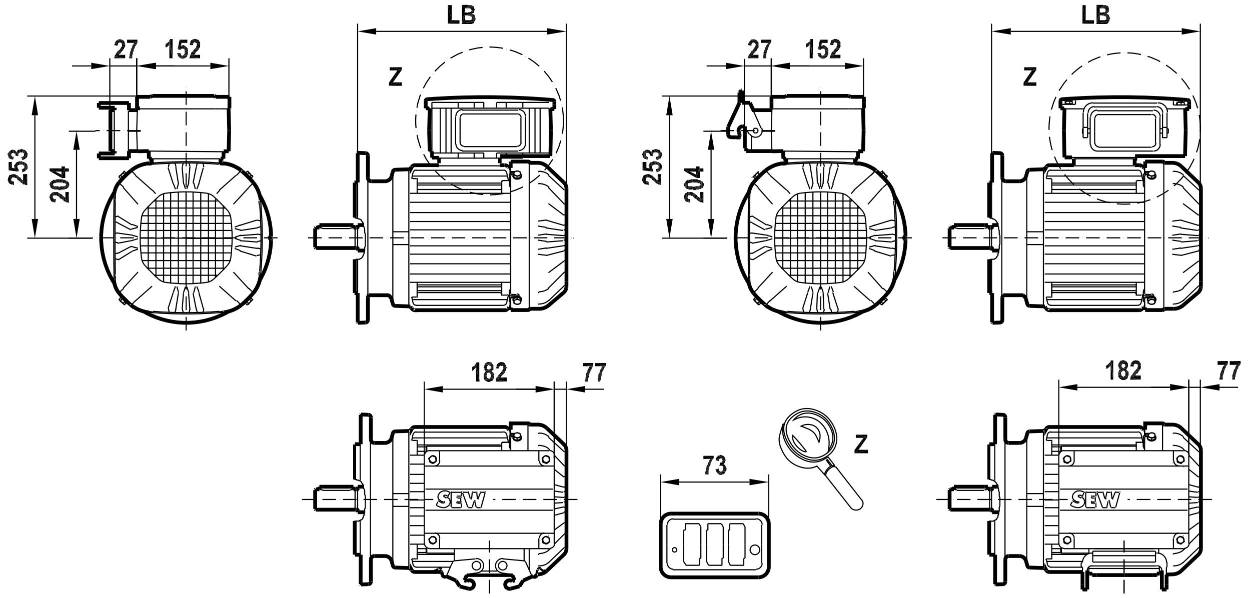

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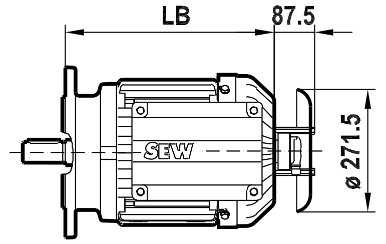

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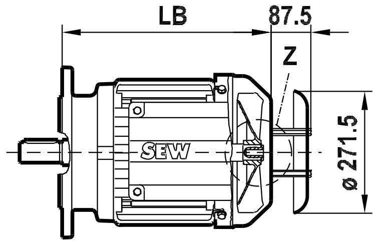

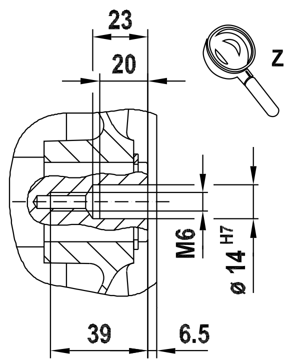

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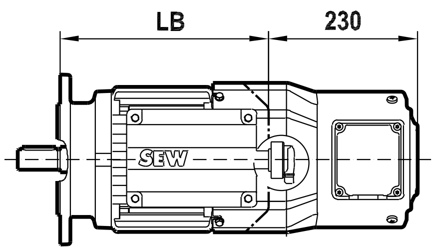

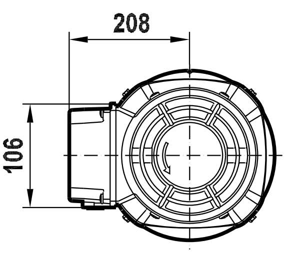

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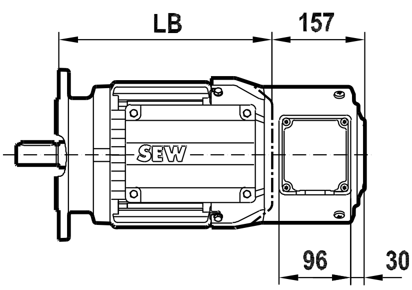

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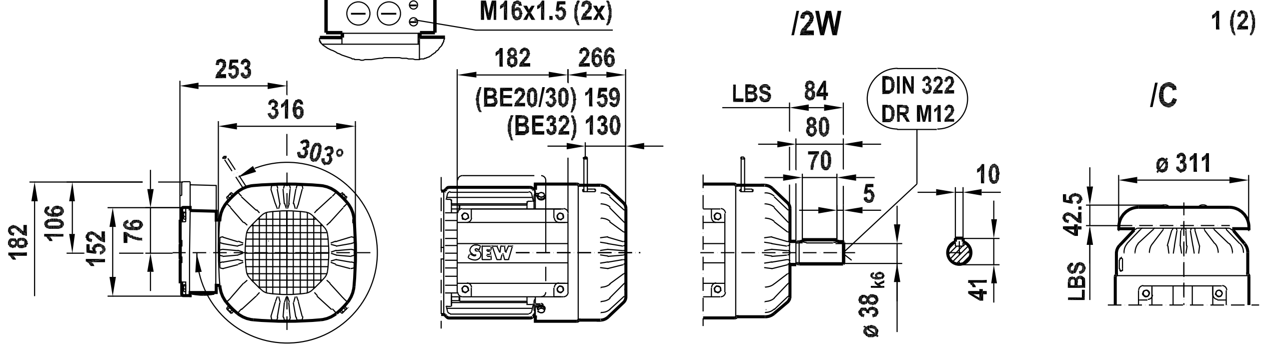

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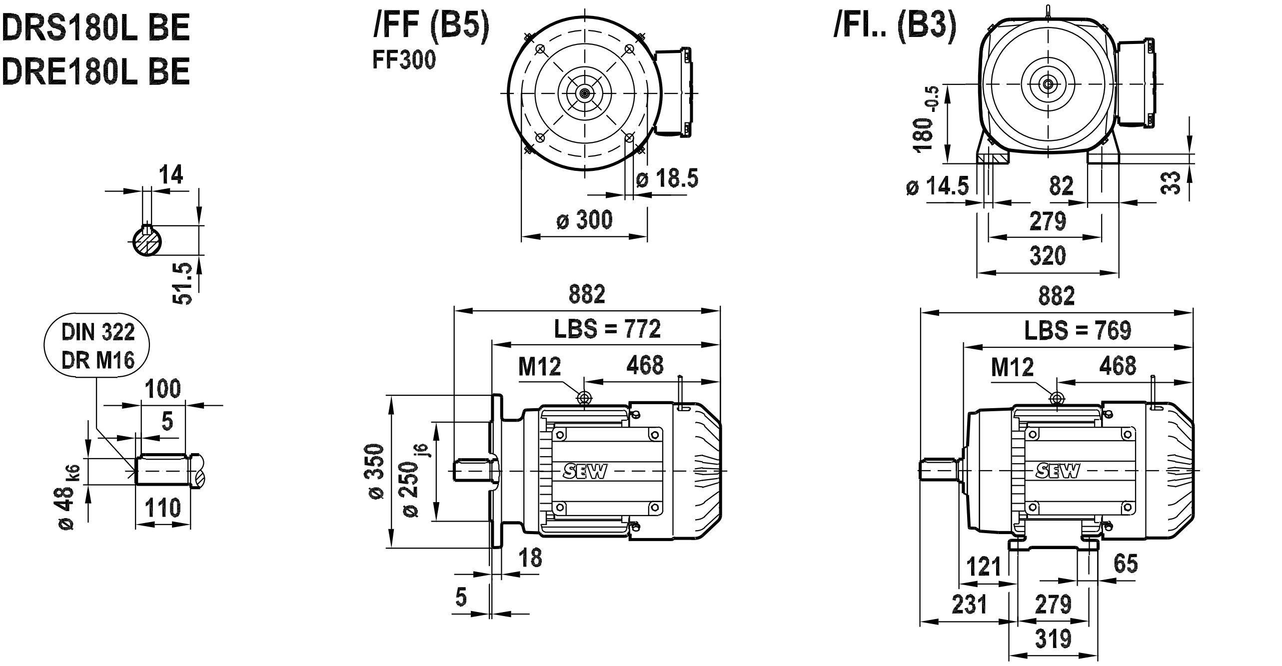

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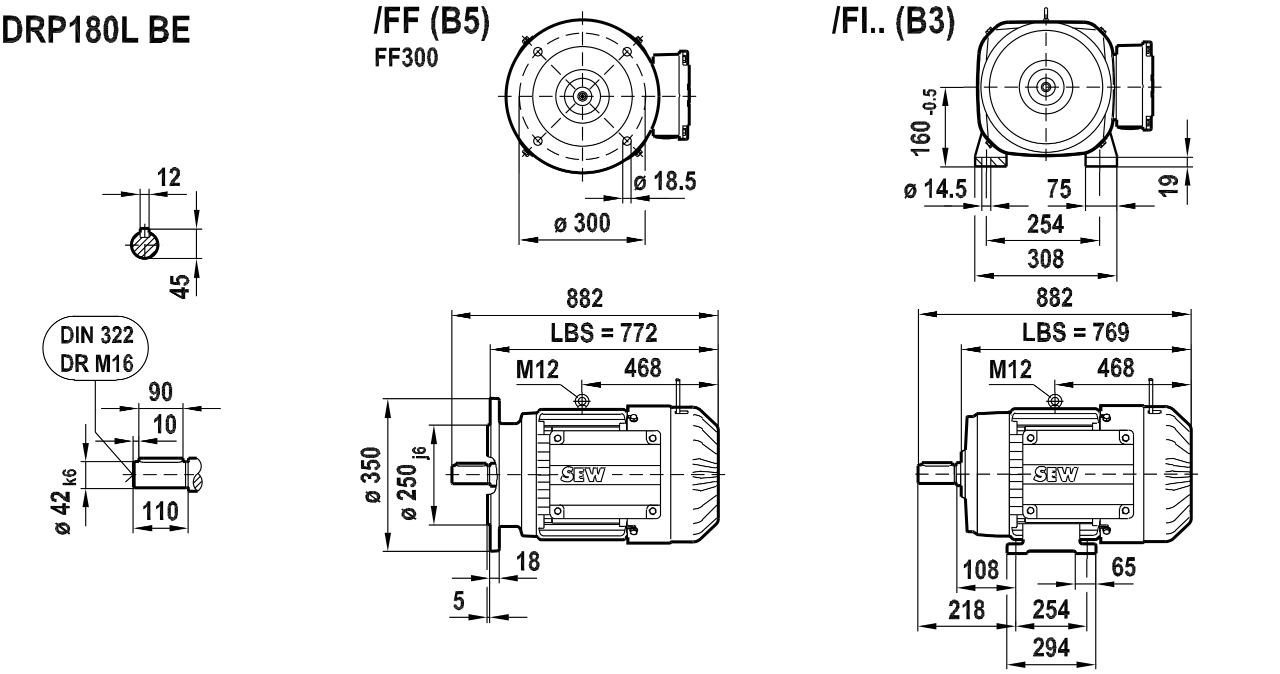

DR.180L BE

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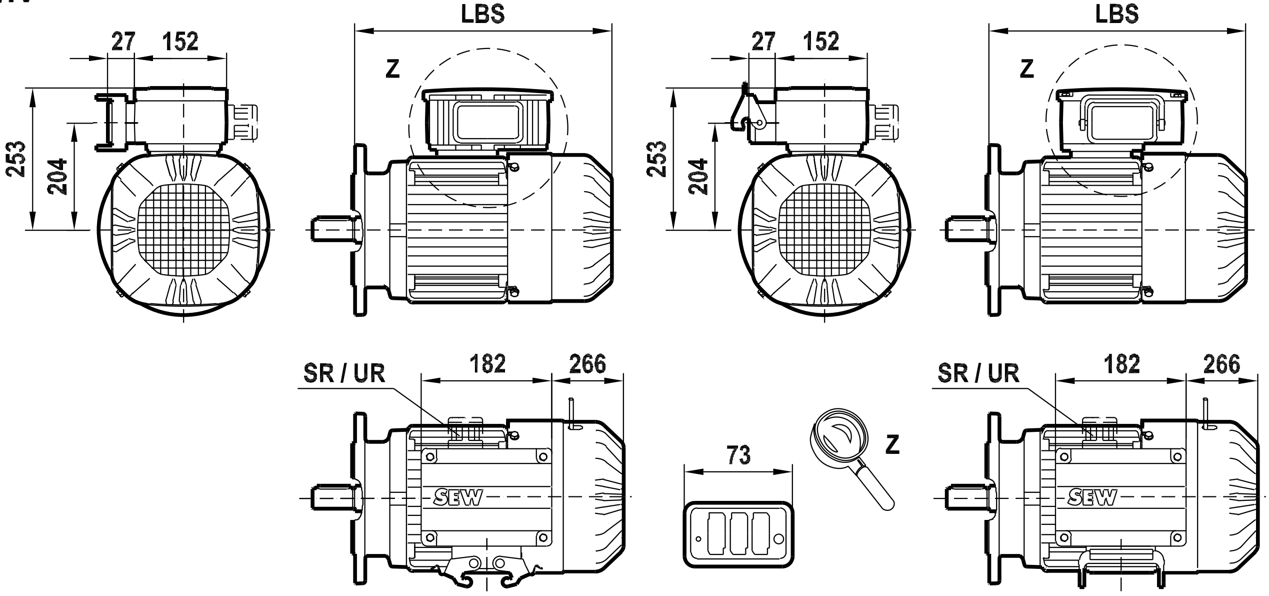

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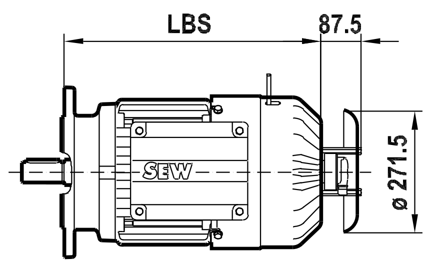

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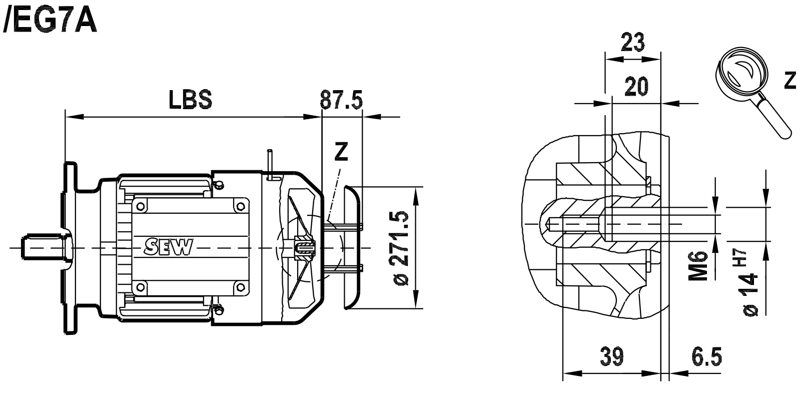

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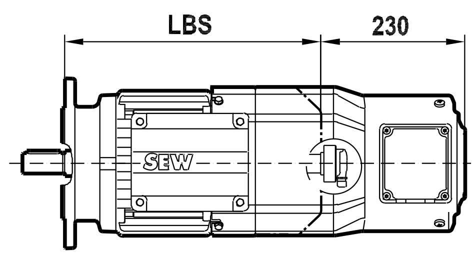

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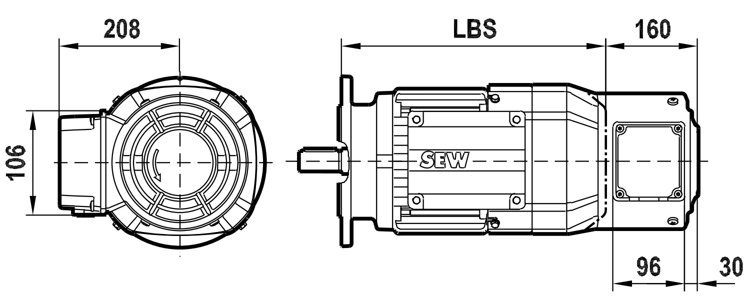

DR.180LC

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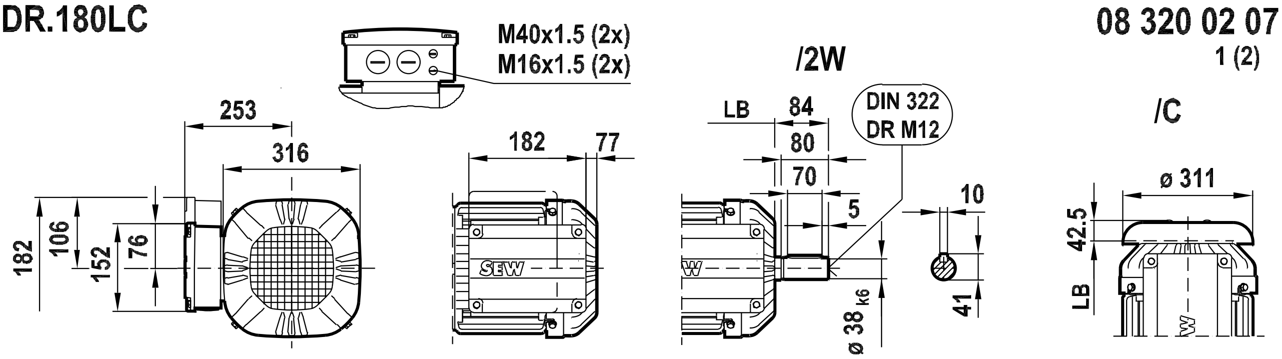

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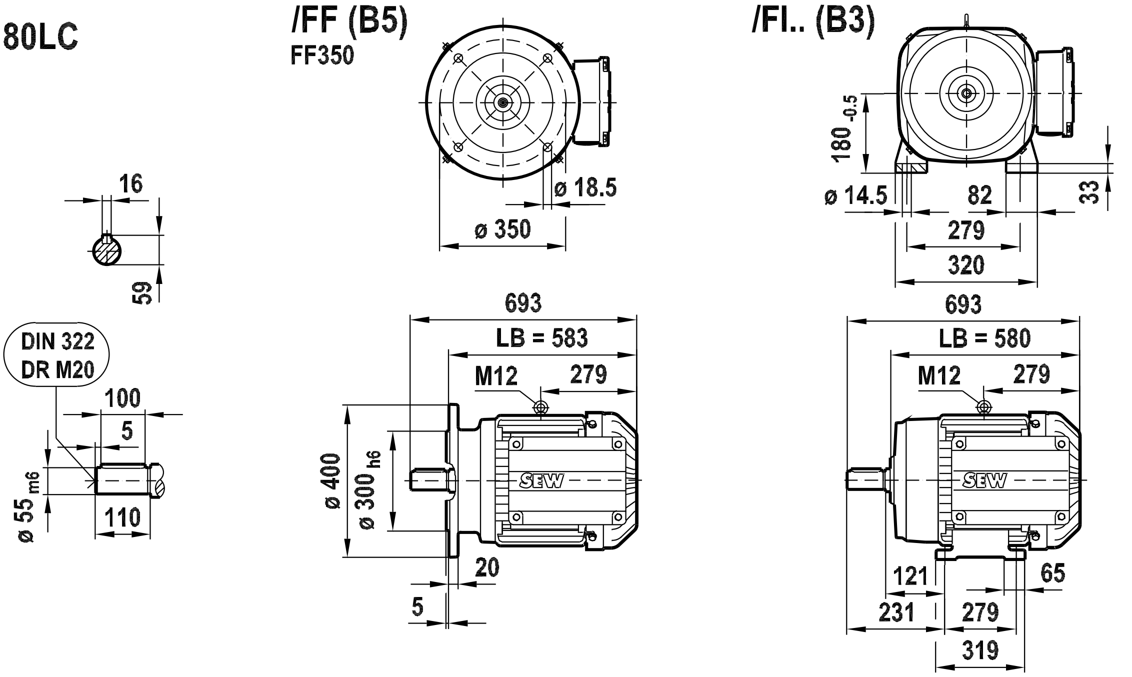
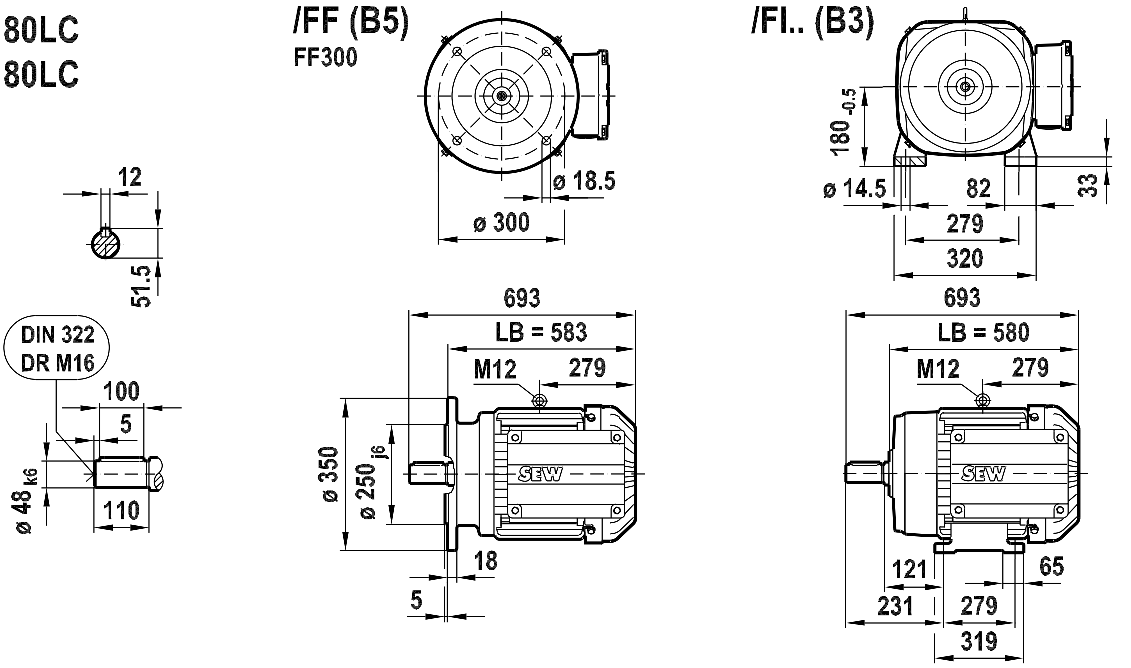


DRE180LC
DRP180LC



DR.180LC

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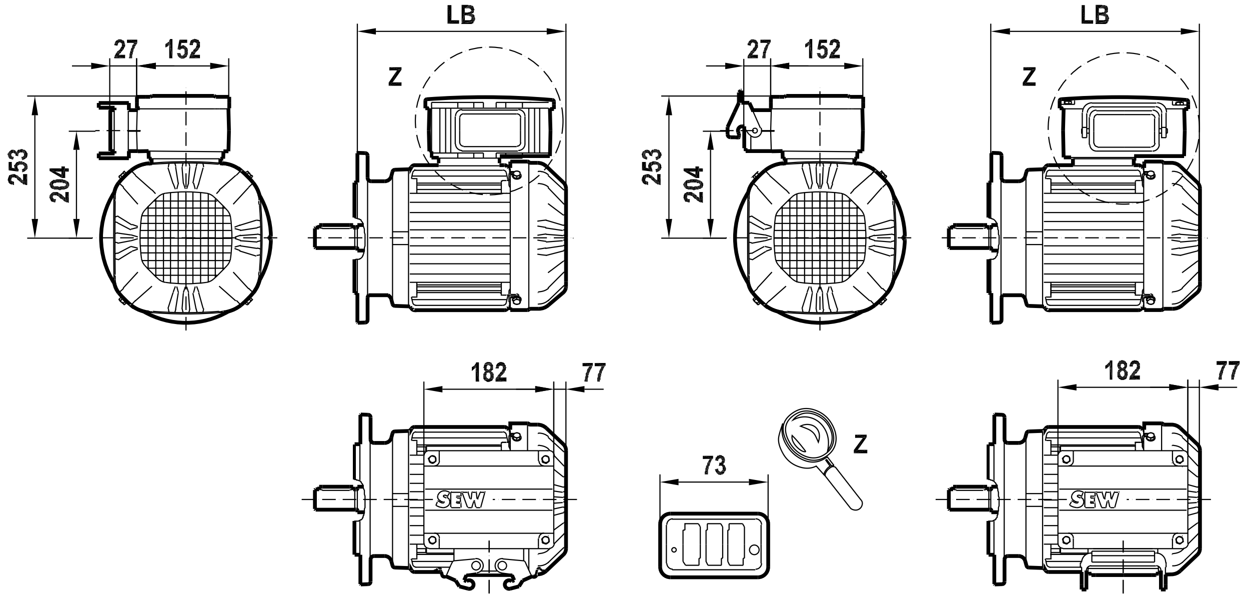

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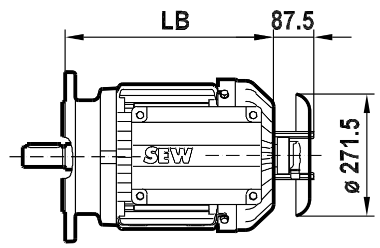

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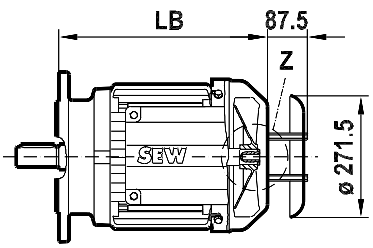

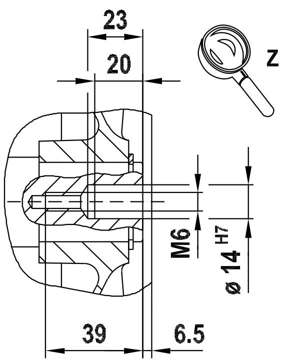

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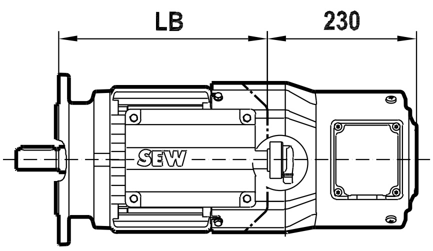

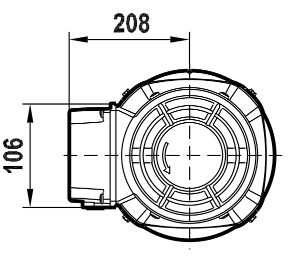

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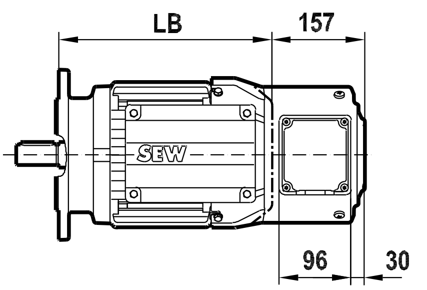

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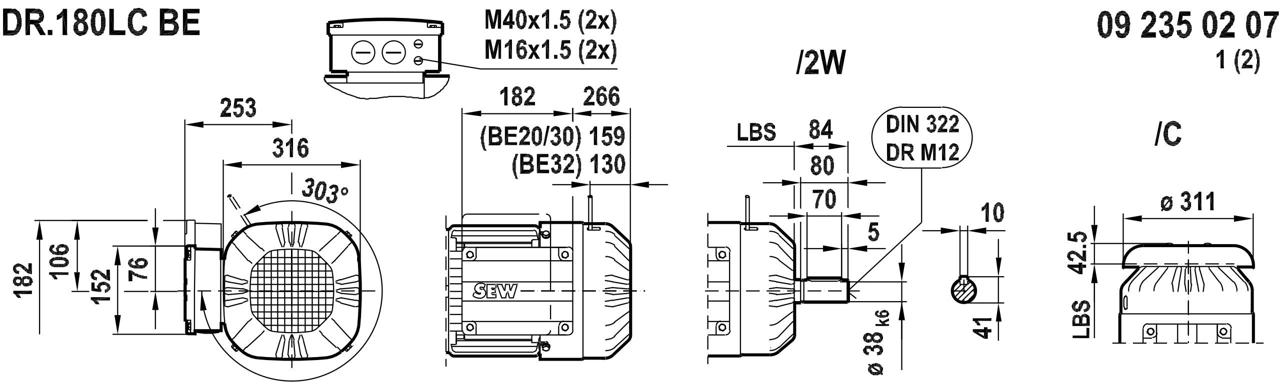

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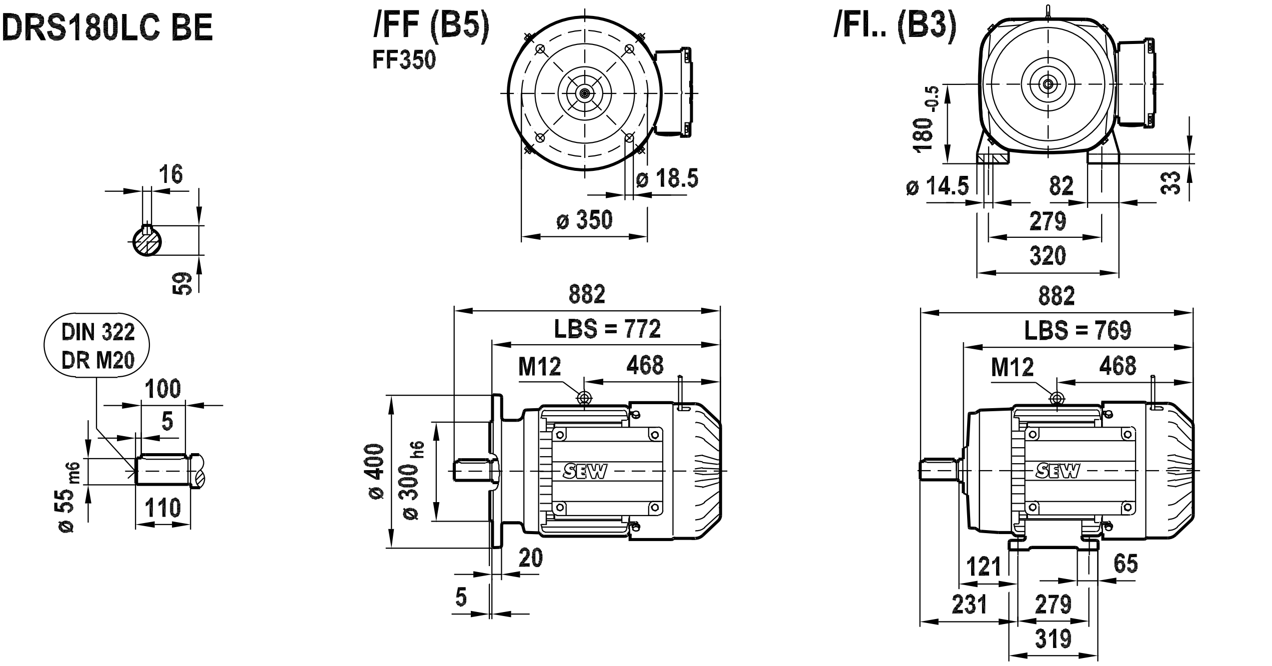

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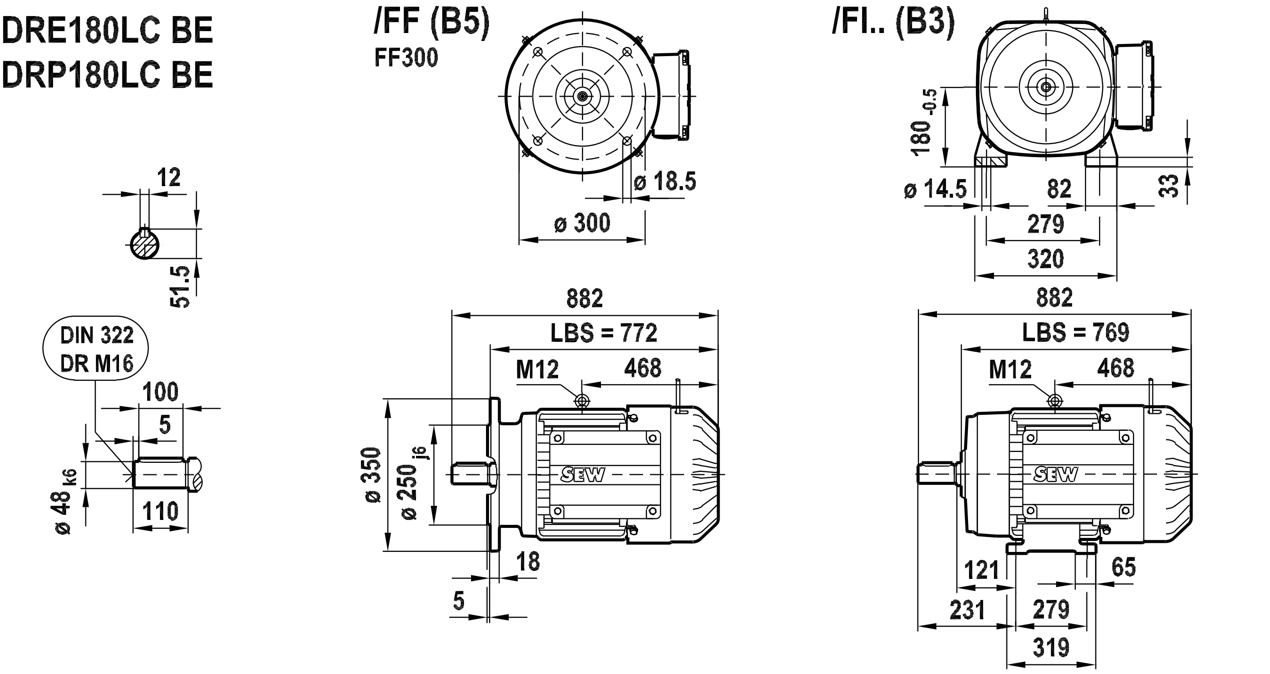

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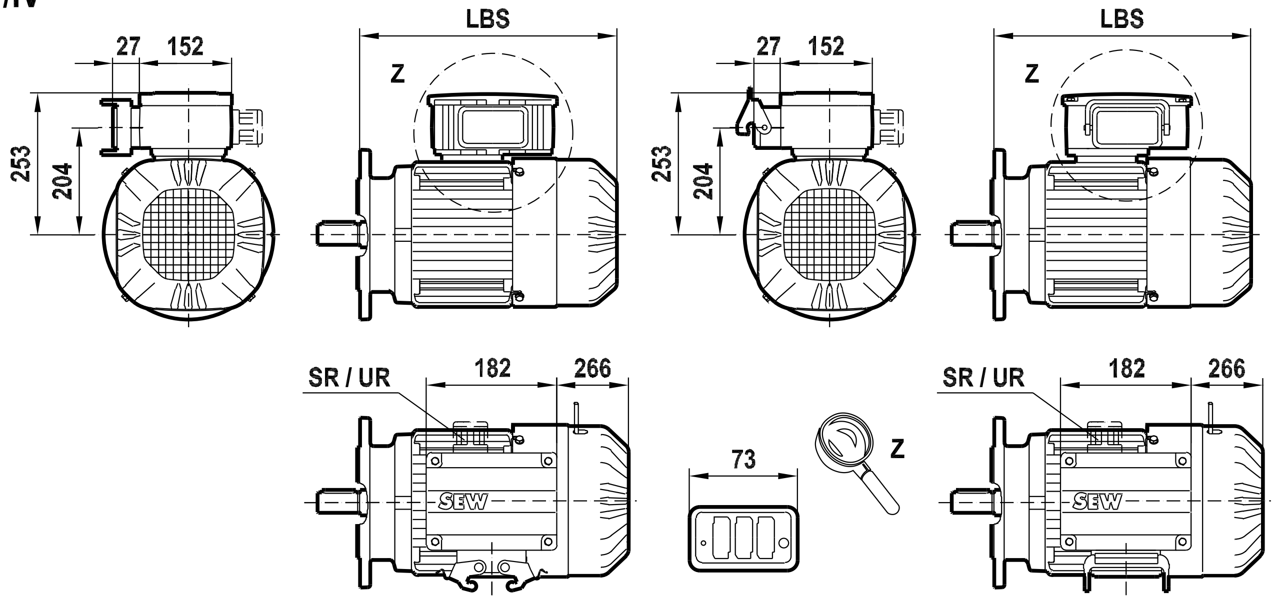

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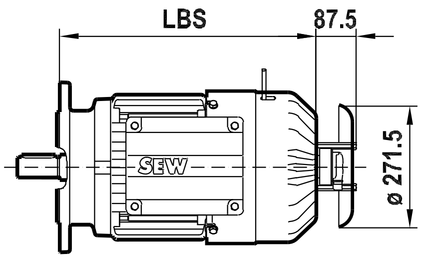

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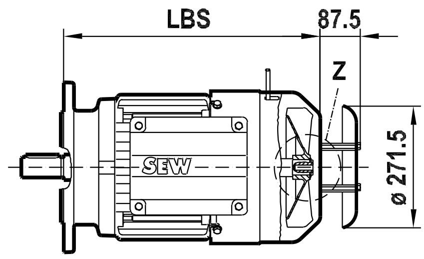

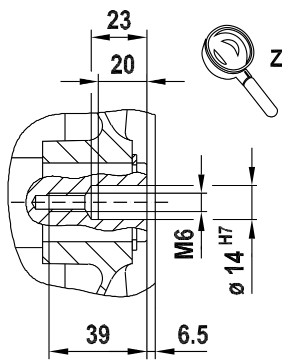

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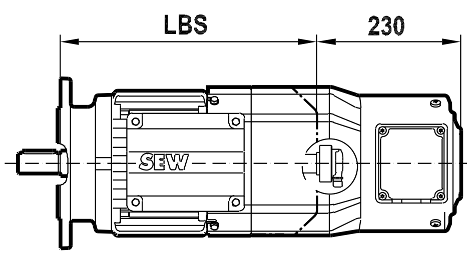

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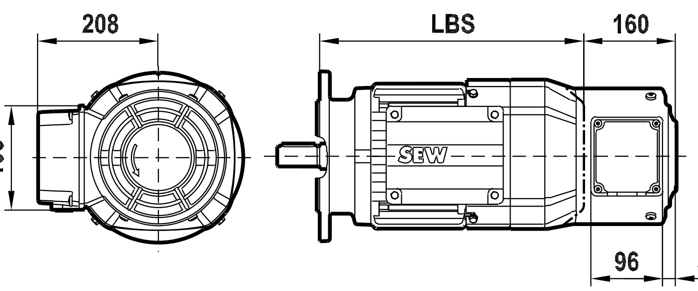

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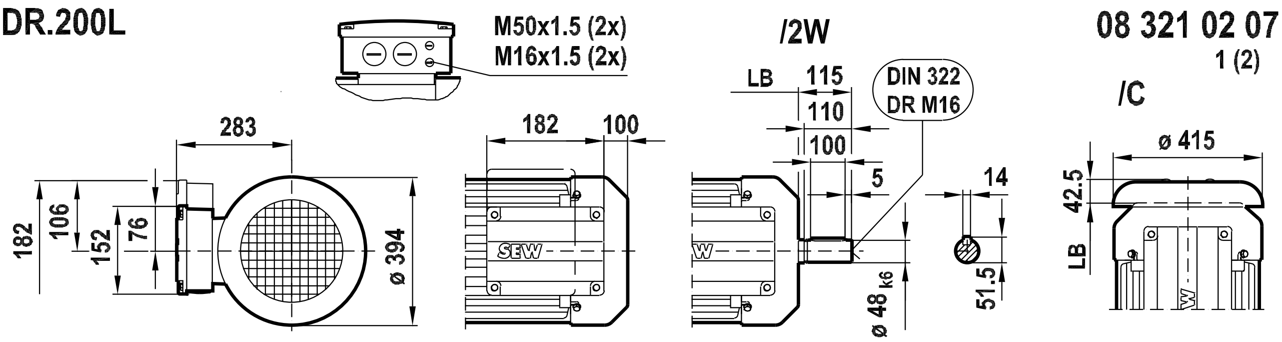

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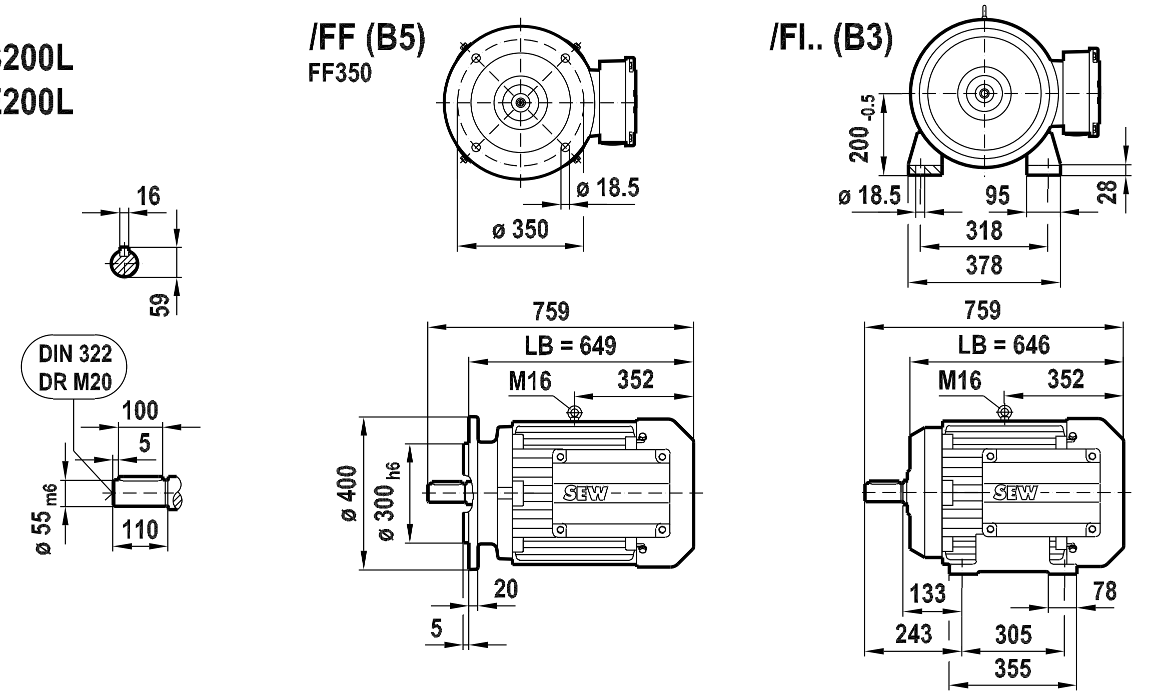

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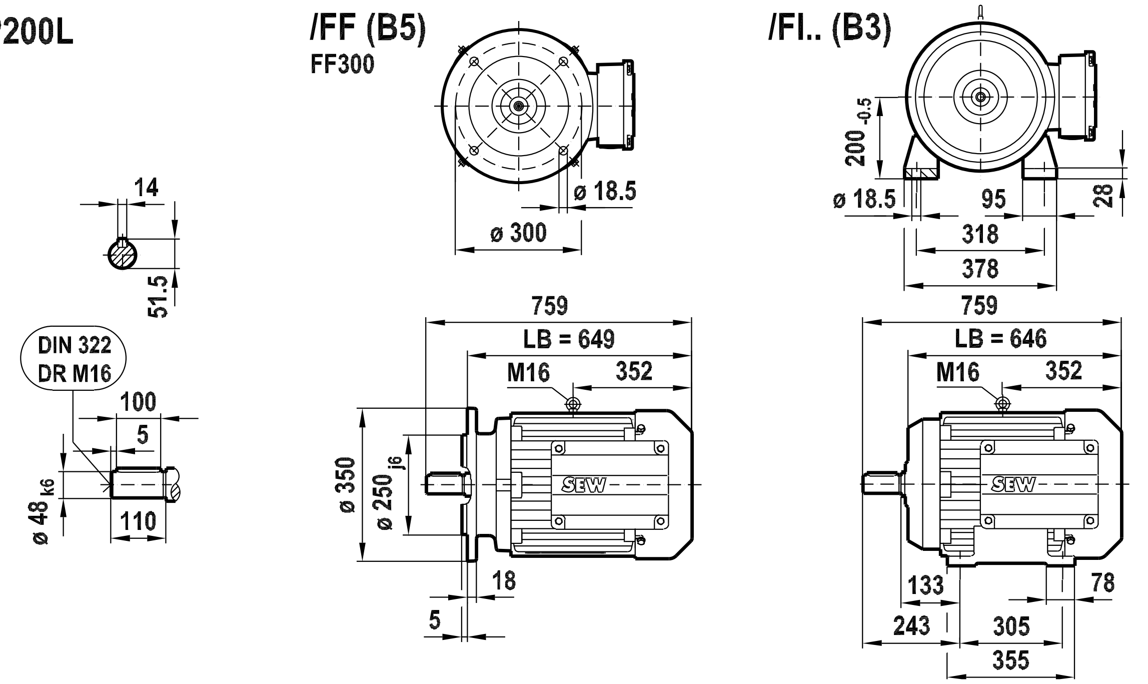

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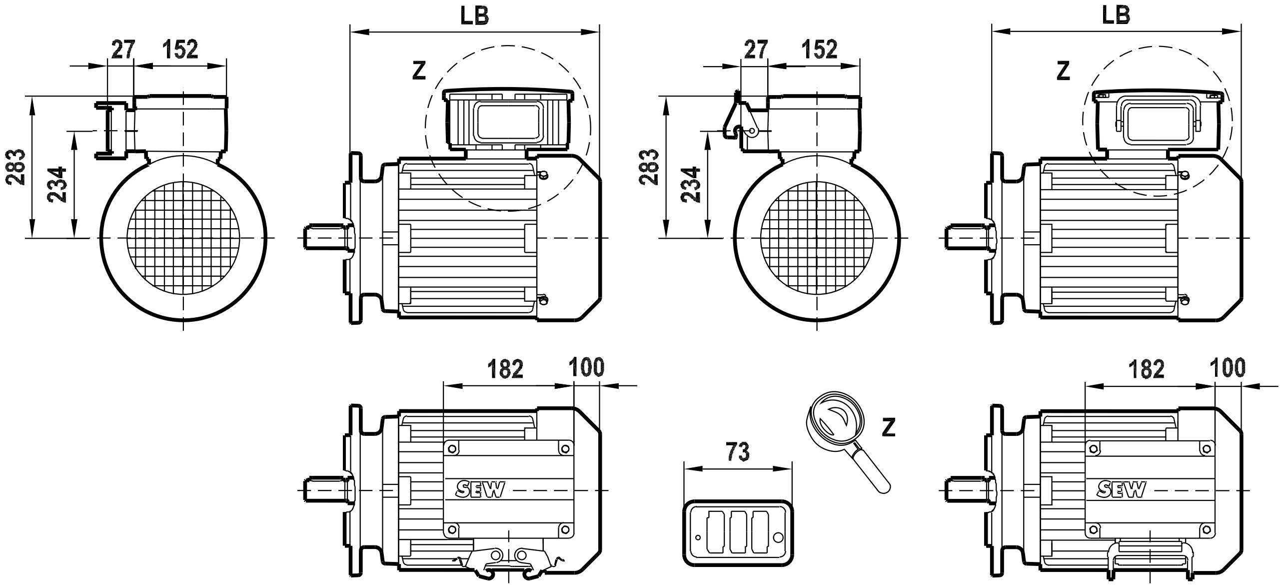

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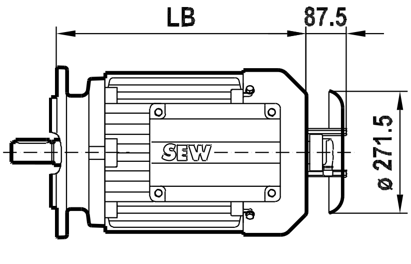

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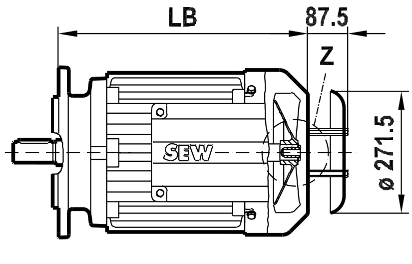

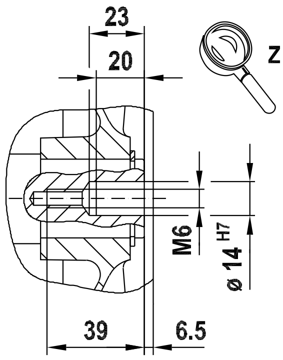

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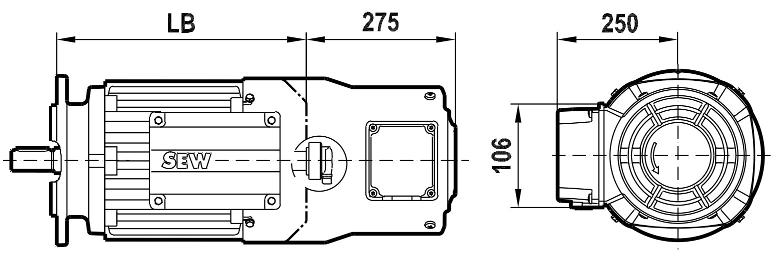

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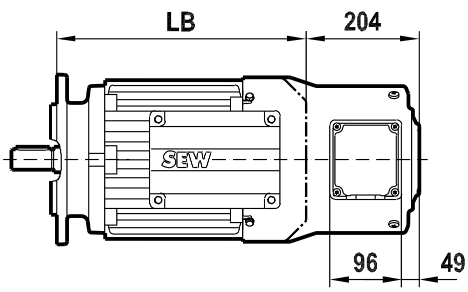

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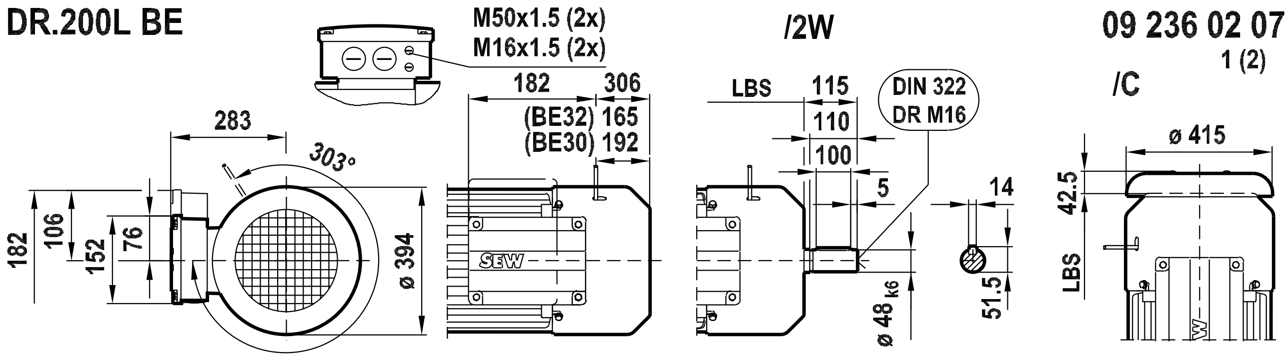

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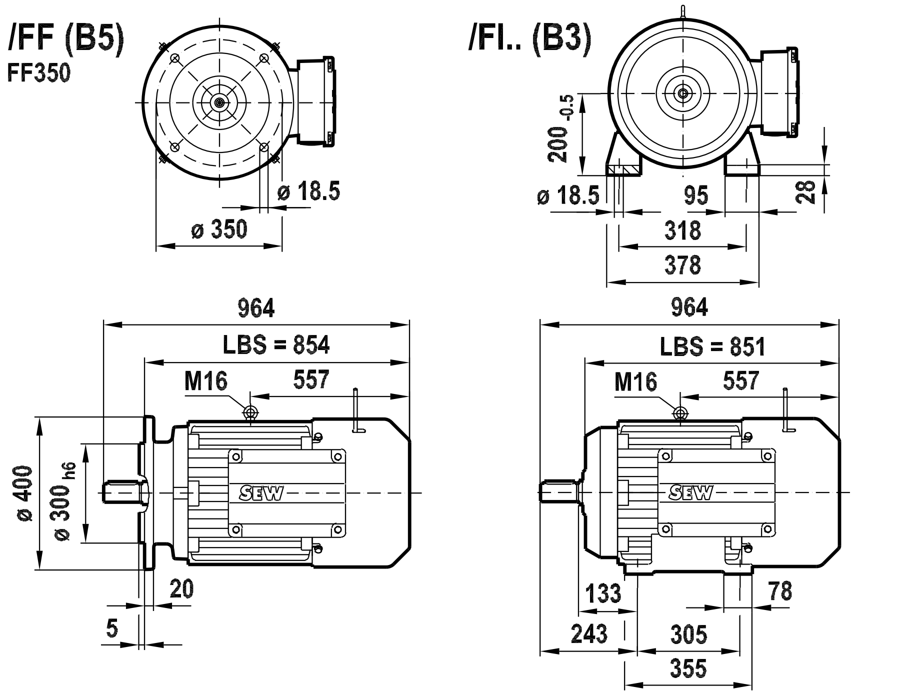

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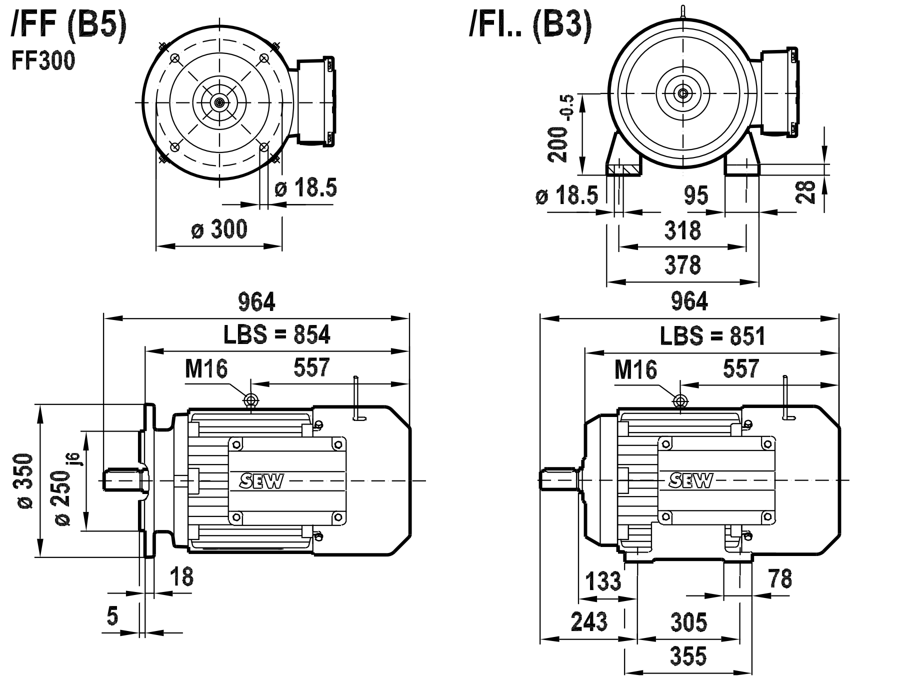

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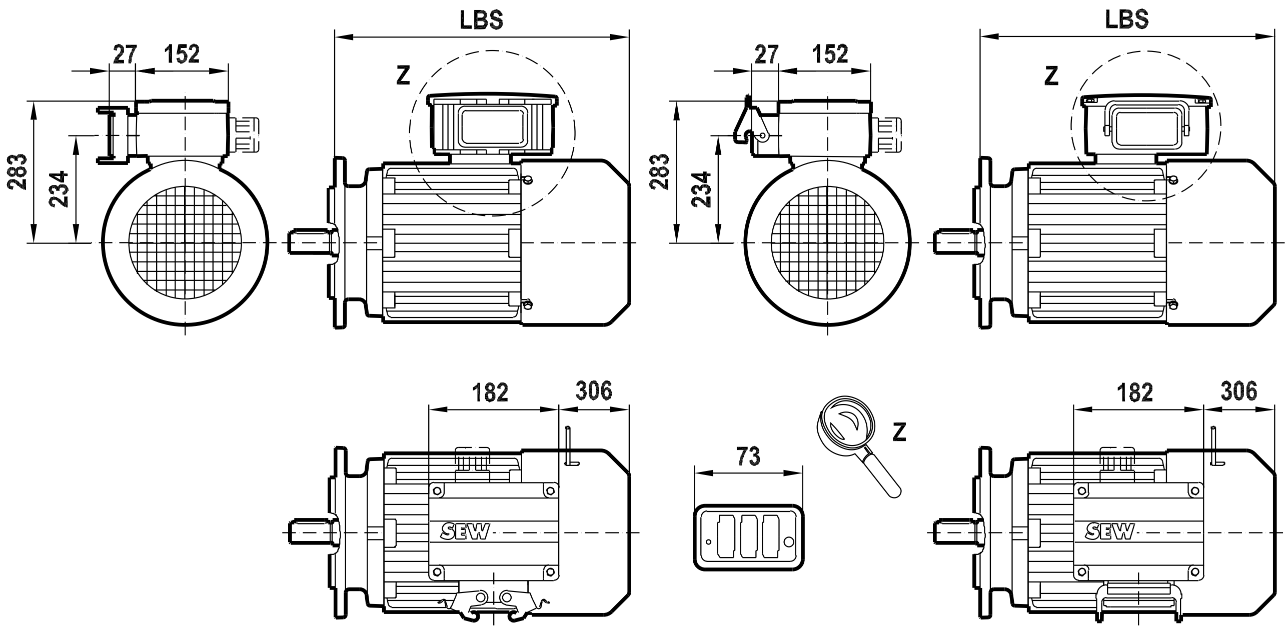

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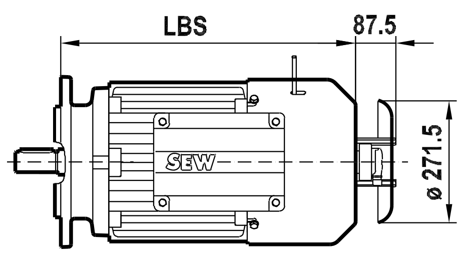

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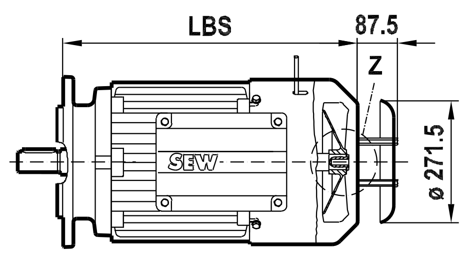

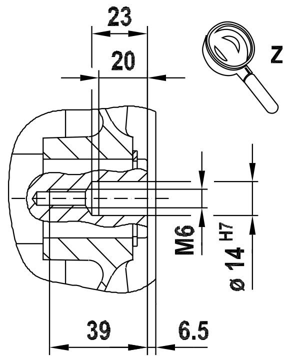

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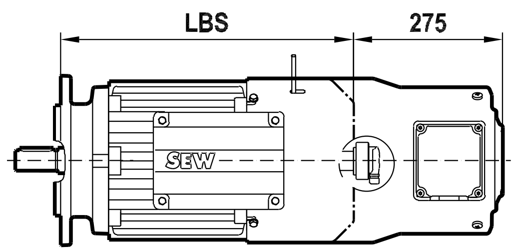

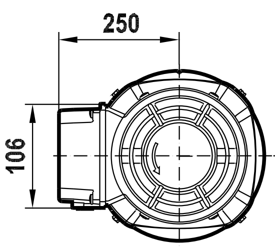

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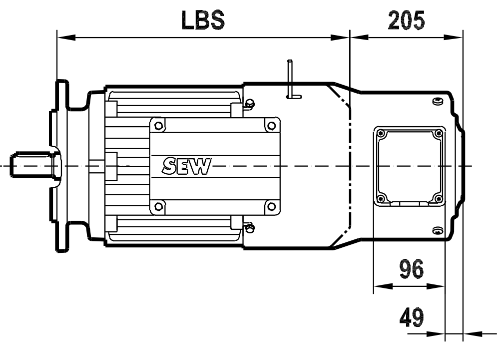

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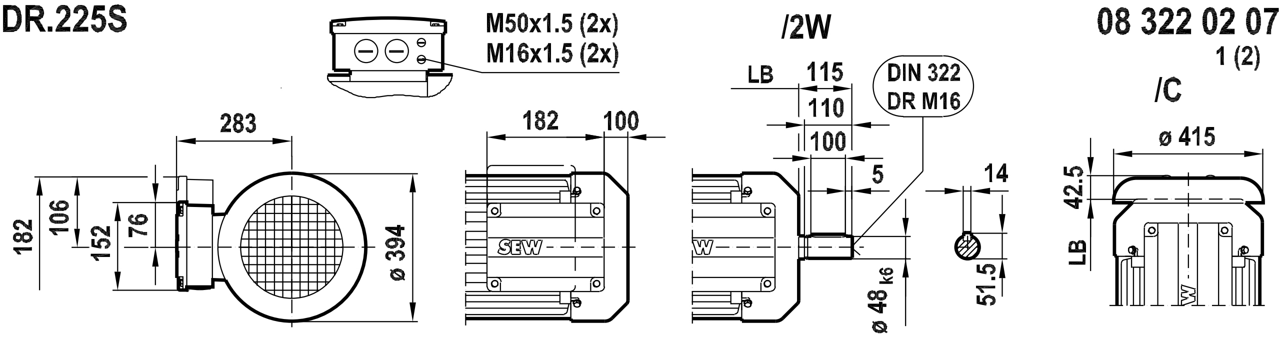

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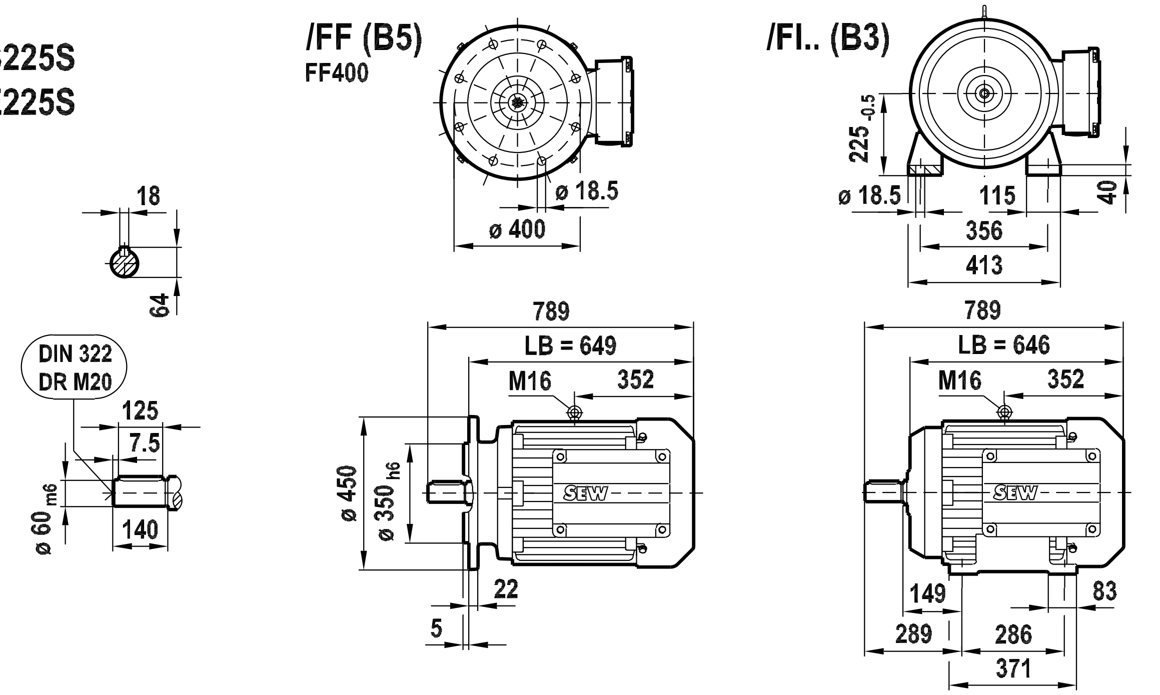

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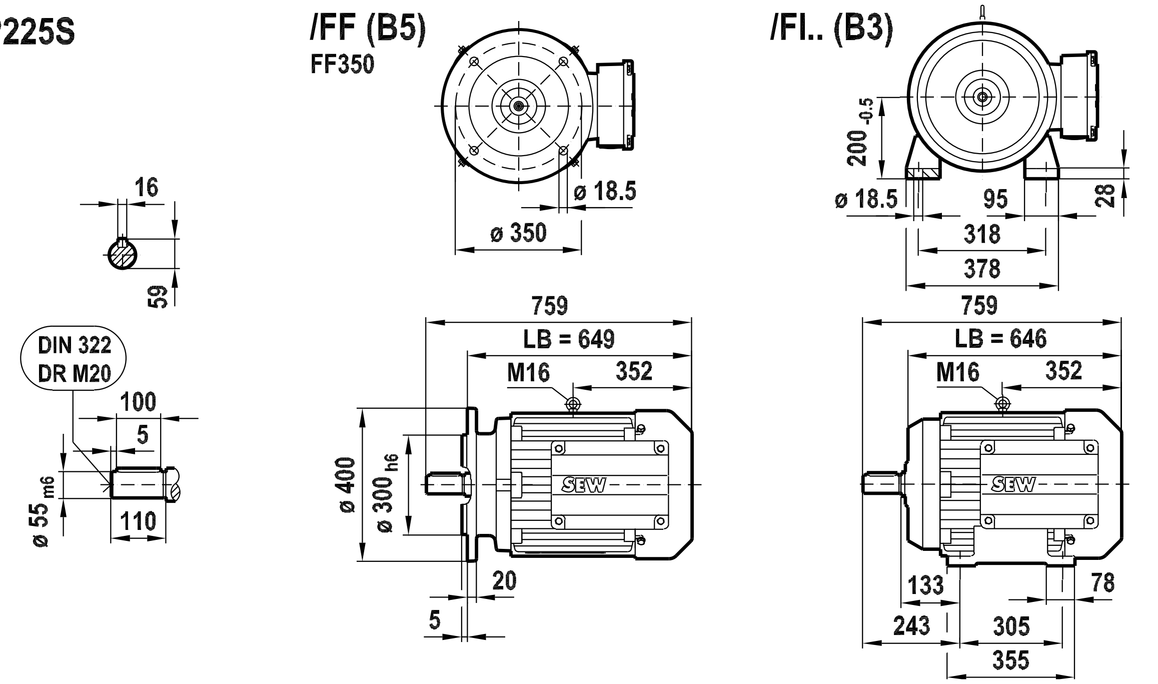

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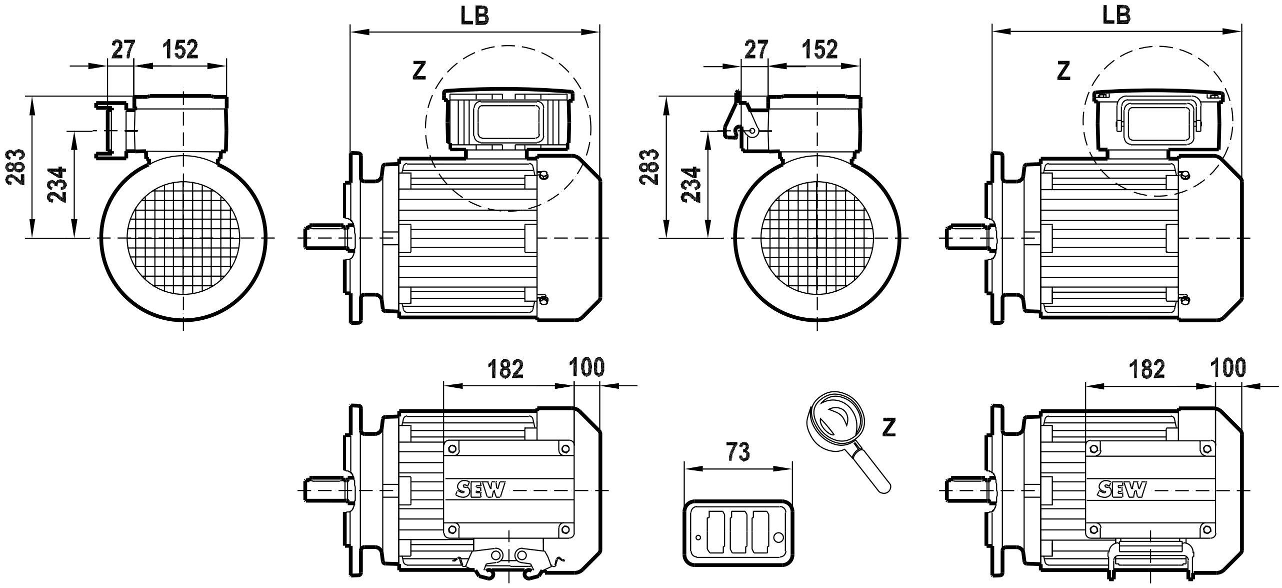

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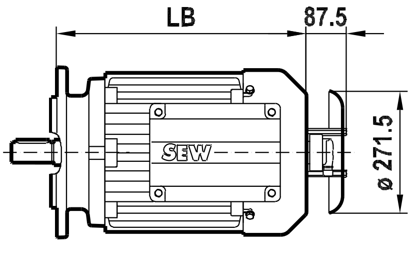

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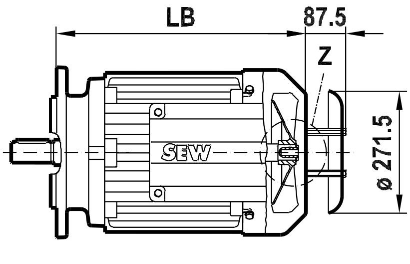

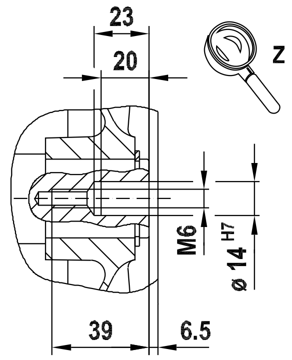

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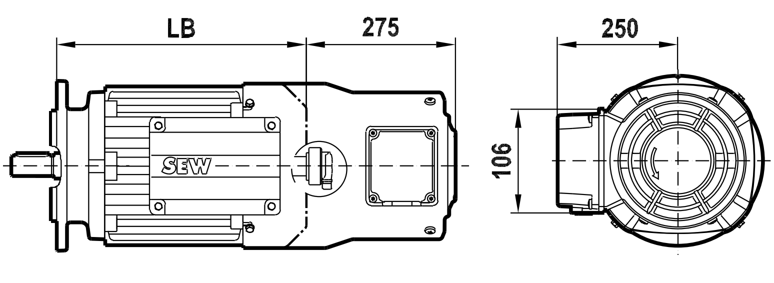

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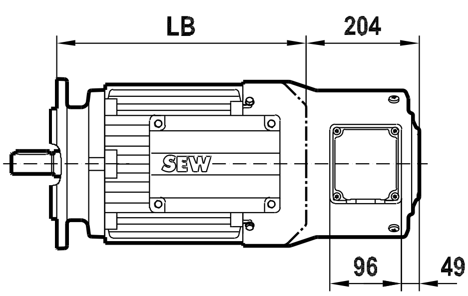

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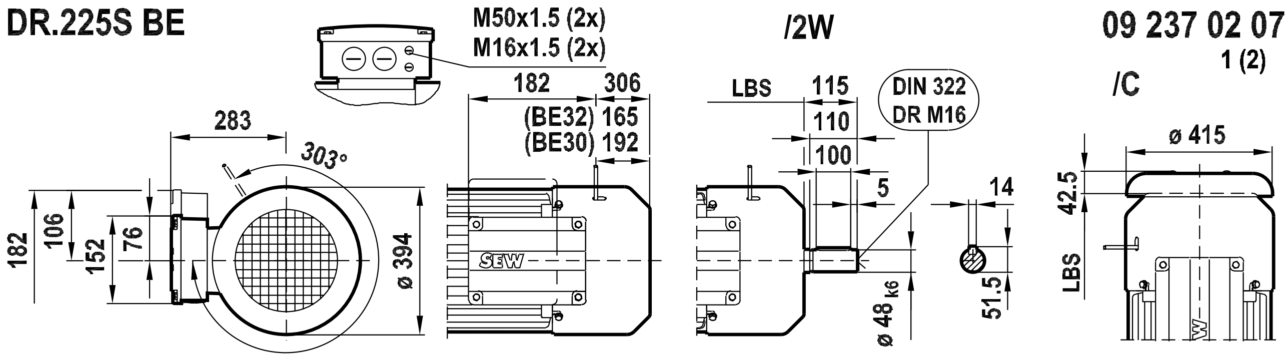

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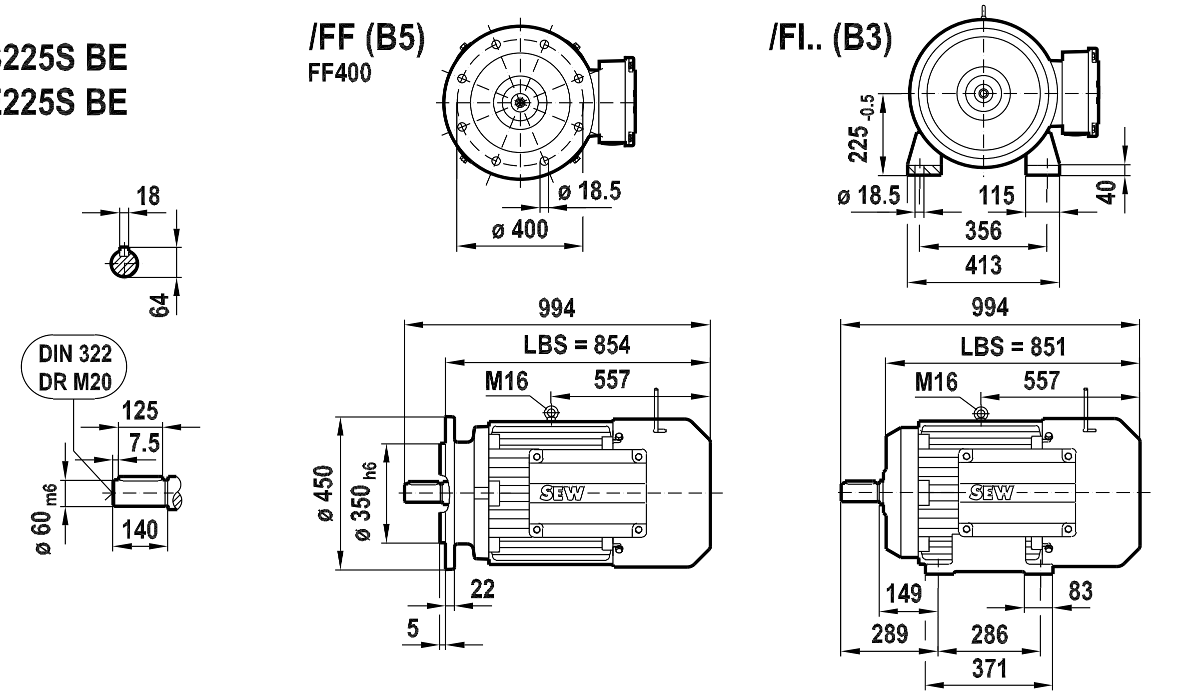

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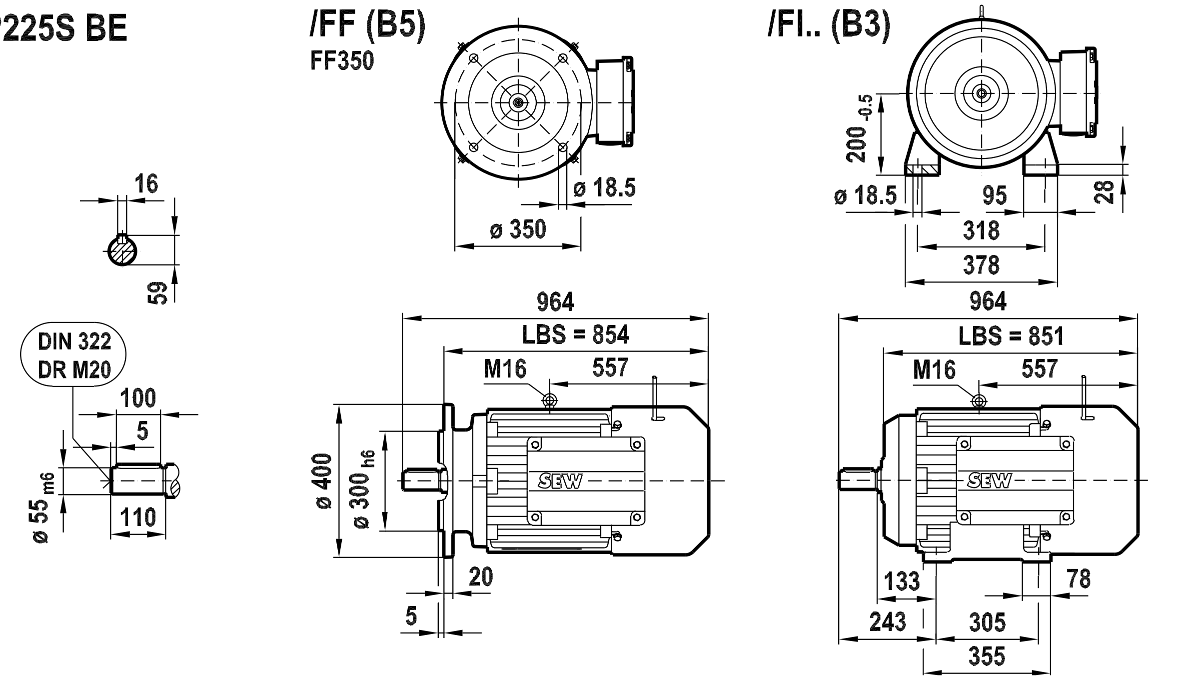

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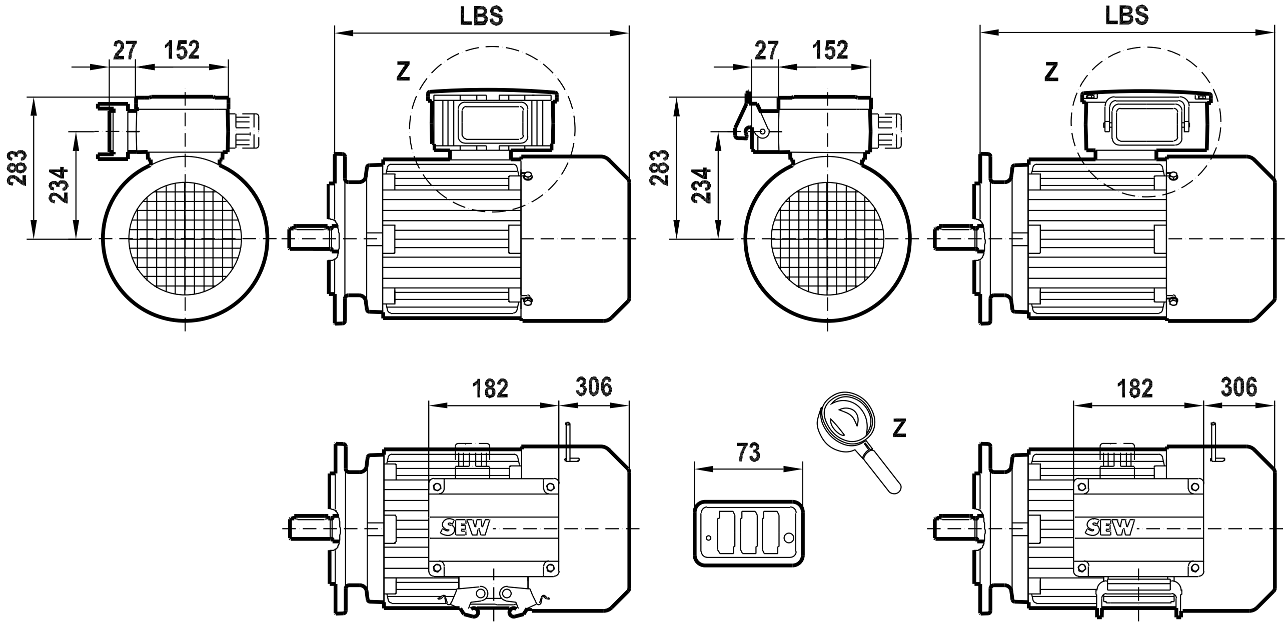

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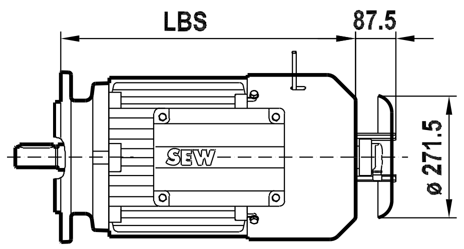

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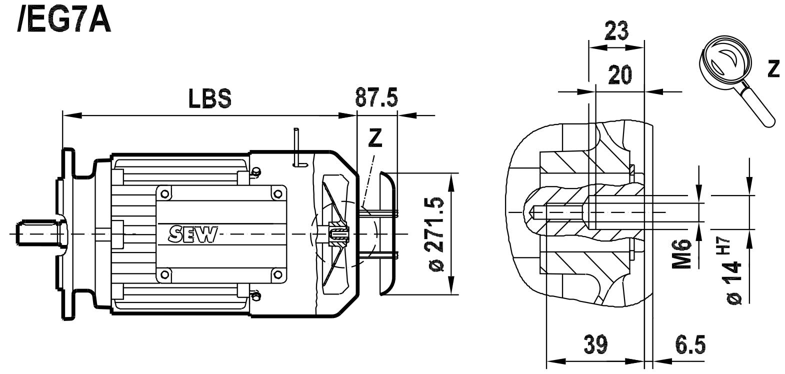

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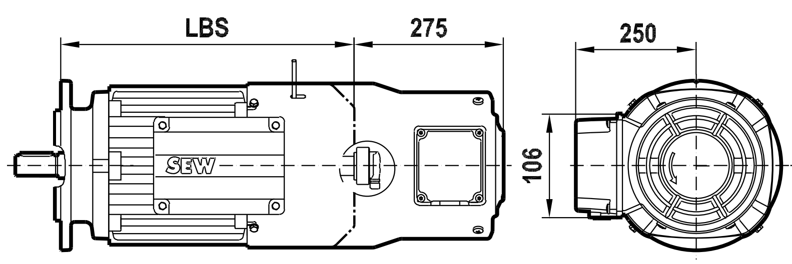

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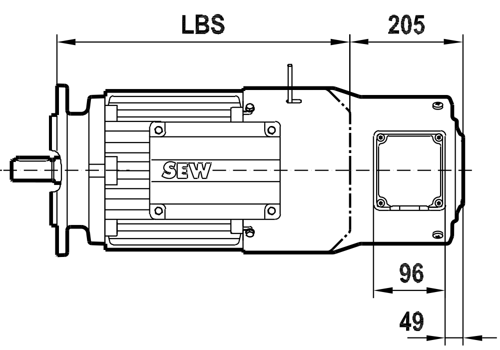

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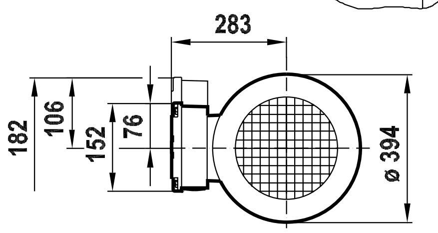

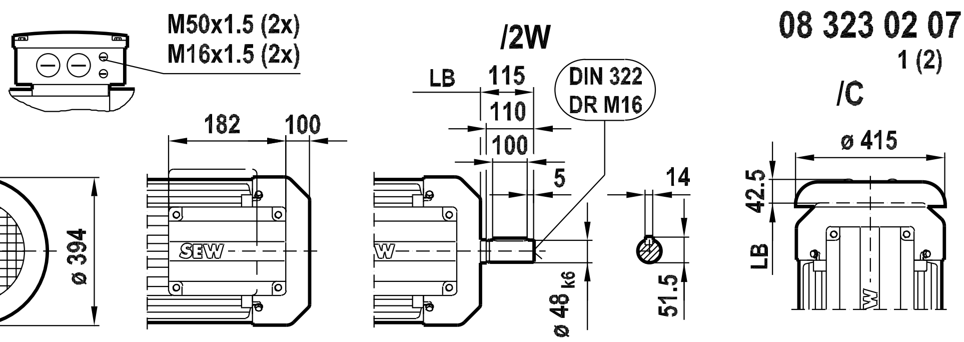

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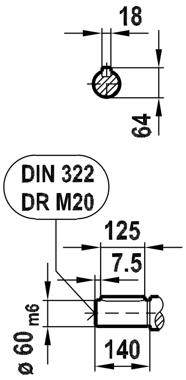

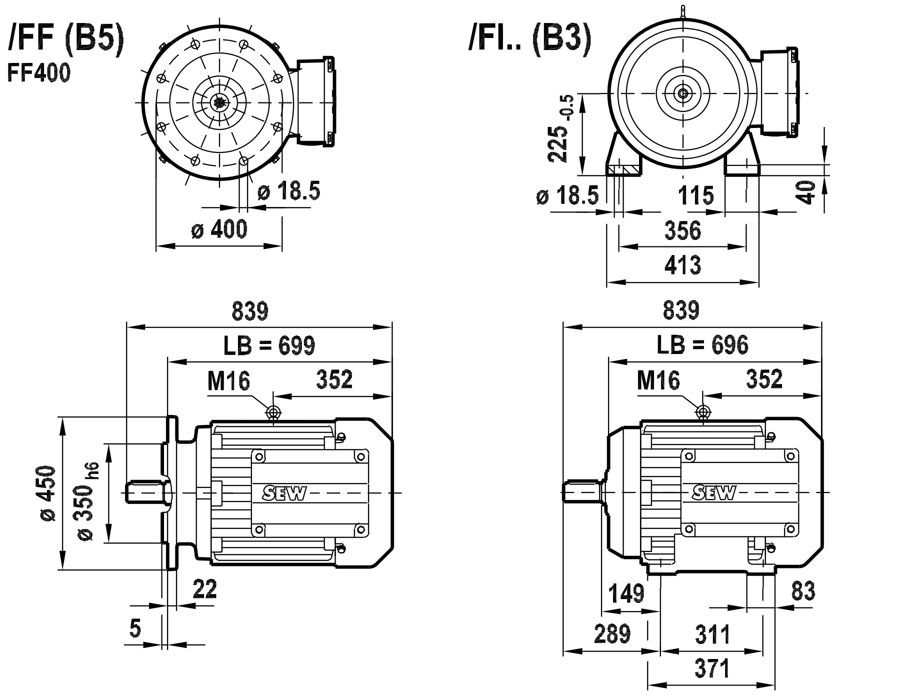

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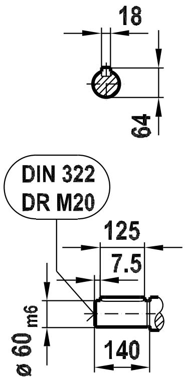

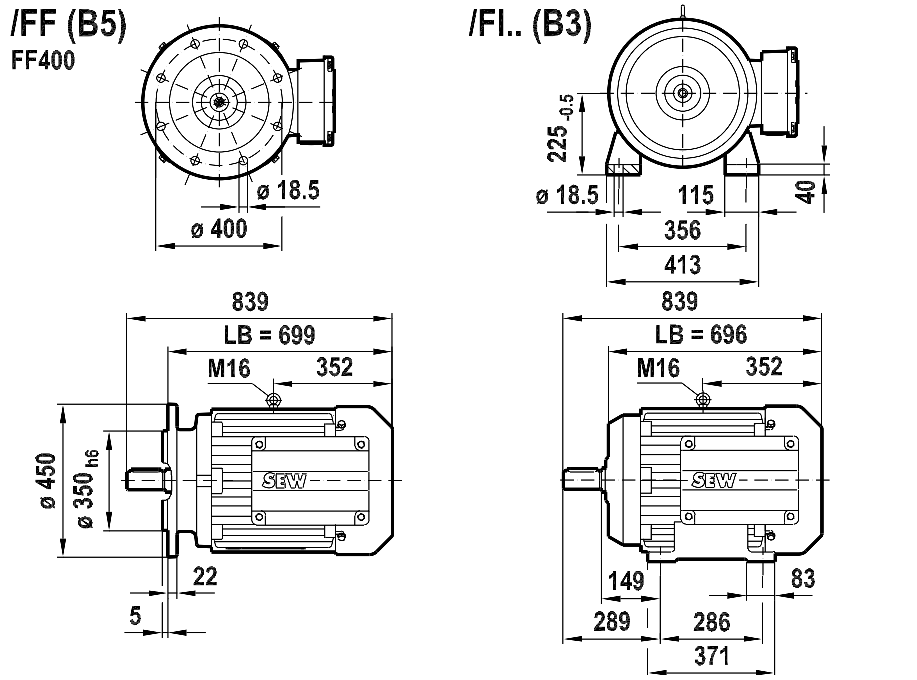

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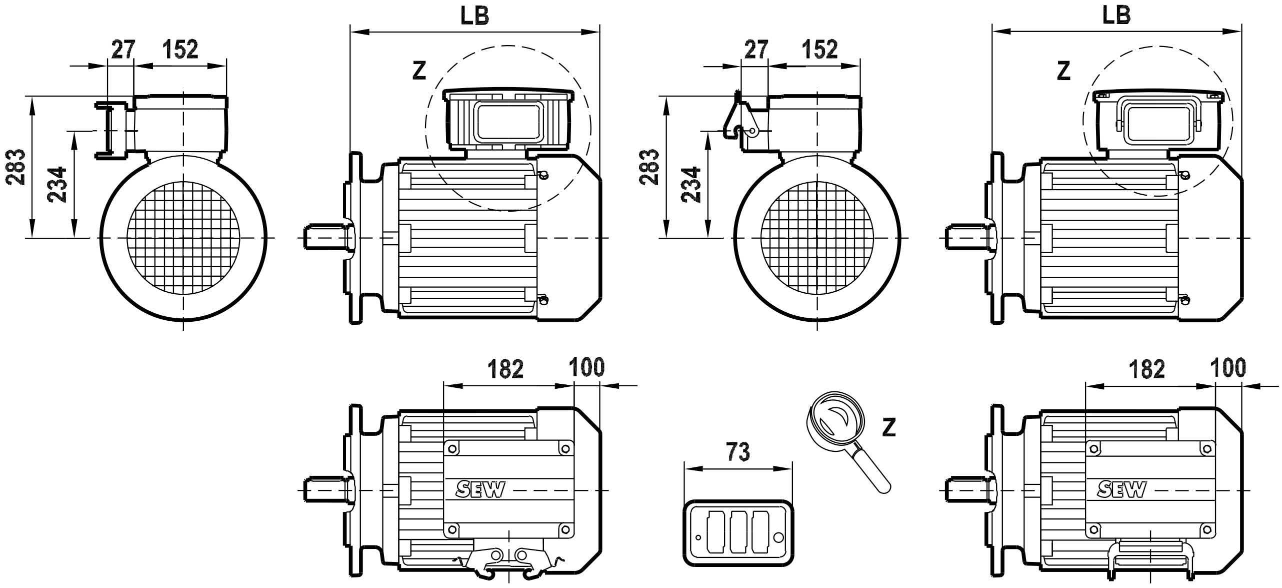

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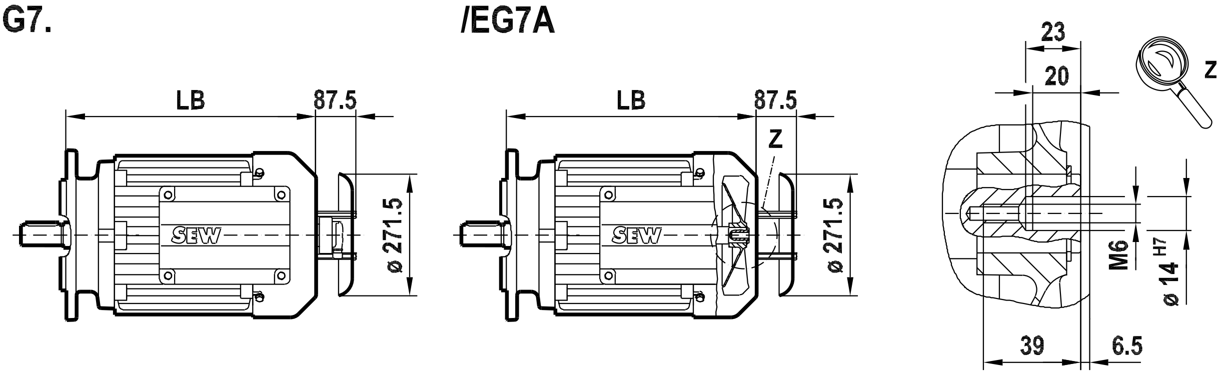

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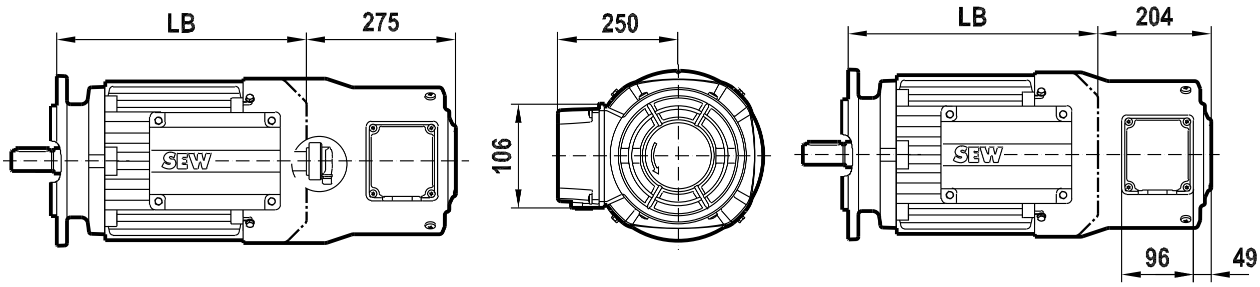

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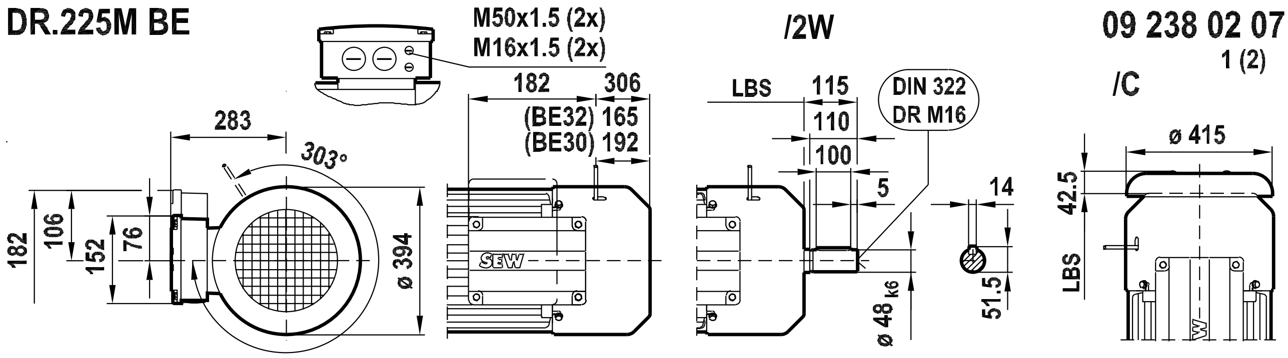

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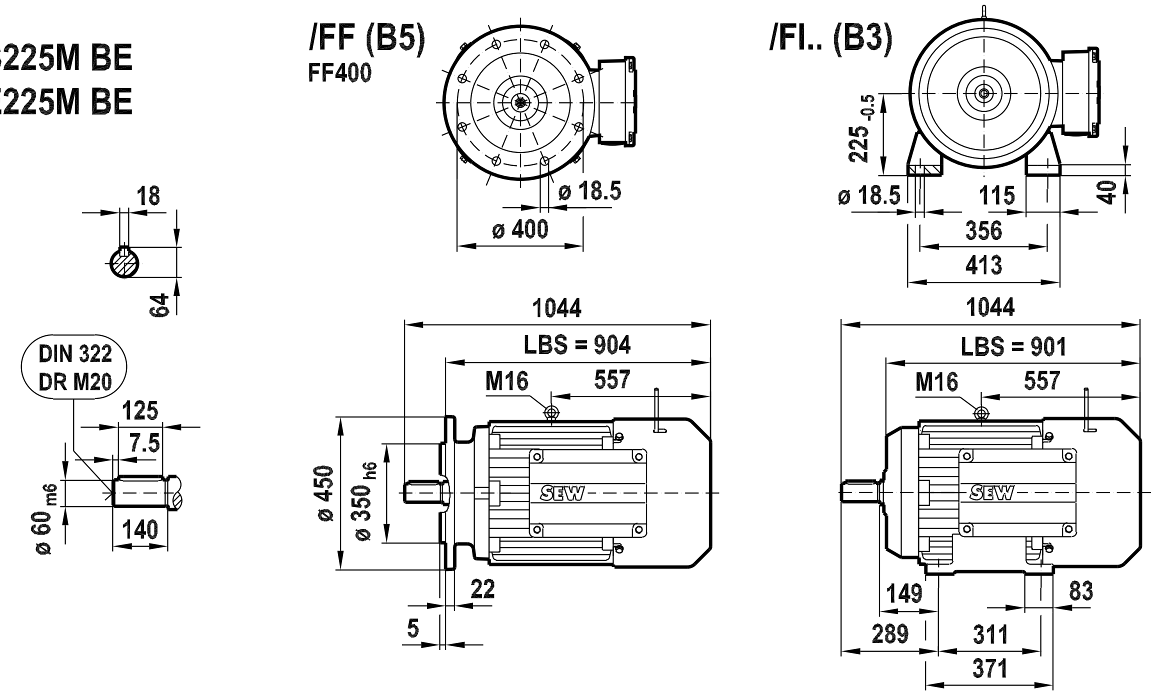

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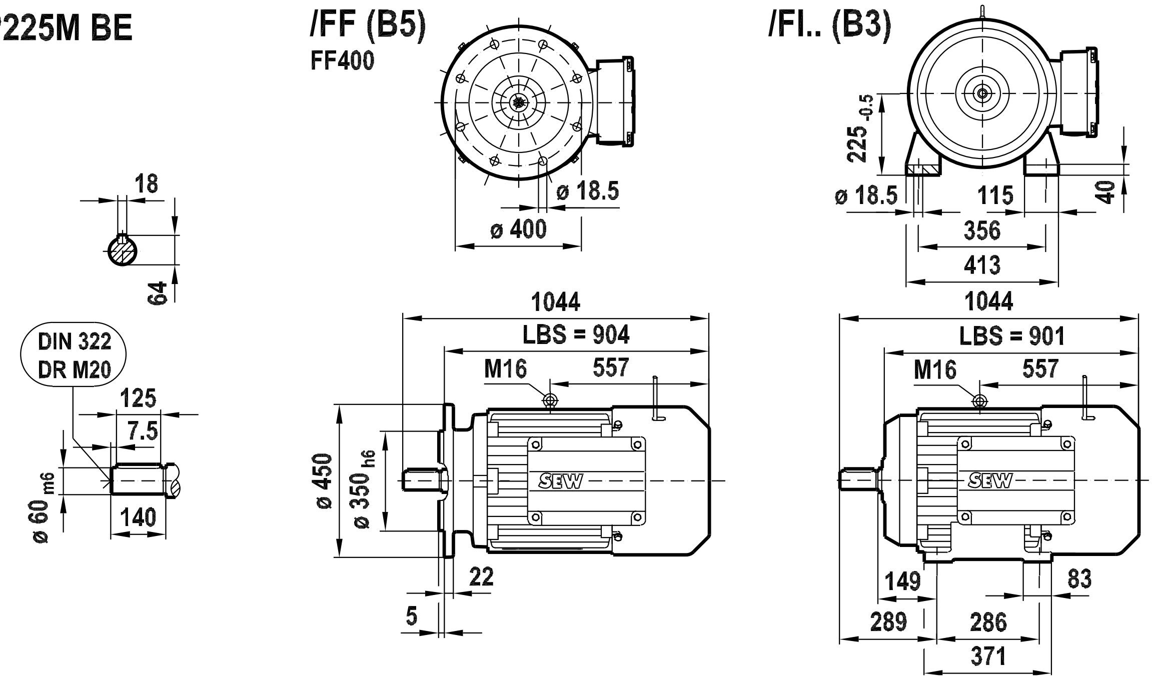

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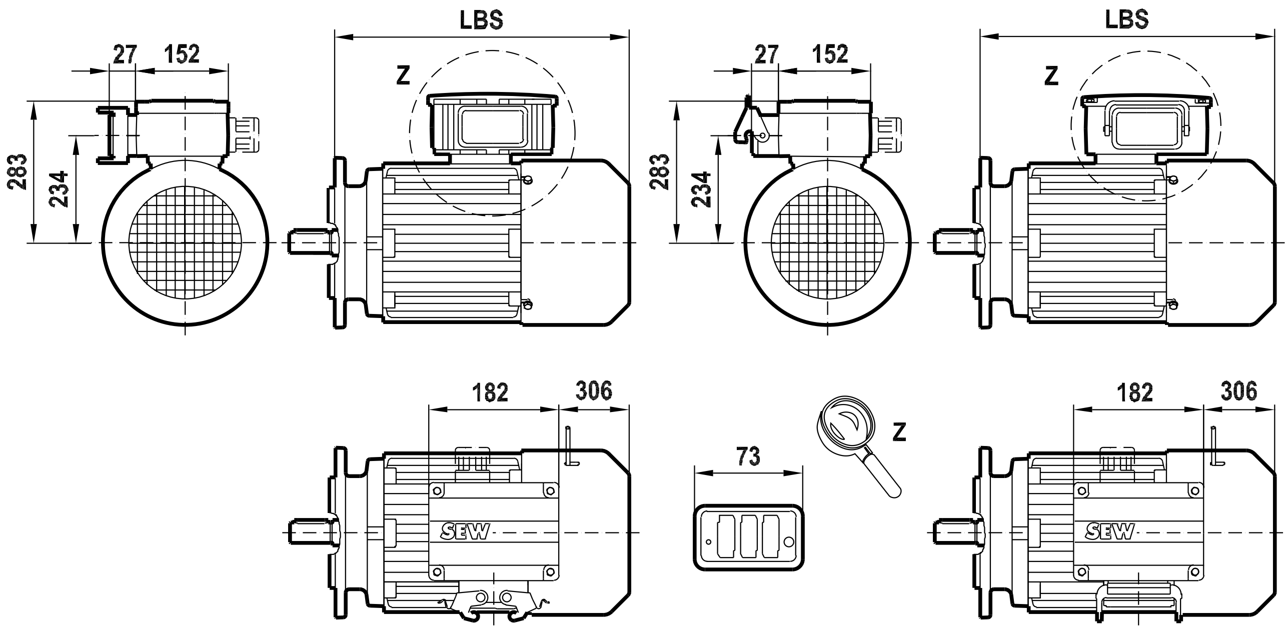

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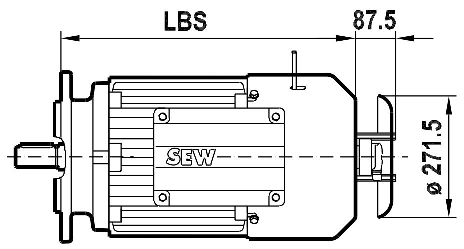

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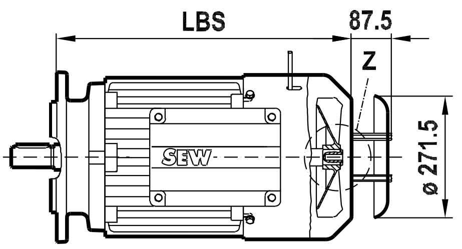

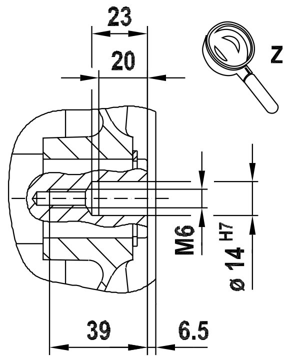

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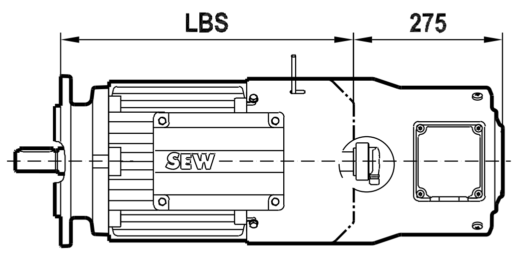

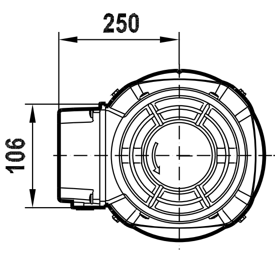

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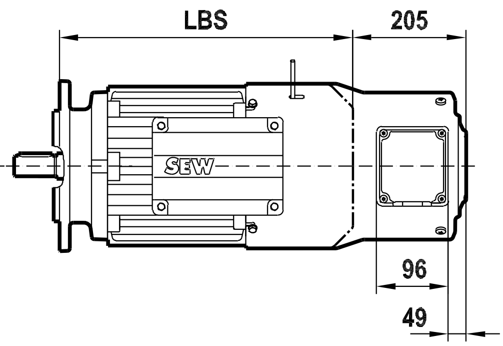

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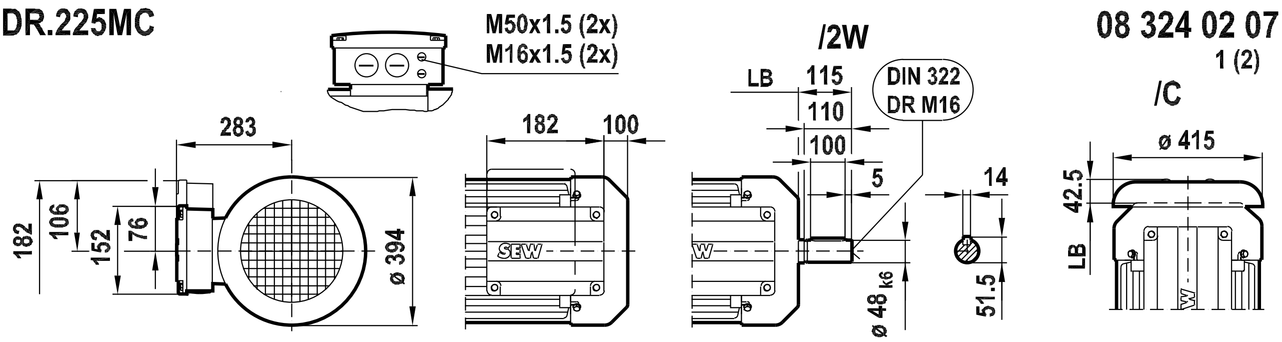

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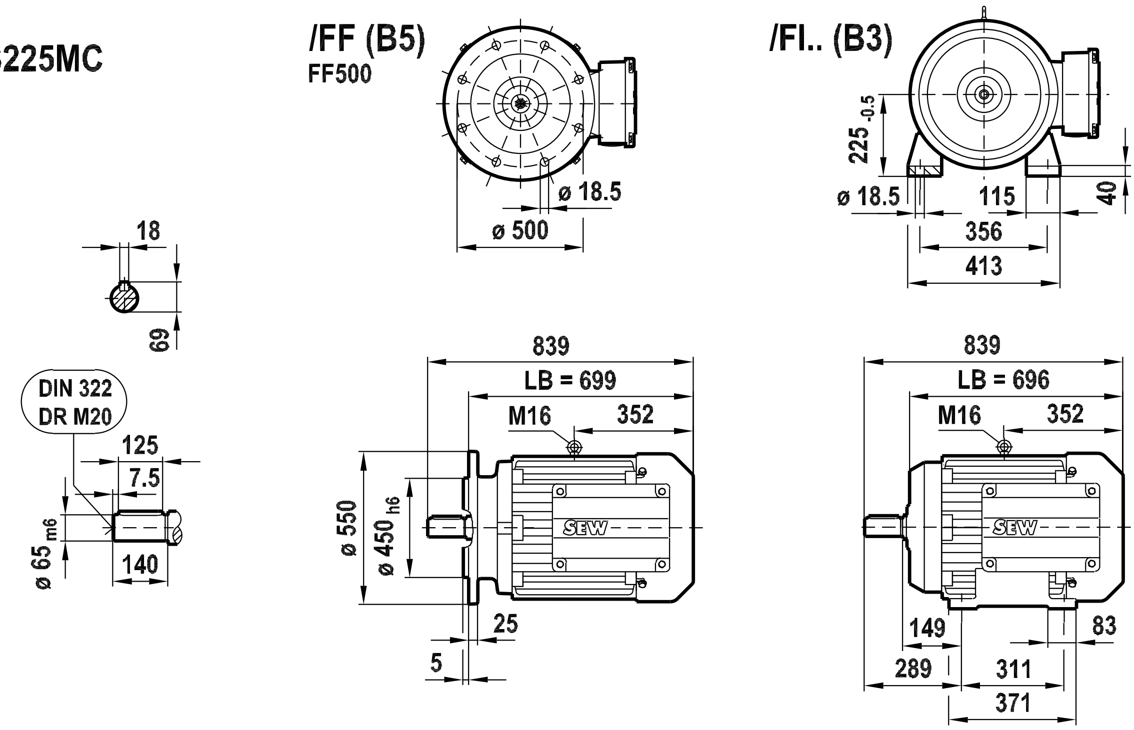

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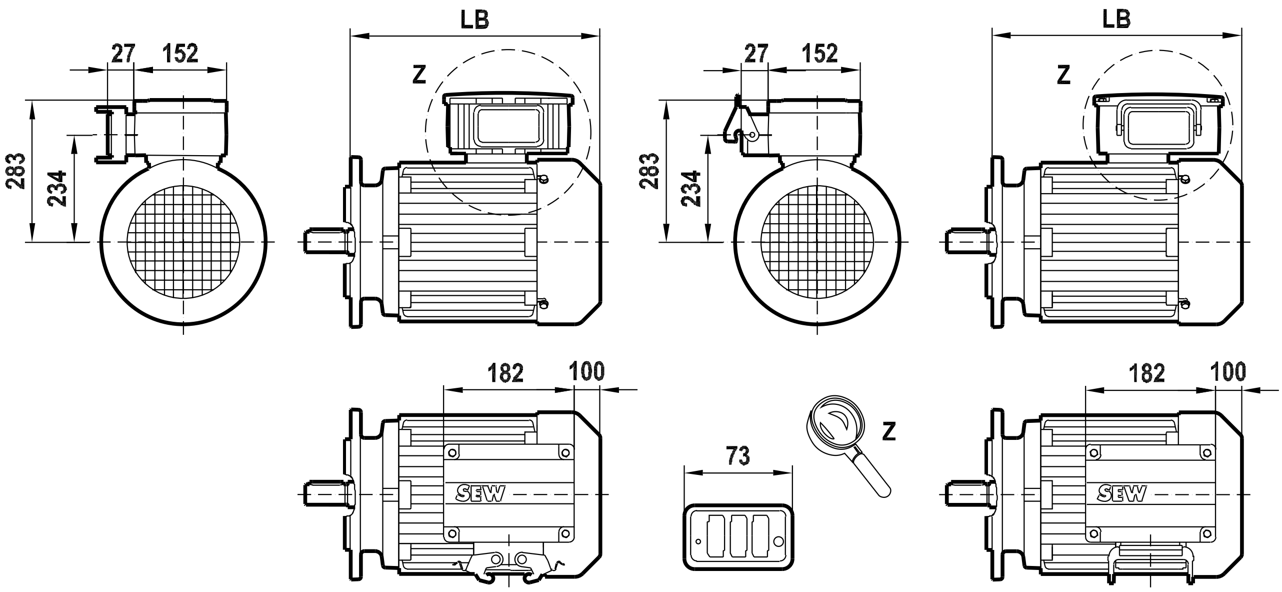

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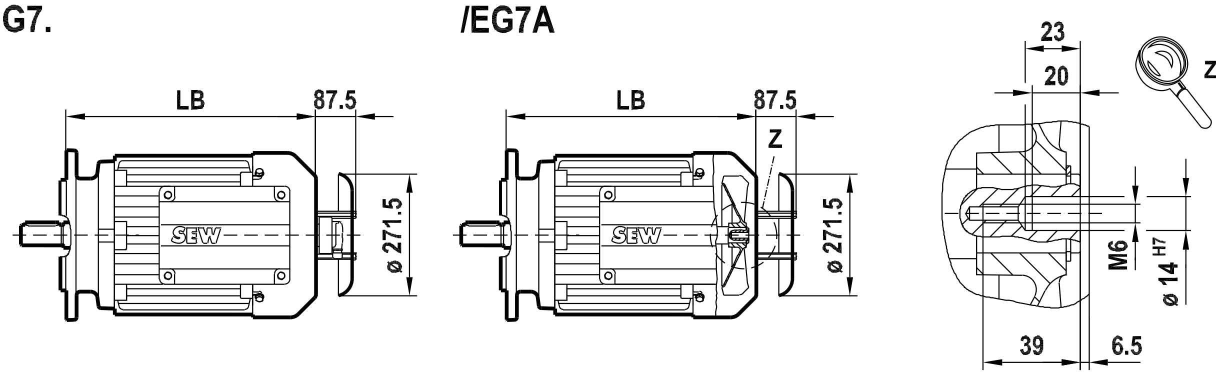

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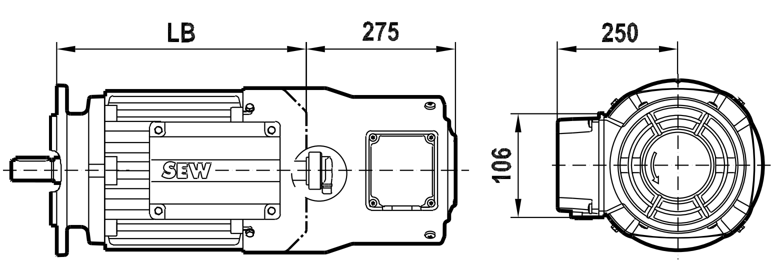

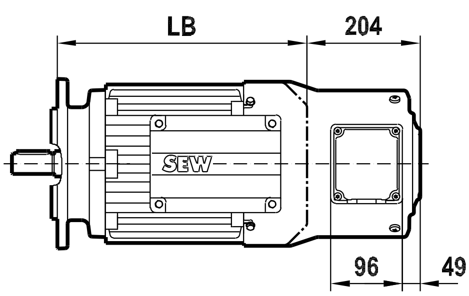

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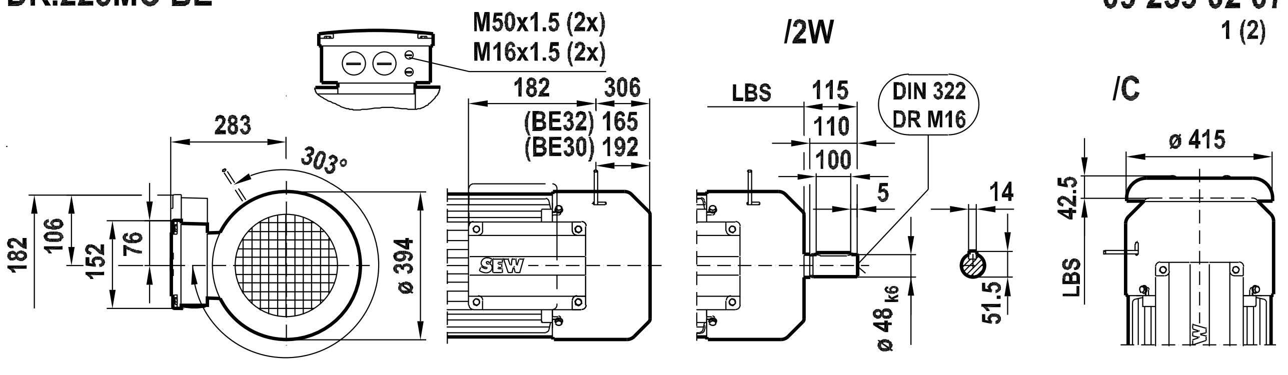

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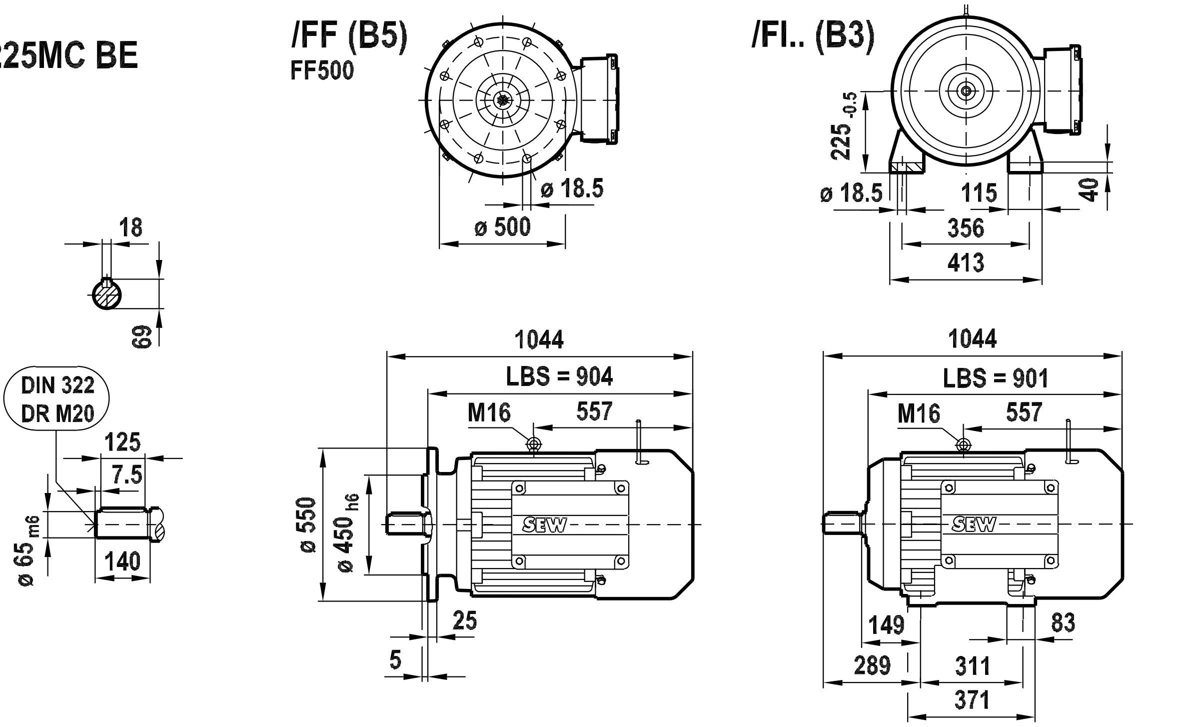

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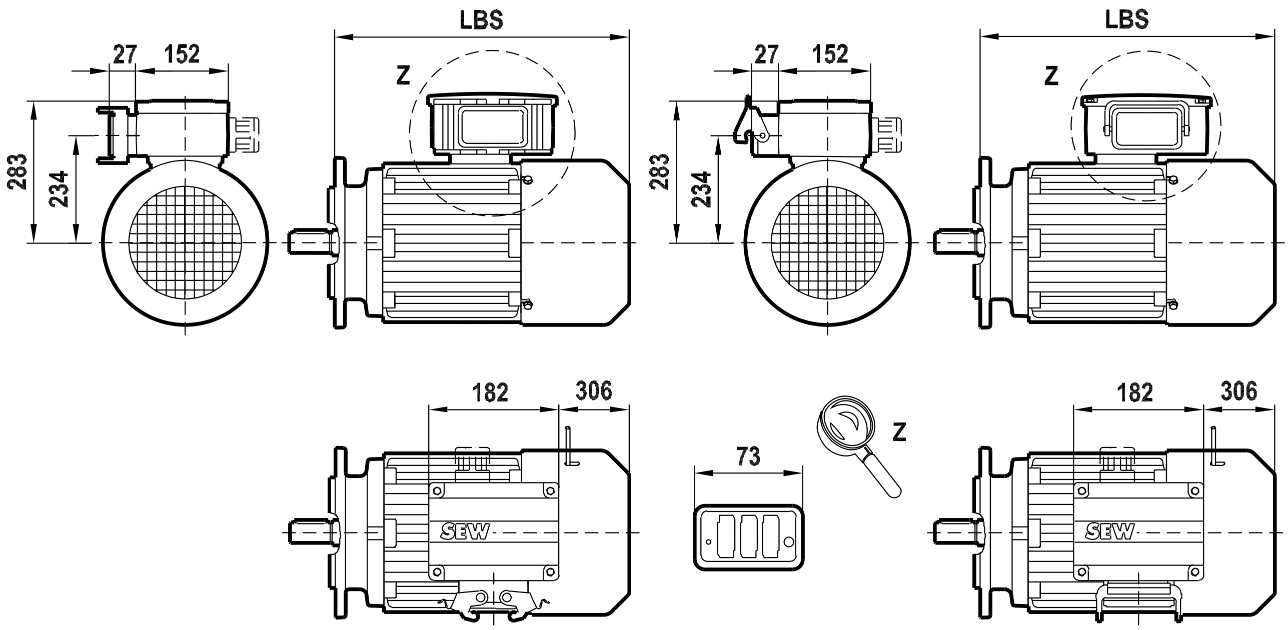

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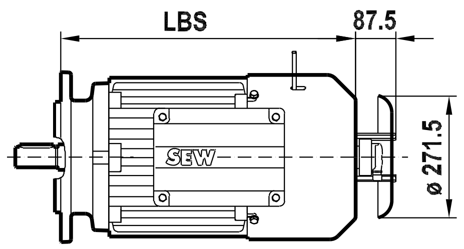

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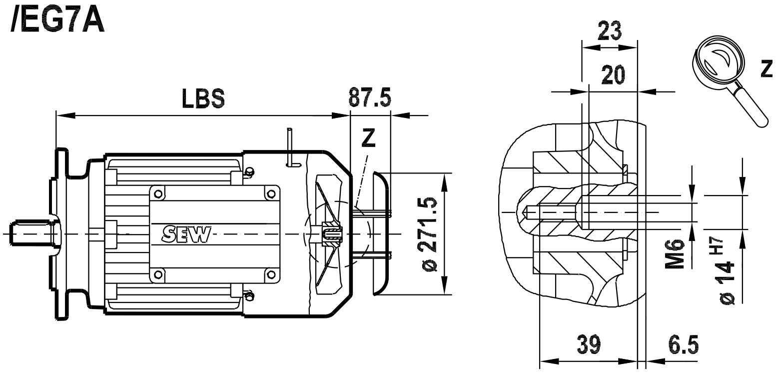

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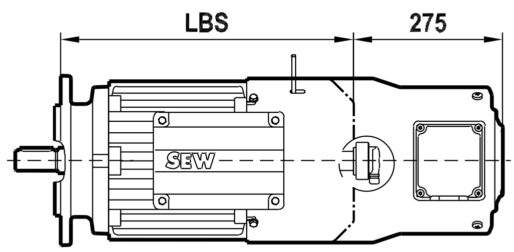

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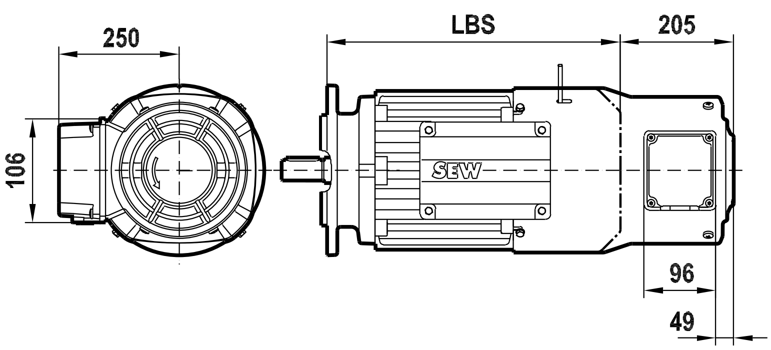

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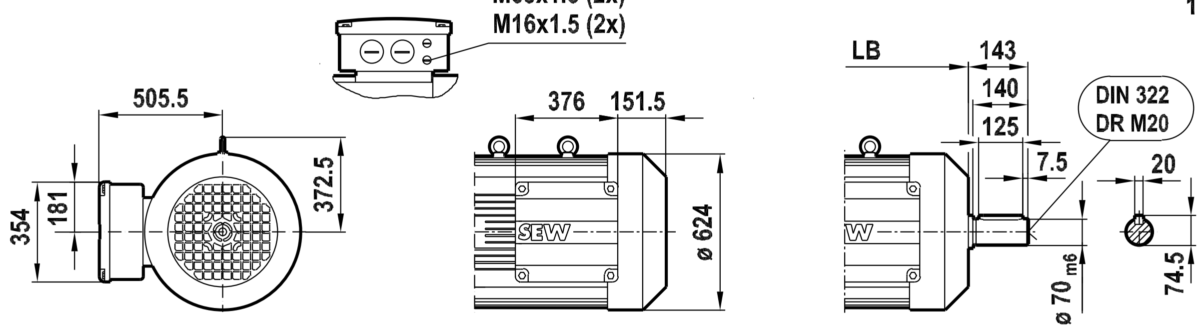

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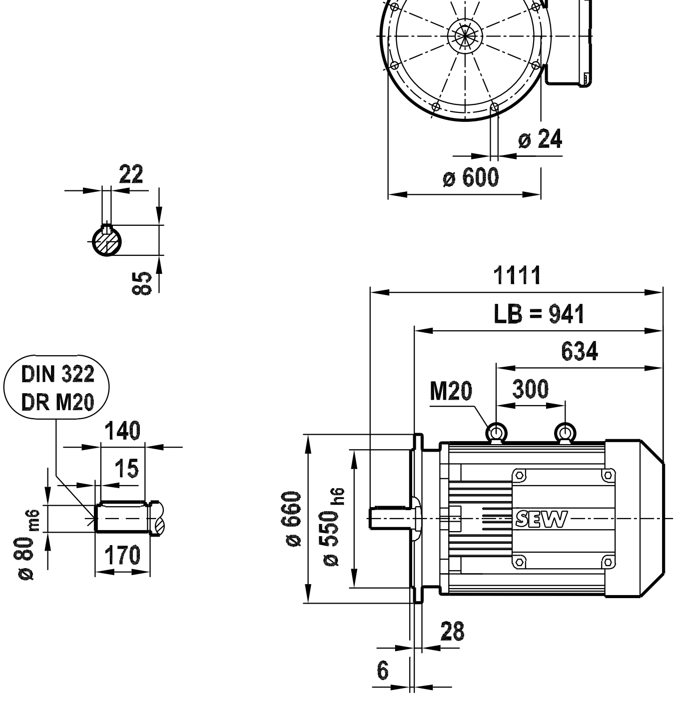

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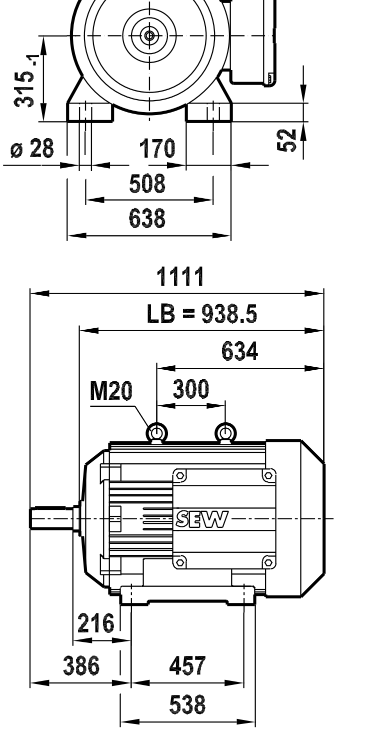

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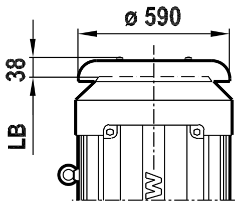

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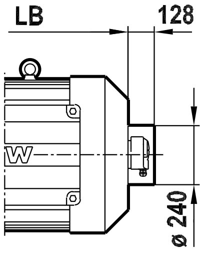

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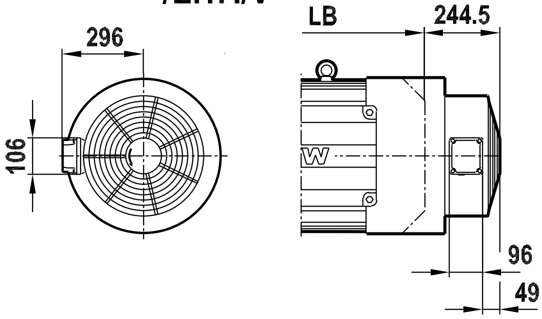

DRS/DRE/DRP315K,S BE

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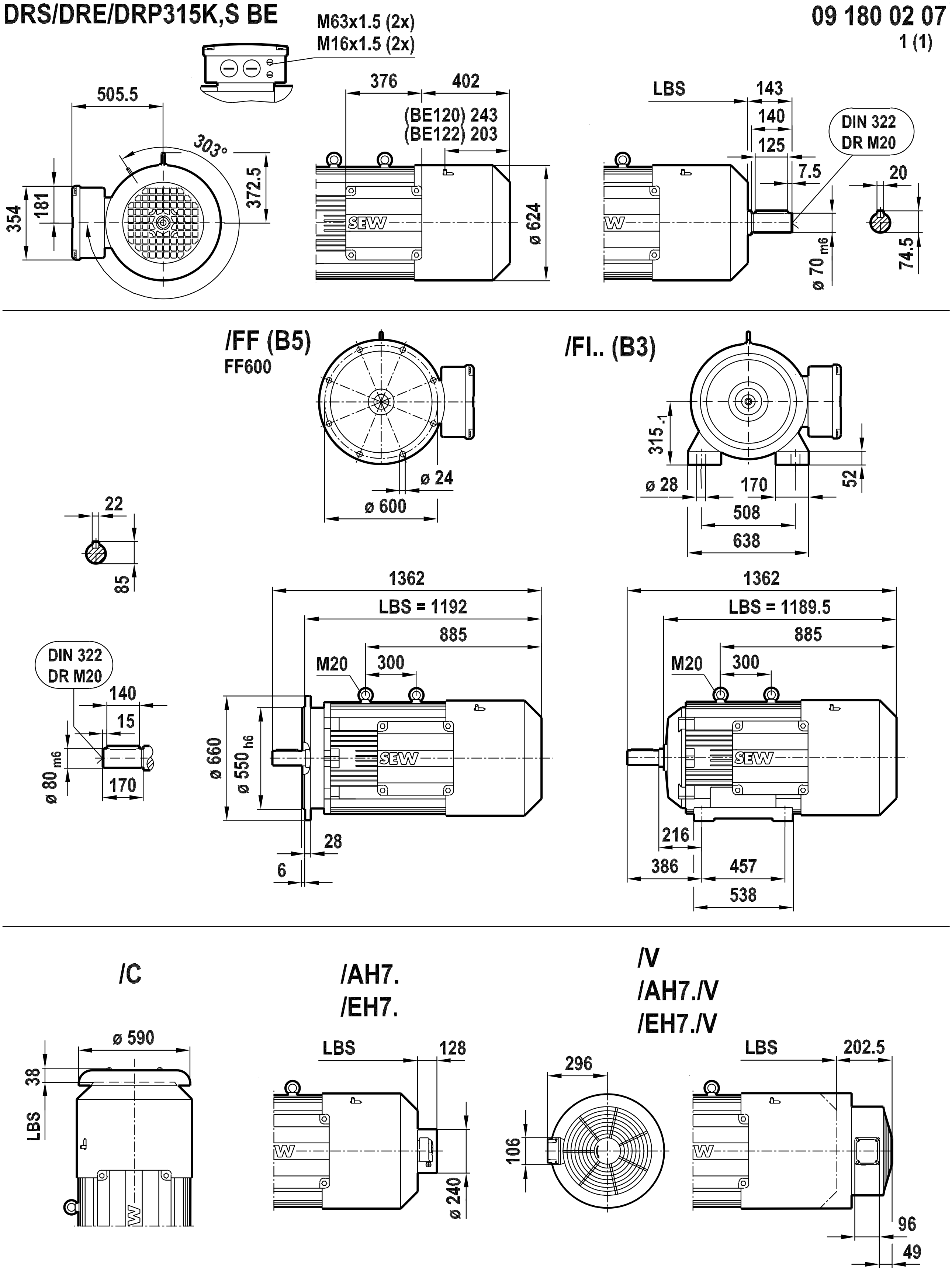

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DRS/DRE/DRP315M,L

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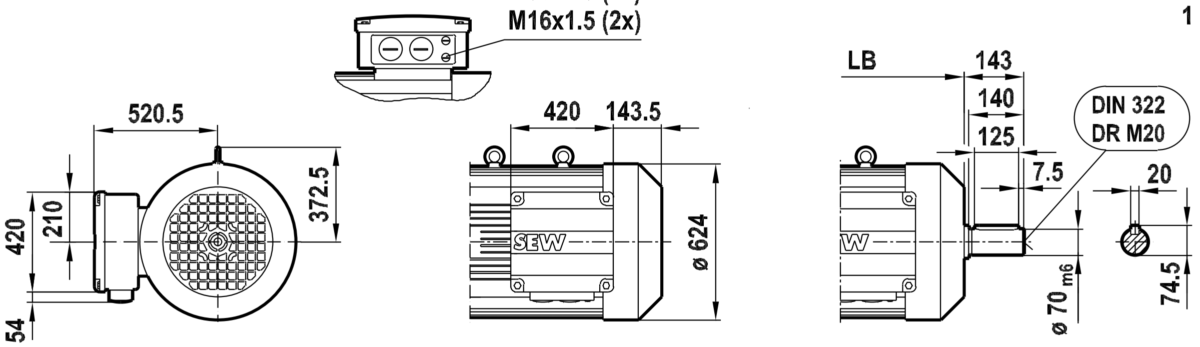

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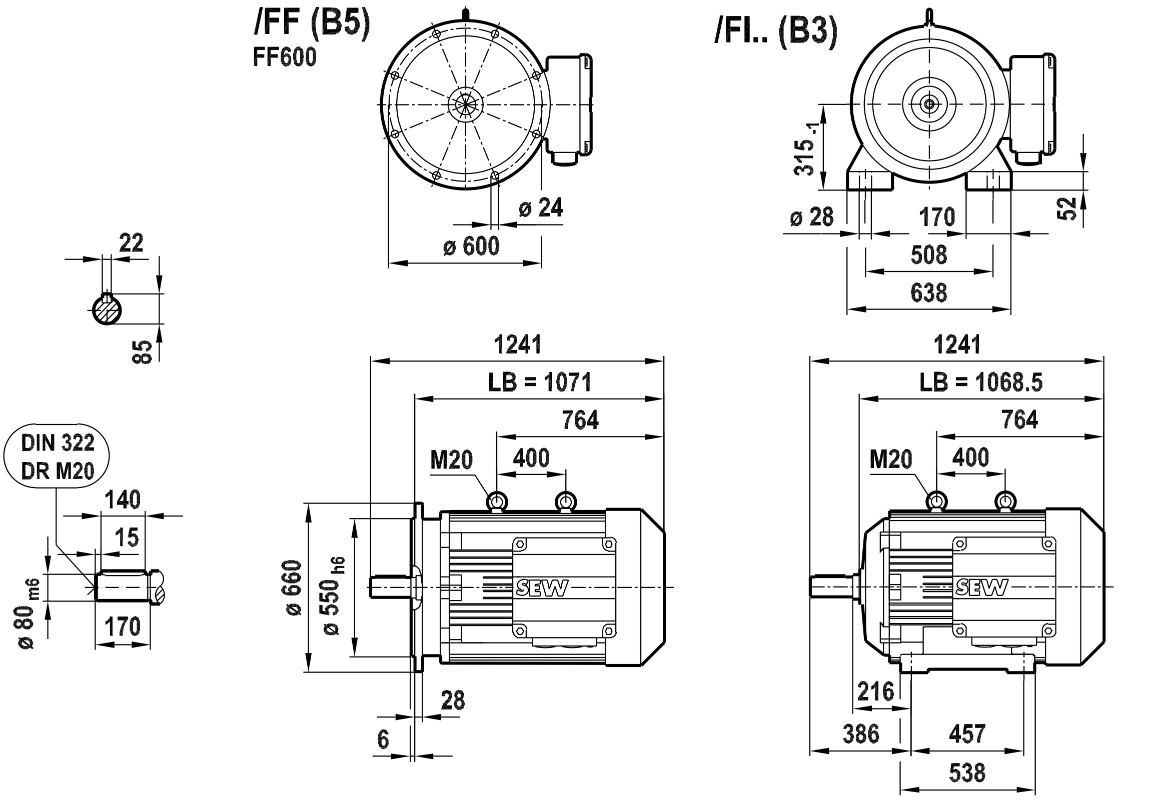

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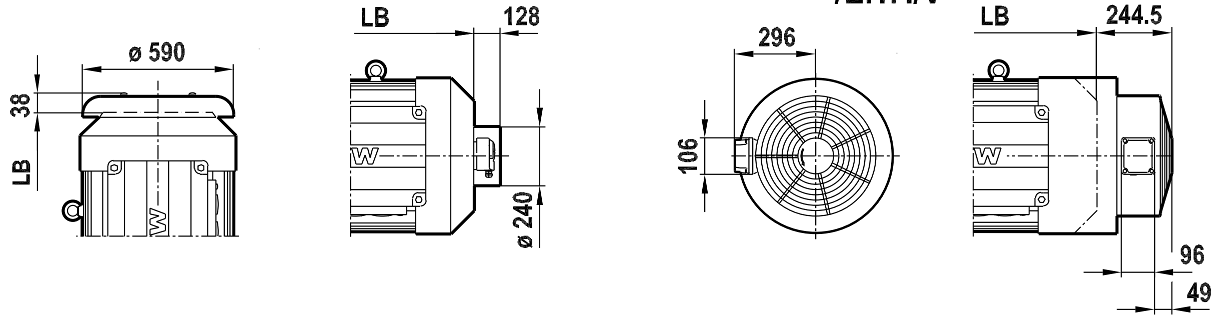

DRS/DRE/DRP315M,L BE

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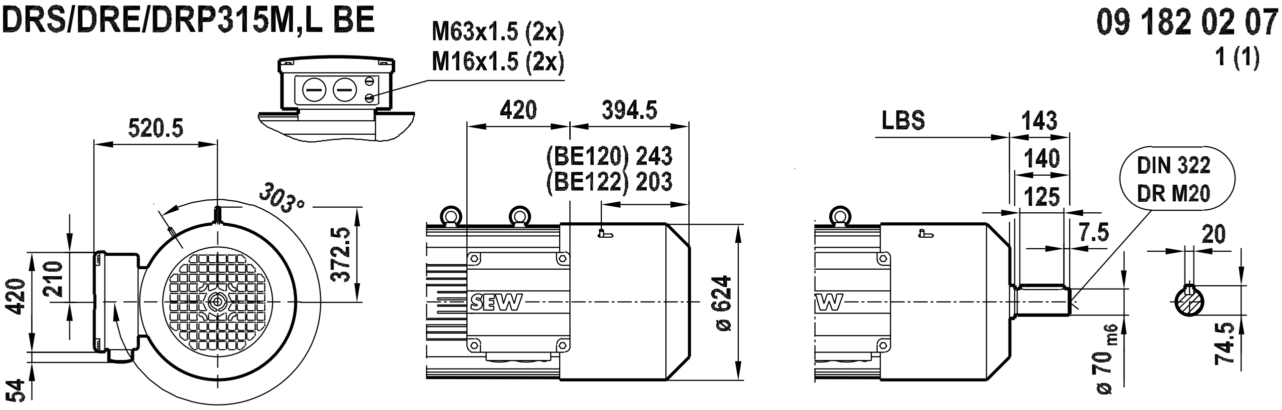

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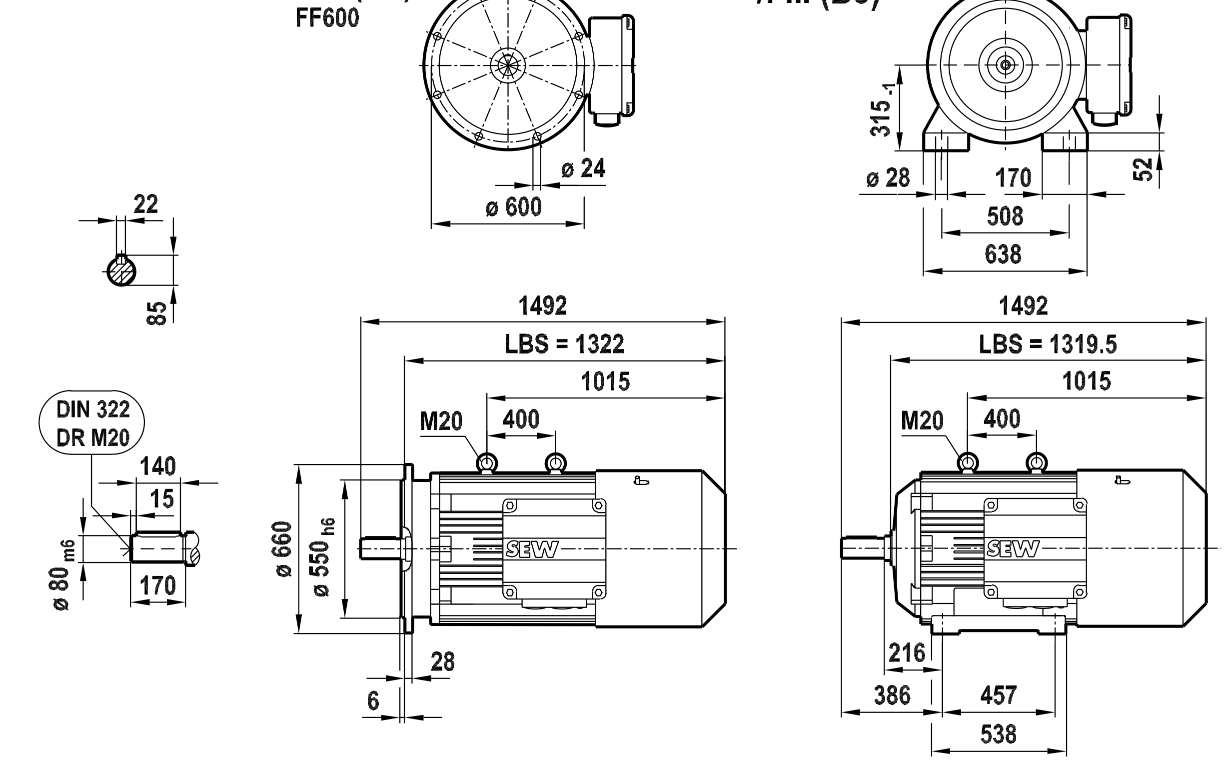

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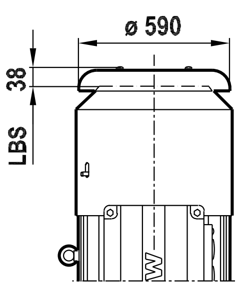

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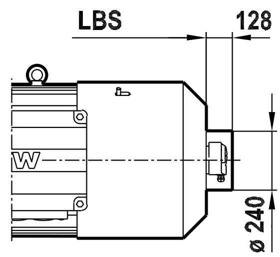

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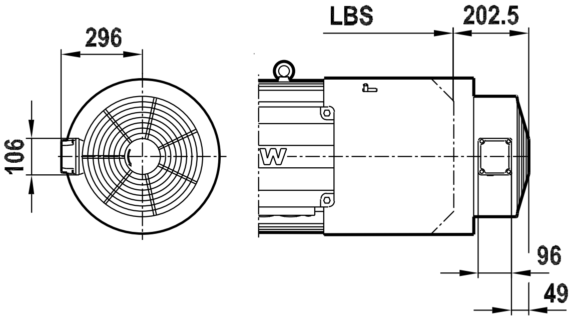
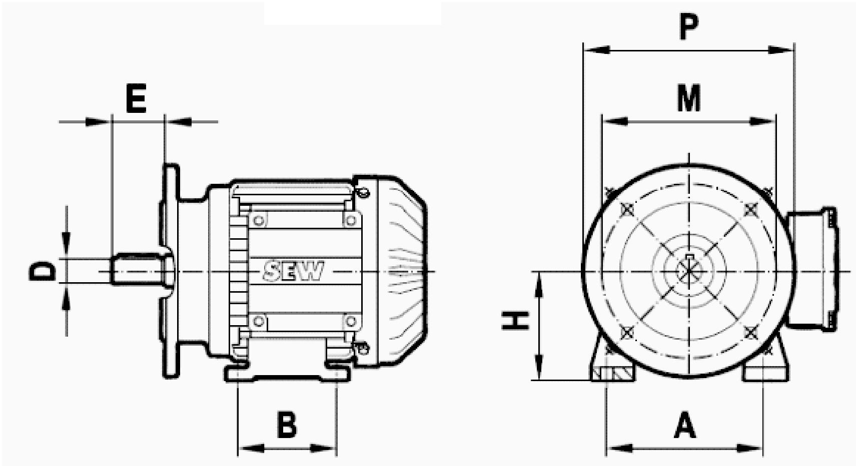


7.3 *Deviating dimensions for 2, 4 and 6-pole motors*

Key to the tables

14 × 30	Fields shaded in gray:	Dimensions in line with IEC standard (DIN EN 50347)
14 × 30	Dimensions in bold:	Dimensions of the components used as standard for DR. motors

2-pole motors



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<table>
<tr><th>Power
kW</th><th>Motor</th><th>D × E
mm × mm</th><th>Hole circle Ø
M..
mm</th><th>Flange Ø P..
mm</th><th>H
mm</th><th>A × B
mm × mm</th></tr>
<tr><td rowspan="3">0.55</td><td>IEC</td><td>14 × 30</td><td>FF130</td><td>D160</td><td>71</td><td>112 × 90</td></tr>
<tr><td rowspan="2">DRS71M2</td><td>14 × 30</td><td>FF130</td><td>D160</td><td>71</td><td>112 × 90</td></tr>
<tr><td>19 × 40</td><td>FF165</td><td>D200</td><td>80</td><td>125 × 100</td></tr>
<tr><td colspan="7"></td></tr>
<tr><td rowspan="12">0.75</td><td>IEC</td><td>19 × 40</td><td>FF165</td><td>D200</td><td>80</td><td>125 × 100</td></tr>
<tr><td rowspan="3">DRS80S2</td><td rowspan="3">19 × 40</td><td>FF130</td><td>D160</td><td rowspan="3">80</td><td rowspan="3">125 × 100</td></tr>
<tr><td>FF165</td><td>D200</td></tr>
<tr><td>FF215</td><td>D250</td></tr>
<tr><td rowspan="4">DRE80M2</td><td rowspan="2">19 × 40</td><td>FF130</td><td>D160</td><td rowspan="2">80</td><td rowspan="2">125 × 100</td></tr>
<tr><td rowspan="2">FF165</td><td rowspan="2">D200</td></tr>
<tr><td rowspan="2">24 × 50</td><td rowspan="2">90</td><td rowspan="2">140 × 100</td></tr>
<tr><td>FF215</td><td>D250</td></tr>
<tr><td rowspan="4">DRP80M2</td><td rowspan="2">19 × 40</td><td>FF130</td><td>D160</td><td rowspan="2">80</td><td rowspan="2">125 × 100</td></tr>
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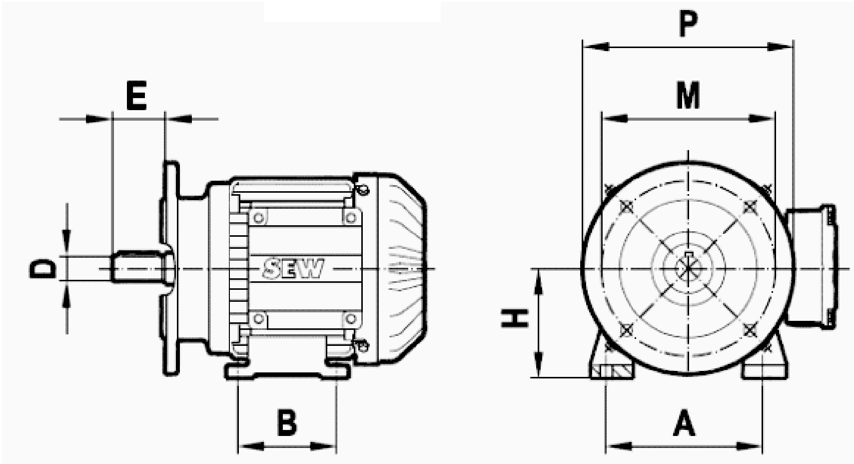
<tr><td colspan="7">Table continued on next page</td></tr>
</table>

Power kW	Motor	D × E mm × mm	Hole circle Ø M.. mm	Flange Ø P.. mm	H mm	A × B mm × mm
1.1	IEC	19 × 40	FF165	D200	80	125 × 100
	DRS80M2	19 × 40	FF130	D160	80	125 × 100
		19 × 40 / **24 × 50**	**FF165**	**D200**	80 / **90**	125 × 100 / **140 × 100**
		24 × 50	FF215	D250	**90**	**140 × 100**
	DRE90M2	19 × 40	FF130	D160	**90**	**140 × 125**
		19 × 40 / **24 × 50**	**FF165**	**D200**	**90** / 90	**140 × 125** / 160 × 140
		24 × 50	FF215	D250	90	160 × 140
	DRP90M2	**19 × 40**	FF130	D160	**90**	**140 × 125**
		19 × 40 / 24 × 50	**FF165**	**D200**	**90** / 100	**140 × 125** / 160 × 140
		24 × 50	FF215	D250	100	160 × 140
1.5	IEC	24 × 50	FF165	D200	90	140 × 100
	DRS90M2	19 × 40	FF130	D160	**90**	**140 × 125**
		19 × 40 / **24 × 50**	**FF165**	**D200**	**90** / 100	**140 × 125** / 160 × 140
		24 × 50	FF215	D250	100	160 × 140
	DRE90M2	19 × 40	FF130	D160	**90**	**140 × 125**
		19 × 40 / **24 × 50**	**FF165**	**D200**	**90** / 100	**140 × 125** / 160 × 140
		24 × 50	FF215	D250	100	160 × 140
	DRP100M2	**24 × 50**	**FF165**	**D200**	**100**	**160 × 140**
		28 × 60	FF215	D250	112	190 × 140
2.2	IEC	24 × 50	FF165	D200	90	140 × 125
	DRS90L2	24 × 50	FF130	D160	90	140 × 125
		24 × 50 / **28 × 60**	FF165	D200	90 / **100**	140 × 125 / **160 × 140**
		28 × 60	**FF215**	**D250**	**100**	**160 × 140**
	DRE100M2	24 × 50	FF165	D200	**100**	**160 × 140**
		28 × 60	**FF215**	**D250**	112	190 × 140
	DRP100M2	**24 × 50**	**FF165**	**D200**	**100**	**160 × 140**
		28 × 60	FF215	D250	112	190 × 140

Table continued on next page

Power kW	Motor	D × E mm × mm	Hole circle Ø M.. mm	Flange Ø P.. mm	H mm	A × B mm × mm
3	IEC	28 × 60	FF215	D250	100	160 × 140
	DRS100M2	24 × 50	FF165	D200	**100**	**160 × 140**
		28 × 60	**FF215**	**D250**	112	190 × 140
	DRE100L2	**28 × 60**	FF165	D200	**100**	**160 × 140**
			FF215	**D250**	112	190 × 140
	DRP100LC2	**28 × 60**	FF165	D200	**100**	**160 × 140**
			FF215	**D250**	112	190 × 140
	DRP112M2	**28 × 60**	**FF215**	**D250**	**112**	**190 × 140**
			FF265	D300		
4	IEC	28 × 60	FF215	D250	112	190 × 140
	DRS100LC2	**28 × 60**	FF165	D200	100	160 × 140
			FF215	**D250**	**112**	**190 × 140**
	DRS112M2	**28 × 60**	**FF215**	**D250**	**112**	**190 × 140**
			FF265	D300		
	DRE112M2	**28 × 60**	**FF215**	**D250**	**112**	**190 × 140**
			FF265	D300		
	DRP132S2	**28 × 60**	**FF215**	**D250**	**112**	**190 × 140**
		38 × 80	FF265	D300	132	216 × 178
5.5	IEC	38 × 80	FF265	D300	132	216 × 140
	DRS132S2	28 × 60	FF215	D250	112	190 × 140
		38 × 80	**FF265**	**D300**	**132**	**216 × 140**
	DRE132S2	**28 × 60**	**FF215**	**D250**	**112**	**190 × 140**
		38 × 80	FF265	D300	132	216 × 140
	DRP132M2	**28 × 60**	**FF215**	**D250**	**132**	**216 × 178**
		38 × 80	FF265	D300		
7.5	IEC	38 × 80	FF265	D300	132	216 × 140
	DRS132M2	28 × 60	FF215	D250	**132**	**216 × 178**
		38 × 80	**FF265**	**D300**		
	DRE132M2	28 × 60	FF215	D250	**132**	**216 × 178**
		38 × 80	**FF265**	**D300**		
9.2	IEC	-	-	-	-	-
	DRS132M2	28 × 60	FF215	D250	**132**	**216 × 178**
		38 × 80	**FF265**	**D300**		
	DRE132MC2	28 × 60	FF215	D250	**132**	**216 × 178**
		38 × 80	**FF265**	**D300**		

6-pole motors



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kW</th><th>Motor</th><th>D × E
mm × mm</th><th>Hole circle Ø M..
mm</th><th>Flange Ø P..
mm</th><th>H
mm</th><th>A × B
mm × mm</th></tr>
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<tr><td rowspan="2">FF165</td><td rowspan="2">D200</td></tr>
<tr><td rowspan="2">28 × 60</td><td rowspan="2">100</td><td rowspan="2">160 × 140</td></tr>
<tr><td>FF215</td><td>D250</td></tr>
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</table>

Power kW	Motor	D × E mm × mm	Hole circle Ø M.. mm	Flange Ø P.. mm	H mm	A × B mm × mm
1.1	IEC	24 × 50	FF165	D200	90	140 × 125
	DRS90L6	24 × 50	FF130	D160	90	140 × 125
			FF165	D200		
		28 × 60			**100**	**160 × 140**
			FF215	**D250**		
	DRE100M6	24 × 50	FF165	D200	**100**	**160 × 140**
		28 × 60	**FF215**	**D250**	112	190 × 140
	DRP100L6	**28 × 60**	FF165	D200	**100**	**160 × 140**
			FF215	**D250**	112	190 × 140
1.5	IEC	28 × 60	FF215	D250	100	160 × 140
	DRS100M6	24 × 50	FF165	D200	**100**	**160 × 140**
		28 × 60	**FF215**	**D250**	112	190 × 140
	DRE100L6	**28 × 60**	FF165	D200	**100**	**160 × 140**
			FF215	**D250**	112	190 × 140
	DRP112M6	**28 × 60**	**FF215**	**D250**	**112**	**190 × 140**
			FF265	D300		
2.2	IEC	28 × 60	FF215	D250	112	190 × 140
	DRS112M6	**28 × 60**	**FF215**	**D250**	**112**	**190 × 140**
			FF265	D300		
	DRE112M6	**28 × 60**	**FF215**	**D250**	**112**	**190 × 140**
			FF265	D300		
	DRP132S6	**28 × 60**	**FF215**	**D250**	**112**	**190 × 140**
		38 × 80	FF265	D300	132	216 × 140
3	IEC	38 × 80	FF265	D300	132	216 × 140
	DRS132M6	**28 × 60**	**FF215**	**D250**	**112**	**190 × 140**
			FF265	D300		
	DRE132S6	**28 × 60**	**FF215**	**D250**	**112**	**190 × 140**
		38 × 80	FF265	D300	132	216 × 140
	DRP132M6	**28 × 60**	**FF215**	**D250**	**132**	**216 × 178**
		38 × 80	FF265	D300		
4	IEC	38 × 80	FF265	D300	132	216 × 178
	DRS132S6	28 × 60	FF215	D250	112	190 × 140
		38 × 80	**FF265**	**D300**	**132**	**216 × 140**
	DRE132M6	28 × 60	FF215	D250	**132**	**216 × 178**
		38 × 80	**FF265**	**D300**		
	DRP160M6	**38 × 80**	**FF265**	**D300**	**160**	**254 × 210**
		42 × 110	FF300	D350		

Table continued on next page

Power kW	Motor	D × E mm × mm	Hole circle Ø M.. mm	Flange Ø P.. mm	H mm	A × B mm × mm
5.5	IEC	38 × 80	FF265	D300	132	216 × 178
	DRS160S6	**38 × 80**	**FF265**	**D300**	**160**	**254 × 210**
			FF300	D350		
	DRE160M6	**38 × 80**	**FF265**	**D300**	**160**	**254 × 210**
		42 × 110	FF300	D350		
7.5	IEC	42 × 110	FF300	D350	160	254 × 210
	DRS160M6	38 × 80	FF265	D300	**160**	**254 × 210**
		42 × 110	**FF300**	**D350**		

7.4 DR.. dimension sheets with KCC and KC1

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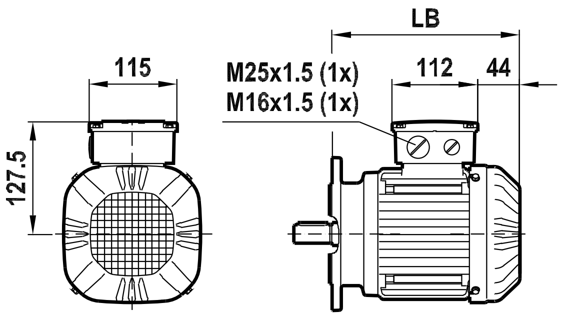
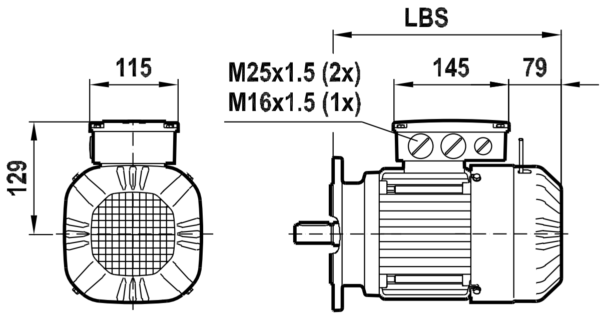
1 (2)

DR.71.. KCC



DR.71..BE KCC



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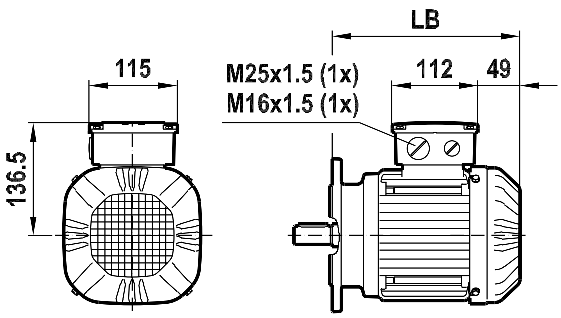

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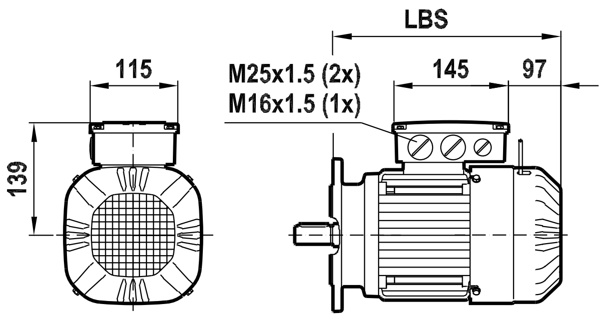

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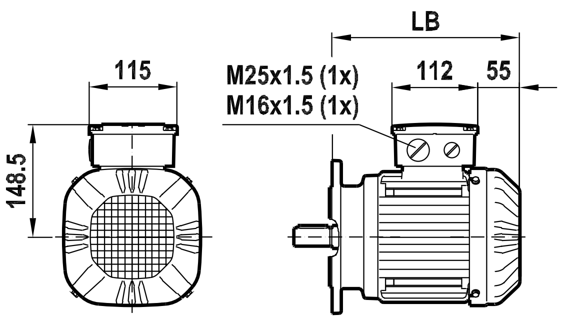

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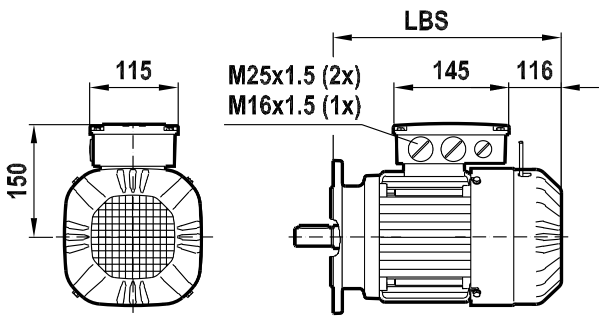

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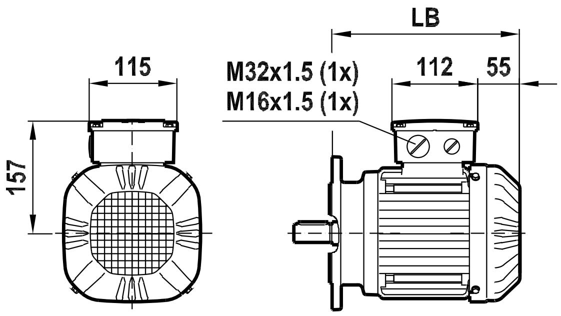

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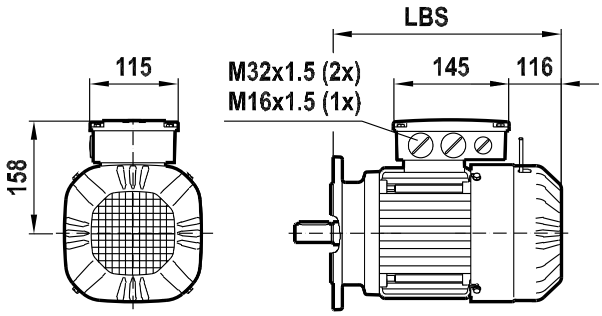

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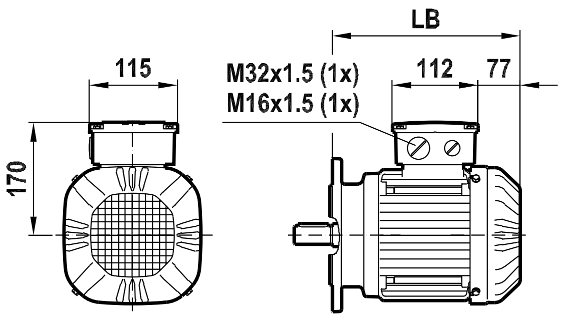

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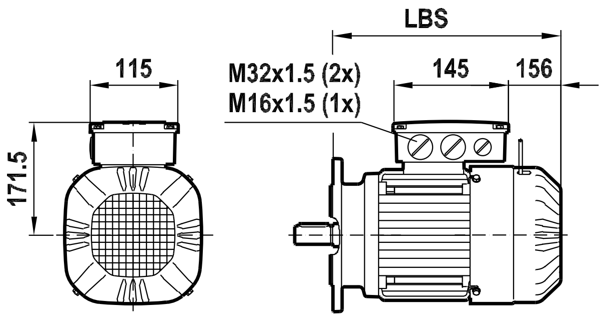

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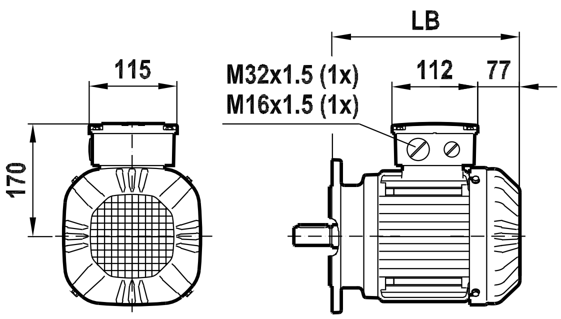

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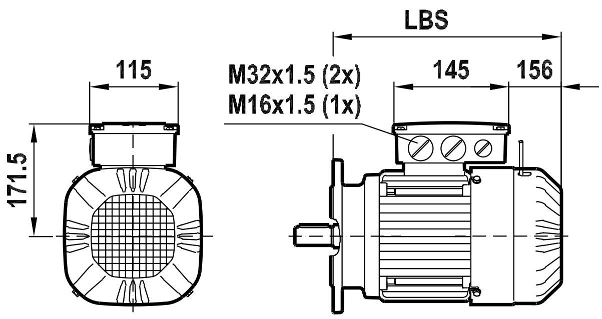

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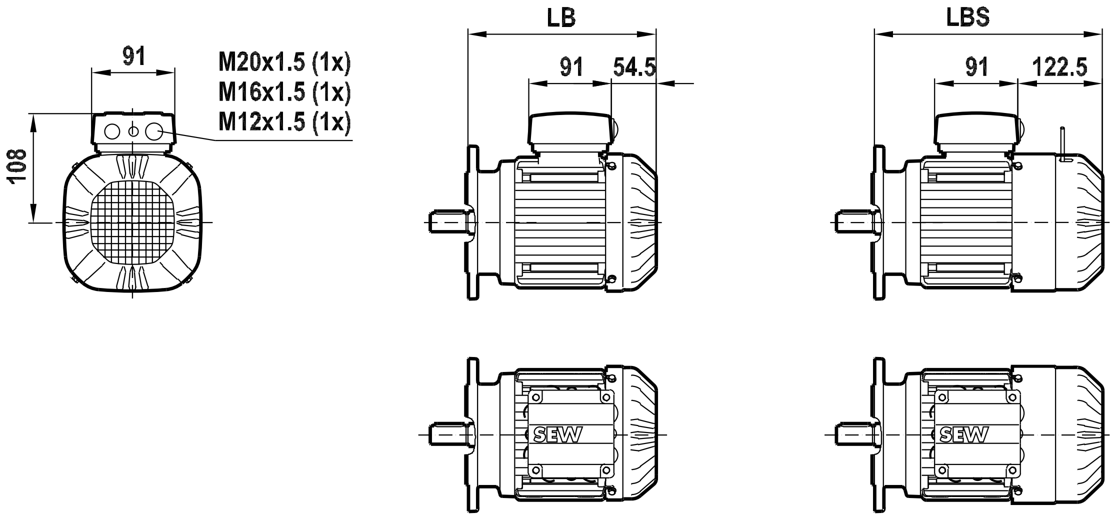

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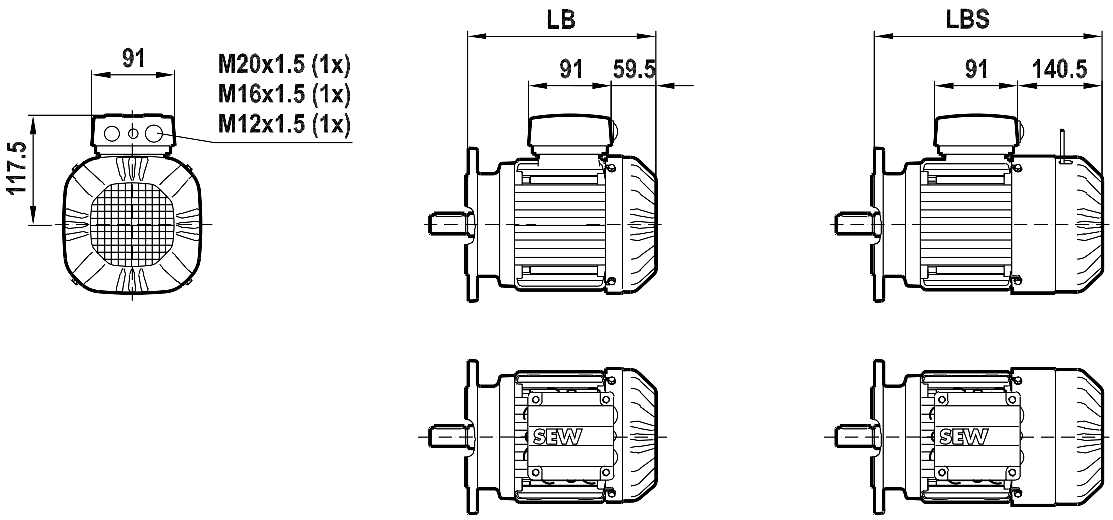

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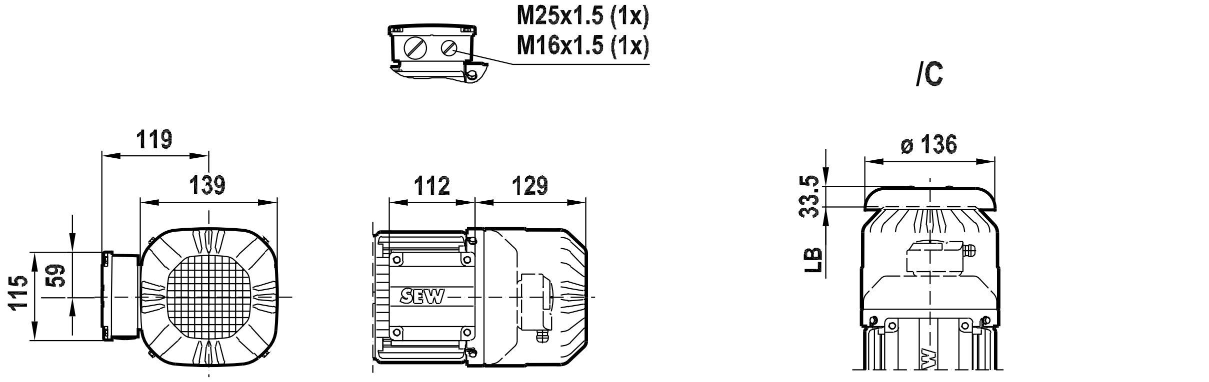

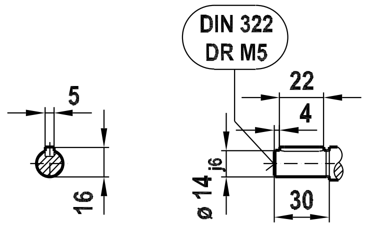

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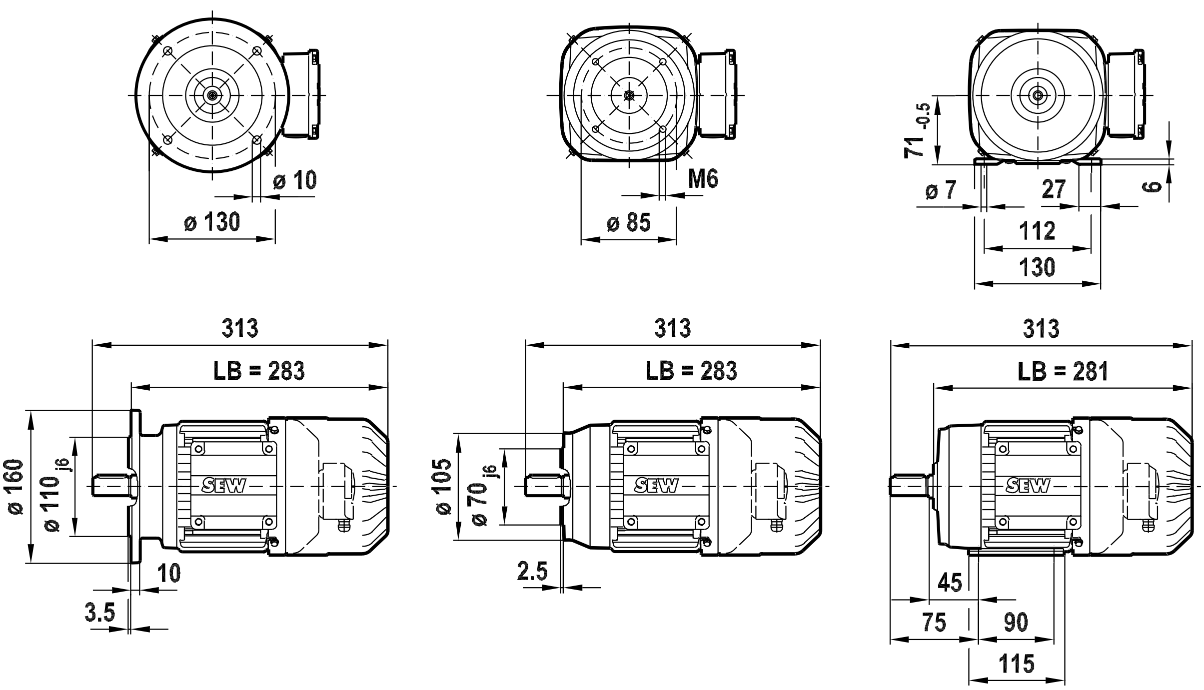

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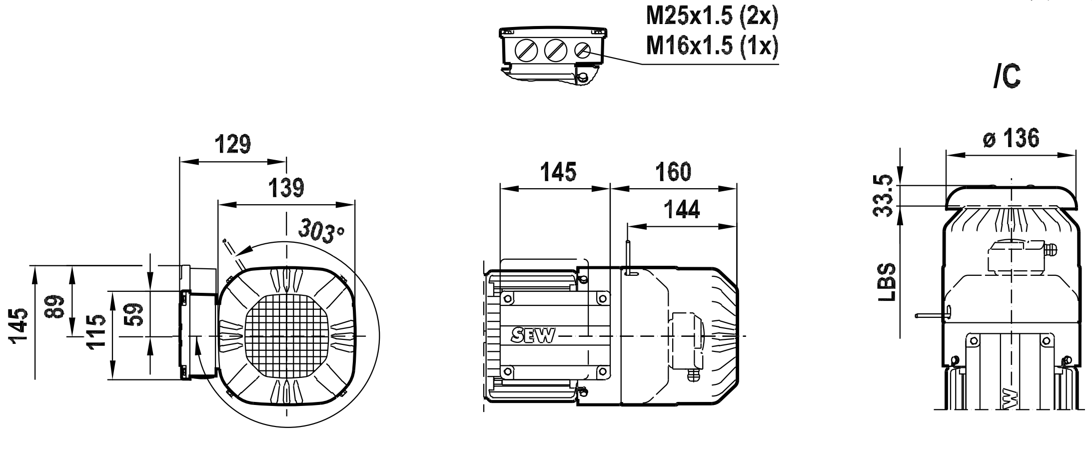

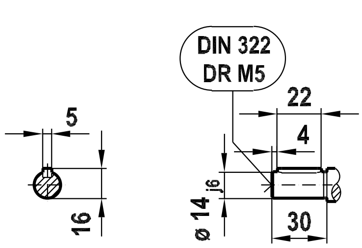

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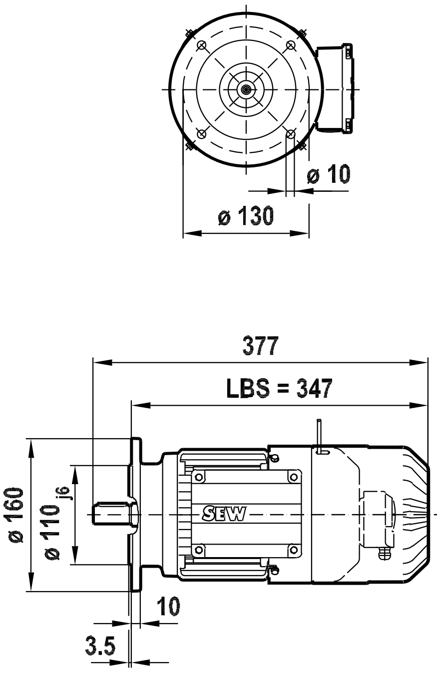

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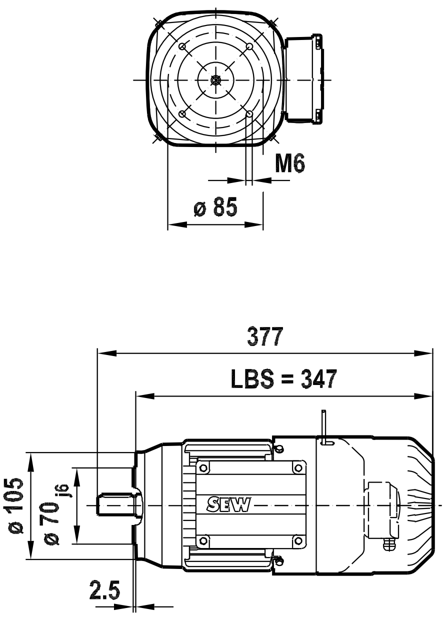

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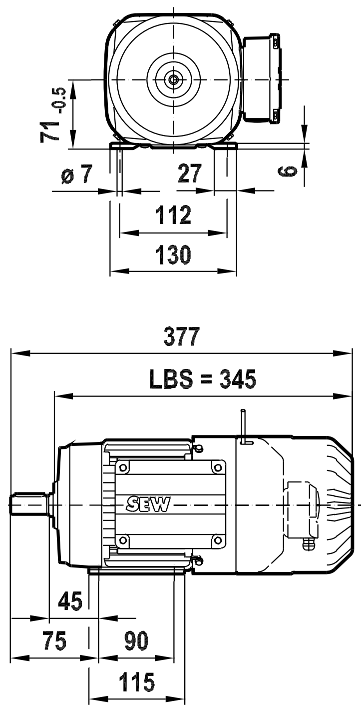

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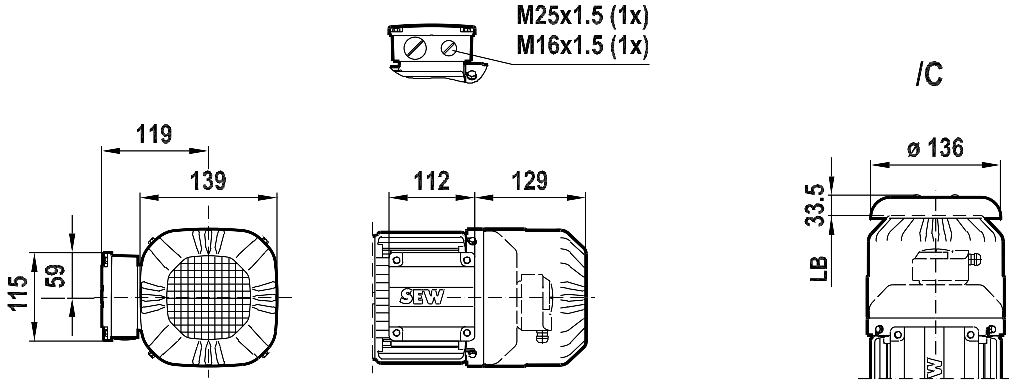

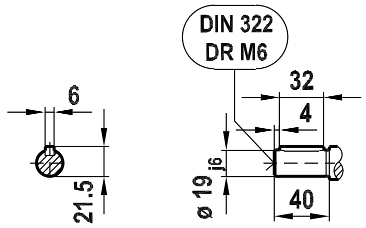

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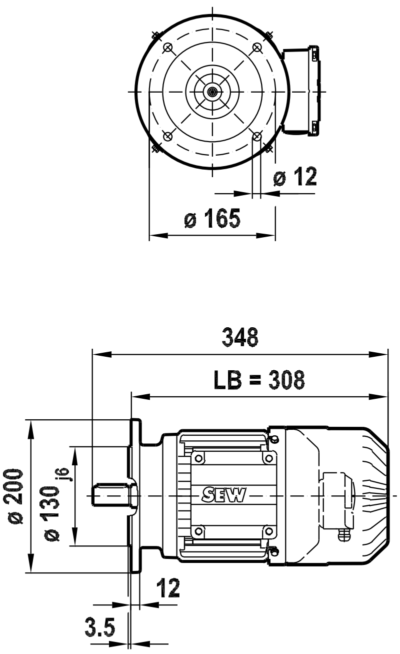

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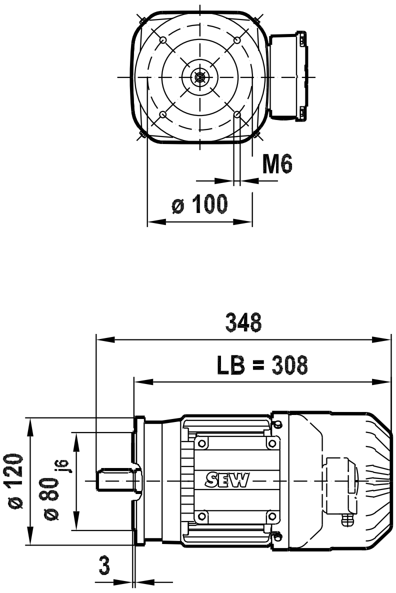

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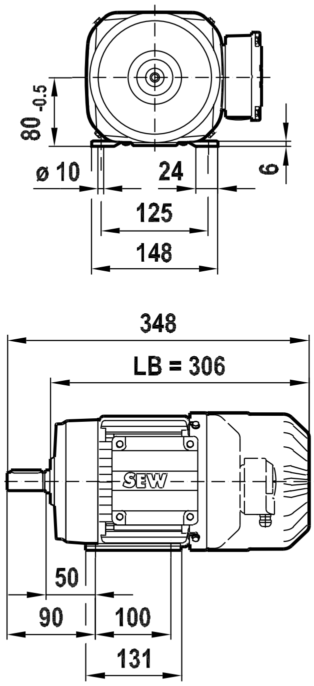

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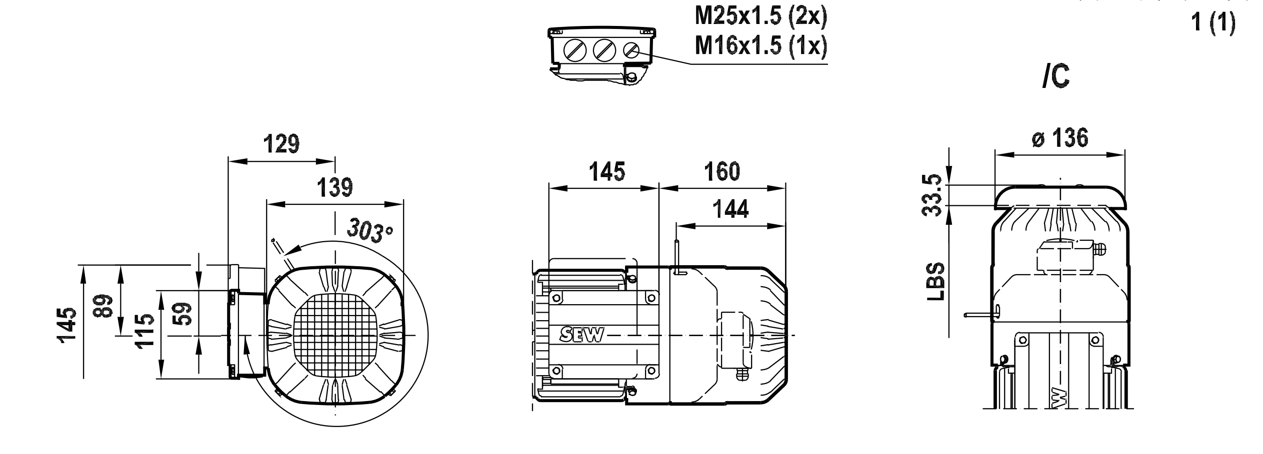

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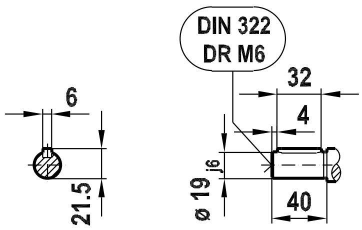

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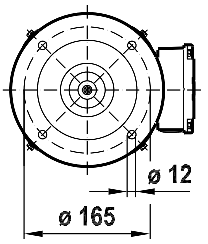

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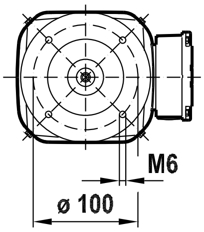

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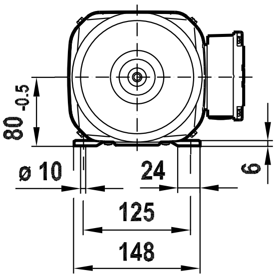

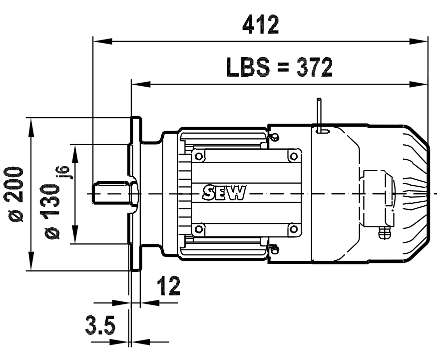

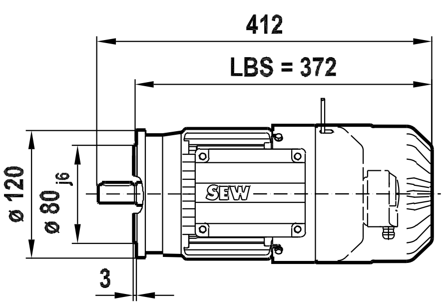

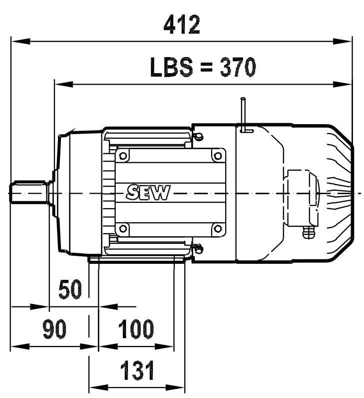

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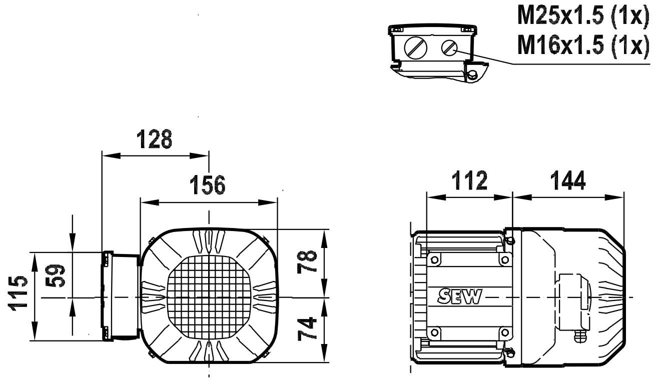

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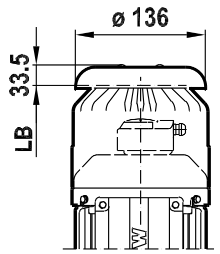

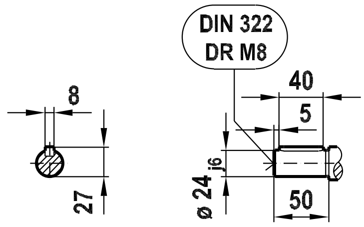

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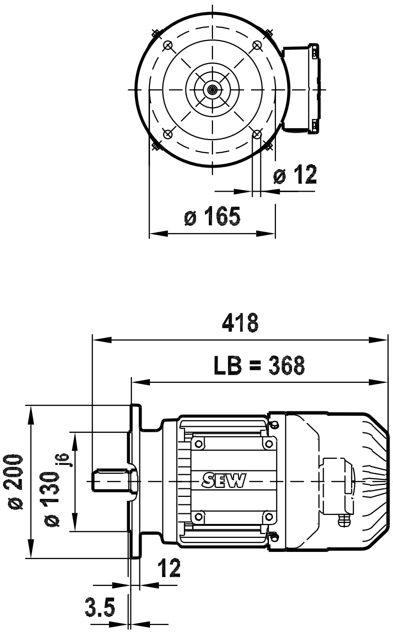

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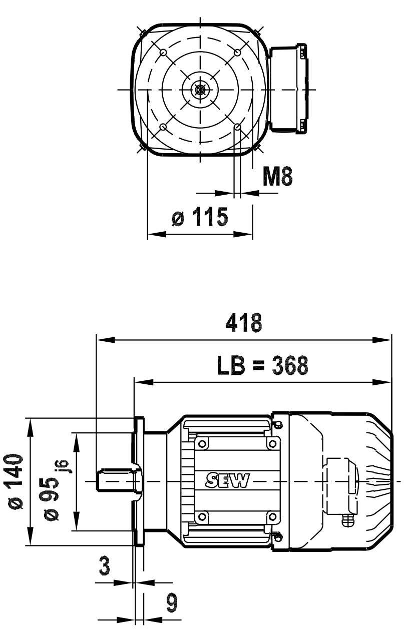

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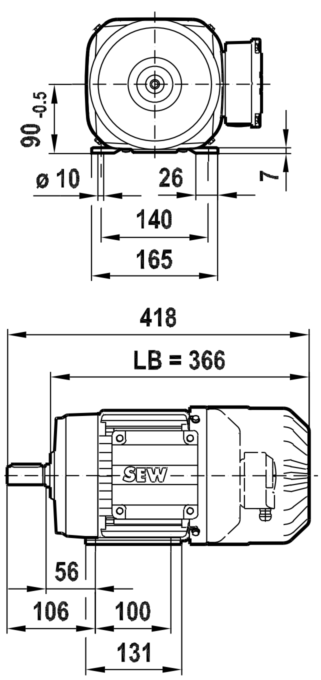

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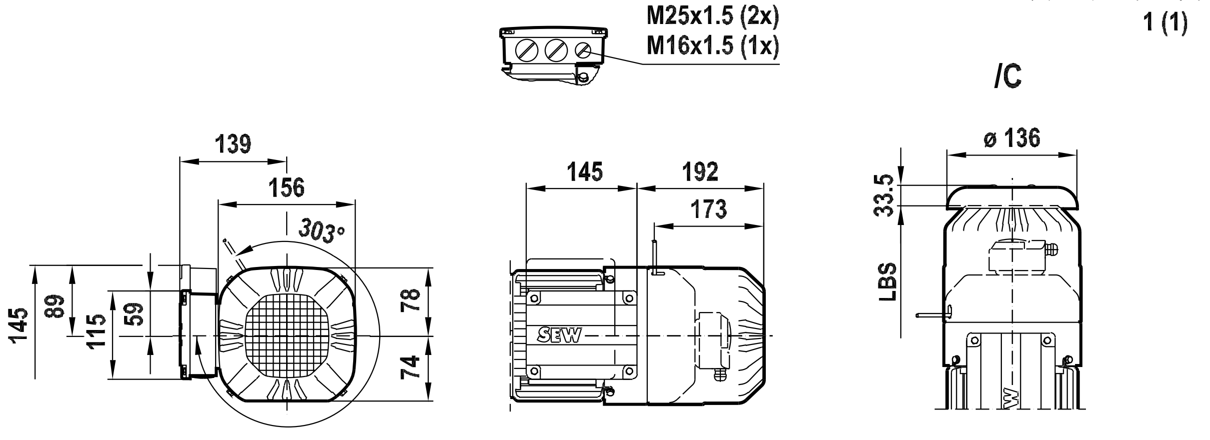

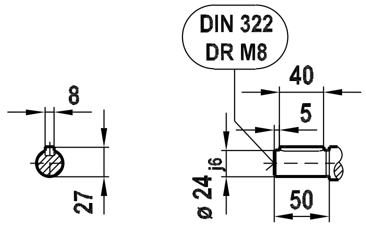

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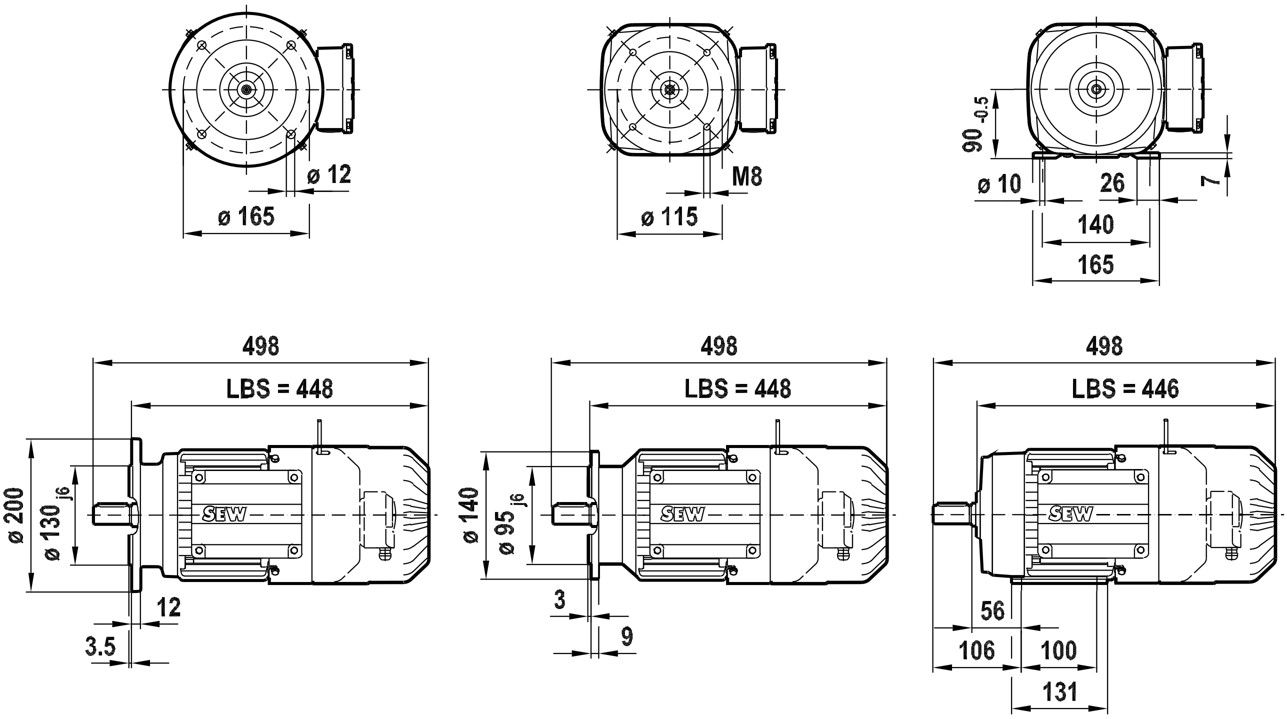

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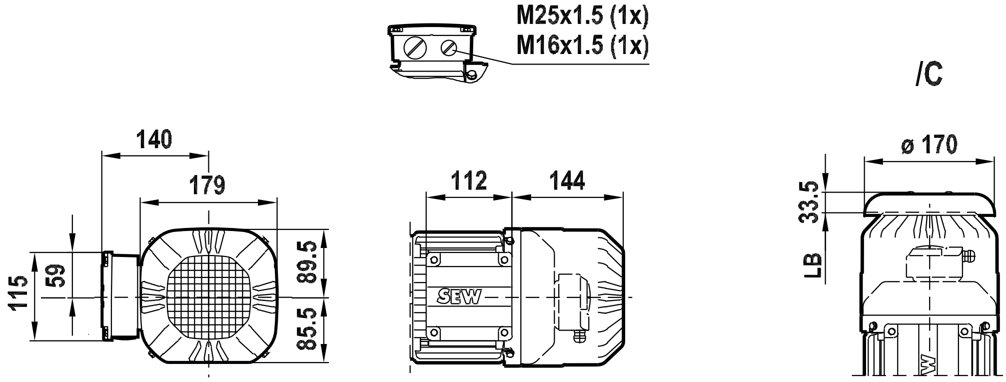

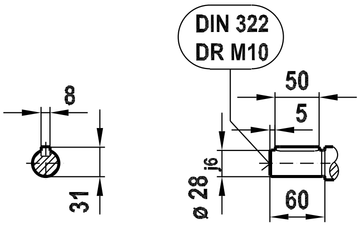

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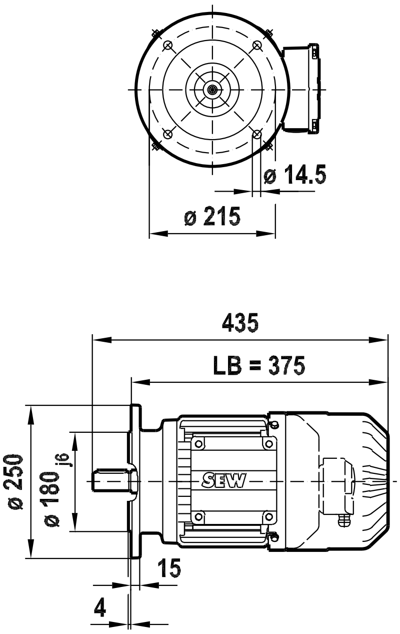

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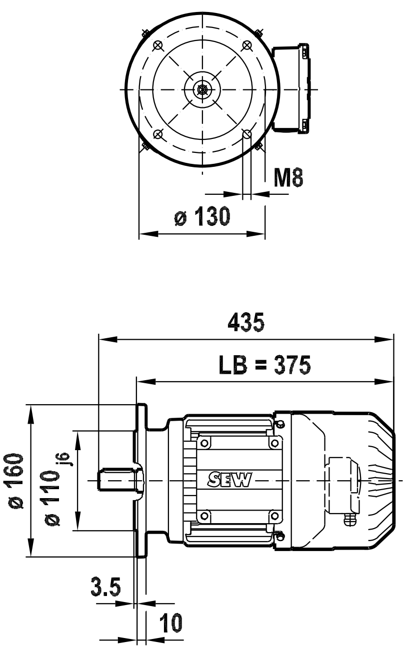

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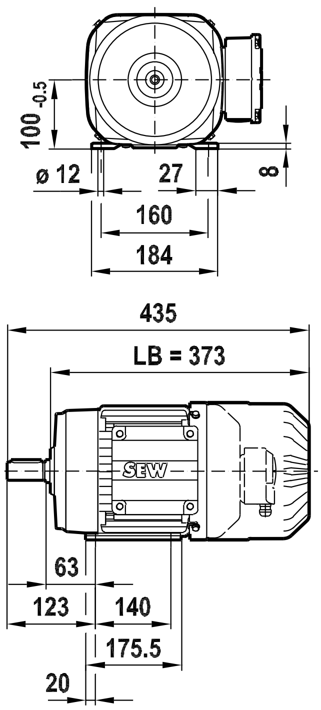

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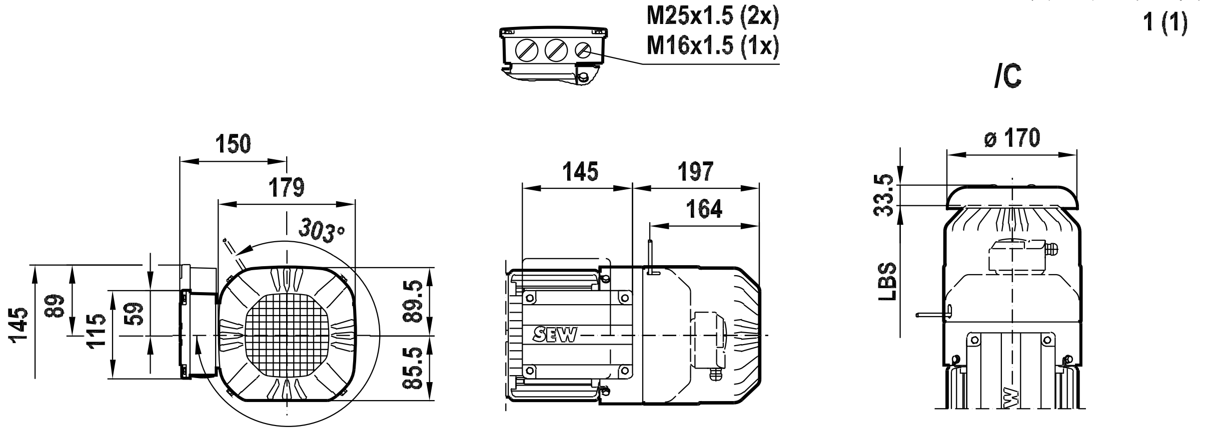

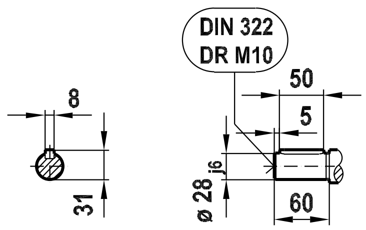

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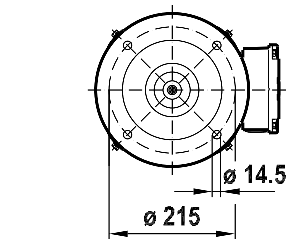

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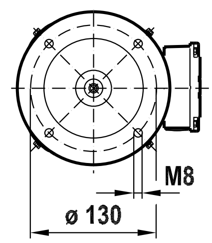

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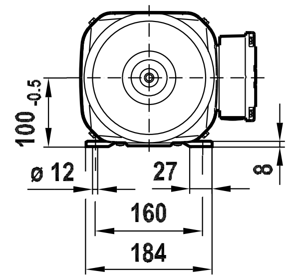

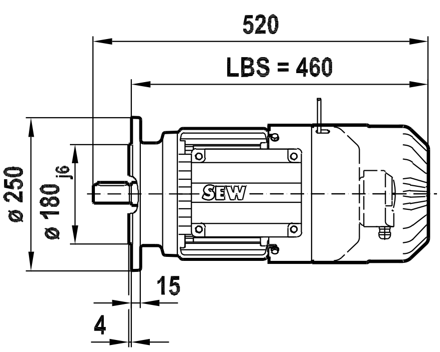

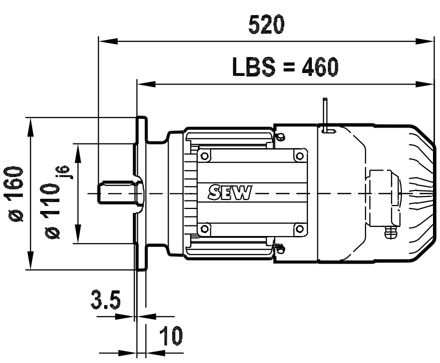

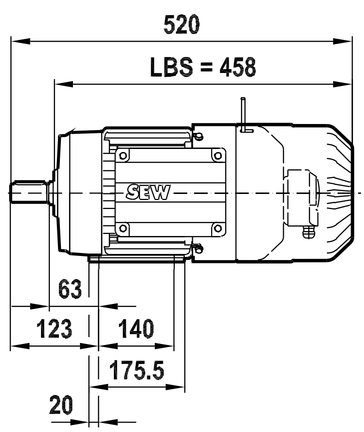

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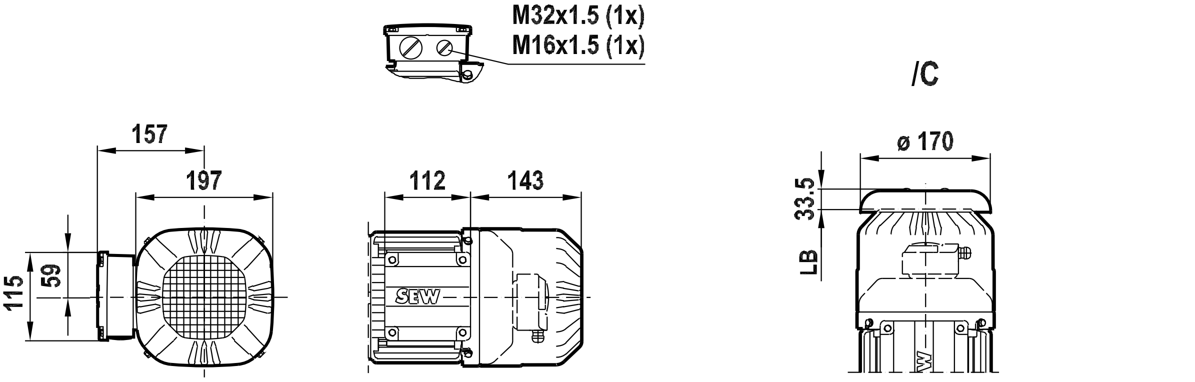

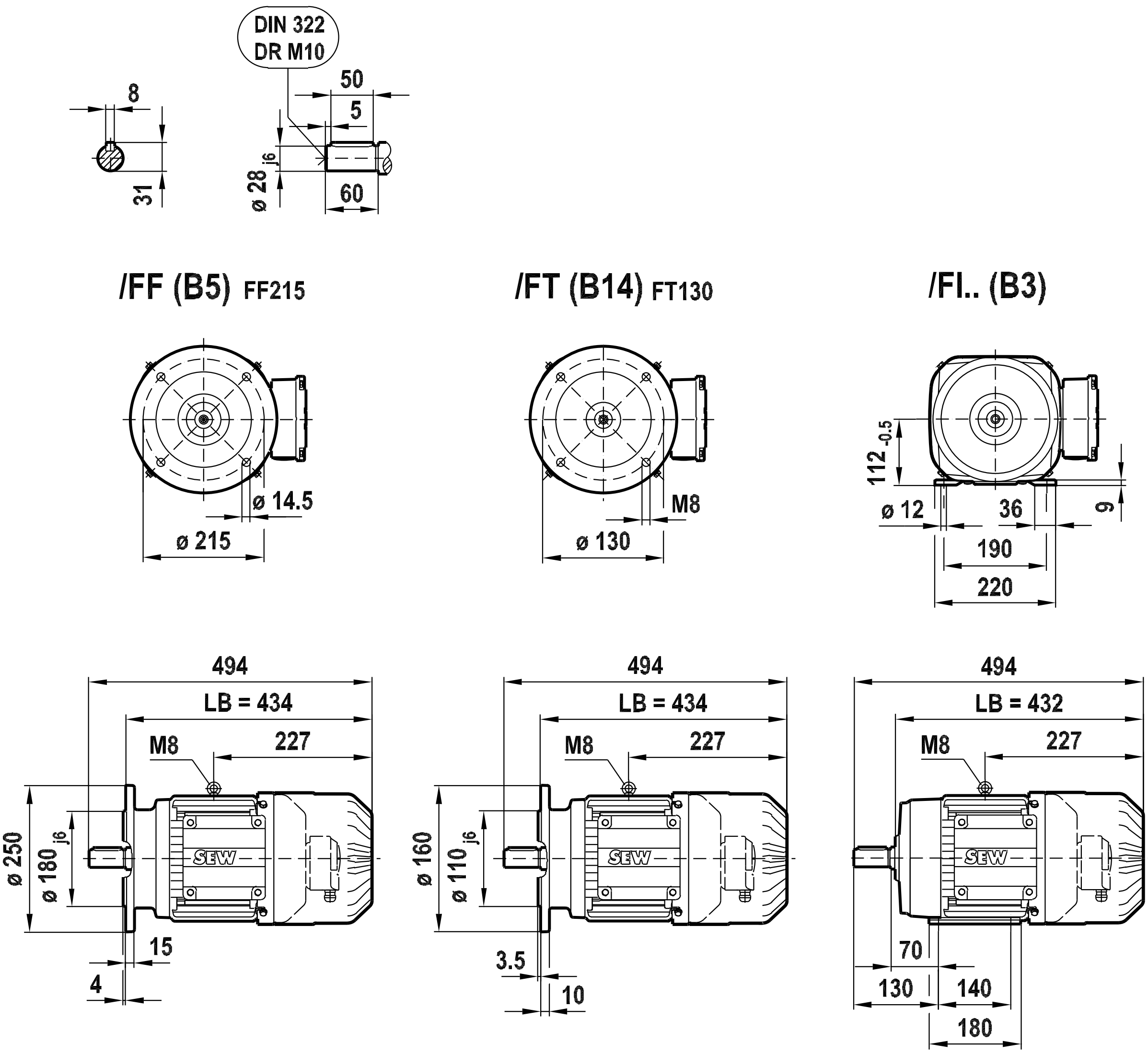

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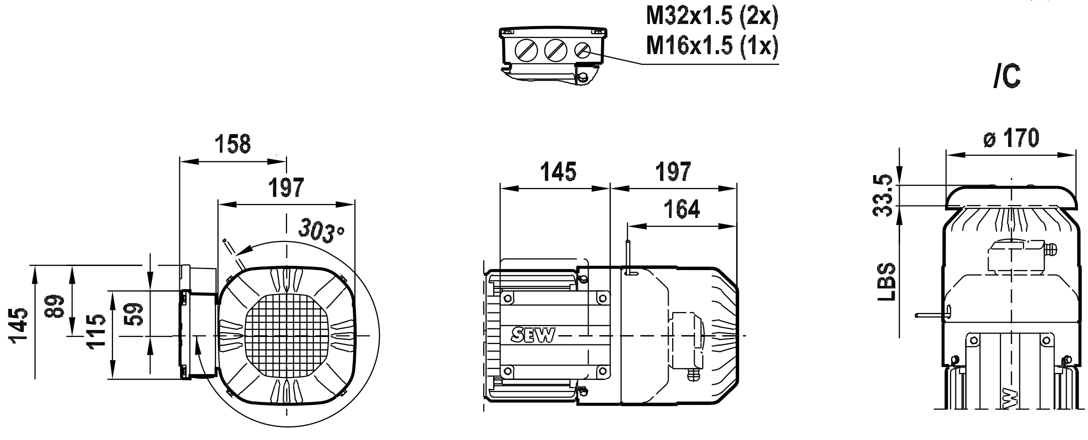

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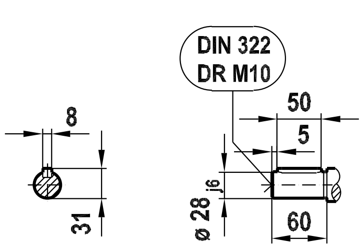

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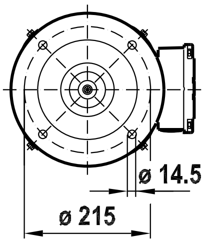

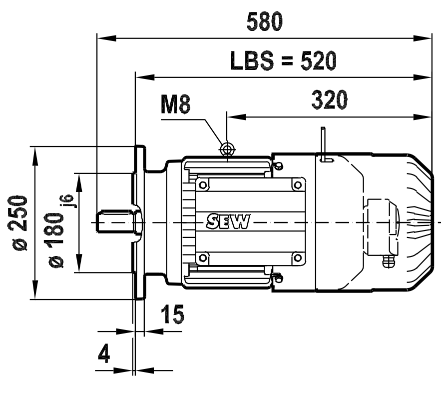

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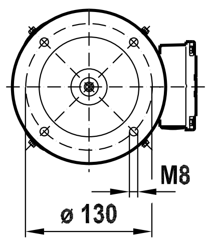

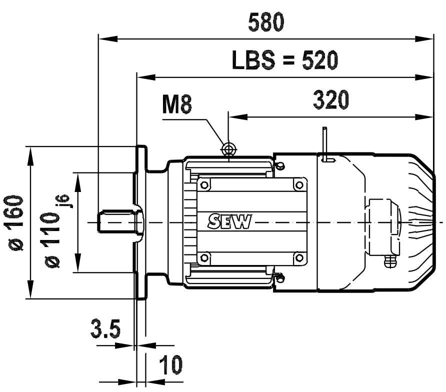

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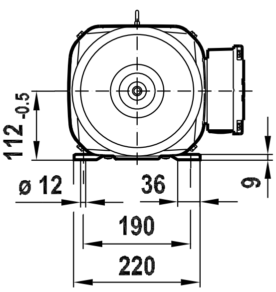

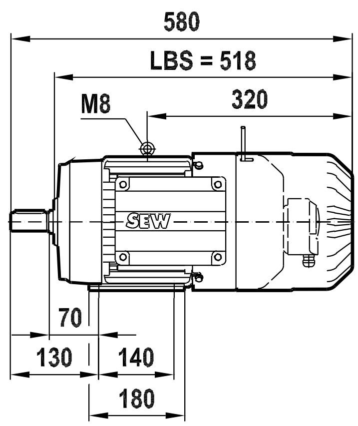

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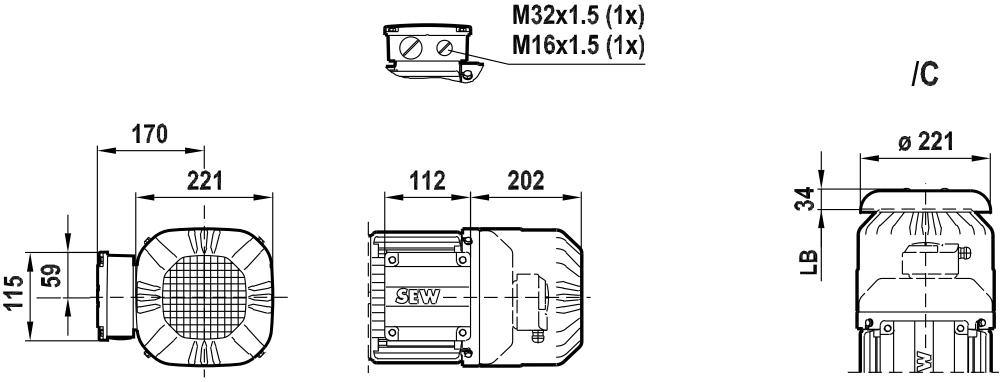

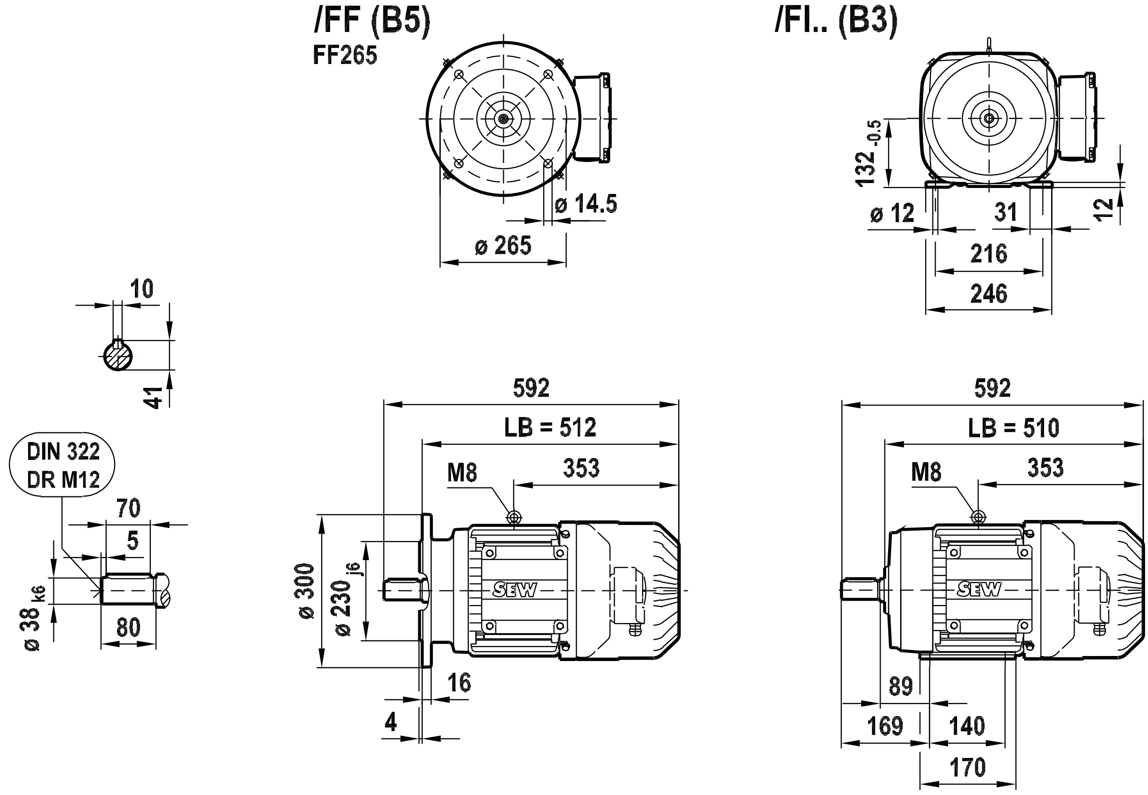

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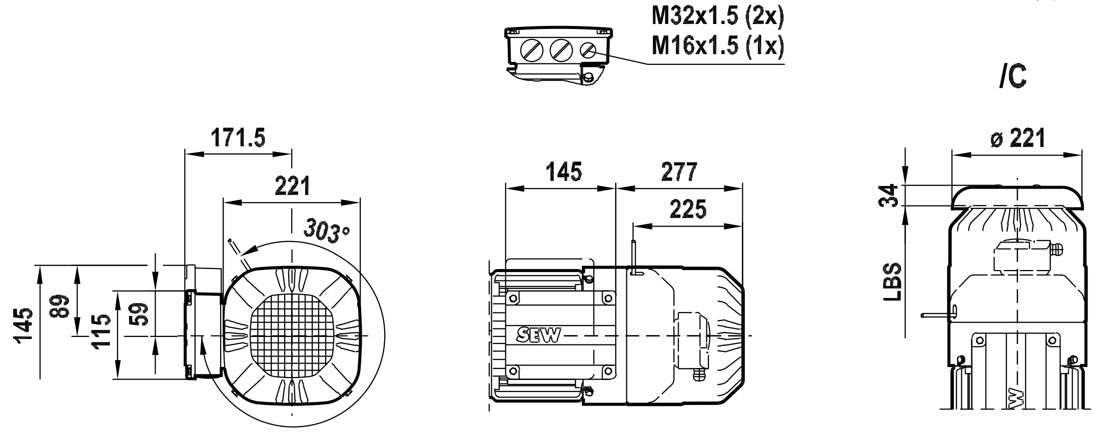

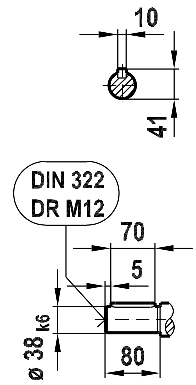

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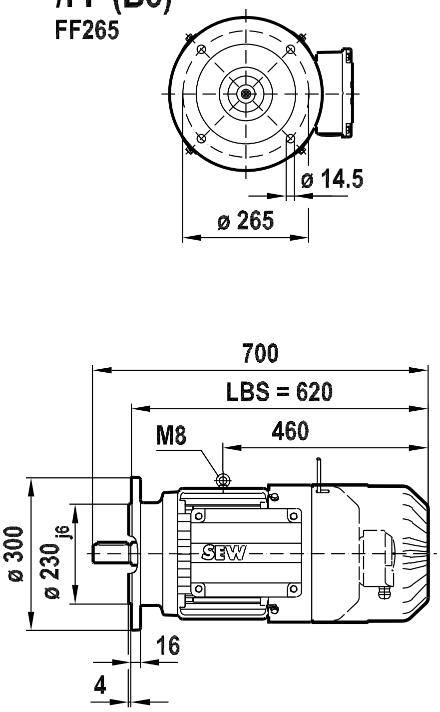

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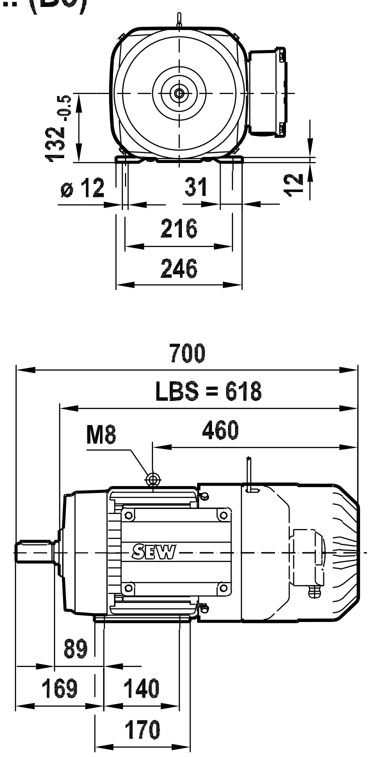

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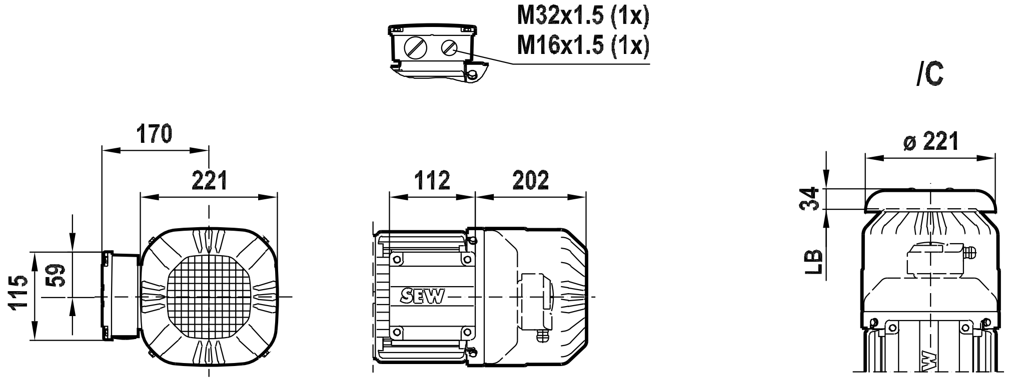

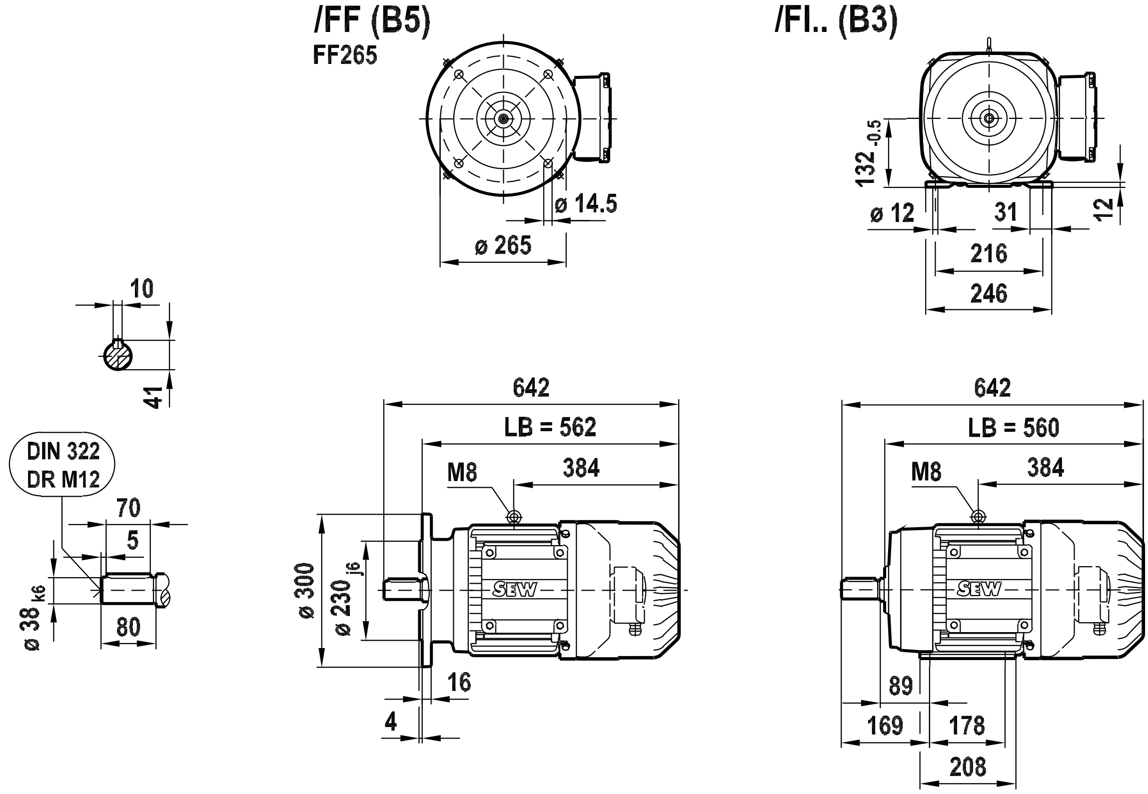

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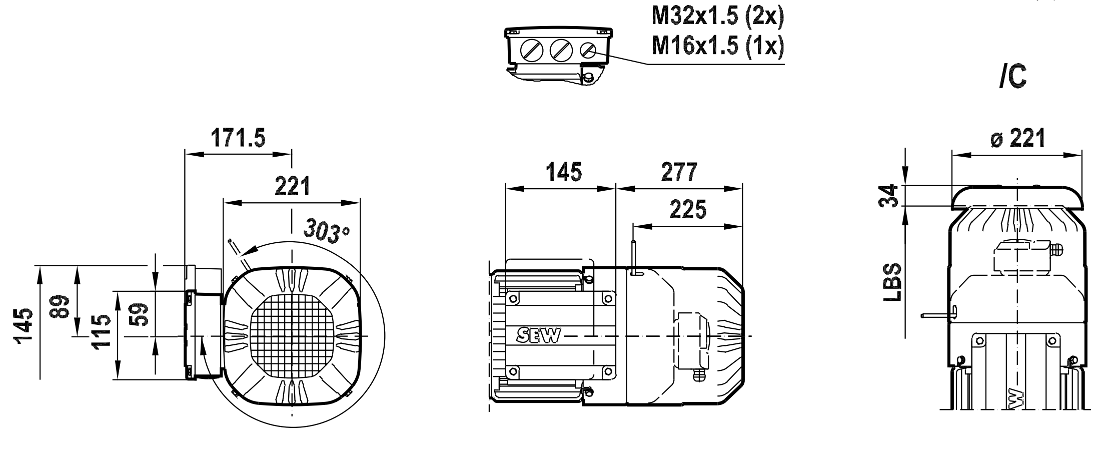

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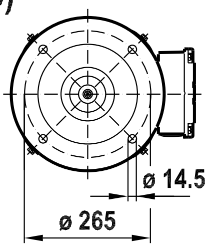

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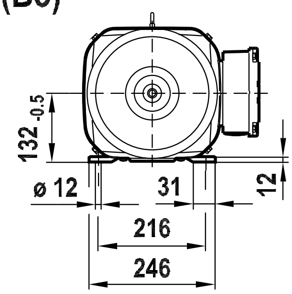

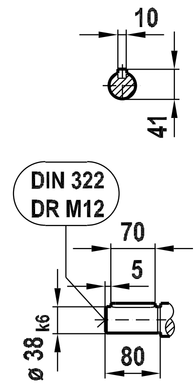

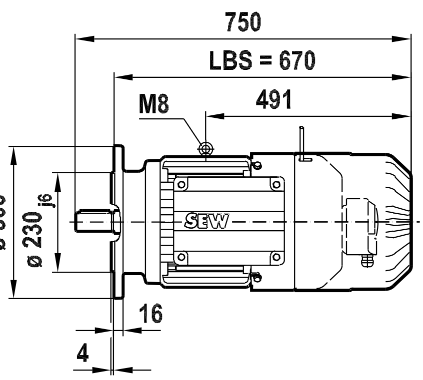

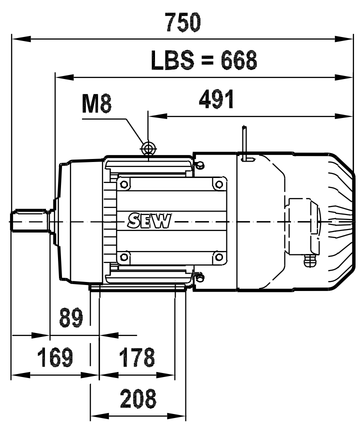

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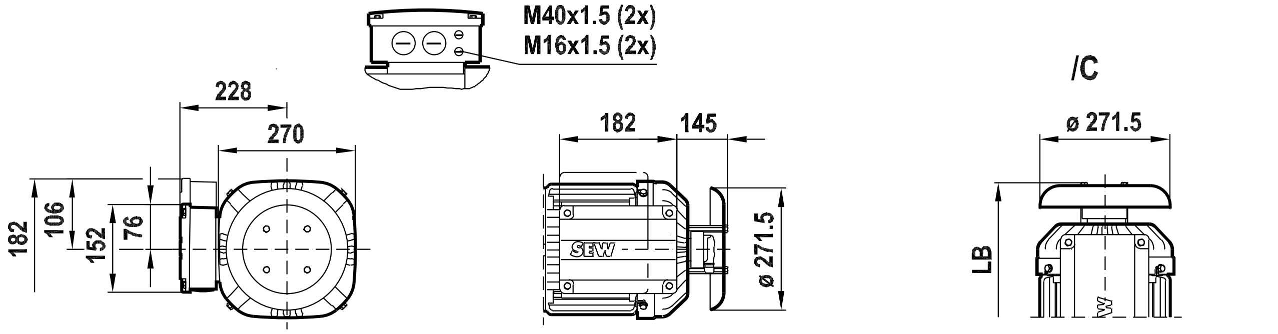

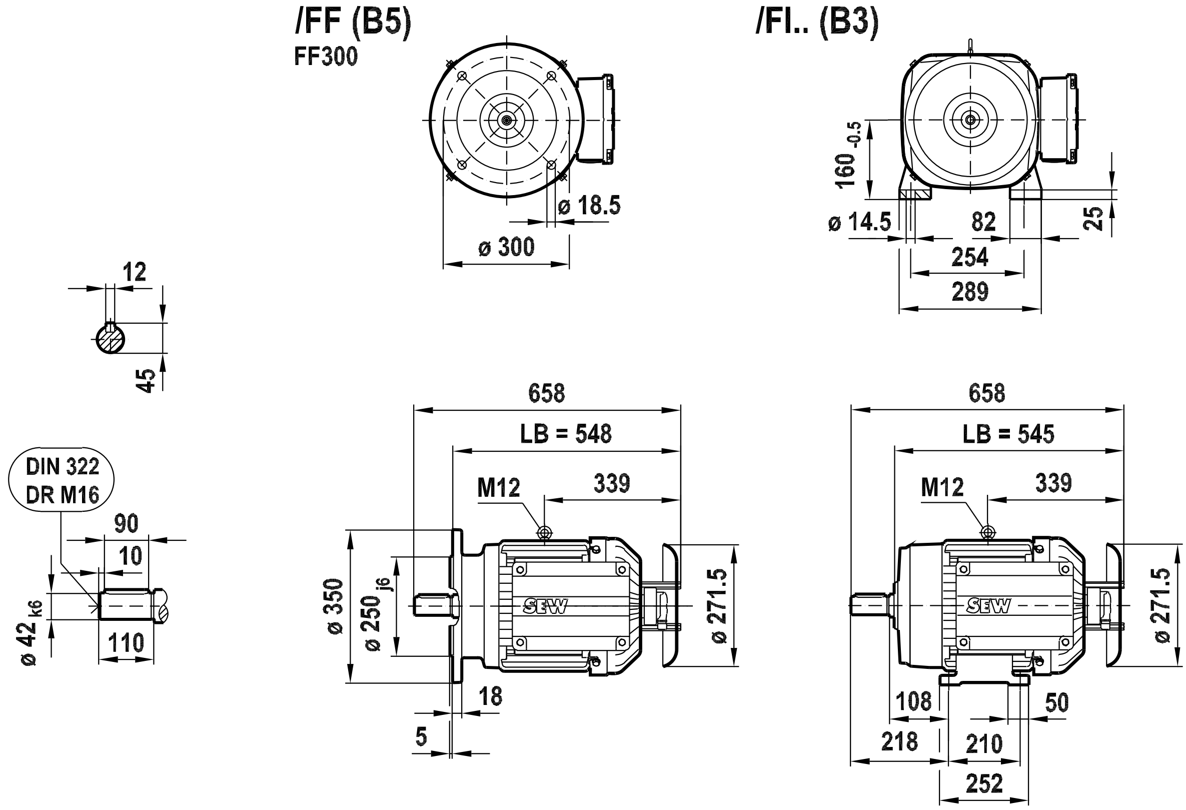

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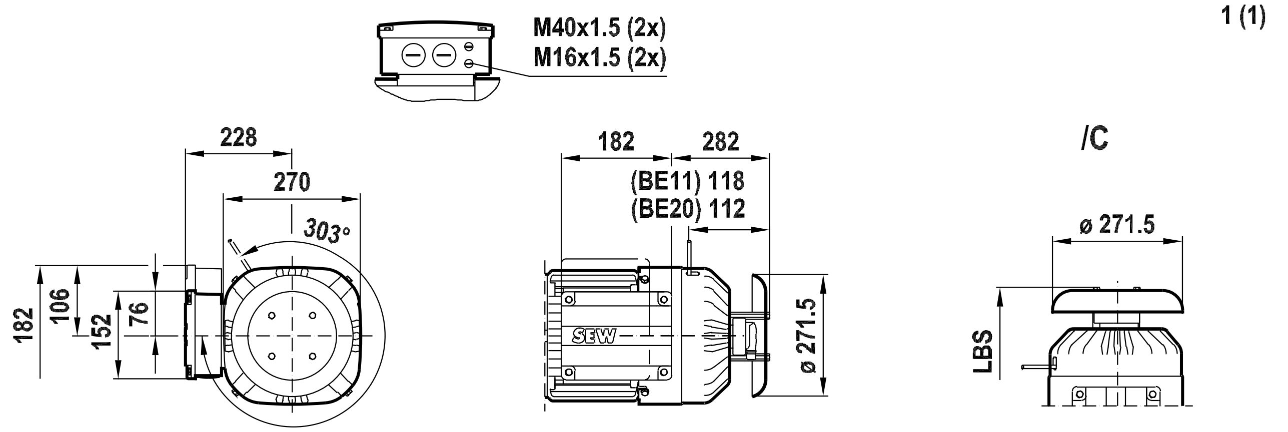

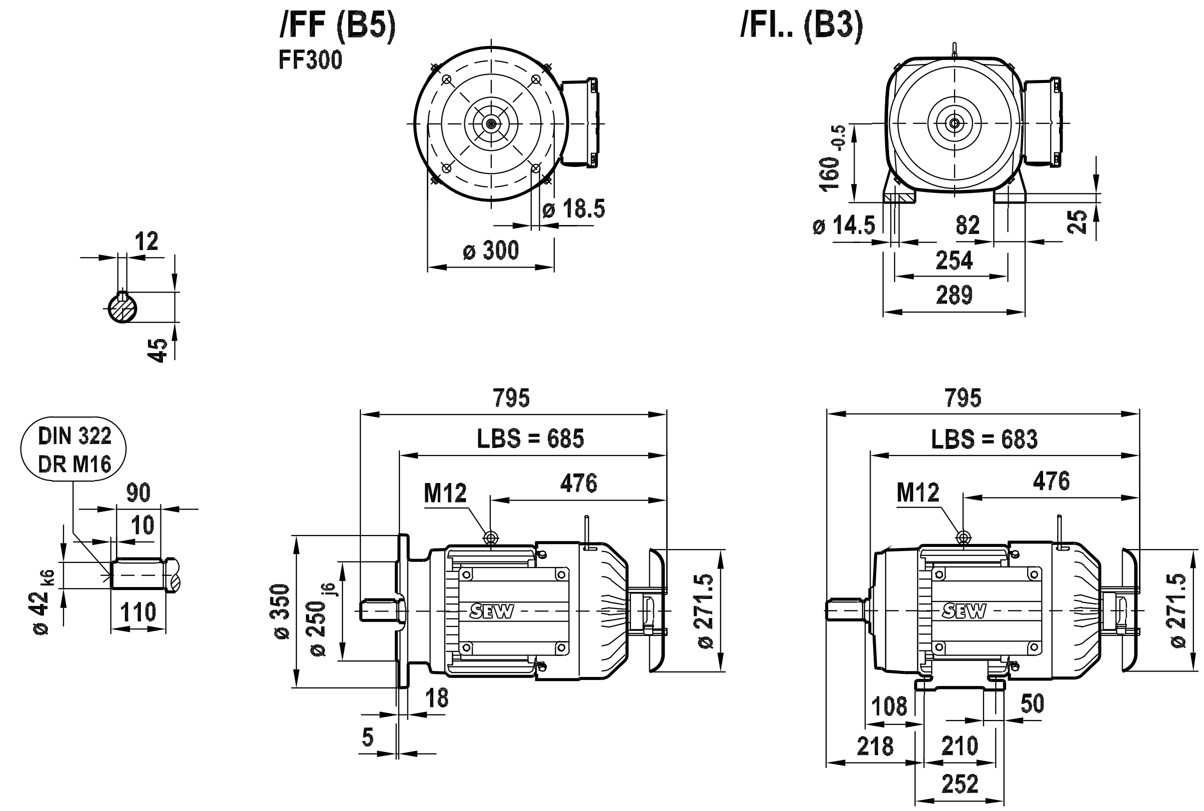

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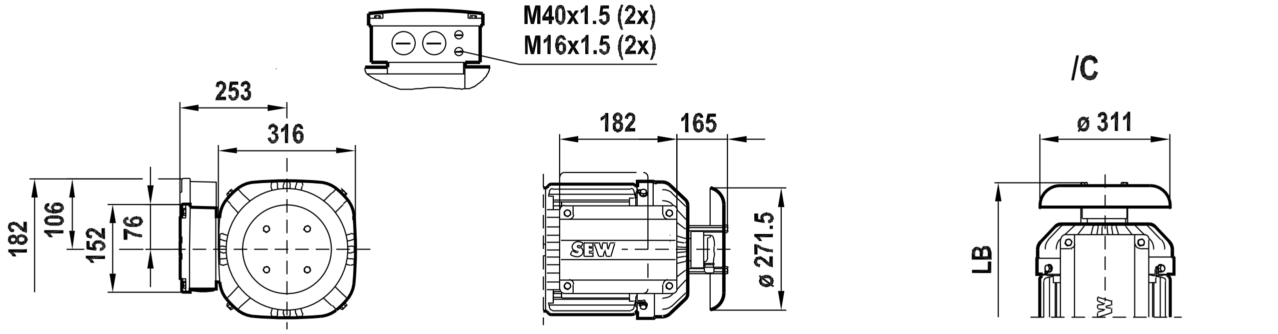

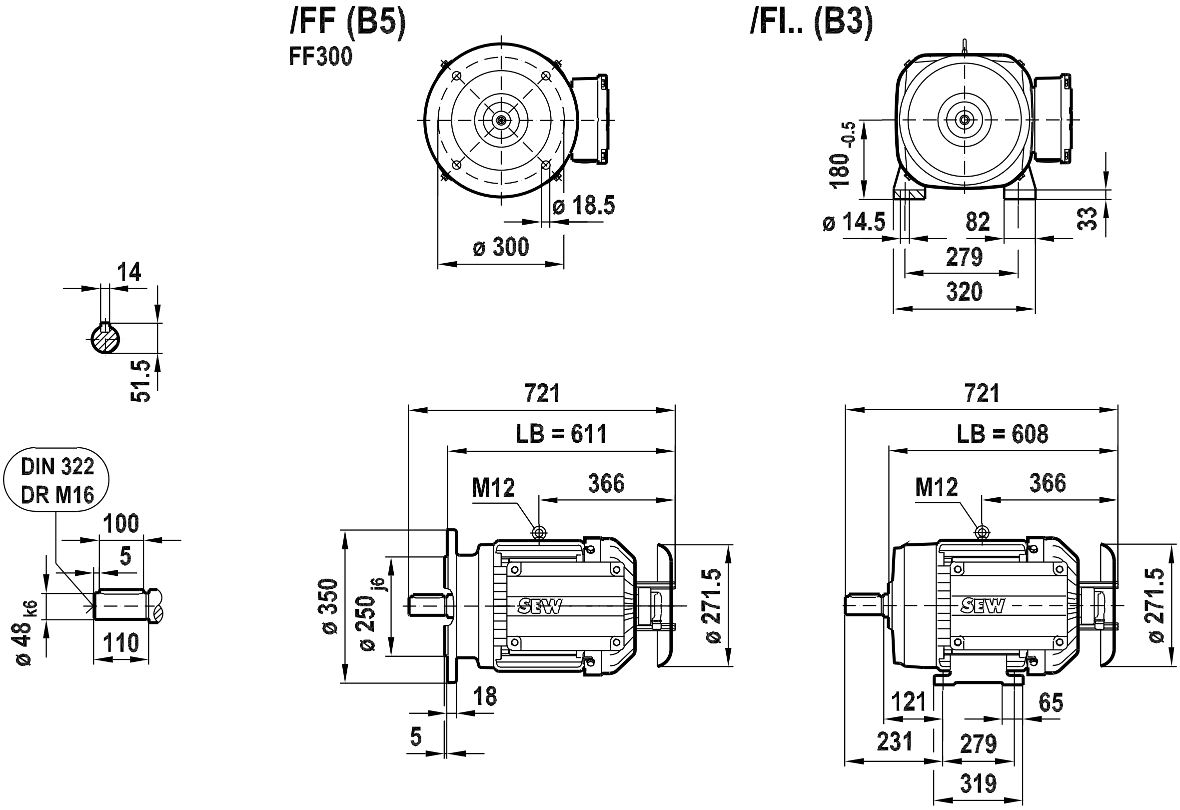

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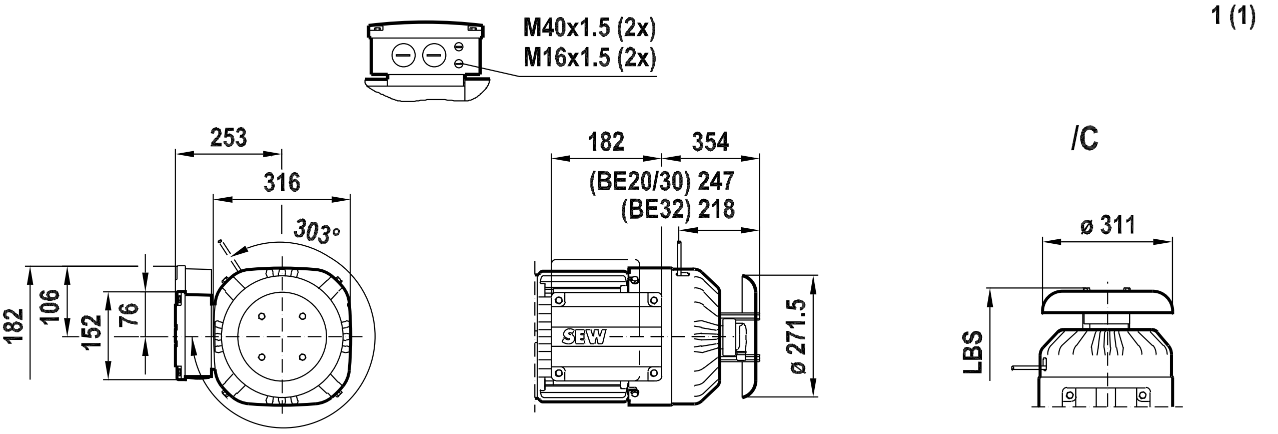

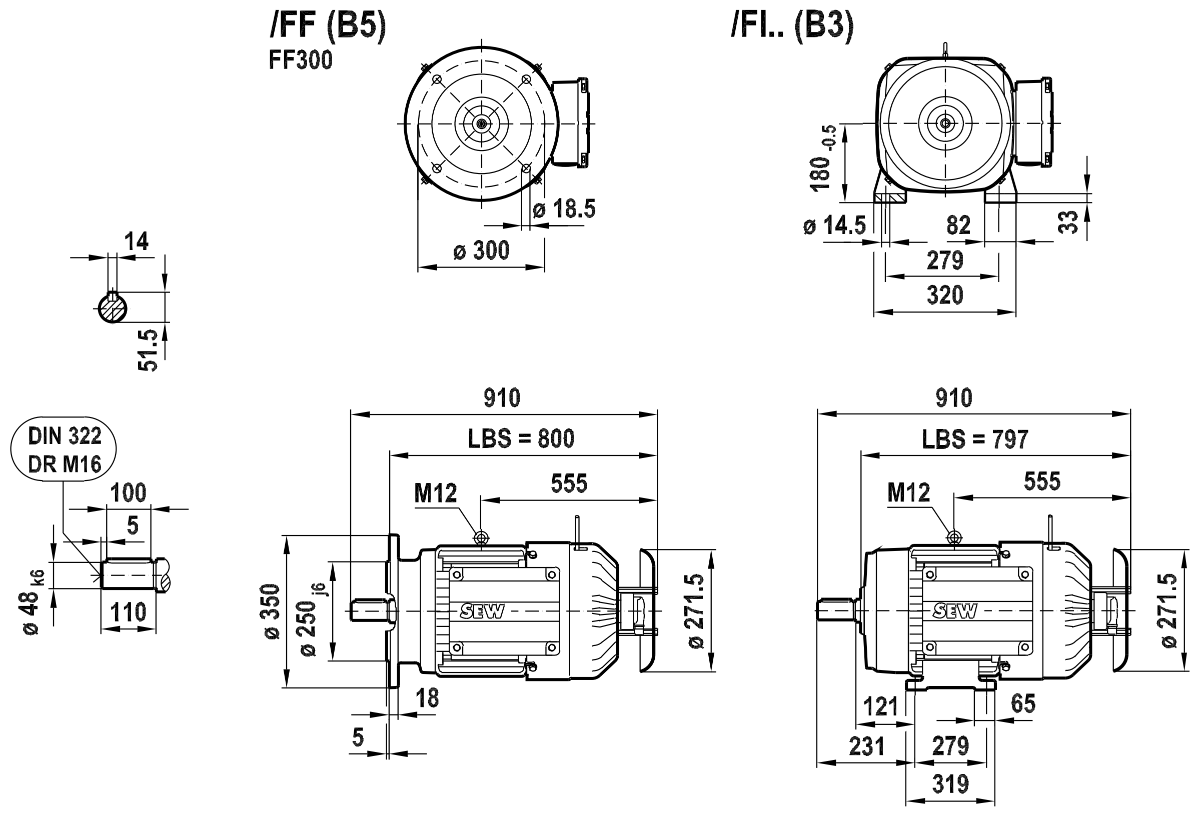

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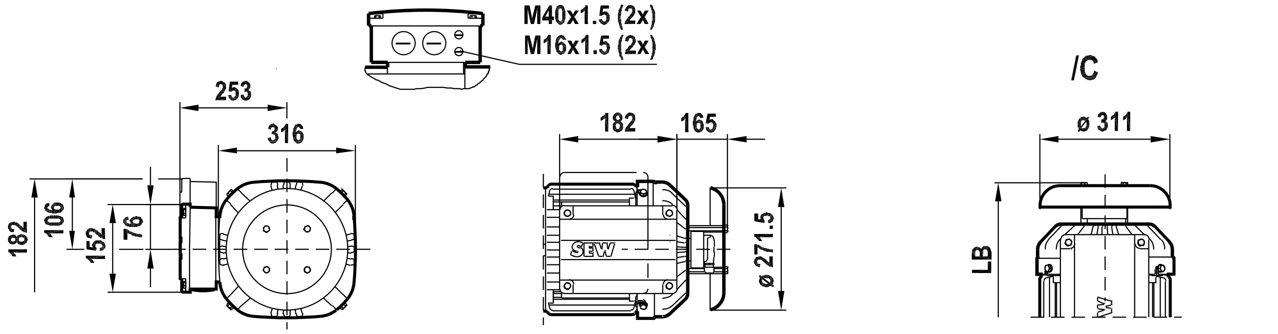

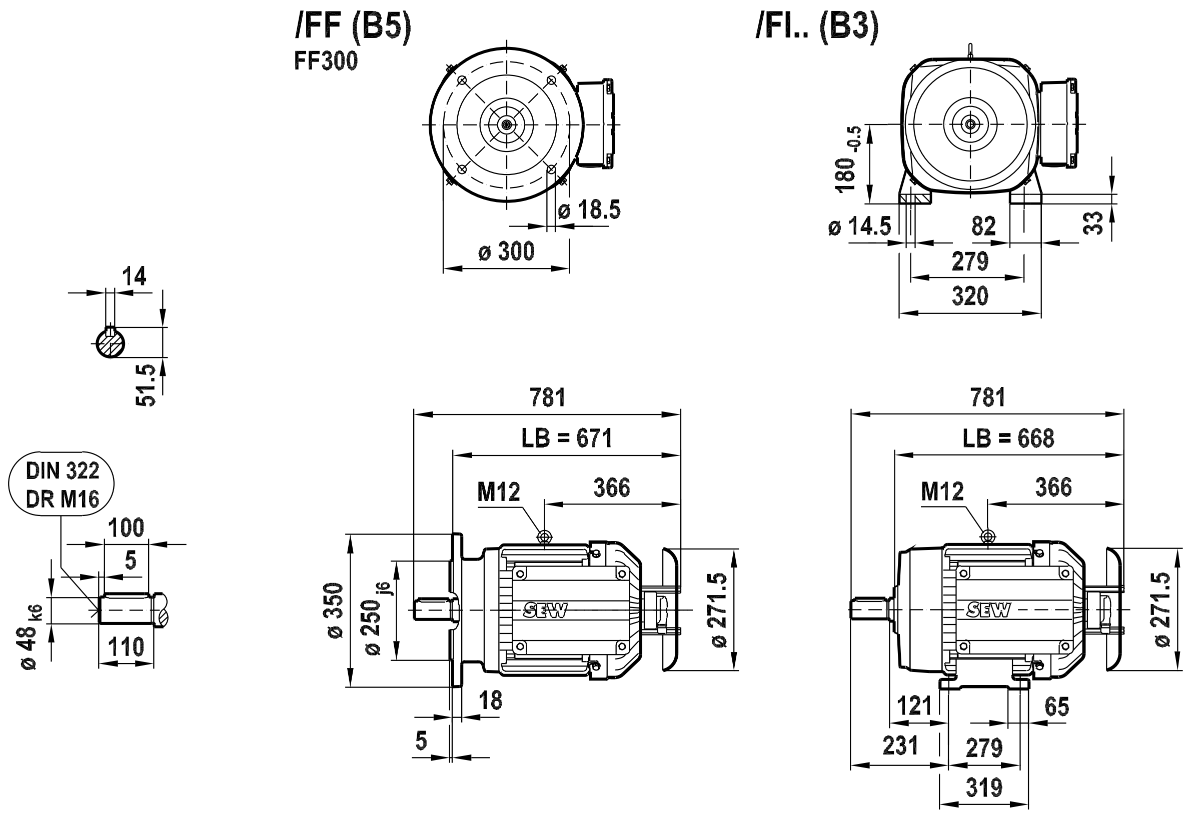

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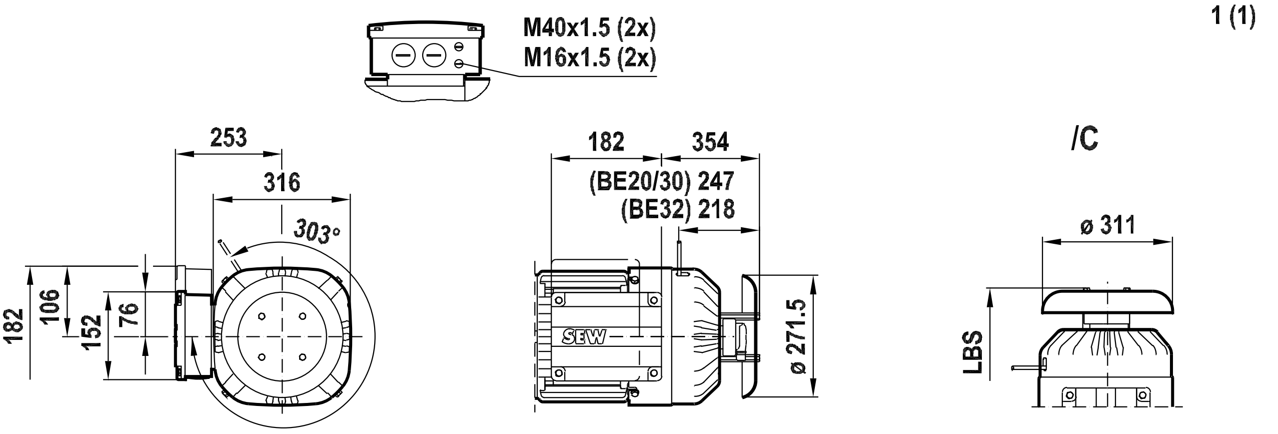

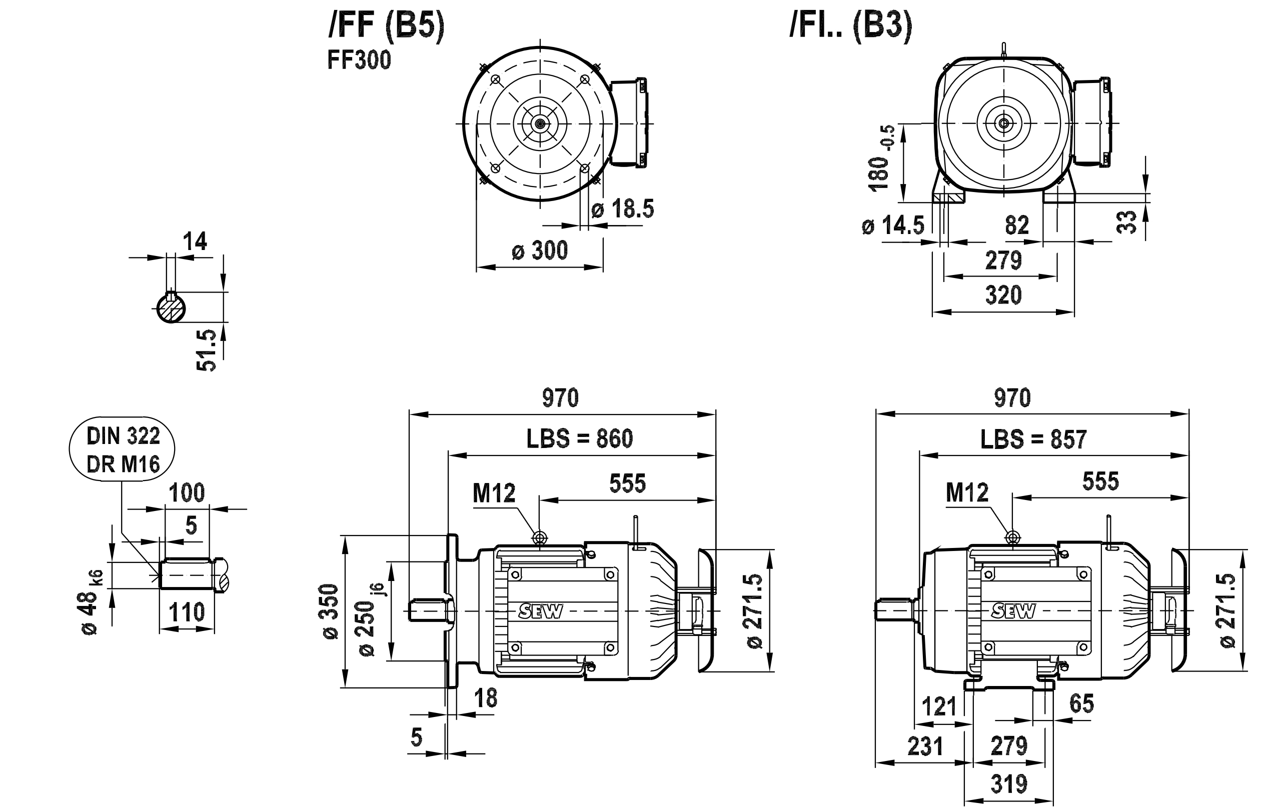

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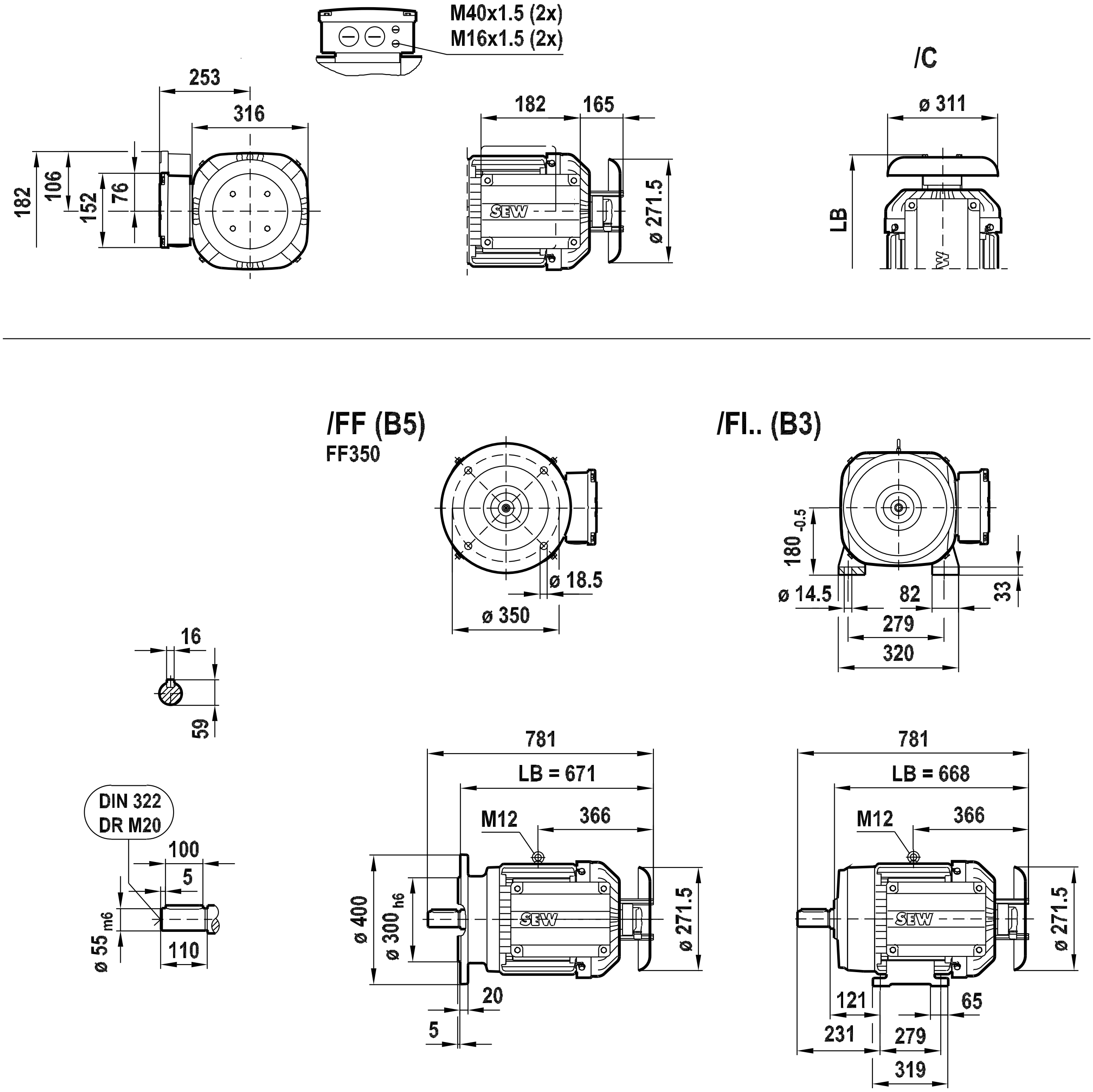

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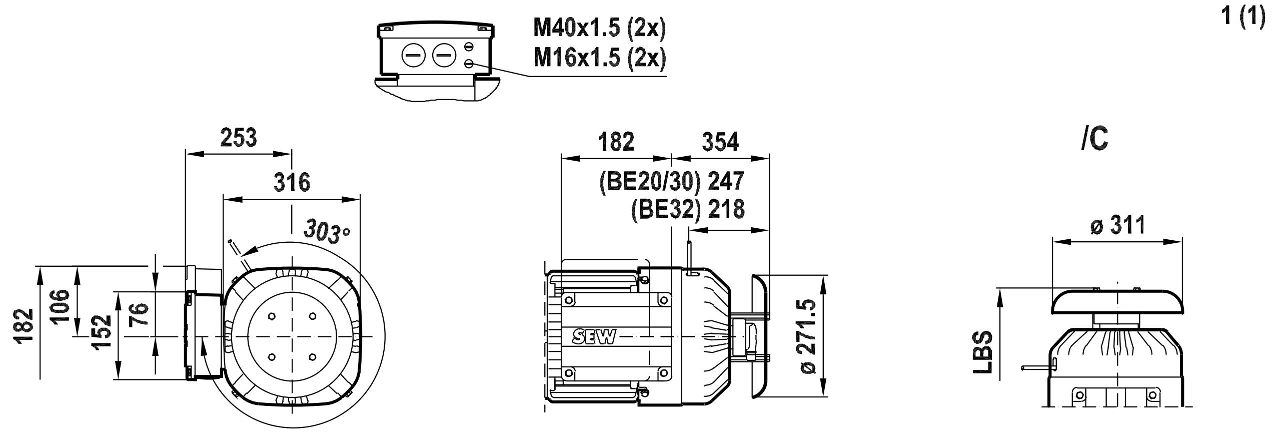

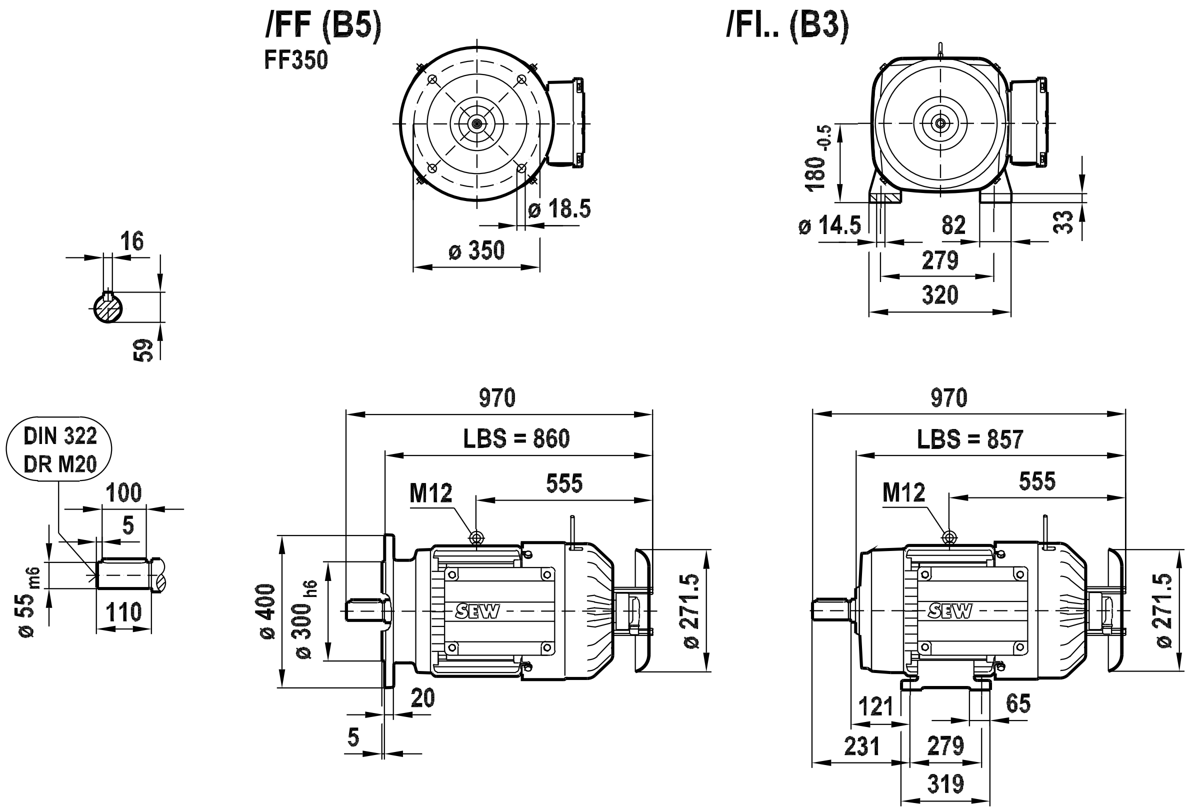

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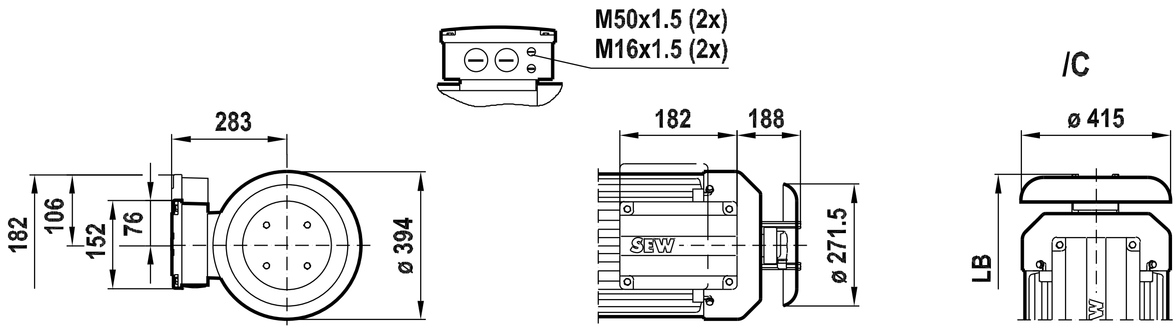

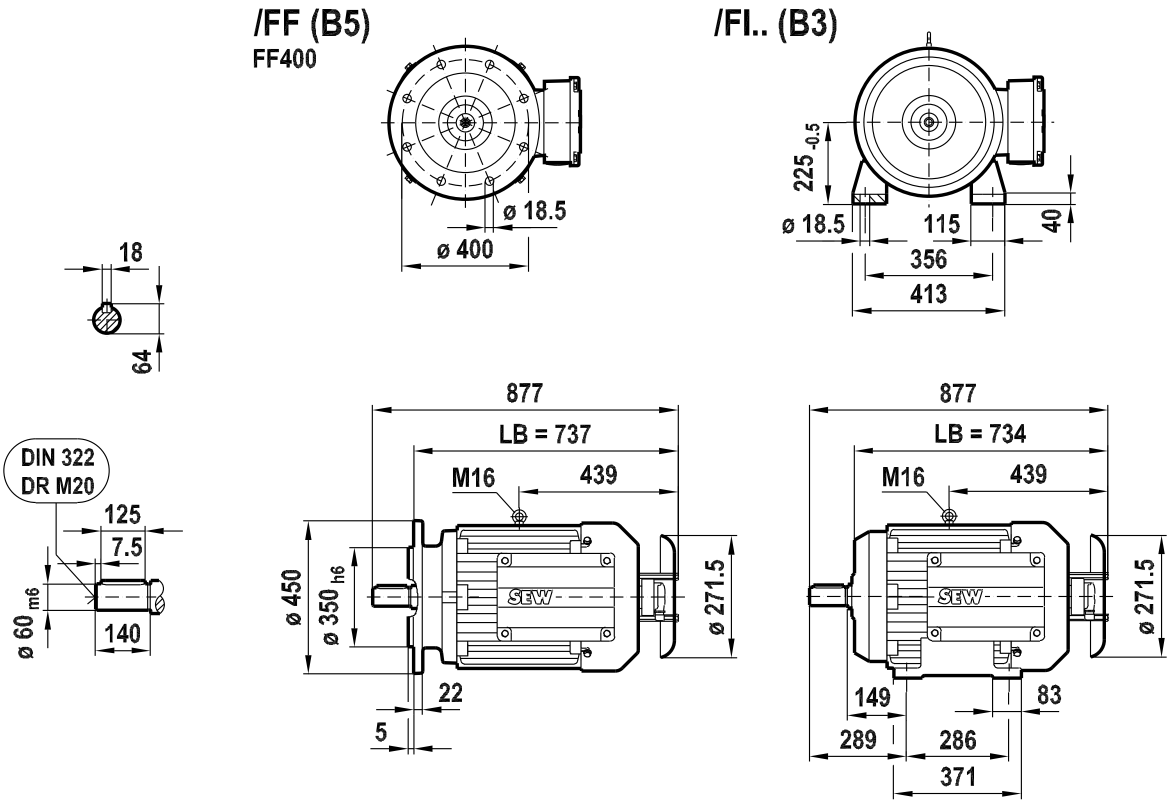

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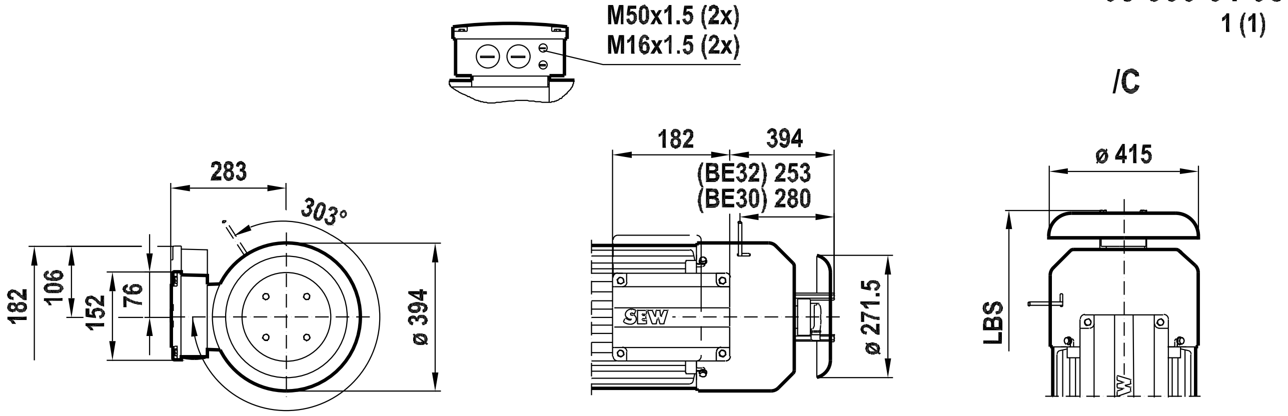

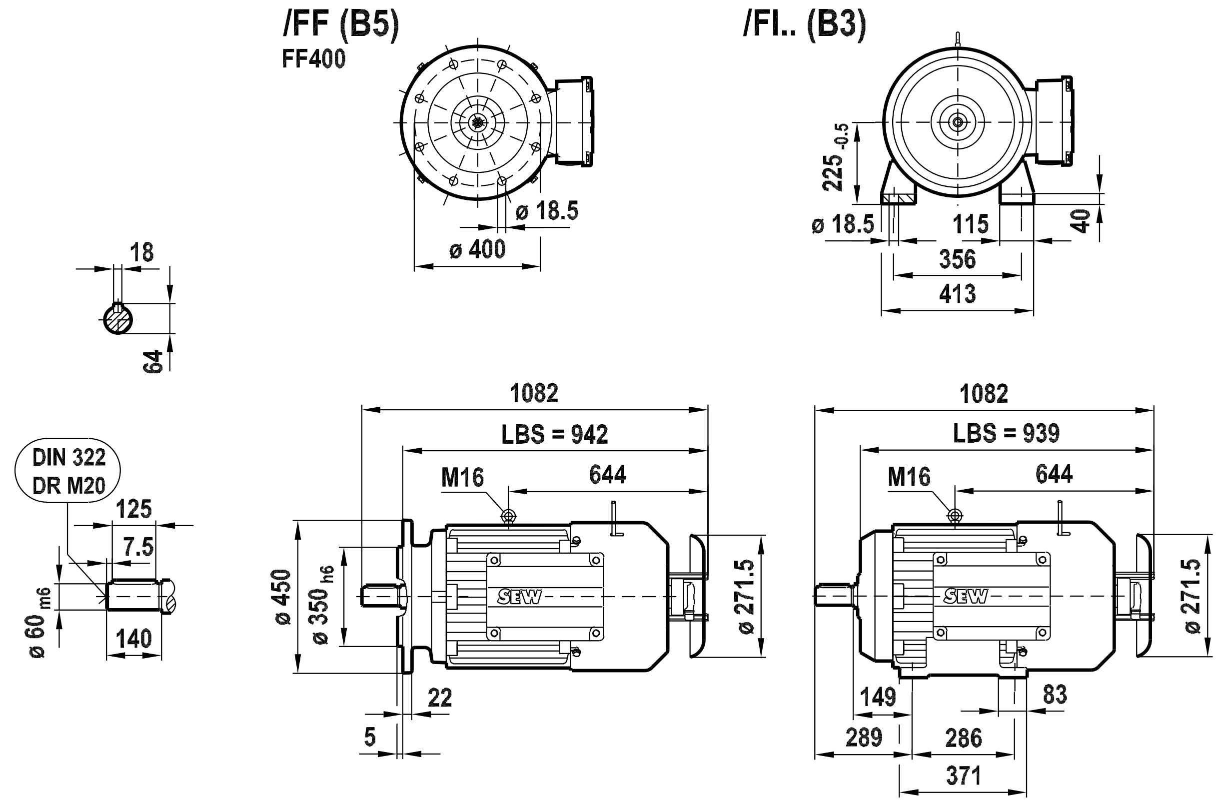

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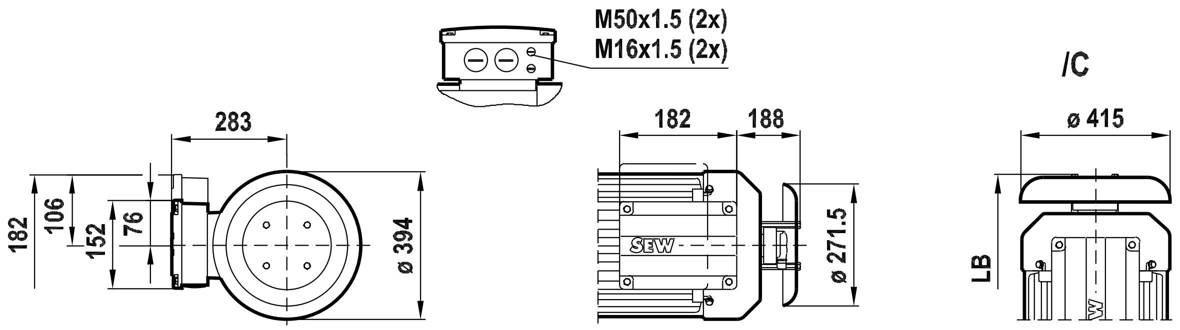

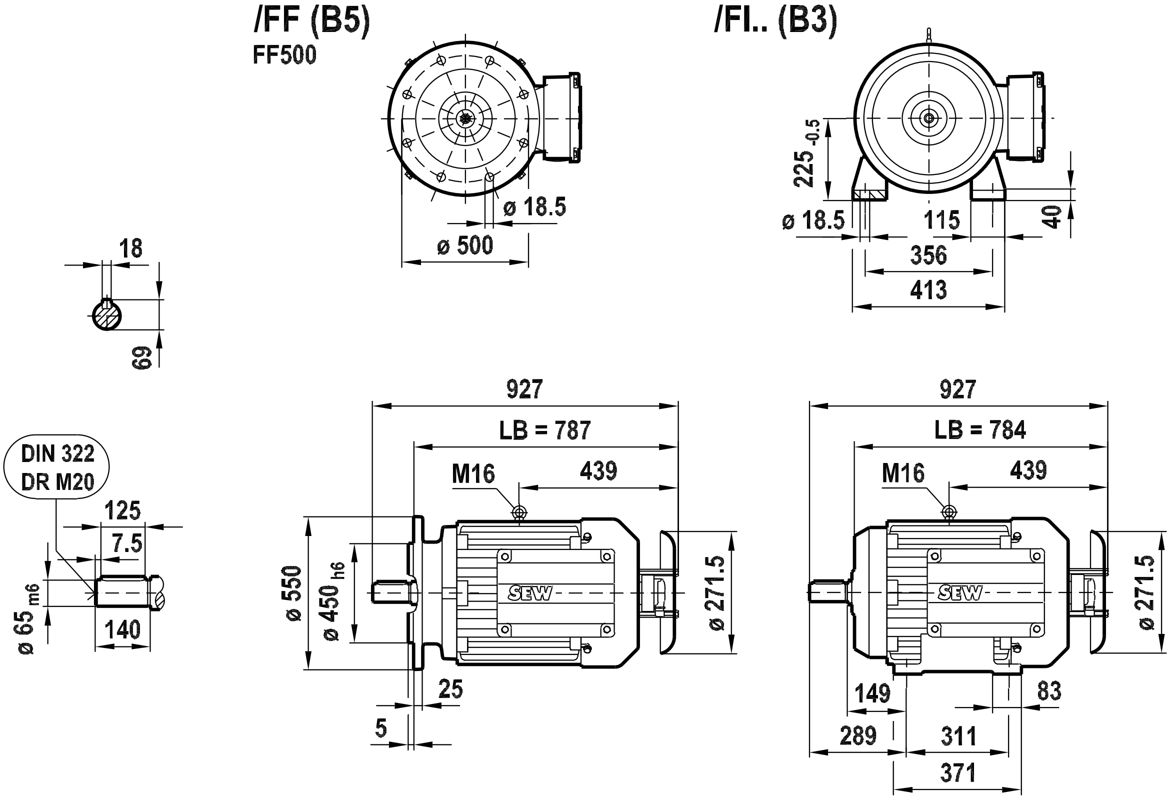

DRL225MC BE

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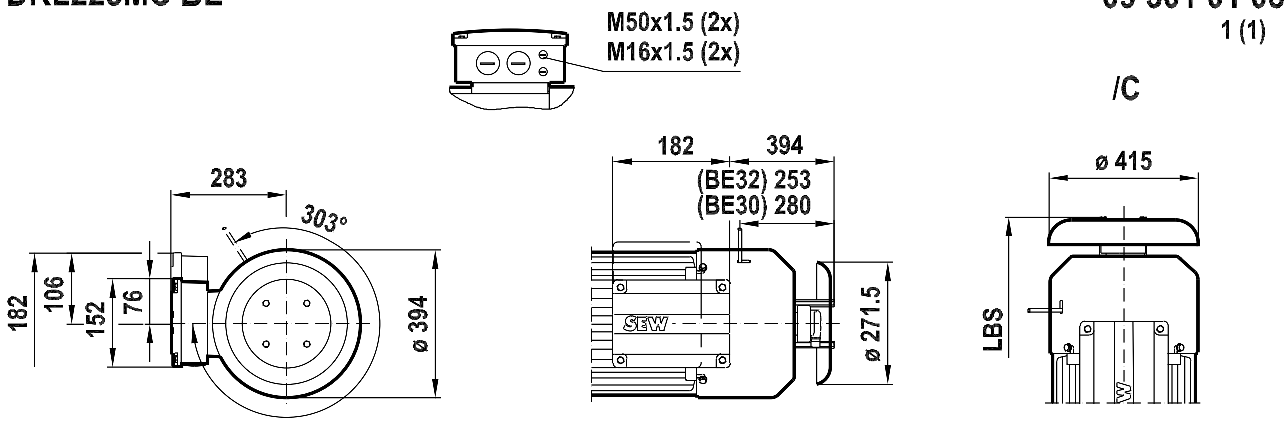
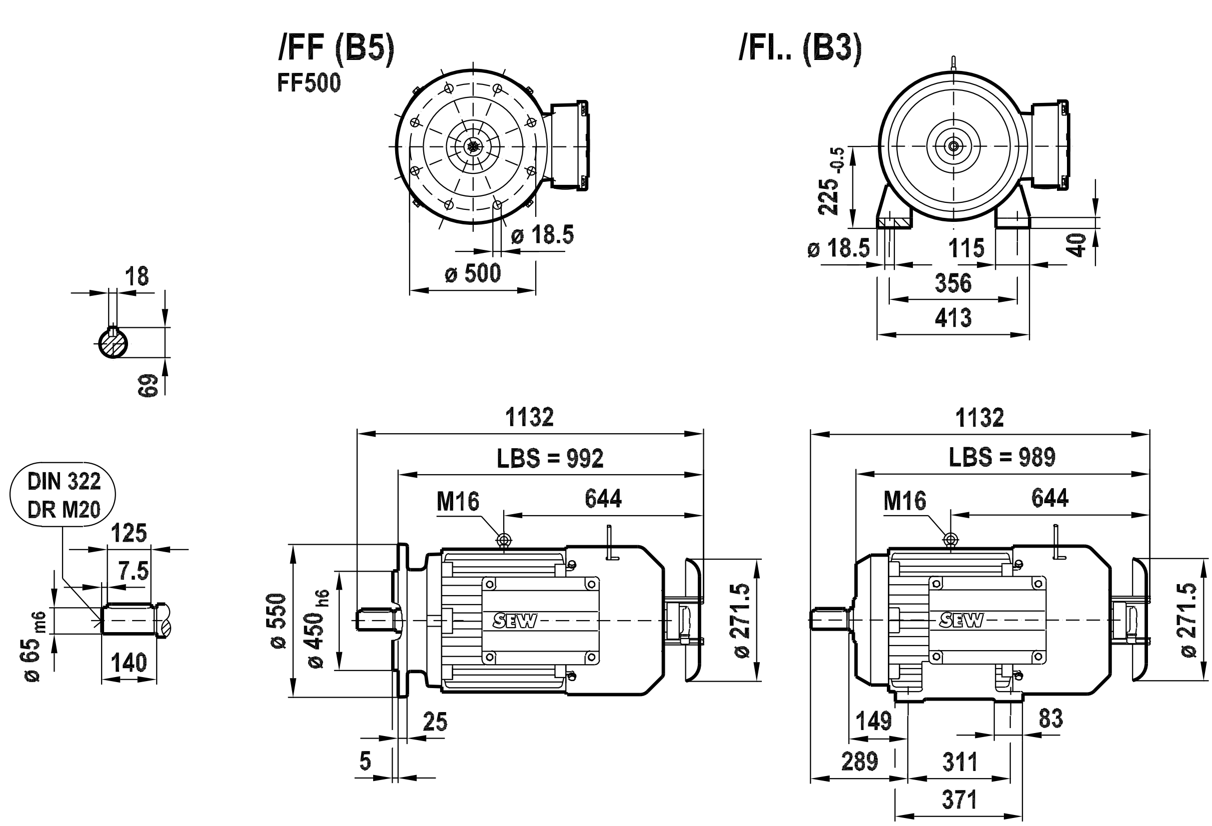




8 BE Brake

8.1 Description

General information

On request, SEW-EURODRIVE motors and gearmotors are 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 setscrew is supplied.

The brake is controlled by a brake controller 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 integrated construction of the brakemotor permits particularly compact and sturdy solutions.

Description

The brake is installed on the B-end 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 by 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 for mounting one of up to three brake sizes to a motor. The B-side endshield is to be regarded like a connecting flange that accommodates the BE 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.

8.2 Principles of the BE brake

Basic structure

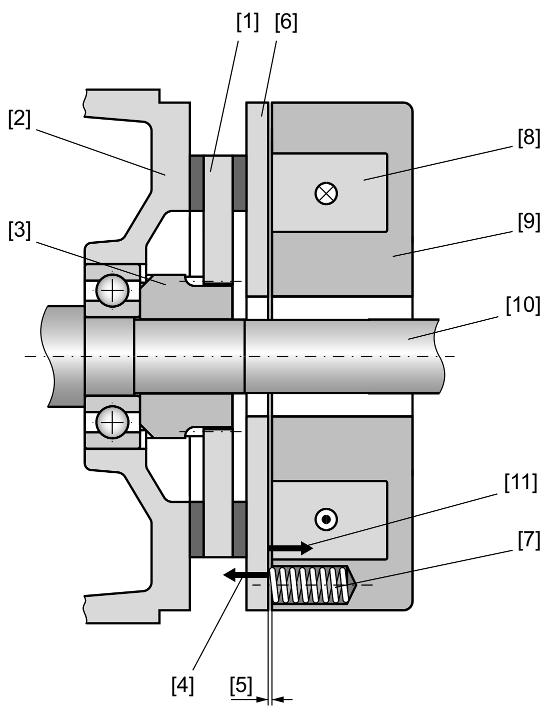
The SEW brake is an electromagnetic disk brake with a DC coil that releases electrically and brakes using spring force. The system meets all fundamental safety requirements: The brake is applied automatically if the power fails.

The principal parts of the brake system are the brake coil itself [8] (accelerator coil + coil section = holding coil), comprising the magnet [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 design of the SEW brakemotor makes for particularly compact and sturdy solutions.

Basic function

In contrast to other disk brakes with a DC coil, the 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 deenergized. The brake is applied to the motor. The type and number of brake springs determines the braking torque. When the brake coil is connected to the appropriate DC voltage, the spring force [4] is overcome by magnetic force [11], thereby bringing the pressure plate into contact with the magnet. The brake disk moves clear and the rotor can turn.



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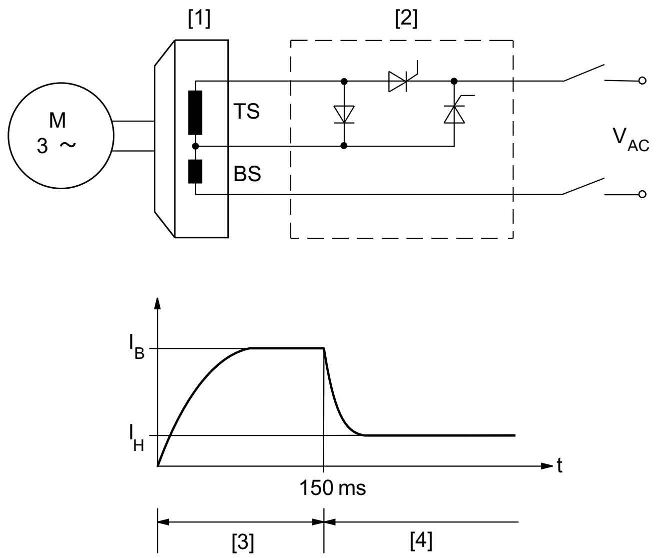
[1] Brake disk
[2] Brake endshield
[3] Carrier
[4] Spring force
[5] Working air gap
[6] Pressure plate
[7] Brake spring
[8] Brake coil
[9] Magnet
[10] Motor shaft
[11] Electromagnetic force

Particularly short response times at switch-on

A special brake control system 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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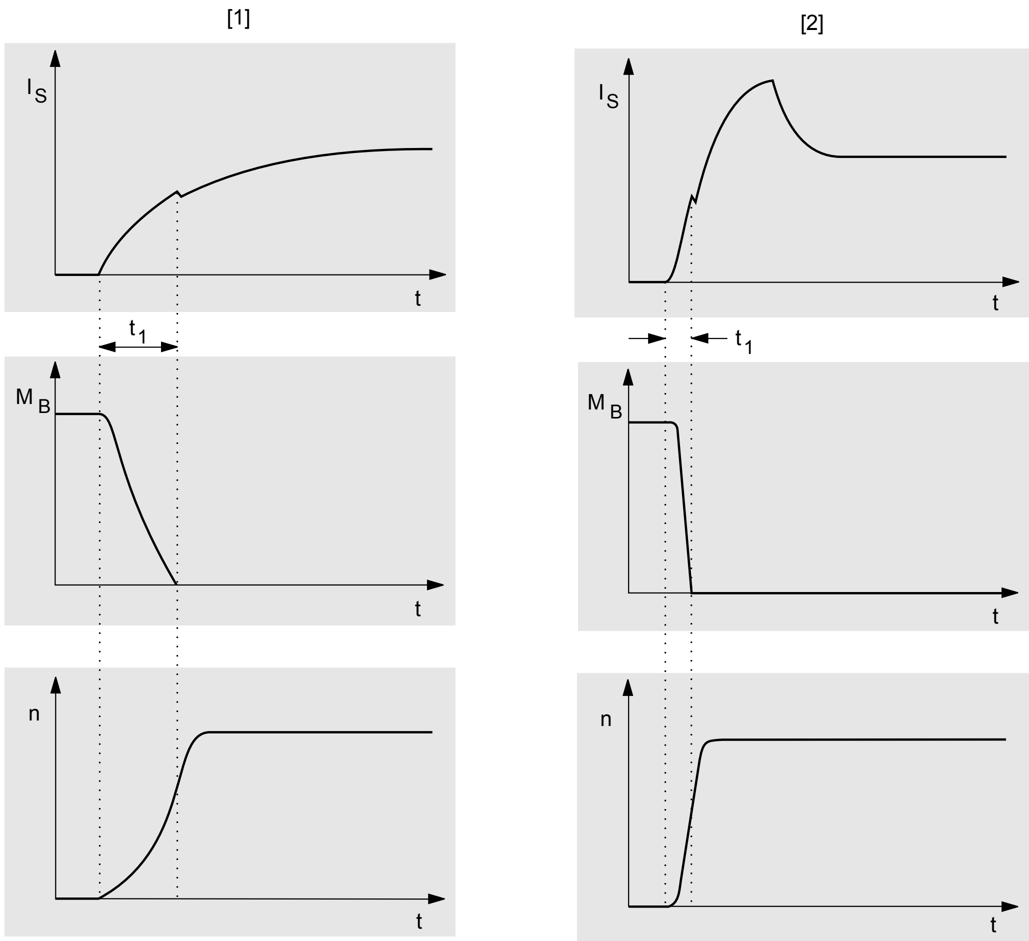
BS Accelerator coil
TS Coil section
[1] Brake
[2] Brake controller
[3] Acceleration
[4] Holding
I_B Acceleration current
I_H Holding current
BS + TS = Holding coil

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



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[1] Switch-on procedure for operation with rectifier without switching electronics

[2] Switch-on procedure for operation with SEW rectifier with switching electronics, e.g. BGE (standard from size BE5)

I_S Coil current

M_B Braking torque

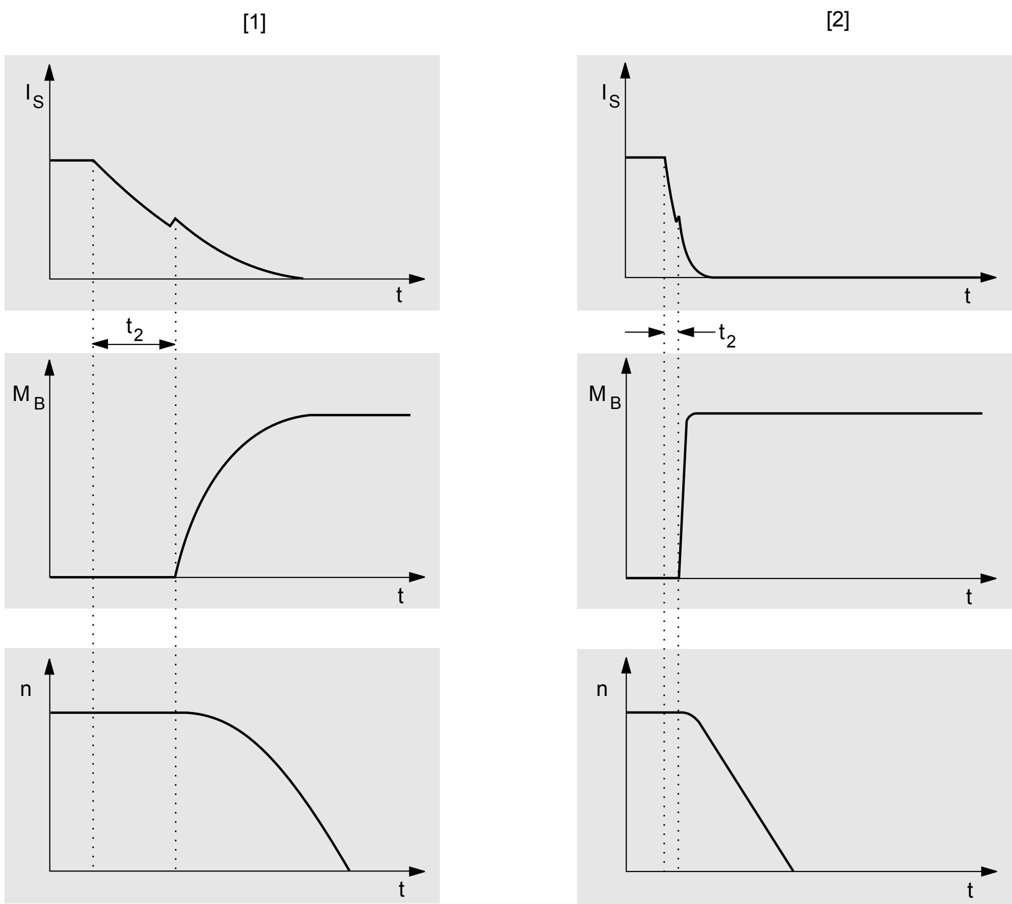
n Speed

t_1 Brake response time

The system switches to the holding coil electronically as soon as the SEW brake has released. The braking magnet is now only magnetized to such an extent (weak holding current) to ensure that the pressure plate is held open with a sufficient degree of safety and minimum brake heating.

Particularly short response times at switch-off

This means de-excitation occurs very rapidly when the coil is switched off, so 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 hoist drives.



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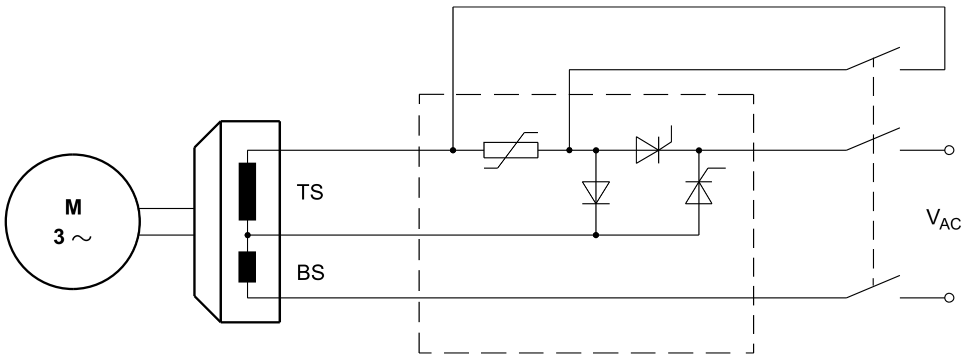
[1] Brake response to cut-off in the AC circuit
[2] Brake response to cut-off in the AC and DC circuits
I_S Coil current
M_B Braking torque
n Speed
t_2 Brake application time

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 power 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 brake contactor (suitable for an inductive load).

Under certain conditions, you can also use SR and UR electronic relays for interrupting the DC circuit.



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Particularly quiet Particularly quiet brakemotors are required in many applications in the power range up to approximately 5.5 kW (4-pole) 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.

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.

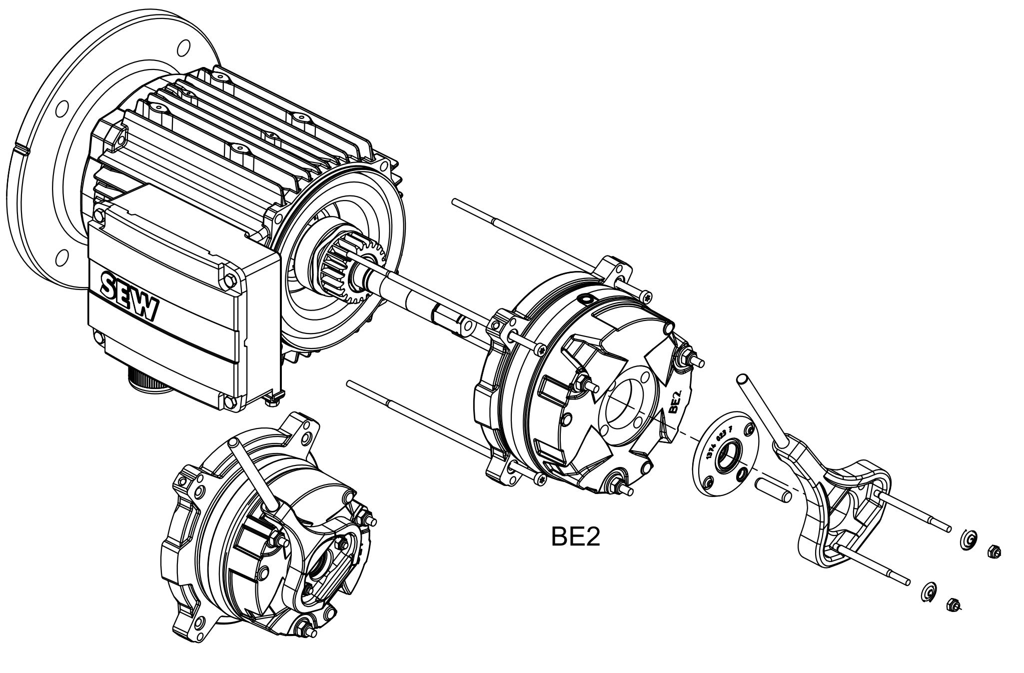
8.3 The BE brake in detail

BE brake The BE.. brake is used for AC motors DR.71 - DR.315.

Main features of the brake:

- Different brake sizes can be mounted to one motor size
- Brake coil with tap
- Movable pressure plate
- Plug connector for simple electrical connection from 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 integral part of the brake with a friction surface.



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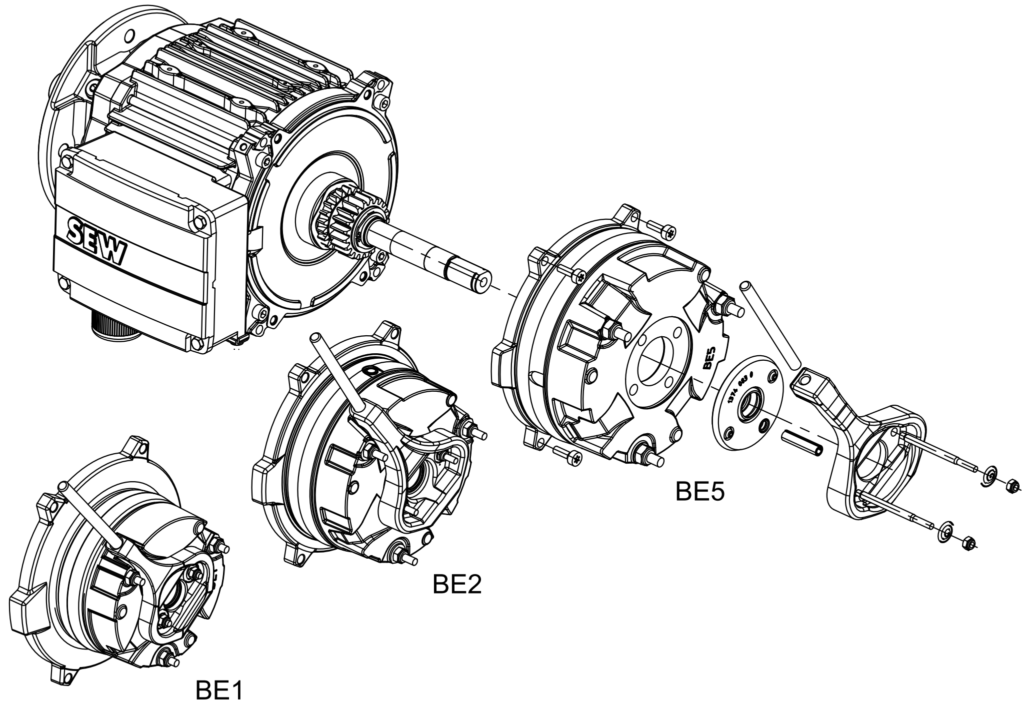
Modular design

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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8.4 General notes on project planning for the brake

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 / brakemotor in accordance with the project planning data, see page 238.
2. Determining the brake voltage, see page 241.
3. Selecting the brake control system and connection type, see page 242.
4. Dimensioning and routing the cable, see page 249.
5. Selecting the brake contactor, see page 250.
6. Important design information, see page 251.
7. Motor protection switch if necessary (to protect the brake coil), see page 252.
8. Brake monitoring diagnostic unit, see page 281.

8.5 Selecting the brake/braking torque according to the project planning data

The mechanical components, brake type and braking torque, are determined when the drive 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 and number of emergency braking operations
- Working brake or holding brake
- Amount of braking torque ("soft braking"/"hard braking")
- Hoist applications
- Minimum / maximum deceleration

Values determined/calculated during brake selection:

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 system (important for the electrical design for wiring diagrams)
Braking time **Braking distance** **Braking deceleration** **Braking accuracy**	The required data can only be observed if the aforementioned parameters meet the requirements
Braking work **Brake service life**	Maintenance interval (important for service)

1) The braking torque is determined from the requirements of the application with regards to the maximum deceleration and the maximum permitted distance or time.

For detailed information on selecting the size of the brakemotor and calculating the braking data, refer to the documentation "Drive Engineering - Practical Implementation – Project Planning for Drives".

Selecting the brake

The brake suitable for the relevant application is selected by means of the following main criteria:

- Required braking torque
- Required working capacity

Braking torque

The required braking torque is usually selected according to the required deceleration of the application.

The nominal braking torque values of the BE brakes have been determined and checked in accordance with DIN VDE 0580.

The "Brake assignment" show the possible braking torque rating for horizontal and vertical movements, see page 266.

Braking torque in hoist applications

The selected braking torque must be greater by at least factor 2 than the maximum load torque (consider static load).

If the brake is used as a holding brake only (when the drive is standing still), there is no friction to regenerate the brake lining. For such a type of operation, a minimum factor of 2.5 must be assumed for the BE brake.

Working capacity

The working capacity of the brake is determined by the permitted braking work W_1 per braking operation and the total permitted braking work W_{insp} until the next inspection of the brake.

You can determine the permitted braking work per cycle/braking operation W_1 by means of the diagrams "Permitted braking work of the BE brake in hoist applications" on page 274 ff and "Permitted braking work of the BE brake in travel drives" on page 278. For the total permitted braking work W_{insp}, refer to the table "Brake assignment", see page 266.

Permitted number of braking operations until maintenance of the brake:

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

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Braking work per braking operation:

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

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NB	= Number of braking operations until service
W_{insp}	= Total braking work until service [J]
W_1	= Braking work per braking operation [J]
J_{tot}	= Total mass moment of inertia (related to the motor shaft) in [kg m^2]
n	= Motor speed [rpm]
M_B	= Braking torque [Nm]
M_L	= Load torque [Nm] (note the sign) +: for vertical upward and horizontal movement -: for vertical downward movement

EMERGENCY STOP features

The BE brake is designed for a brake lining made of organic material. The emergency stop properties must therefore be based on the directions of movement.

1. Brakes for vertical direction of movement

   For hoist applications, the limits of the maximum permitted braking work per braking operation or the maximum permitted total braking work may not be exceeded in case of an emergency stop (values of the maximum braking work in the diagrams on page 274 and subsequent pages at Z=1 [S/h]).

   Please consult SEW-EURODRIVE if you need values for increased EMERGENCY STOP braking work in hoist applications.

2. Brakes for horizontal direction of movement

   For horizontal movements, such as in travel drive applications, higher braking work might be permitted for emergency stop situations if the following conditions A) - D) are fulfilled (values of increased braking work in the diagram on page 278).

   A) Selected braking torque

   Braking torque must be reduced by at least 1 step in relation to the brake size (for an overview of braking torques for travel drives, go to page 267 and subsequent pages).

   Example: BE20 with $M_{B\ max}$ = 200 Nm, reduced to $M_{B\ red}$ = 150 Nm for the travel drive.

   B) Brake wear

   The specific wear of the brake lining increases significantly in case of an emergency stop. It can reach factor 100 under certain circumstances.

   This additional wear must be considered when determining the maintenance cycle.

   C) Braking process

   During the braking process, the effective dynamic braking torque can be reduced due to the heating of the brake lining during braking. In extreme cases, the effective braking torque can be reduced to 60% of the rated value. This must be taken into account when determining the braking distance.

   Example: BE20 with $M_{B\ red}$ = 150 Nm, minimal effective $M_{B\ is}$ = 90 Nm

   D) Braking speed

   A decisive factor for the permitted increased braking work is the speed at which the braking process is triggered. The lower the speed, the higher the permitted braking work.

   Please consult SEW-EURODRIVE to obtain the values.

   - For increased emergency stop braking work in travel drive applications,
   - For brake size BE5 and smaller.

3. Brakes in angular direction of movement

   As the angular movement has a vertical and a horizontal component, the permitted emergency stop braking work is predominantly determined according to 1.

   Please contact SEW-EURODRIVE if you cannot clearly determine the direction of movement as horizontal or vertical.

Standard design

As standard, AC brakemotors DR..BE are supplied with an integrated BG/BGE brake controller for AC connection or a BS/BSG control unit installed in the control cabinet for DC 24 V connection. The motors are delivered completely ready for connection.

Brake size	AC connection	DC 24 V connection
BE05, BE1, BE2	BG	BS
BE5, BE11, BE20	BGE	BSG
BE30, BE32	BGE	--
BE120, BE122	BMP3.1	--

8.6 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 types for which the supply 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 system is installed in the terminal box.

The standard brake voltages are listed in the following table:

Brake	BE05 - BE20	BE30 - BE122
	Brake voltage	
Voltage range	**AC 220 - 242 / 380 - 420 V**	
Rated voltage	DC 24 V AC 230 V AC 400 V	- AC 230 V AC 400 V

For motor voltage information, refer to page 73 et seq.

Extra-low voltages 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 DC 24 V 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 rated voltage.

8.7 *Selecting the brake controller and the connection type*

Various brake controllers are available for controlling disk brakes with a DC coil, depending on the requirements and the operating conditions. All brake control systems are fitted as standard with varistors to protect against overvoltage.

The brake control systems are either installed directly on the motor in the 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.

Brake control system 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 pole-changing motors and for operation with a frequency inverter, the supply voltage for the brake must be supplied separately.

Furthermore, bear in mind that the brake response is delayed by the residual voltage of the motor if the brake is powered by the motor supply voltage. The brake application time t_2I specified in the technical data for cut-off in the AC circuit applies to a separate supply only.

Wiring space of the motor

The following tables list 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 size DR.71-DR.225

Type	Function	Voltage	Holding current I_{Hmax} [A]	Type	Part number	Color code
BG	One-way rectifier	AC 230 - 575 V	1.4	BG 1.4	827 881 4	Black
		AC 150 - 500 V	1.5	BG 1.5	825 384 6	Black
		AC 24 - 500 V	3.0	BG 3	825 386 2	Brown
BGE	One-way rectifier with electronic switching	AC 230 - 575 V	1.4	BGE 1.4	827 882 2	Red
		AC 150 - 500 V	1.5	BGE 1.5	825 385 4	Red
		AC 42 - 150 V	3.0	BGE 3	825 387 0	Blue
BSR	One-way rectifier + current relay for cut-off in the DC circuit	AC 150 - 500 V	1.0	BGE 1.5 + SR 11	825 385 4 826 761 8	Red -
			1.0	BGE 1.5 + SR 15	825 385 4 826 762 6	Red -
			1.0	BGE 1.5 + SR 19	825 385 4 826 246 2	Red -
		AC 42 - 150 V	1.0	BGE 3 + SR11	825 387 0 826 761 8	Blue -
			1.0	BGE 3 + SR15	825 387 0 826 762 6	Blue -
			1.0	BGE 3 + SR19	825 387 0 826 246 2	Blue -

Table continued on next page.

Type	Function	Voltage	Holding current I_{Hmax} [A]	Type	Part number	Color code
BUR	One-way rectifier + voltage relay for cut-off in the DC circuit	AC 150 - 500 V	1.0	BGE 1.5 + UR 15	825 385 4 826 759 6	Red -
		AC 42 - 150 V	1.0	BGE 3 + UR 11	825 387 0 826 758 8	Blue -
BS	Varistor protection circuit	DC 24 V	5.0	BS24	826 763 4	Aqua
BSG	Electronic switching	DC 24 V	5.0	BSG	825 459 1	White

Type	Variant	Standard terminal box	Integrated plug connector IS	Industrial plug connector IV[1] (AC.., AS.., AM.., AB.., AK.., AD..)
BG	BG1.4 BG1.5 BG3	71 - 100 / BE2	71 - 100 / BE2	71 - 100 / BE2
BGE	BG1.4 BGE1.5 BGE3	71 - 225 / BE32	71 - 132 /BE11	71 - 225 / BE32
BSR	BGE1.5 + SR11 BGE1.5 + SR15 BGE1.5 + SR19 BGE3 + SR11 BGE3 + SR15 BGE3 + SR19	71 - 225 / BE32	71 - 132 /BE11	71 - 225 / BE32
BUR	BGE1.5 + UR15 BGE3 + UR11	71 - 225 / BE32	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 current strength of the relevant plug connector

Motor size DR.315

Type	Function	Voltage	Holding current I_{Hmax} [A]	Type	Part number	Color code
BMP	Half-wave rectifier with electronic switching, integrated voltage relay for cut-off in the DC circuit.	AC 230 - 575 V	2.8	BMP 3.1	829 507 7	-

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.

Motor size DR.71-DR.225

Type	Function	Voltage	Holding current I_{Hmax} [A]	Type	Part number	Color code
BMS	One-way rectifier such as BG	AC 230 - 575 V	1.4	BMS 1.4	829 830 0	Black
		AC 150 - 500 V	1.5	BMS 1.5	825 802 3	Black
		AC 42 - 150 V	3.0	BMS 3	825 803 1	Brown
BME	One-way rectifier with electronic switching such as BGE	AC 230 - 575 V	1.4	BME 1.4	829 831 9	Red
		AC 150 - 500 V	1.5	BME 1.5	825 722 1	Red
		AC 42 - 150 V	3.0	BME 3	825 723 X	Blue
BMH	One-way rectifier with electronic switching and heating function	AC 230 - 575 V	1.4	BMH 1.4	829 834 3	Green
		AC 150 - 500 V	1.5	BMH 1.5	825 818 X	Green
		AC 42 - 150 V	3	BMH 3	825 819 8	Yellow
BMP	One-way rectifier with electronic switching, integrated voltage relay for cut-off in the DC circuit	AC 230 - 575 V	1.4	BMP 1.4	829 832 7	White
		AC 150 - 500 V	1.5	BMP 1.5	825 685 3	White
		AC 42 - 150 V	3.0	BMP 3	826 566 6	Light blue
BMK	One-way rectifier with electronic switch mode, DC 24 V control input and separation in the DC circuit	AC 230 - 575 V	1.4	BMK 1.4	829 883 5	Aqua
		AC 150 - 500 V	1.5	BMK 1.5	826 463 5	Aqua
		AC 42 - 150 V	3.0	BMK 3	826 567 4	Bright red
BMV	Brake control unit with electronic switching, DC 24 V control input and fast cut-off	DC 24 V	5.0	BMV 5	1 300 006 3	White

Type	Variant	Standard terminal box	Integrated plug connector IS	Industrial plug connector IV[1] (AC.., AS.., AM.., AB.., AK.., AD..)
BMS	BMS 1.4 BMS 1.5 BMS 3	71 - 100 / BE2	71 - 100 / BE2	71 - 100 / BE2
BME	BME 1.4 BME 1.5 BME 3	71 - 225 / BE32	71 - 132 /BE11	71 - 225 / BE32
BMP	BMP 1.4 BMP 1.5 BMP 3	71 - 225 / BE32	71 - 132 /BE11	71 - 225 / BE32
BMK	BMK 1.4 BMK 1.5 BMK 3	71 - 225 / BE32	71 - 132 /BE11	71 - 225 / BE32
BMH	BMH 1.4 BMH 1.5 BMH 3	71 - 225 / BE32	71 - 132 /BE11	71 - 225 / BE32
BMV	BMV 5	71 - 180 / BE20	71 - 132 /BE11	71 - 180 / BE20

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

Motor size DR.315

Type	Function	Voltage	Holding current I_{Hmax} [A]	Type	Part number	Color code
BMP	Half-wave rectifier with electronic switching, integrated voltage relay for cut-off in the DC circuit.	AC 230 - 575 V	2.8	BMP 3.1	829 507 7	-

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 types of protection, plug connections and special brake control systems.

High switching frequency

A high switching frequency in combination with significant external mass moments of inertia is often a requirement for brakemotors.

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 switching frequency.

Brakes from BE5 are designed for a high switching frequency as standard.

The table below shows that besides BGE (BME) and BSG, the brake control systems BSR, BUR, BMH, BMK and BMP also have properties for shortening the response time in addition to their other functions.

Brake	High switching frequency	
	Brake control system for AC connection	Brake control system for DC 24 V connection
BE05	BGE (BSR, BUR) in terminal box or BME (BMH, BMP, BMK) in control cabinet	BSG in terminal box or BMV and BSG in control cabinet
BE1		
BE2		
BE5		
BE11		
BE20		
BE30		-
BE32		

High stopping accuracy

Positioning systems require high stopping accuracy.

Due to their mechanical principle, the degree of wear on the linings and on-site physical peripheral conditions, brakemotors are subject to an empirically determined braking distance variation of ± 12 %. The shorter the response times, the smaller the absolute value of the variation.

Cut-off in the DC and AC circuits makes it possible to shorten the brake application time t_2II considerably.

Cut-off in the DC and AC circuits with mechanical contact:

In the sections "Motor wiring space" on page 242 and subsequent pages and "Control cabinet" on page 244 and subsequent pages, we have already referred to the possibility of achieving this solution by conventional means by using an extra contact.

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 BGE 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 or BUR in conjunction with the motor or brake voltage. The SEW order processing system assigns a suitable relay.

Refer to page 242 and subsequent pages for relay retrofitting options suited to the motor and voltage. The electronic relays can switch up to 1 A brake current and thereby limit the selection to BSR and BUR.

Principle and selection of the BSR brake controller

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 supply 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 current relay and brake rectifier are allocated depending on the specified motor and brake voltages when ordering.

The following table shows the allocation of the SR current relay to the rated motor current I_N [A] in Y connection and the maximum holding current of the brake I_{Hmax} [A].

$I_{Hmax} = I_H \times 1.3$ $[A_{AC}]$

Current relay	Rated motor current I_N [A] in Y connection	Max. holding current of the brake I_{Hmax} [A]
SR11	0.6 - 10	1
SR15	10 - 50	1
SR19	50 - 90	1

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 control unit has a separate voltage supply because there is no constant voltage at the motor terminal board (pole-changing motors, motor with 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 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.

Brake	BUR (BGE + UR..) for brake control system (AC V)														
	23-26	57-62	79-123	124-138	139-193	194-217	218-243	244-273	274-306	307-343	344-379	380-431	432-484	485-542	543-600
BE05			UR11	UR11	UR15	UR15	UR15	UR15	UR15	UR15	UR15	UR15	UR15	UR15	
BE1			UR11	UR11	UR15	UR15	UR15	UR15	UR15	UR15	UR15	UR15	UR15	UR15	
BE2			UR11	UR11	UR15	UR15	UR15	UR15	UR15	UR15	UR15	UR15	UR15	UR15	
BE5				UR11	UR15	UR15	UR15	UR15	UR15	UR15	UR15	UR15	UR15	UR15	
BE11							UR15	UR15	UR15	UR15	UR15	UR15	UR15	UR15	
BE20							UR15	UR15	UR15	UR15	UR15	UR15	UR15	UR15	
BE30									UR15	UR15	UR15	UR15	UR15	UR15	
BE32									UR15	UR15	UR15	UR15	UR15	UR15	

UR15 UR11 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 180 (H) are valid reasons for installing the brake control system in the control cabinet.

Only brake control systems 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 DC 24 V direct connection for the special case of "electrical brake release when motor is at standstill".

Special versions of brakemotors 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 function anti-condensation heating.

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, the coil system creates heat, which causes a rise in temperature of about 25 K compared to the ambient temperature.

The heating function (via K16 in the sample circuits) must be ended before the brake starts its normal switching function again.

BMH is available for the motor sizes 71 - 225 and is only mounted in the control cabinet.

Brake control system in the control cabinet

The SEW brake control systems are also available for control cabinet installation. The following aspects favor control cabinet installation:

- Unfavorable ambient conditions at the motor (e.g. motor with thermal class 180 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 system for service purposes

When the brake control system is installed in the control cabinet, 3 cables must always be routed between the brake coil and the control system. An auxiliary terminal strip with 5 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.

<table>
<tr><th rowspan="2">Brake type</th><th colspan="2">Brake control system in the control cabinet</th></tr>
<tr><th>For AC connection</th><th>For DC 24 V connection</th></tr>
<tr><td>BE05</td><td rowspan="3">BMS, BME, BMH, BMP, BMK</td><td rowspan="6">BSG
BMV</td></tr>
<tr><td>BE1</td></tr>
<tr><td>BE2</td></tr>
<tr><td>BE5</td><td rowspan="5">BME, BMH, BMP, BMK</td></tr>
<tr><td>BE11</td></tr>
<tr><td>BE20</td></tr>
<tr><td>BE30</td><td rowspan="4">-</td></tr>
<tr><td>BE32</td></tr>
<tr><td>BE120</td><td rowspan="2">BMP3.1</td></tr>
<tr><td>BE122</td></tr>
</table>

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 any particular group of brakes in parallel to one brake control system.

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 system.

TIP

If a fault occurs in one brake, all brakes must be cut-off in the AC circuit.

8.8 Dimensioning 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 rated voltage. The data sheets for the brakes provide information on the possible supply voltages and the result operating currents.

Refer to the table below for 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.

Brake type	Minimum cross section in mm² (AWG) of the brake cables for cable lengths ≤ 50 m and brake voltage (AC V)					
	24	60 DC24 V	120	184 - 208	230	254 - 575
BE05	10 (8)	1.5 (16)	1.5 (16)	1.5 (16)	1.5 (16)	1.5 (16)
BE1	10 (8)	1.5 (16)	1.5 (16)	1.5 (16)	1.5 (16)	1.5 (16)
BE2	10 (8)	2.5 (12)	1.5 (16)	1.5 (16)	1.5 (16)	1.5 (16)
BE5	1)	4 (10)	1.5 (16)	1.5 (16)	1.5 (16)	1.5 (16)
BE11	1)	10 (8)	2.5 (12)	1.5 (16)	1.5 (16)	1.5 (16)
BE20	1)	10 (8)	2.5 (12)	1.5 (16)	1.5 (16)	1.5 (16)
BE30 / 32	1)	1)	2.5 (12)	1.5 (16)	1.5 (16)	1.5 (16)
BE120 / 122	1)	1)	1)	1)	1.5 (16)	1.5 (16)

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.

b) Routing information

Brake cables must always be routed separately from other power cables with phased currents unless they are shielded.

Ensure adequate equipotential bonding between the drive and the control cabinet (for an example, see the documentation Drive Engineering - Practical Implementation "EMC in Drive Engineering").

Power cables with phased currents are in particular

- Output cables from frequency inverters and servo controllers, soft start units and brake units
- Supply cables to braking resistors

8.9 Selection of the brake 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 brake contactor for supply system 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 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, see page 244), which perform the cut-off in the DC circuit internally, have been specifically 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).

8.10 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 on the supply system.

Additional instructions in the frequency inverter documentation must also be taken into account for operation with frequency inverters.

The EMC instructions in the servo controller documentation must also be taken into account for the operation of SEW servomotors with brake.

You must always adhere to the cable routing instructions (see page 249).

b) Connection type

The electrical design team and, in particular the installation and startup personnel, must be given detailed information on the connection type and the intended brake function.

Maintaining certain brake application times may be relevant to safety. The decision to implement cut-off in the AC circuit or cut-off in the DC and AC circuits must be passed on clearly and unambiguously to the people undertaking the work. The brake application times t_2I specified in the data summary (see page 265) 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 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 contactor (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 system.

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.

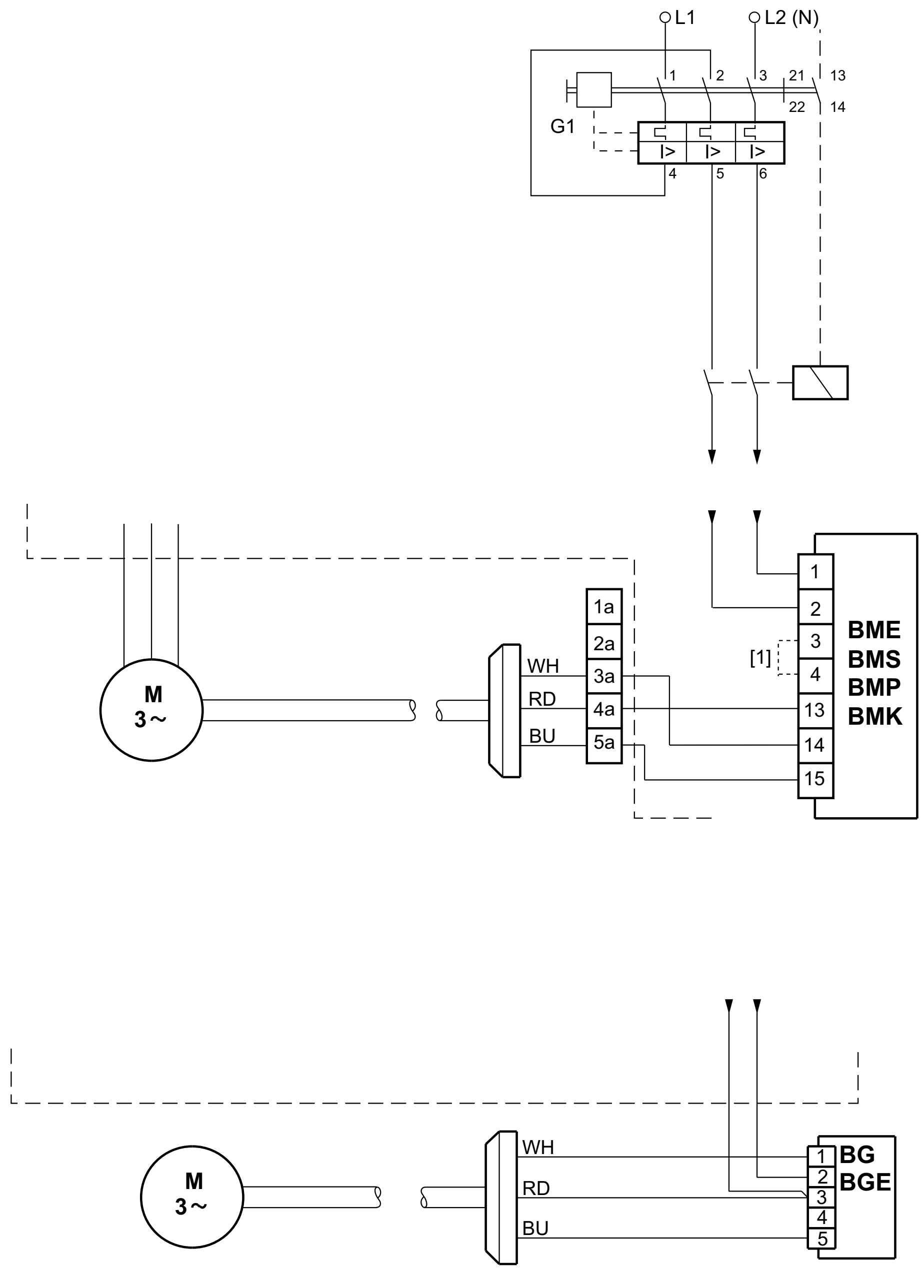
8.11 Motor protection switch

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 $I_{Brake\ holding\ current}$ (r.m.s. value). For holding currents, see page 242 and subsequent pages.

Motor protection switches are suitable for all brake rectifiers in the control cabinet (important: except for the BMH heating function) and in the terminal box with separate voltage supply.

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



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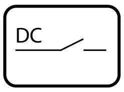
[1] Customers must connect terminals 3 and 4 according to the relevant wiring diagram.

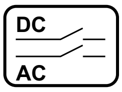
8.12 Block diagrams

Key

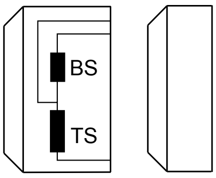
Cut-off in the AC circuit
(Standard application of the brake)



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

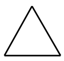


Cut-off in the DC and AC circuits
(rapid brake application)



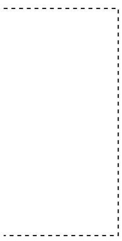
Brake
BS = Accelerator coil
TS = Coil section

Auxiliary terminal strip in terminal box



Motor with delta connection

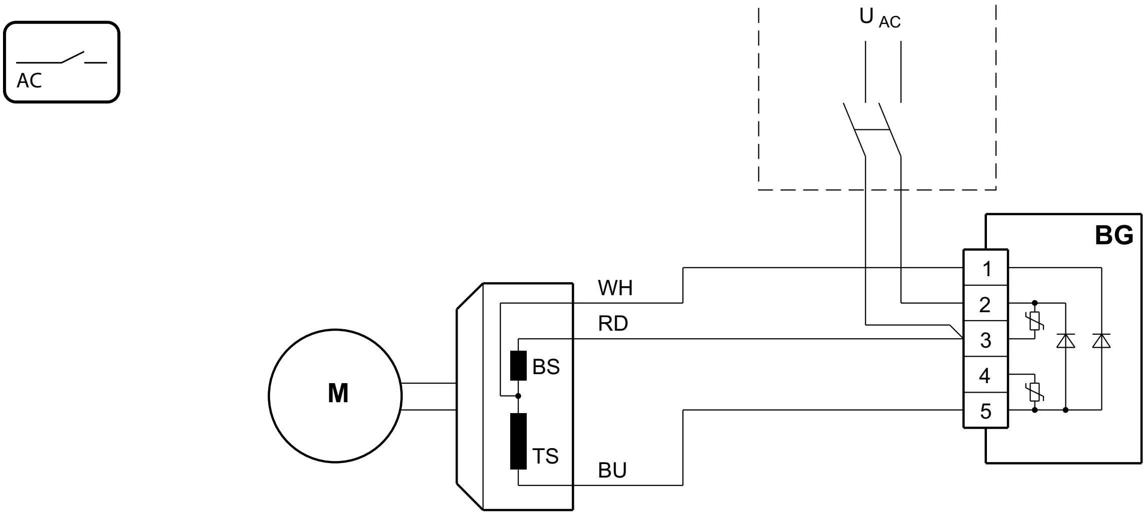
Motor with star connection



Control cabinet limit

WH	White
RD	Red
BU	Blue
BN	Brown
BK	Black

BG brake controller



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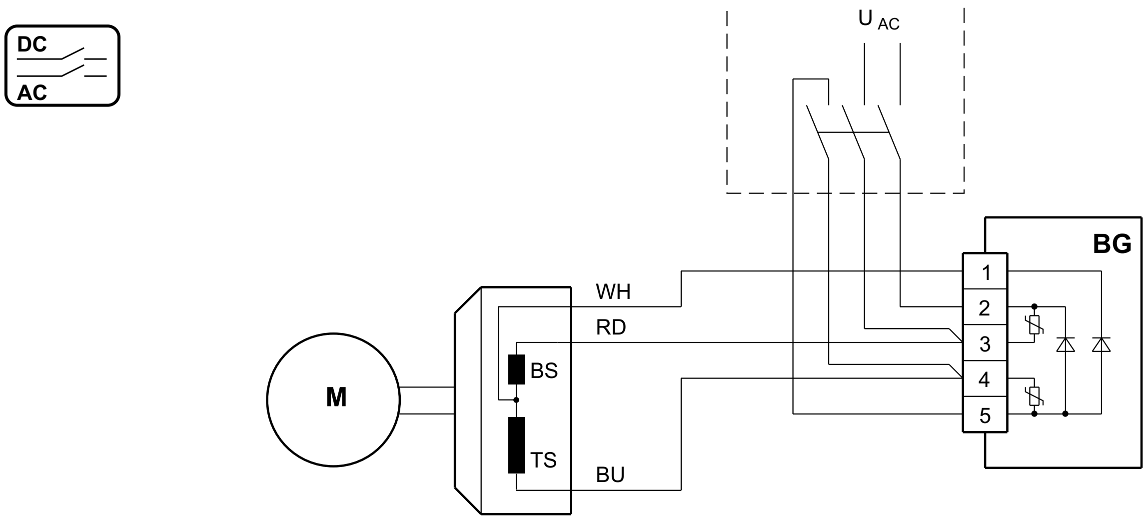

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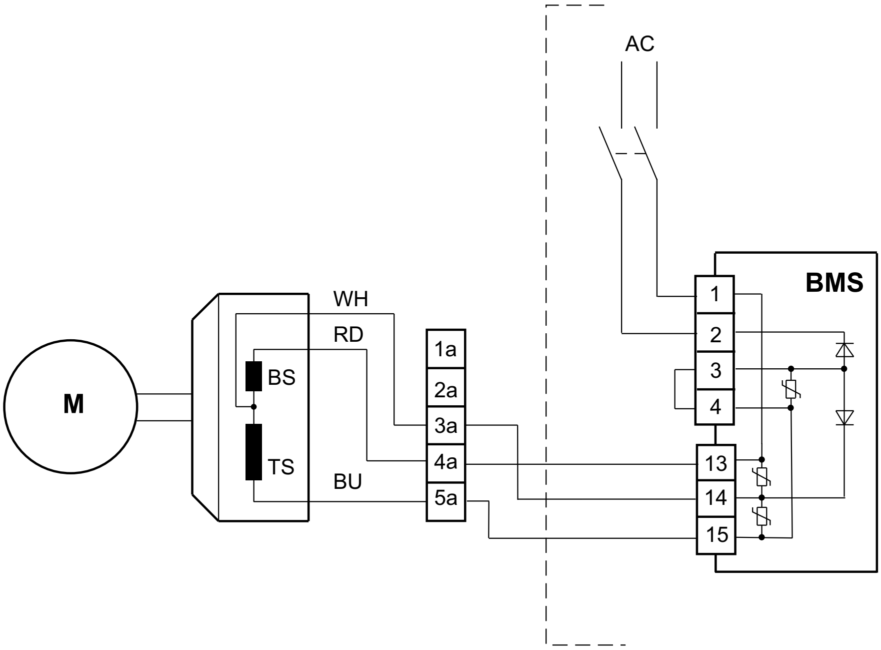
Brake control system BMS



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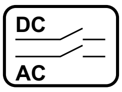

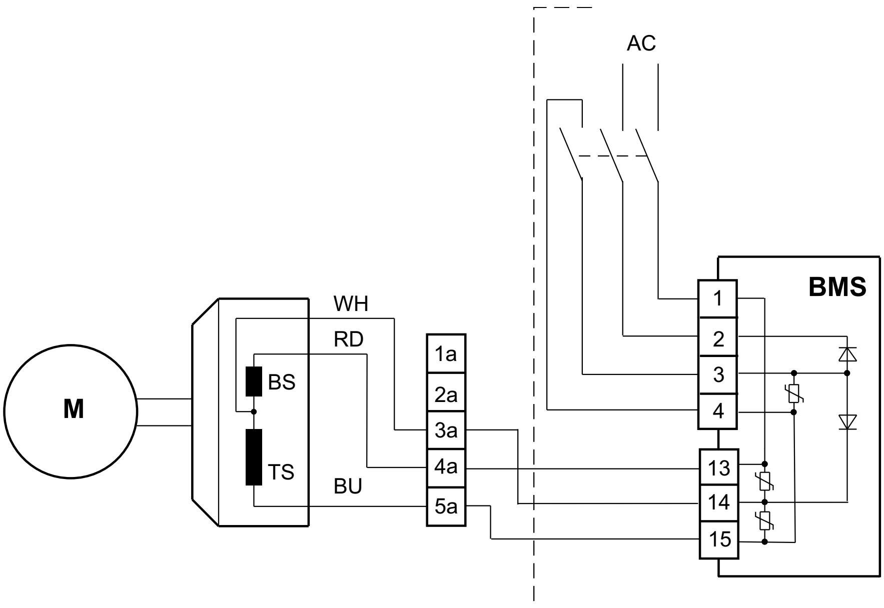

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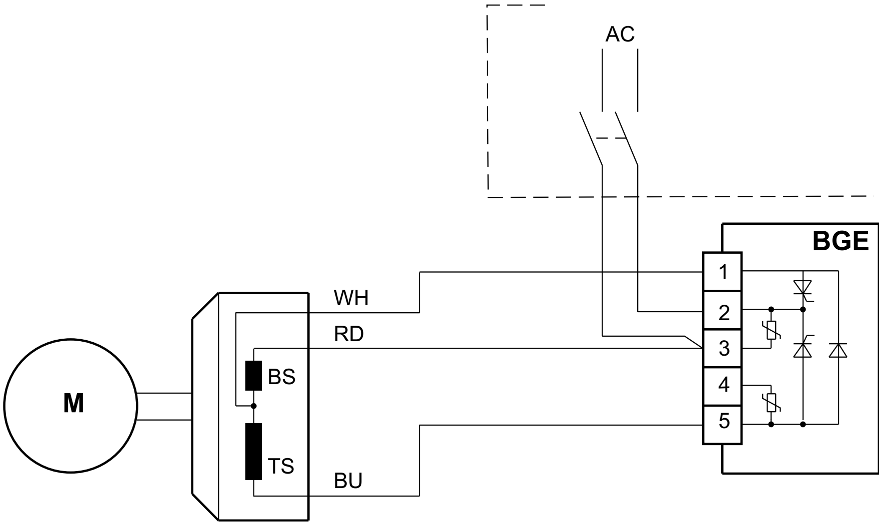
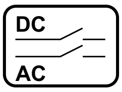
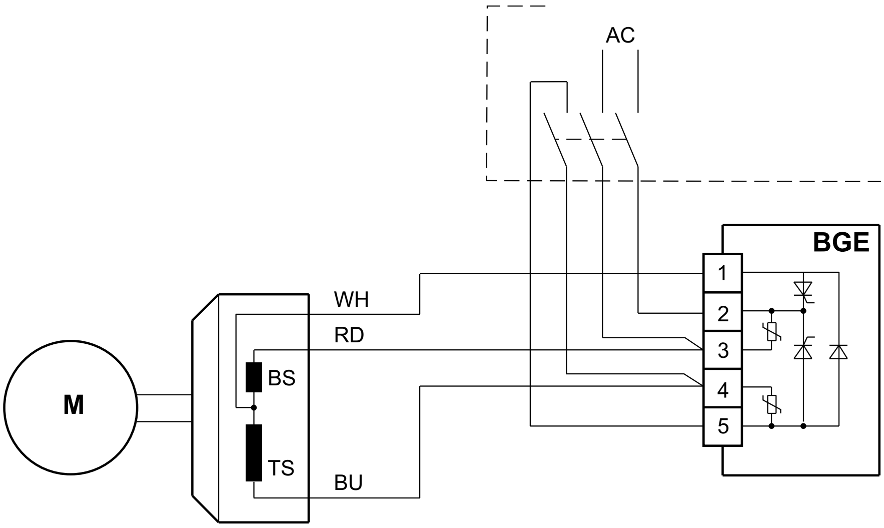
Brake control system BGE



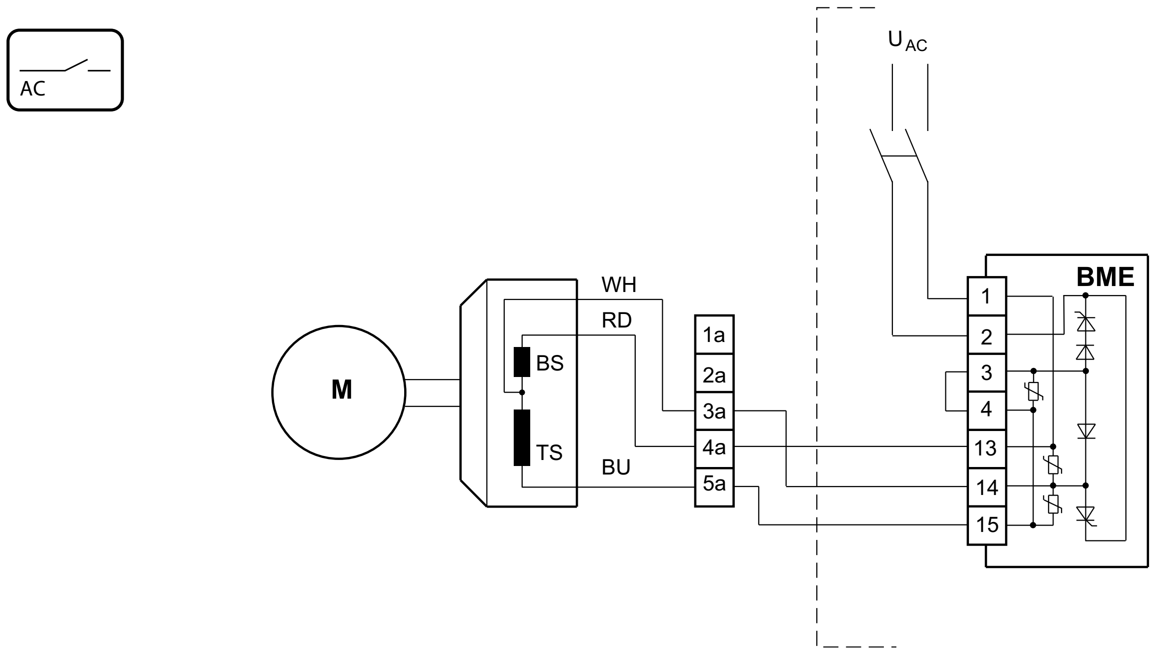
50648AXX



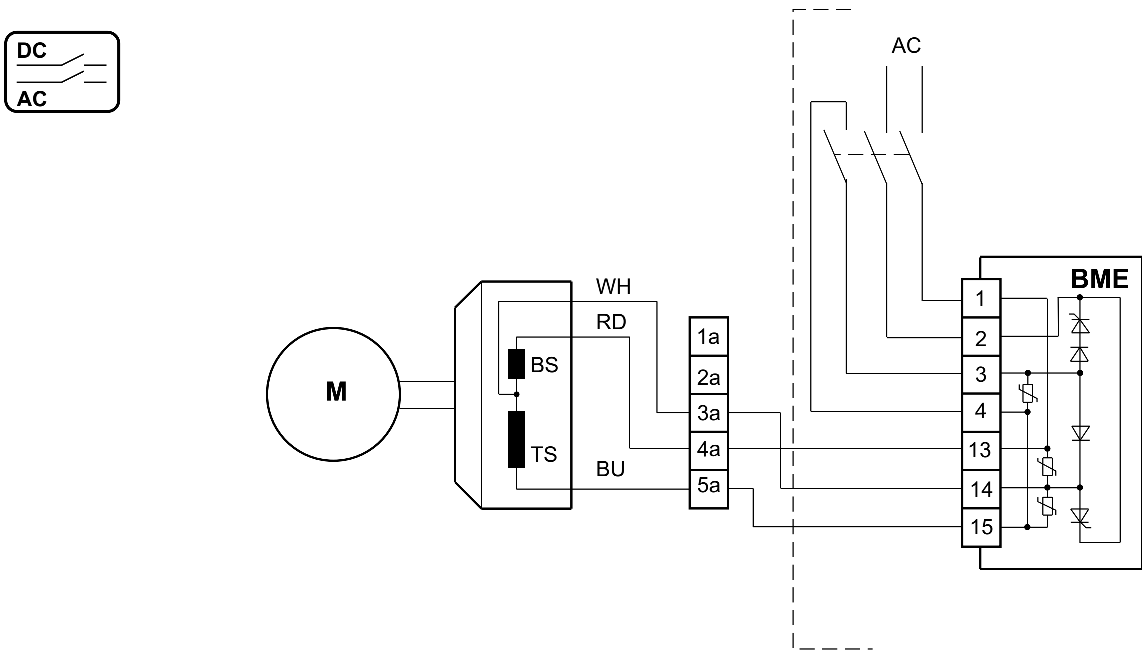


50653BXX

Brake control system BME



50656AXX

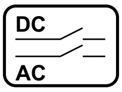


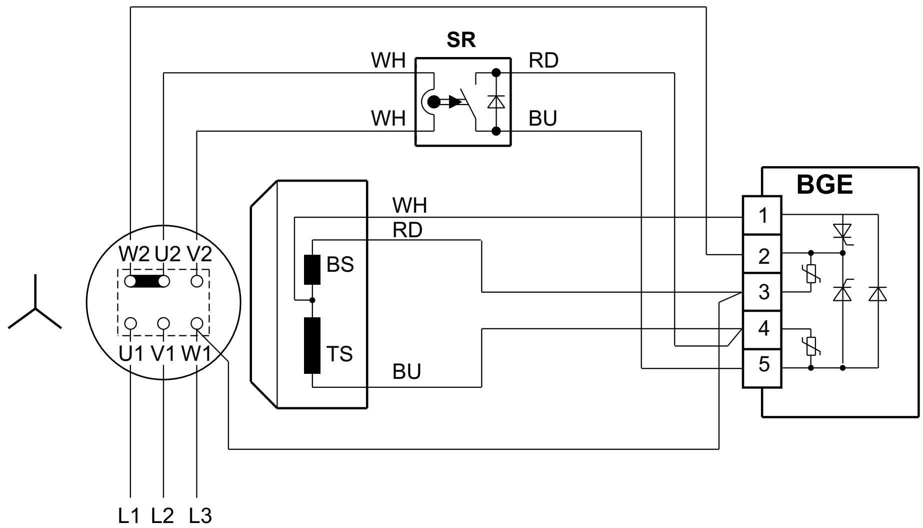
50657AXX

Brake control system BSR

Brake voltage = Phase voltage

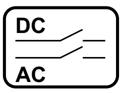
Example: Motor 230 V△ / 400 V ⅄ , brake AC 230 V

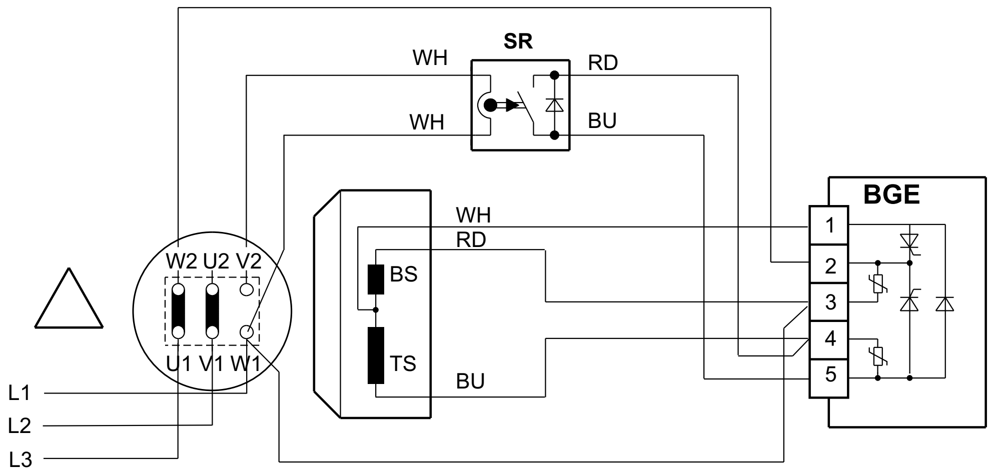




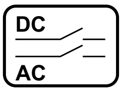
56557AXX

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



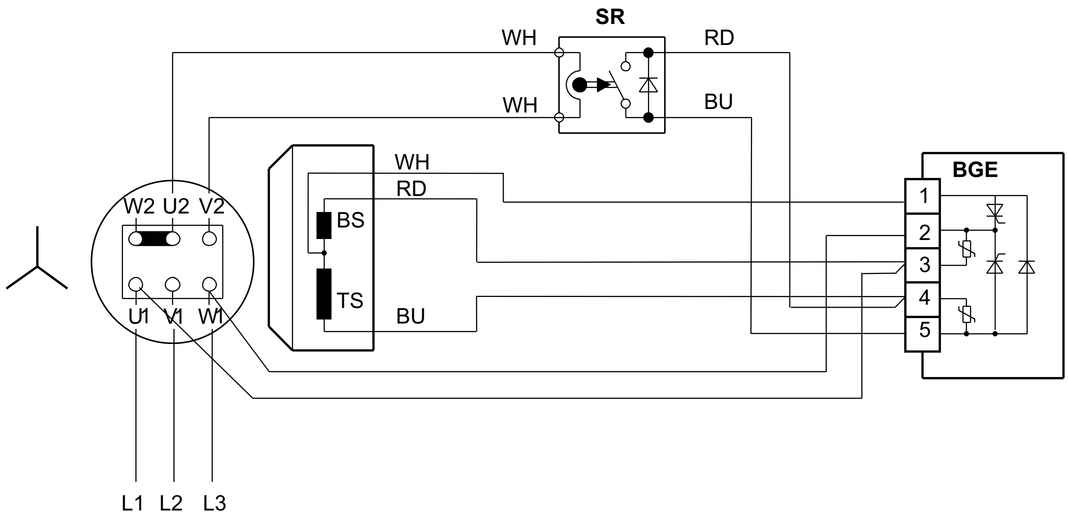


57839AXX



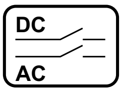
Brake voltage = Phase-to-phase voltage

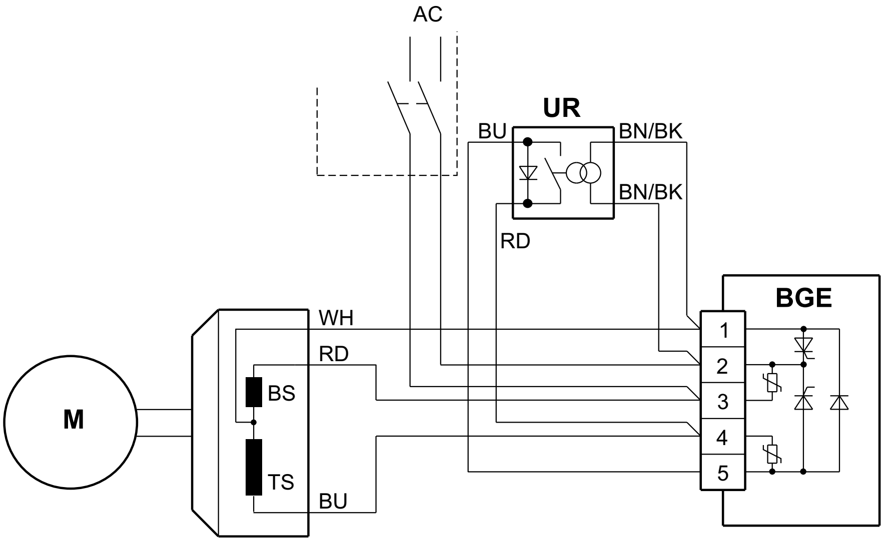
The input voltage of the brake rectifier corresponds to the line voltage of the motor, e.g. motor: 400 V $\curlywedge$, brake: AC 400 V



57840AXX

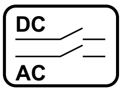
Brake control system BUR

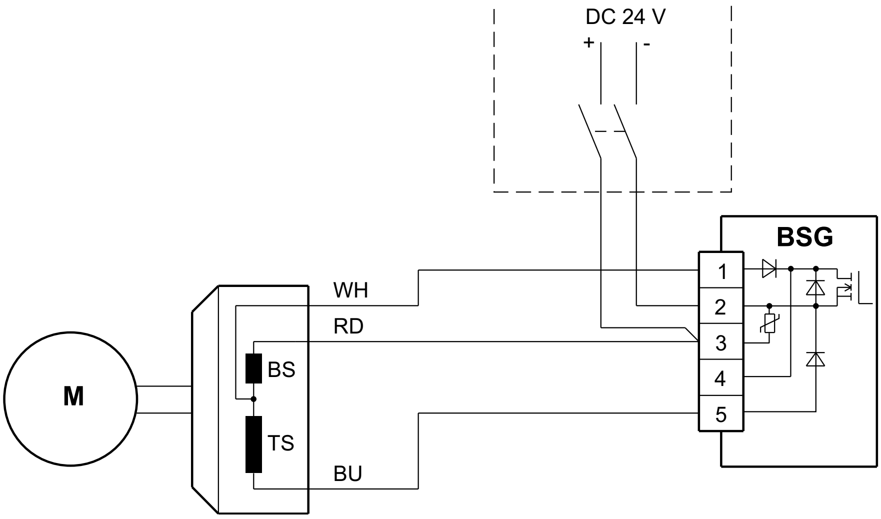




56580AXX

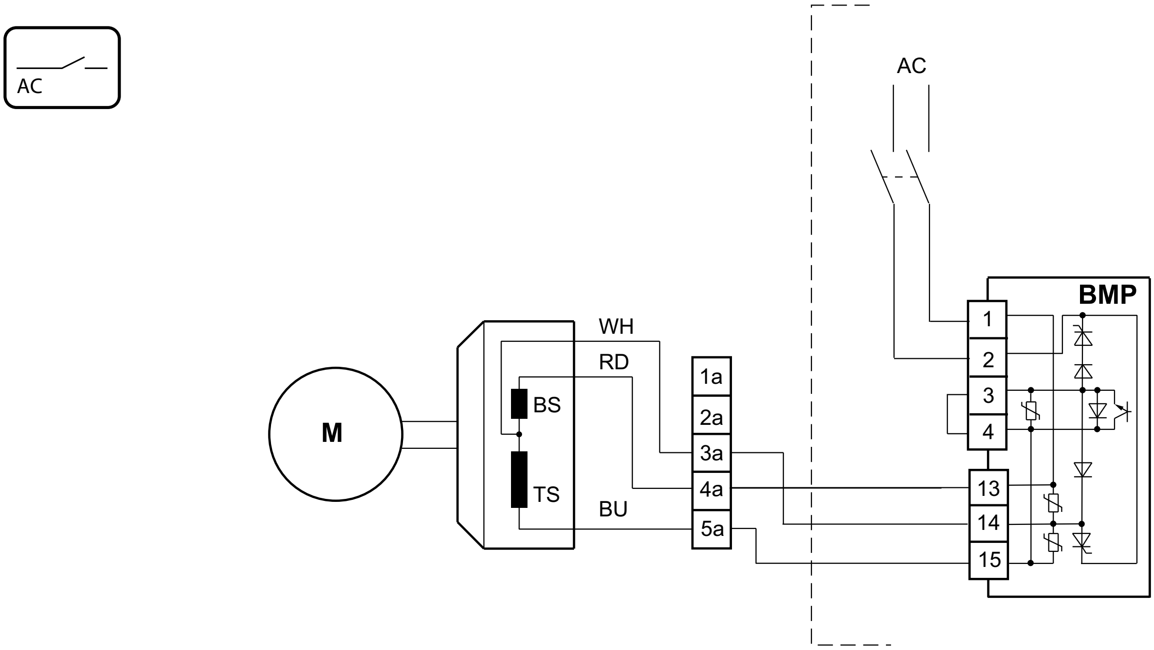
Brake control system BSG



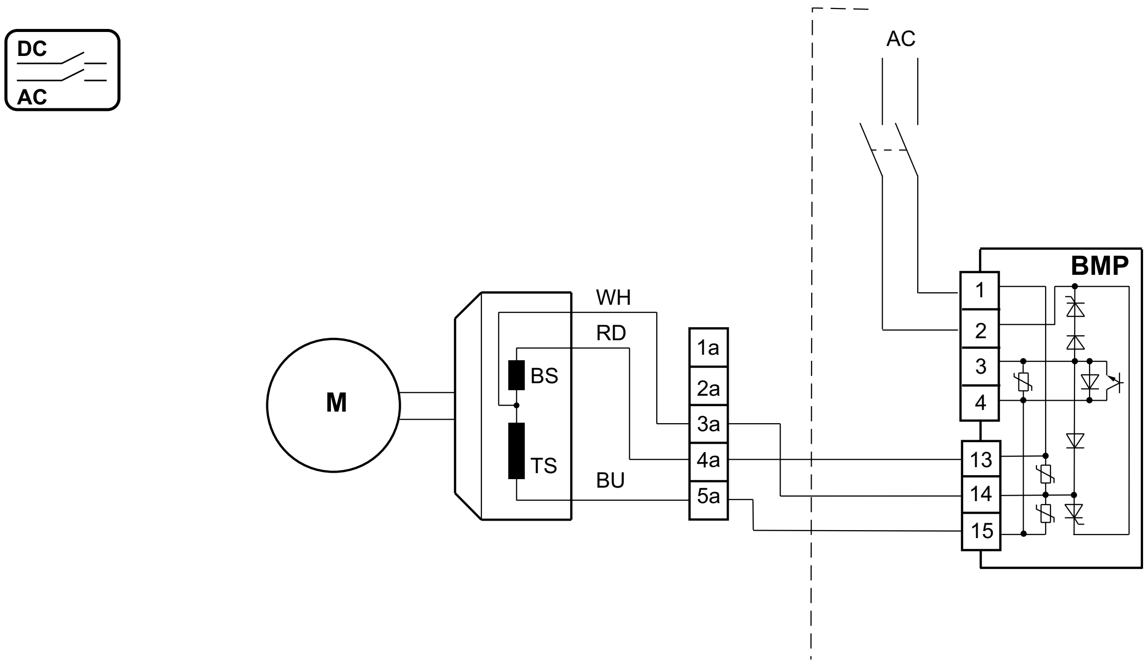


56581AXX

Brake control system BMP

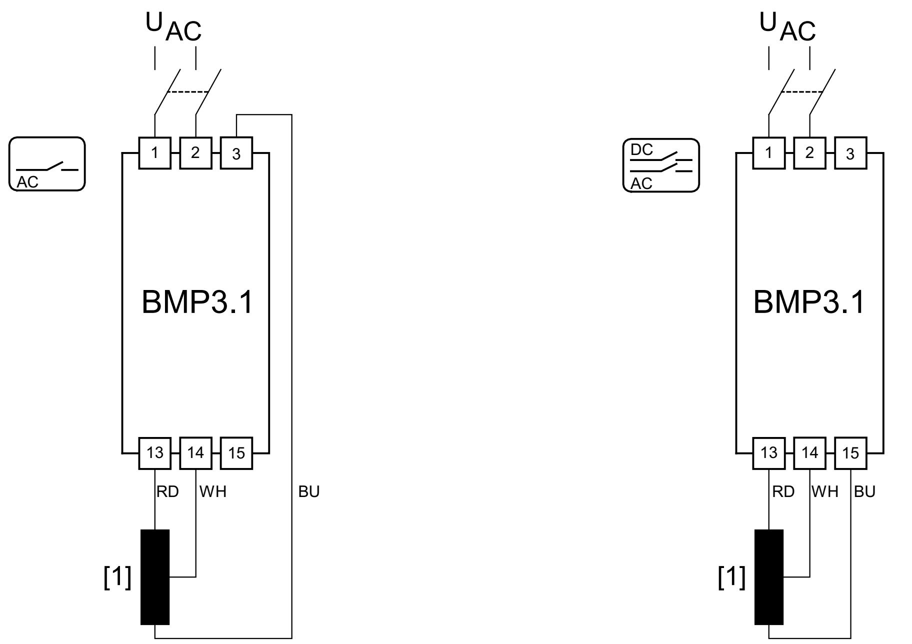


57891AXX



57892AXX

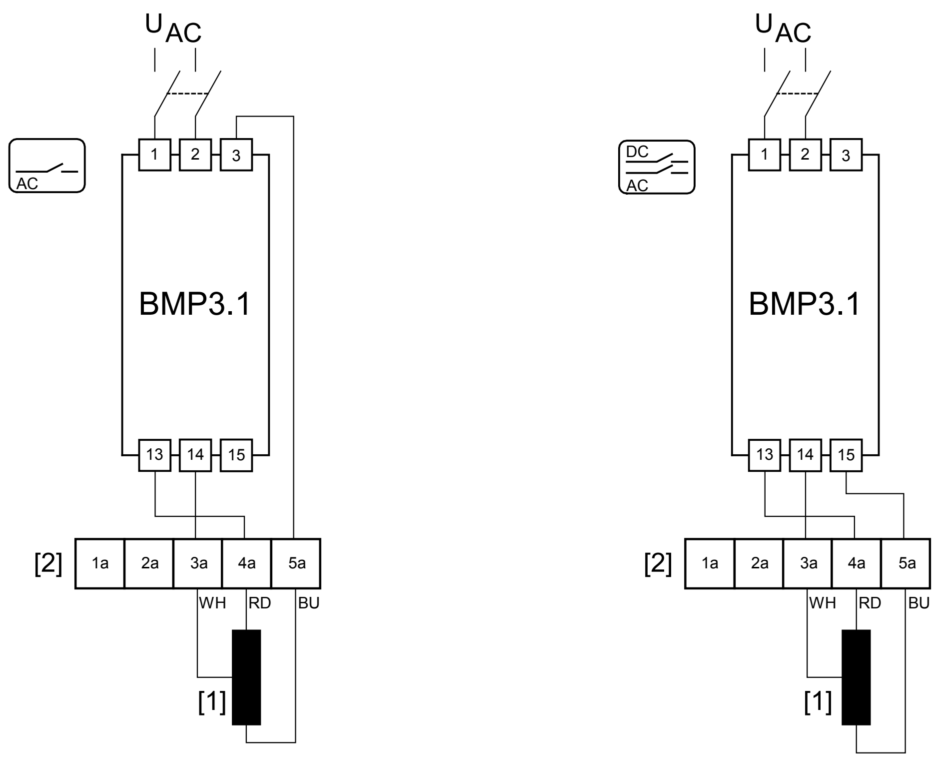
BMP 3.1 brake controller (motor)



61837AXX

[1] Brake coil

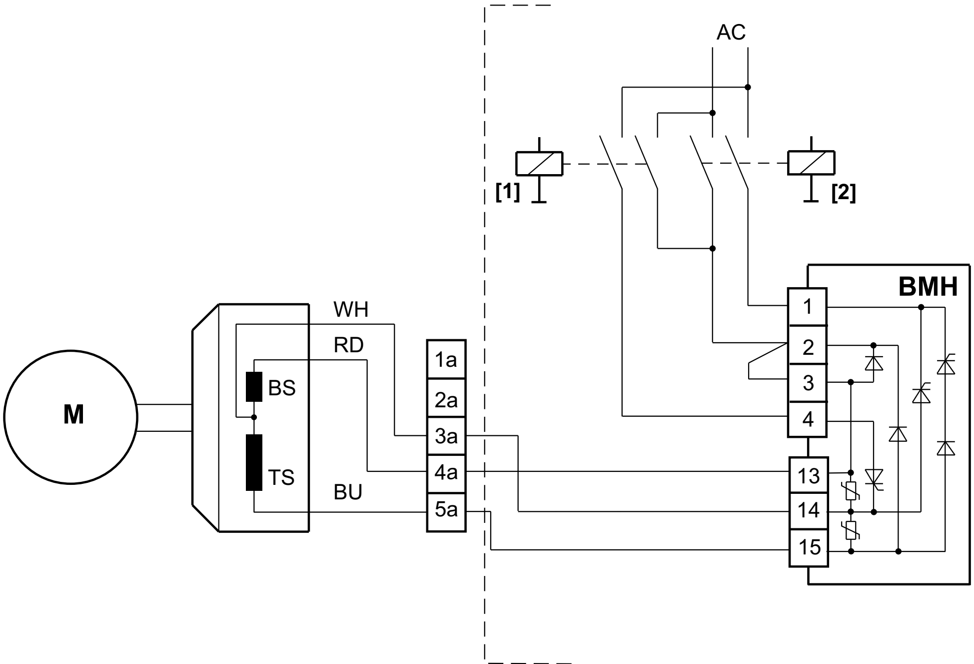
Brake control system BMP 3.1 (control cabinet)



61838AXX

[1] Brake coil
[2] Terminal strip

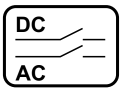
Brake control system BMH

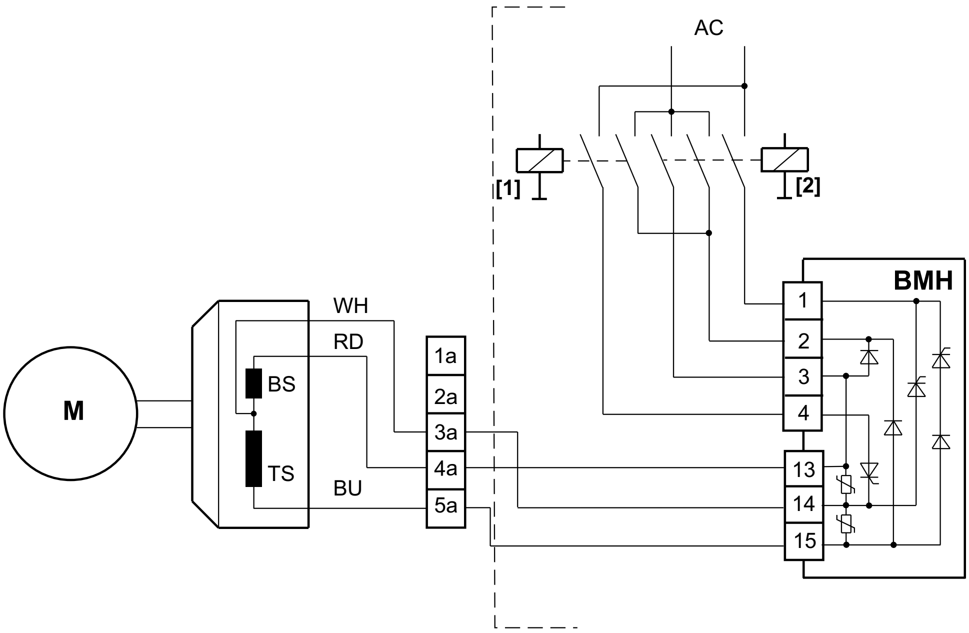


57893AXX

[1] Heating

[2] Ventilation



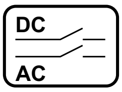


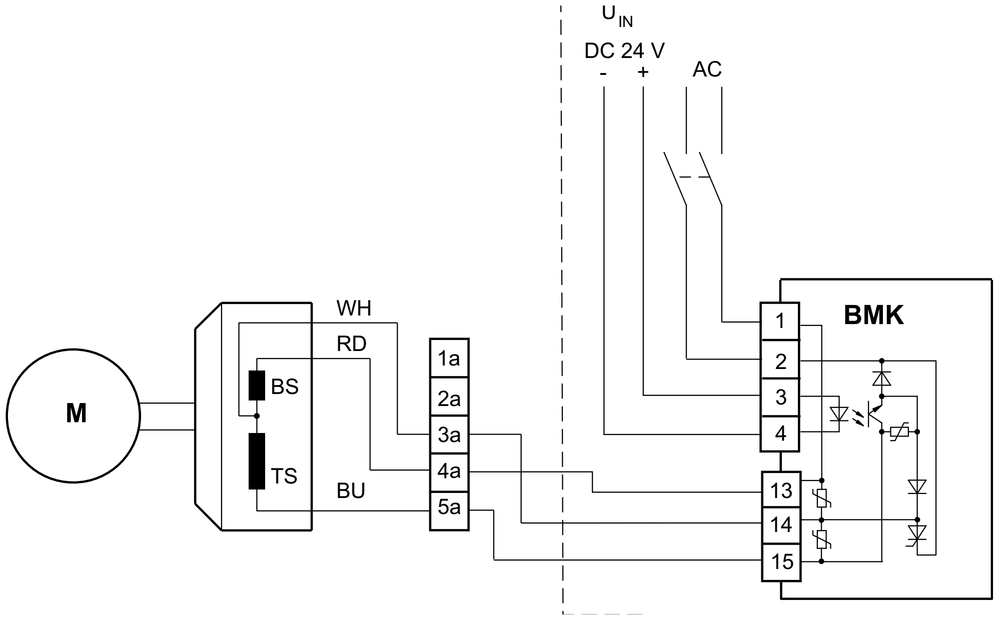
57894AXX

[1] Heating

[2] Ventilation

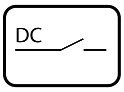
Brake control system BMK

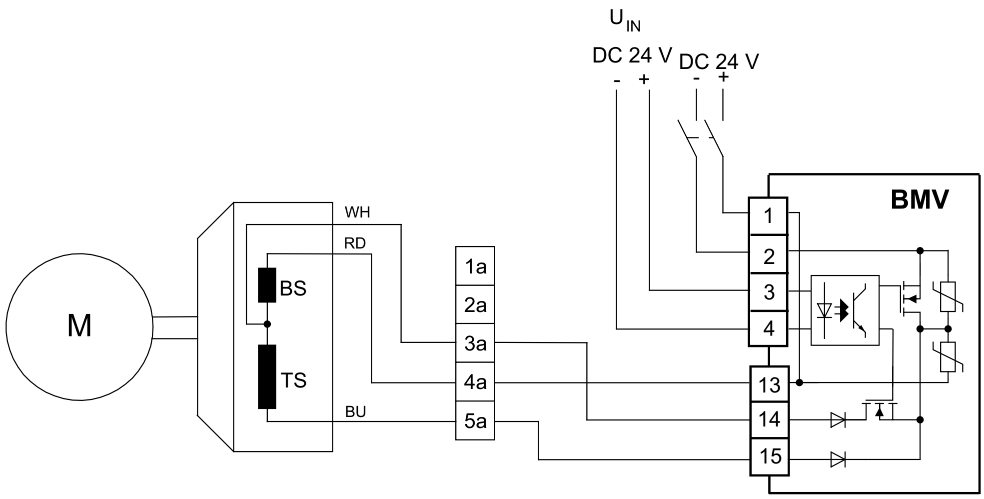




50868AXX

Brake control system BMV





57408AXX

U_{IN} = Control signal

8.13 Technical data of the BE brake

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 result in reduced braking torque values $M_{B\ red}$.

Brake type	M_{Bmax} [Nm]	Reduced braking torques M_{Bred} [Nm]					W_{insp} [10^6 J]	t_1 [10^{-3}s]		t_2 [10^{-3}s]		P_B [W]
								BG	BGE	t_2II	t_2I	
BE05	5.0	3.5	2.5	1.8	-	-	120	34	15	10	42	32
BE1	10	7.0	5.0	-	-	-	120	55	10	12	76	32
BE2	20	14	10	7.0	-	-	165	73	17	10	68	43
BE5	55	40	28	20/14	-	-	260	-	37	10	70	49
BE11	110	80	55	40	-	-	640	-	41	15	82	76
BE20	200	150	110	80/55	-	-	1000	-	57	20	88	100
BE30	300	200	150	100	75	-	1500	-	60	16	80	130
BE32	600	500	400	300/	200	150	1500	-	60	16	80	130
BE120	1000	800	600	400	-	-	520	-	120	40	130	250
BE122	2000	1600	1200	800	-	-	520	-	120	40	130	250

$M_{B\ max}$ = Maximum braking torque
$M_{B\ red}$ = Reduced braking torque
W_{insp} = Braking work until service
t_1 = Response time
t_2I = Brake application time for cut-off in the AC circuit
t_2II = Brake application time for cut-off in the DC and AC circuit
P_B = Braking power

TIP

The response and application times are recommended values in relation to the maximum braking torque.

8.14 Different brake sizes

Depending on the demands placed on the brake, different brake sizes are available for mounting to the respective motor.

Brake assignment

Hoist (vertical movement)

The table below shows possible assignments of motor and BE brake and possible braking torques for hoist applications:

Motor type	Design	Brake type	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	100	110	150	200	300	400	500	600	800	1000	1200	1600	2000
DR.71	Inte-grated	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	165					x	x	x	x																	
DR.90	Modu-lar	BE1	120				x	x	x																			
		BE2	165					x	x	x	x																	
		BE5	260							x	x	x	x	x														
DR.100		BE2	165					x	x	x	x																	
		BE5	260							x	x	x	x	x														
DR.112 DR.132		BE5	260							x	x	x	x	x														
		BE11	640										x	x	x		x											
DR.160		BE11	640										x	x	x		x											
		BE20	1000												x		x	x	x									
DR.180		BE20	1000												x		x	x	x									
		BE30	1500													x		x	x	x								
		BE32	1500															x	x	x	x							
DR.200 DR.225		BE30	1500													x		x	x	x								
		BE32	1500															x	x	x	x	x	x					
DR.315		BE120	520																		x		x	x	x			
		BE122	520																					x		x	x	x

Travel drive (horizontal movement)

The table below shows possible assignments of motor and BE brake and possible braking torques for travel drive applications:

Motor type	Design	Brake type	W_{insp} [10^6 J]	Braking torque gradation in Nm																	
				28	40	55	75	80	100	110	150	200	300	400	500	600	800	1000	1200	1600	2000
DR.112 DR.132	Modular	BE11	640		x	x		x													
DR.160		BE11	640		x	x		x													
		BE20	1000			x		x		x	x										
DR.180		BE20	1000			x		x		x	x										
		BE30	1500				x		x		x	x									
		BE32	1500								x	x	x	x							
DR.200 DR.225		BE30	1500				x		x		x	x									
		BE32	1500								x	x	x	x							
DR.315		BE120	520											x		x	x				
		BE122	520														x		x	x	

8

8.15 Operating currents for brakes

The following tables list the operating currents of the brakes at different voltages. The following values are specified:

- Inrush current ratio I_B / I_H; I_B = accelerator current, I_H = holding current
- Direct current I_G for direct DC voltage supply
- Rated voltage U_N (rated voltage range)

The accelerator current I_B (= inrush current) only flows for a short time (ca. 150 ms) when the brake is released. When the BG brake control system or direct DC voltage supply is used (only possible to brake size BE2), increased inrush current does not occur.

The values for the holding currents I_H are r.m.s. values. Use suitable measuring instruments for current measurements.

The key for the following tables is listed on page 271.

Brake BE05, BE1, BE2

The current values I_H (holding current) listed in the tables are r.m.s. values. Use appropriate instruments for measuring r.m.s. values. The inrush current (accelerator 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 $M_{B\ max}$[Nm]	5/10	20
Braking power P_B [W]	32	43
Inrush current ratio I_B/I_H	4	4

Rated voltage U_N		BE05 / 1		BE2	
V_{AC}	V_{DC}	I_H [A_{AC}]	I_G [A_{DC}]	I_H [A_{AC}]	I_G [A_{DC}]
	24	-	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

Brake BE5, BE11, BE20

The current values I_H (holding current) listed in the tables are r.m.s. values. Use appropriate instruments for measuring r.m.s. values. The inrush current (accelerator current) I_B only flows for a short time (ca. 160 ms) when the brake is released. Direct voltage supply is not possible.

	BE5	BE11	BE20
Max. braking torque $M_{B\,max}$[Nm]	55	110	200
Braking power P_B [W]	49	76	100
Inrush current ratio I_B/I_H	5.8	6.7	7.5

Rated voltage U_N		**BE5**	**BE11**	**BE20**
V_{AC}	**V_{DC}**	**I_H [A_{AC}]**	**I_H [A_{AC}]**	**I_H [A_{AC}]**
	24	1.67[1)]	2.67[1)]	3.32[1)]
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) I_H [A_{DC}] for operation with BSG or BMV

8

Brake BE30, BE32

The current values I_H (holding current) listed in the tables are r.m.s. values. Use appropriate instruments for measuring r.m.s. values. The inrush current (accelerator current) I_B only flows for a short time (ca. 160 ms) when the brake is released. Direct voltage supply is not possible.

	BE30, BE32
Max. braking torque $M_{B\ max}$[Nm]	300 / 600
Braking power P_B [W]	130
Inrush current ratio I_B/I_H	8.5

Rated voltage U_N		BE30/BE32
V_{AC}		I_H [A_{AC}]
120 (111-123)		1.66
184 (174-193)		1.05
208 (194-217)		0.94
230 (218-243)		0.84
254 (244-273)		0.75
290 (274-306)		0.67
330 (307-343)		0.59
360 (344-379)		0.53
400 (380-431)		0.47
460 (432-484)		0.42
500 (485-542)		0.37
575 (543-600)		0.33

Brake BE120, BE122

The current values I_H (holding current) listed in the tables are r.m.s. values. Use appropriate instruments for measuring r.m.s. values. The inrush current (accelerator current) I_B only flows for a short time (ca. 400 ms) when the brake is released. Direct voltage supply is not possible.

	BE120	BE122
Max. braking torque $M_{B\ max}$[Nm]	1000	2000
Braking power P_B [W]	250	250
Inrush current ratio I_B/I_H	4.9	4.9

Rated voltage U_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

Key

I_B	Accelerator current - brief inrush current
I_H	Holding current r.m.s. value in the supply cable to the SEW brake rectifier
I_G	Direct current with direct DC voltage supply
V_N	Rated voltage (rated voltage range)

8.16 Brake coil resistance

Brake BE05, BE1, BE2

	BE05, BE1	BE2
Max. braking torque $M_{B\ max}$[Nm]	5/10	20
Braking power P_B [W]	32	43
Inrush current ratio I_B/I_H	4	4

Rated voltage U_N		BE05 / 1		BE2	
V_{AC}	V_{DC}	R_B	R_T	R_B	R_T
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

Brake BE5, BE11, BE20

	BE5	BE11	BE20
Max. braking torque $M_{B\ max}$[Nm]	55	110	200
Braking power P_B [W]	49	76	100
Inrush current ratio I_B/I_H	5.8	6.7	7.5

Rated voltage U_N		BE5		BE11		BE20	
V_{AC}	V_{DC}	R_B	R_T	R_B	R_T	R_B	R_T
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

Brake BE30, BE32

	BE30, BE32
Max. braking torque $M_{B\ max}$[Nm]	300 / 600
Braking power P_B [W]	130
Inrush current ratio I_B/I_H	8.5

Rated voltage U_N		BE30, BE32	
V_{AC}		**R_B**	**R_T**
120 (111-123)		2.3	17.2
184 (174-193)		5.8	43
208 (194-217)		7.3	54
230 (218-243)		9.2	69
254 (244-273)		11.6	86
290 (274-306)		14.6	109
330 (307-343)		18.3	137
360 (344-379)		23	172
400 (380-431)		29	215
460 (432-484)		36.5	275
500 (485-542)		46	345
575 (543-600)		58	430

Brake BE120, BE122

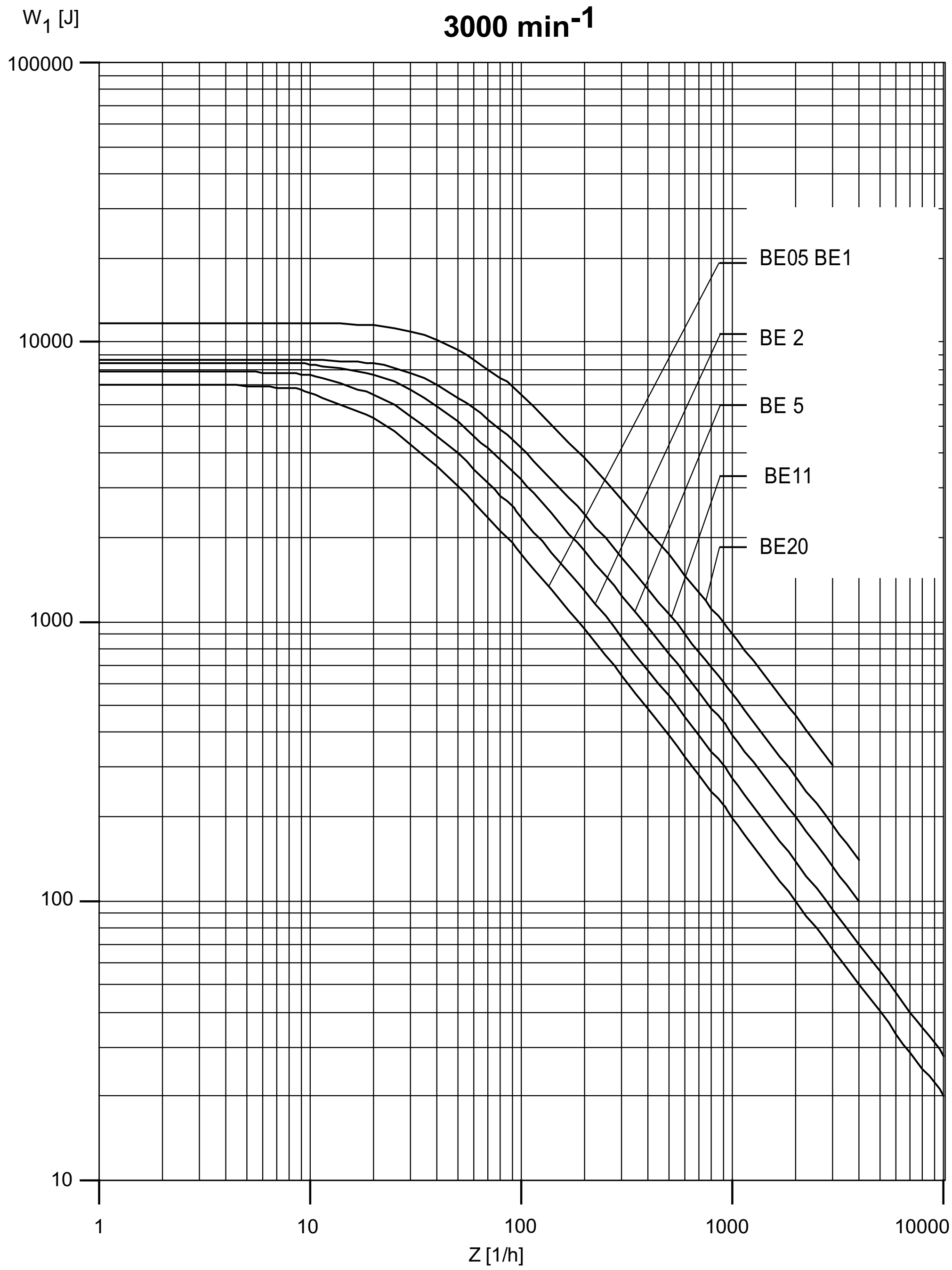
	BE120	BE122
Max. braking torque $M_{B\ max}$[Nm]	1000	2000
Braking power P_B [W]	250	250
Inrush current ratio I_B/I_H	4.9	4.9

Rated voltage U_N		BE120		BE122	
V_{AC}		**R_B**	**R_T**	**R_B**	**R_T**
230 (218-243)		7.6	29.5	7.6	29.5
254 (244-273)		9.5	37	9.5	37
290 (274-306)		12	46.5	12	46.5
360 (344-379)		19.1	74	19.1	74.0
400 (380-431)		24	93	24	93
460 (432-484)		30	117	30	117
500 (485-542)		38	147	38	147
575 (543-600)		48	185	48	185

8.17 Permitted braking work of the BE brake for hoist applications

If you are using a brakemotor, you have to check whether the brake is approved for use with the required switching 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 switching frequency "Z" in cycles per hour (1/h).

BE05, BE1, BE2, BE5, BE11, BE20



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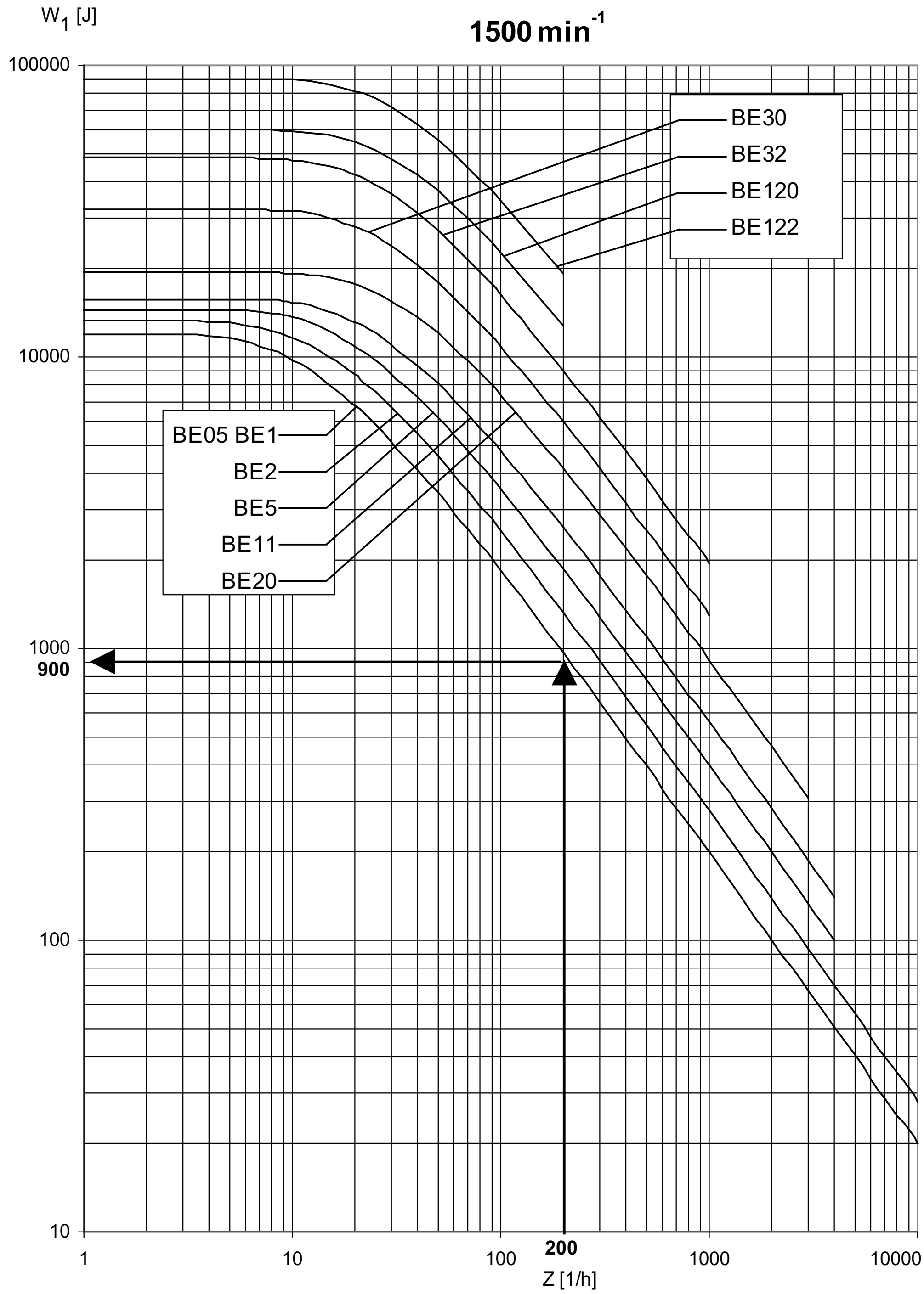
BE05, BE1, BE2, BE5, BE11, BE20, BE30, BE32, BE120, BE122



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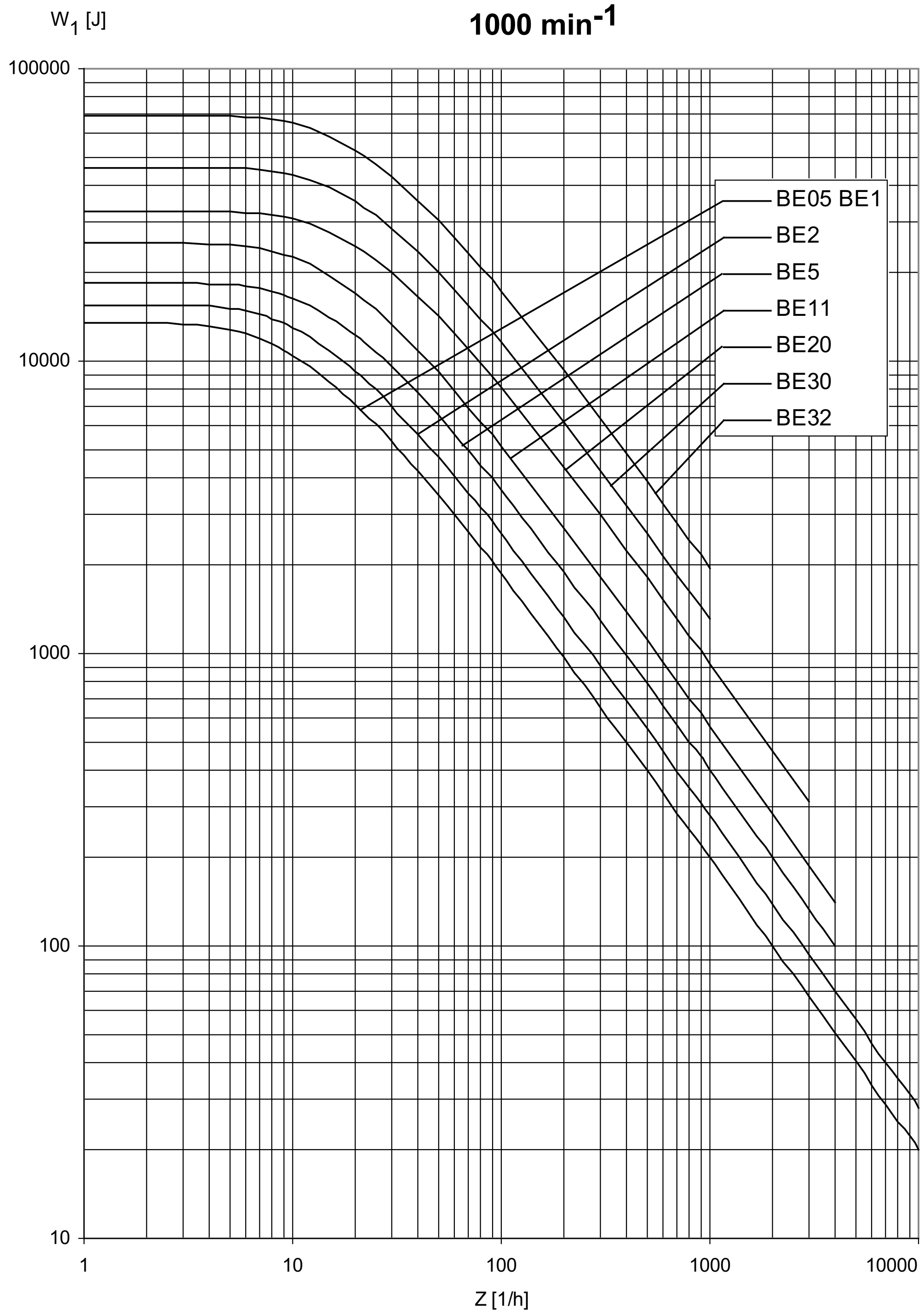
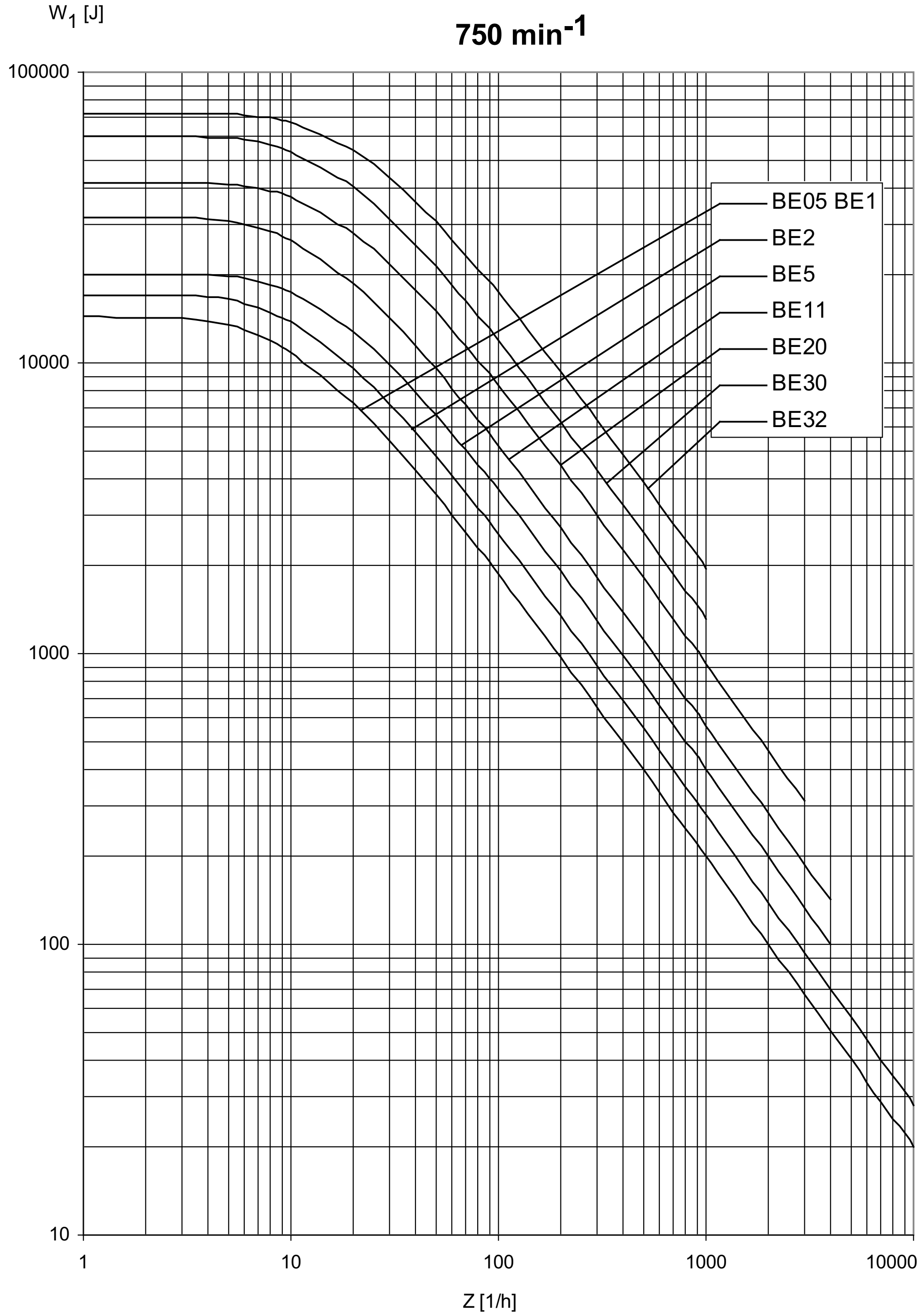
Example: The rated speed is 1500 rpm and brake BE05 is used. At 200 braking operations per hour, the permitted braking work per braking operation is 900 J.

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



62529axx

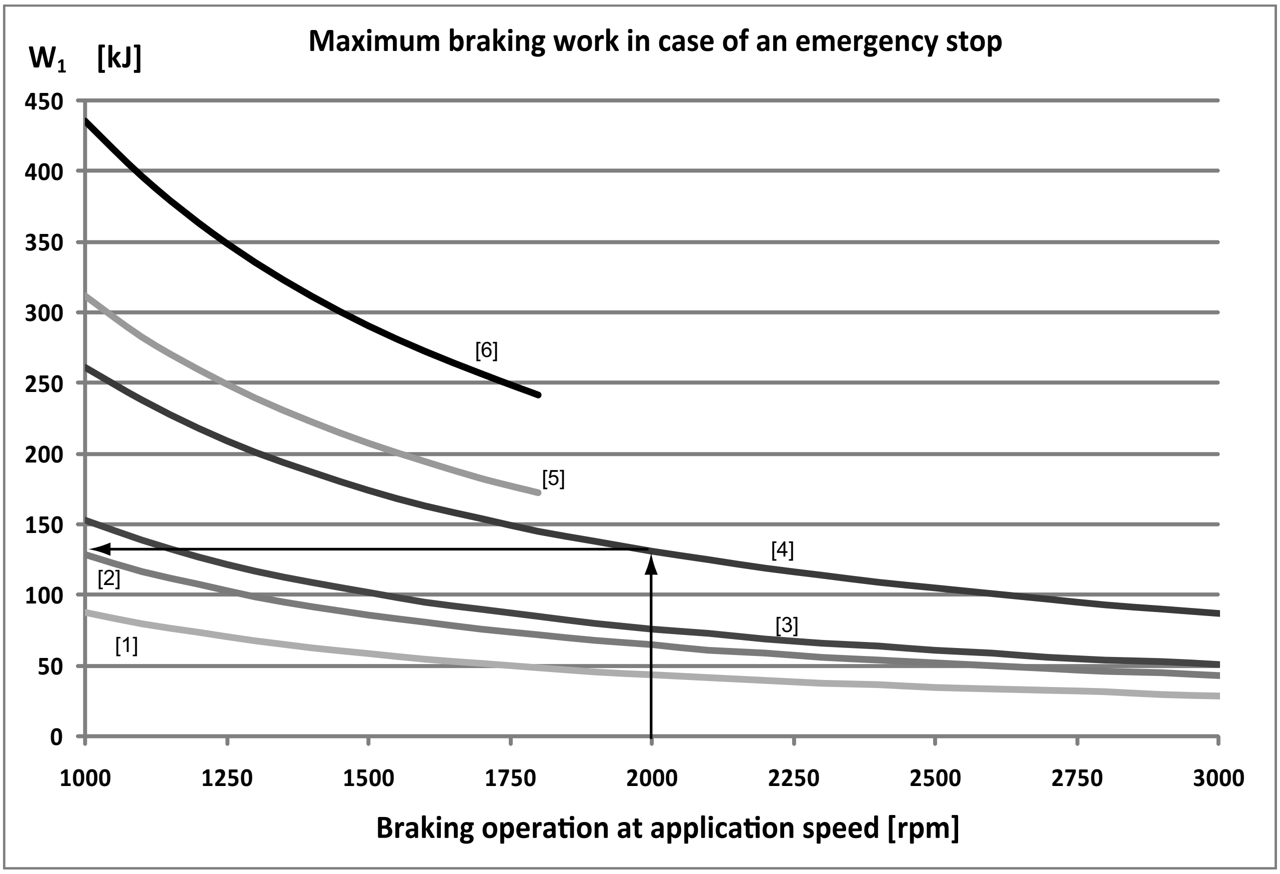
BE05, BE1, BE2, BE5, BE11, BE20, BE30, BE32



62530axx

8.18 Permitted braking work of the BE brake for travel drive applications

	TIP
	If you use the brakemotor for decelerating a travel drive, you must check whether the brake can supply the braking work required for the brake application speed in an emergency stop situation, see also page 240.



65387aen

[1]	BE11	[4]	BE32
[2]	BE20	[5]	BE120
[3]	BE30	[6]	BE122

Example: If the application speed is 2000 rpm, with the BE32 brake the permitted emergency stop braking work per cycle is 135 kJ. Note the emergency stop conditions on page 240.

8.19 Braking work, working air gap, braking torques

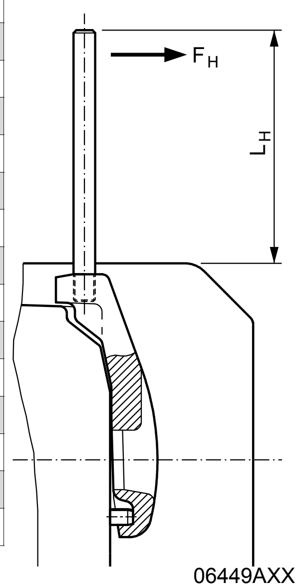
Brake Type	Braking work until inspection	Working air gap [mm]		Brake disk [mm]	Braking torque settings				
					Braking torque	Type and number of brake springs		Order number of brake springs	
	[10^6 J]	min.[1)]	max.	min.	[Nm]	Normal	Blue	Normal	Blue
BE05	120	0.25	0.6	9.0	5.0 3.5 2.5 1.8	2 2 - -	4 2 4 3	0135 017 X	1374 137 3
BE1	120	0.25	0.6	9.0	10 7.0 5.0	6 4 2	- 2 4	0135 017 X	1374 137 3
BE2	165	0.25	0.6	9.0	20 14 10 7.0	6 2 2 -	- 4 2 4	1374 024 5	1374 052 0
BE5	260	0.25	0.9	9.0	55 40 28 20 14	6 2 2 - -	- 4 2 4 3	1374 070 9	1374 071 7
BE11	640	0.3	1.2	10.0	110 80 55 40	6 2 2 -	- 4 2 4	1374 183 7	1374 184 5
BE20	1000	0.3	1.2	10.0	200 150 110 80 55	6 4 3 3 -	- 2 3 - 4	1374 322 8	1374 248 5
BE30	1500	0.3	1.2	10.0	300 200 150 100 75	8 4 4 - -	- 4 - 8 6	0187 4551	1374 435 6
BE32	1500	0.4	1.2	10.0	600 500 400 300 200	8 6 4 4 -	- 2 4 - 8	0187 4551	1374 435 6
BE120	520	0.4	1.2	12.0	1000 800 600 400	8 6 4 4	- 2 4 -	1360 877 0	1360 831 2
BE122	520	0.5	1.2	12.0	2000 1600 1200 800	8 6 4 4	- 2 4 -	1360 877 0	1360 831 2

1) Note when checking the working air gap: Parallelism tolerances on the brake disk may cause deviations of ± 0.15 mm after a test run.

8.20 Actuation force for manual release

In brakemotors with ..HR "Brake with self-reengaging manual brake release" option, you can release the brake manually using the provided lever. 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 [N]	Lever length L_H [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**	200	73
BE5	**112/132**	200	55
BE11	**112/132**	230	120
BE11	**160**	230	96
BE20	**160**	375	178
BE20	**180**	375	150
BE30/32	**180**	500	265
BE30/32	**200/225**	500	246



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8.21 Brake monitoring diagnostic unit

DUB10A diagnostic unit

DUB10A: Micro switch for function and/or wear monitoring.

DUB10A (Diagnostic Unit Brake) is a diagnostic unit used for reliable monitoring of the brake function and brake lining wear.

Note that function monitoring of the brake does not fulfill a stop category.

Unit designation

/DUB

- For function monitoring
- Or wear monitoring
- Or function and wear monitoring

Description

The function monitoring system signals whether the brake releases properly.

The wear monitoring system signals when the brake has reached a specified wear limit. However, the brake remains functional.

The micro switch is always the same and is used either as normally open contact (function monitoring) or normally closed contact (wear monitoring).

63792axx

Technical data

A recoiling micro switch is used as normally closed contact or normally open contact, depending on the task.

The signal can be evaluated by a frequency inverter or higher-level controller.

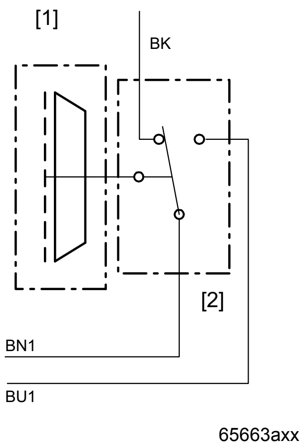
Two sensors allow you to monitor proper brake functioning and lining wear simultaneously.

The DUB10A diagnostic unit can be installed from brake size BE2 on DR.90 to BE122 on DR.315.

Technical data	Value
Operating voltage AC [V] DC [V]	max. 250 24
Rated switching capacity [A]	6 / 0.1 A at 24 V
Mechanical service life [cycles]	50×10^6
Control element material	Stainless steel
Housing material	PA6T/X with fiberglass reinforcement
Degree of protection	IP55
Snap switch mechanism	Flexible tongue made of beryllium-copper with self-cleaning contacts
Tripping force [N]	3.5
Differential travel [mm]	0.1
Temperature range [°C]	-40 to +60
Protection class	II
Can be mounted to	DR.90 BE2 - DR.315 BE122
Connection	Screw contacts on terminal box

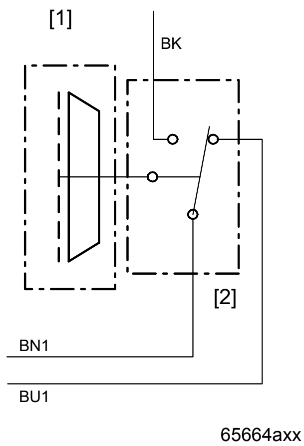
Wiring diagrams

Function monitoring



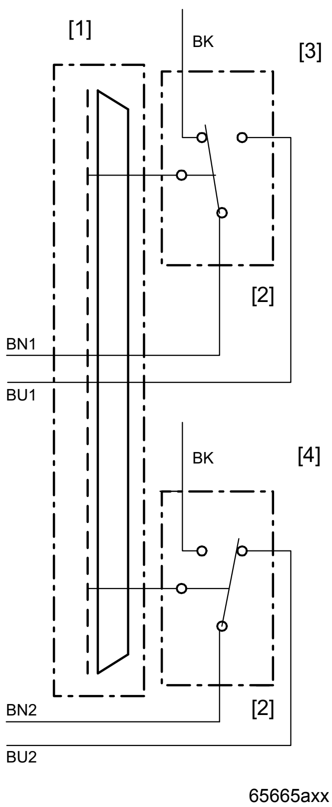
[1] Brake
[2] Micro switch MP321-1MS

Wear monitoring



[1] Brake
[2] Micro switch MP321-1MS

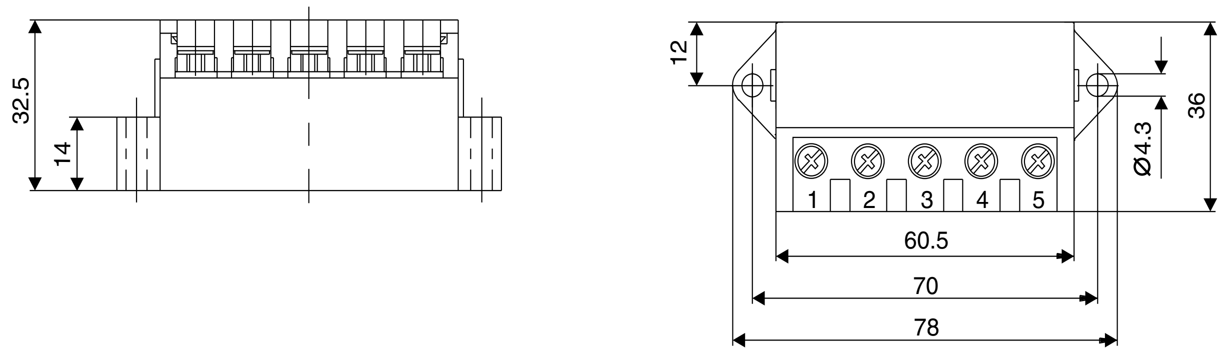
Function monitoring + wear monitoring



[1] Brake
[2] Micro switch MP321-1MS
[3] Function monitoring
[4] Wear monitoring

8.22 Dimension sheets for brake controllers

BG1.5, BG3, BGE, BS, BSG



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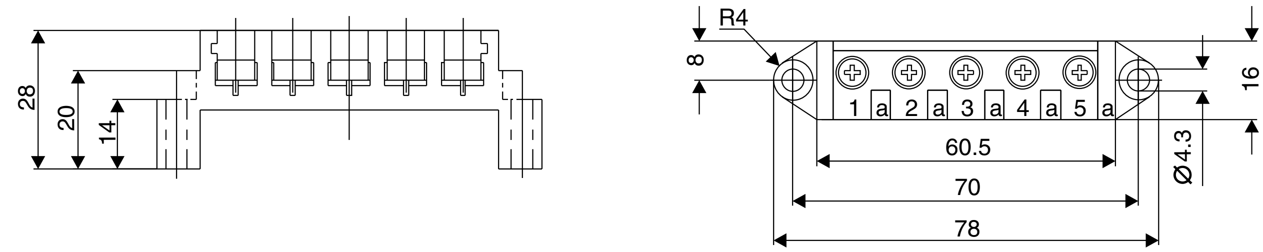
Auxiliary terminal strip

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



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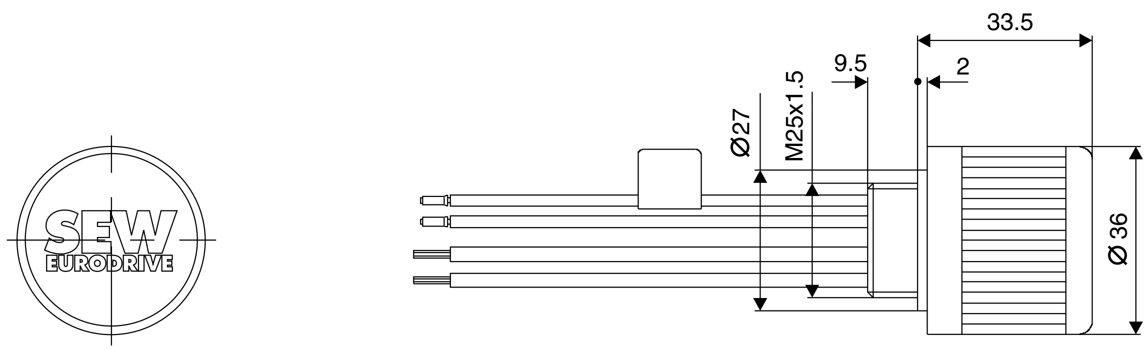
SR, UR



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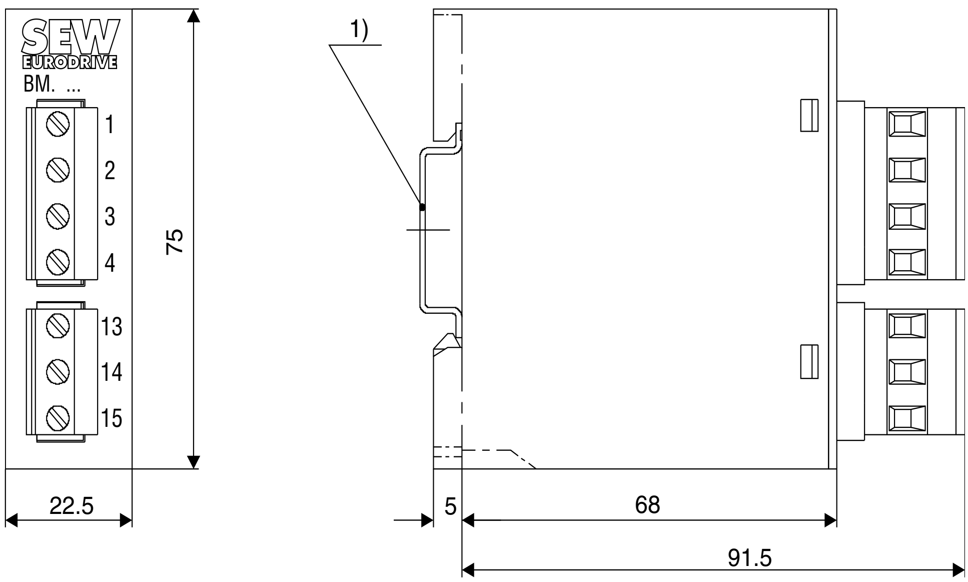
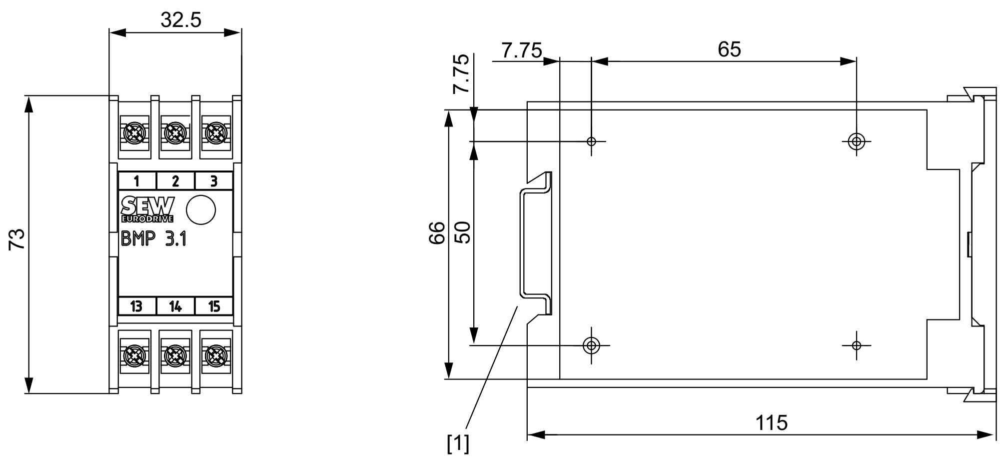
BMS, BME, BMH, BMP, BMK, BMV



01645BXX

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

BMP3.1



62185axx

9 Encoders

9.1 Product description

Unit designation

/ES7 + letter for the electrical interface

/EG7 + letter for the electrical interface

/EV7 + letter for the electrical interface

/AS7 + letter for the electrical interface

/AG7 + letter for the electrical interface

/AV7 + letter for the electrical interface

Description

These encoder types are mounted on the B end of the motor or brakemotor (shaft-centered). The encoder housings are supported by the fan guard.

- Encoders ES7. and AS7. are **shaft-centered with spread shaft**.
- Encoders EG7. and AG7. are **shaft-centered with plug-in shaft and end thread**. They are available a reinforced design compared to ES7./AS7.
- The variants ES7./AS7. can also be mounted to the DR motors **via coupling and flange hood**. The unit designation then changes to EV7./AV7.

For project planning notes and technical data, see page 287 ff.

Pin assignment

For the pin assignment of the respective encoder, refer to chapter "Prefabricated cables" on page 376 ff and page 381 ff.

Standardized encoder mounting adapter

Unit designation /ES7A or /EG7A

Description

The encoder from SEW is not included in the scope of delivery. Only prepared for installation of an encoder. The shaft is predrilled and an additional protective canopy is mounted.

Principle of installation:

DR.71 - 132 .../ES7A

The encoder is connected as non-positive connection with the shaft bore using a spread shaft. The torque arm is attached to the fan guard from outside.

Bore with ∅ 10 mm, H7 fit.

DR.160 - 225 .../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 ∅ 14 mm, H7 fit, and additional end thread in M6.

For project planning notes and technical data, see page 298 and subsequent pages.

Mounting non-SEW encoders

Unit designation /XV..

Description The non-SEW mounting option enables SEW to mount non-SEW encoders to the motor. The non-standard encoder requested by the customer is installed by SEW.

The encoder can be fixed to the motor shaft via the flange hood. The encoder shaft is connected to the motor shaft via spread shaft coupling.

If the customer wants to mount a non-SEW encoder, the /X*A mounting attachment must be ordered.

For project planning notes and technical data, see page 299 ff.

Standardized mechanical interface for mounting of non-SEW encoders by the customer

Unit designation Mounting devices for non-SEW encoders

- /XV0A Any shaft diameter and centering device
- /XV1A Shaft diameter 6 mm; centering device 50 mm
- /XV2A Shaft diameter 10 mm; centering device 50 mm
- /XV3A Shaft diameter 12 mm; centering device 80 mm
- /XV4A Shaft diameter 11 mm; centering device 85 mm

Description The non-SEW mounting option allows non-SEW encoders to be mounted to the motor via a shaft coupling.

The non-SEW encoder itself is not installed yet, only the mechanical interface is installed for mounting the encoder.

The encoder shaft is connected to the motor shaft via a coupling.

For project planning notes and technical data, see page 298 ff.

Built-in encoder

Unit designation /EI71, /EI72, /EI7C, /EI76

Description Hall sensors (A and B track).

Suitable for simple positioning and speed monitoring tasks.

A pole ring is molded in the PVC fan. The sensor unit is located directly behind the B-side endshield, or, when a brakemotor is used, on two spacers behind the brake coil.

For project planning notes and technical data, see page 297 and subsequent pages.

9.2 Project planning, technical data

Speed sensor

Various encoder types are available as standard for installation in DR. series AC motors. The encoders can be combined with other optional additional features, such as brake and forced cooling fan.

For questions, please contact your contact partner for drives at SEW-EURODRIVE.

Delivery

The encoder types ES7./EG7./EV7. and AS7./AG7./AV7 can be delivered in two connection variants:

- With connection cover
- Without connection cover

SEW-EURODRIVE recommends the use of prefabricated cables (see chapter 'Prefabricated cables' on page 359 and subsequent pages). When purchasing the cables from SEW-EURODRIVES, you can order the encoders without a connection cover because this cover is already part of the prefabricated cable.

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.

- Maximum line length (inverter - encoder): 100 m for a cable capacitance:
  - < 83 nF/km (core/core) according to DIN VDE 0472 part 504
  - < 110 nF/km (core/shield)
- Core cross-section: 0.25 - 0.5 mm^2
- Use shielded cables with twisted pair conductors and apply the shield over large area on both ends:
  - At the encoder in the cable gland or in the encoder plug
  - To the inverter on the electronics shield clamp 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.
- Encoder with cable gland: Observe the permitted diameter of the encoder cable to ensure that the cable gland functions correctly.

For the pin assignment of the respective encoder, refer to chapter "Prefabricated cables" on page 376 ff and page 381 ff.

Absolute encoder overview

Electrical interface
RS-485 + 1 V_{SS}
Sin/Cos

Designation	For motor size	Encoder type	Mounting type	Specification [Periods/ revolution]	Supply voltage [V]
AS7W	71 - 132	Absolute encoder (multi-turn)	Shaft centered	2048	DC 7 - 30
AG7W	160 - 225				
AV7W	71 - 225		Coupling		

Electrical interface
MSSI + 1 V_{SS}
Sin/Cos

Designation	For motor size	Encoder type	Mounting type	Specification [Periods/ revolution]	Supply voltage [V]
AS7Y	71 - 132	Absolute encoder SSI® (multi-turn)	Shaft centered	2048	DC 7 - 30
AG7Y	160 - 225				
AV7Y	71 - 225		Coupling		

Electrical interface
MSSI + TTL

Designation	For motor size	Encoder type	Mounting type	Specification [Periods/ revolution]	Supply voltage [V]
AH7Y	315	Absolute encoder SSI® (multi-turn)	Hollow shaft	2048	DC 9 - 30

Speed sensor overview

Electrical interface
1 V_{SS} Sin/Cos

Designation	For motor size	Encoder type	Mounting type	Specification [Periods/ revolution]	Supply voltage [V]
ES7S	71 - 132	Speed sensor	Shaft centered	1024	DC 7 - 30
EG7S	160 - 225				
EH7S	315		Hollow shaft		DC 10 - 30
EV7S	71 - 225		Coupling		DC 7 - 30

Electrical interface
TTL (RS-422)

Designation	For motor size	Encoder type	Mounting type	Specification [Periods/ revolution]	Supply voltage [V]
ES7R	71 - 132	Speed sensor	Shaft centered	1024	DC 7 - 30
EG7R	160 - 225				
EV7R	71 - 225		Coupling		

Built-in encoder overview

Electrical interface HTL (push-pull)

Designation	For motor size	Encoder type	Mounting type	Specification [Periods/ revolution]	Supply voltage [V]
EI7C	71 - 132	Built-in encoder	Integrated	24	DC 9 - 30
EI76				6	
EI72				2	
EI71				1	
ES7C		Speed sensor	Shaft centered	1024	DC 4.75 - 30
EG7C	160 - 225				
EV7C	71 - 225		Coupling		

Technical data for absolute encoders

M-SSI + sin / cos

60602AXX

Encoder For motor size DR.	AS7Y 71 - 132	AG7Y 160 - 225
Mounting type	Shaft centered	
Supply voltage V_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} [mA]	10	
Max. pulse frequency f_{max} [kHz]	200	
Periods per revolution: A, B C	2048 -	
Phase angle A : B	90° ± 3°	
Absolute encoder scanning code	Gray code	
Resolution Single-turn Multi-turn	8196 increments / revolution 4096 revolutions	
Data transfer of absolute value	Synchronous, serial (SSI)	
Serial data output	Driver to EIA RS-485	
Serial clock input	Optocoupler, recommended driver to EIA RS-485	
Clock rate [kHz]	Permitted range: 100 - 2000 (max. 100 m cable length with 300 kHz)	
Clock-pulse space period [ms]	12 - 30	
Vibration resistance [10 Hz – 2 kHz] [m/s^2]	≤ 100 (EN60088-2-6)	≤ 200 (EN60088-2-6)
Shock resistance [m/s^2]	≤ 1000 (EN60088-2-27)	≤ 2000 (EN60088-2-27)
Maximum speed n_{max} [rpm]	6000	
Ambient temperature [°C]	-20 to +60 (EN60721-3-3, class 3K3)	
Degree of protection	IP66 (EN60529)	
Connection	Terminal strip in pluggable connection cover	
Clamping range of the cable gland [mm]	∅ 5 - 10	
Additional weight [kg]	1.15	1.45

For a product description, see page 285.

M-SSI + TTL
(RS-422)

62632axx

Encoder For motor size DR.	AH7Y 315
Mounting type	Hollow shaft
Supply voltage V_B [V]	DC 9 - 30
Max. current consumption I_{in} [mA]	150
Output amplitude V_{high} [V_{SS}] V_{low} [V_{SS}]	≥ 2.5 ≤ 0.5
Signal output	TTL (RS-422)
Output current per track I_{out} [mA]	20
Max. pulse frequency f_{max} [kHz]	120
Periods per revolution A, B C	2048 -
Mark space ratio	1 : 1 ± 20 %
Phase angle A : B	90° ± 20°
Absolute encoder scanning code	Gray code
Resolution Single-turn Multi-turn	4096 increments / revolution 4096 revolutions
Data transfer of absolute value	Synchronous, serial (SSI)
Serial data output	Driver to EIA RS-485
Serial clock input	Optocoupler, recommended driver to EIA RS-485
Clock rate [kHz]	Permitted range: 100 - 800 (max. 100 m cable length with 300 kHz)
Clock-pulse space period [ms]	12 - 30
Data memory	-
Vibration resistance [10 Hz – 2 kHz] [m/s^2]	≤ 100 (EN60088-2-6)
Shock resistance [m/s^2]	≤ 2000 (EN60088-2-27)
Maximum speed n_{max} [rpm]	3500
Ambient temperature [°C]	-20 to +60 (EN60721-3-3, class 3K3)
Degree of protection	IP56 (EN60529)
Connection	Terminal strip on encoder
Clamping range of the cable gland [mm]	∅ 5 - 10
Additional weight [kg]	4.55

For a product description, see page 285.

RS-485 + sin / cos

60602AXX

Encoder For motor size DR.	AS7W 71 - 132	AG7W 160 - 225
Mounting type	Shaft centered	
Supply voltage V_B [V]	DC 7 - 30	
Max. current consumption I_{in} [mA]	150	
Output amplitude [V]	1	
Signal output	Sine/cosine	
Output current per track I_{out} [mA]	10	
Max. pulse frequency f_{max} [kHz]	200	
Periods per revolution A, B C	2048 -	
Phase angle A : B	90° ± 3°	
Absolute encoder scanning code	Binary code	
Resolution Single-turn Multi-turn	8192 increments / revolution 4096 revolutions	
Data transfer of absolute value	Asynchronous, serial (RS-485)	
Serial data output	Driver to EIA RS-485	
Serial clock input	Optocoupler, recommended driver to EIA RS-485	
Data memory	1.792 bytes	
Vibration resistance [10 Hz – 2 kHz] [m/s^2]	≤ 100 (EN60088-2-6)	≤ 200 (EN60088-2-6)
Shock resistance [m/s^2]	≤ 1000 (EN60088-2-27)	≤ 2000 (EN60088-2-27)
Maximum speed n_{max} [rpm]	6000	
Ambient temperature [°C]	-20 to +60 (EN60721-3-3, class 3K3)	
Degree of protection	IP66 (EN60529)	
Connection	Terminal strip in pluggable connection cover	
Clamping range of the cable gland [mm]	∅ 5 - 10	
Additional weight [kg]	1.15	1.45

For a product description, see page 285.

Technical data for incremental encoders

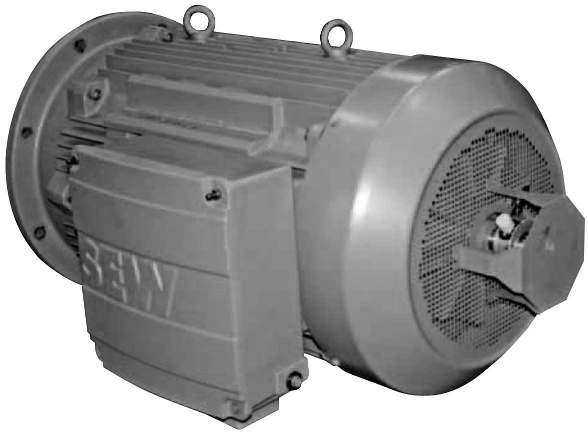
sin / cos

60602AXX

Encoder For motor size DR.	ES7S 71 - 132	EG7S 160 - 225
Mounting type	Shaft centered	
Supply voltage V_B [V]	DC 7- 30	
Max. current consumption I_{in} [mA]	140	
Output amplitude per track V_{high} [V_{SS}] **V_{low} [V_{SS}]**	1	
Signal output	Sine/cosine	
Output current per track I_{out} [mA]	10	
Max. pulse frequency f_{max} [kHz]	150	
Pulses (sine cycles) per revolution A, B **C**	1024 1	
Phase angle A : B	90° ± 3°	
Data memory	1920	
Vibration resistance [m/s^2] (10 Hz - 2000 Hz)	≤ 100 (EN 60068-2-6)	
Shock resistance [m/s^2]	≤ 1000 (EN 60068-2-27)	≤ 2000 (EN 60068-2-27)
Maximum speed n_{max} [min^{-1}]	6000	
Ambient temperature [°C]	-30 to +60 (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]	∅ 5 - 10	
Additional weight [kg]	1.1	1.4

For a product description, see page 285.

sin/cos



62632axx

Encoder For motor size DR.	EH7S 315
Mounting type	Hollow shaft
Supply voltage V_B [V]	DC 10 - 30
Max. current consumption I_{in} [mA]	140
Output amplitude V_{high} [V_{SS}] V_{low} [V_{SS}]	1
Signal output	Sine/cosine
Output current per track I_{out} [mA]	10
Max. pulse frequency f_{max} [kHz]	180
Periods per revolution A, B C	1024 1
Phase angle A : B	90° ± 10°
Data memory	-
Vibration resistance [10 Hz – 2 kHz] [m/s^2]	≤ 100 (EN60088-2-6)
Shock resistance [m/s^2]	≤ 1000 (EN60088-2-27)
Maximum speed n_{max} [rpm]	3000
Ambient temperature [°C]	-20 to +60 (EN60721-3-3, class 3K3)
Degree of protection	IP65 (EN60529)
Connection	12-pin plug connector
Clamping range of the cable gland [mm]	∅ 5 - 10
Additional weight [kg]	2.85

For a product description, see page 285.

TTL (RS-422)

60602AXX

Encoder **For motor size DR.**	**ES7R** **71 - 132**	**EG7R** **160 - 225**
Mounting type	Shaft centered	
Supply voltage V_B [V]	DC 7 - 30	
Max. current consumption I_{in} [mA]	160	
Output amplitude V_{high} [V] **V_{low} [V]**	≥ 2.5 ≤ 0.5	
Signal output	TTL (RS-422)	
Output current per track I_{out} [mA]	25	
Max. pulse frequency f_{max} [kHz]	150	
Periods per revolution A, B **C**	1024 1	
Mark space ratio	1 : 1 ± 10 %	
Phase angle A : B	90° ± 20°	
Vibration resistance [10 Hz – 2 kHz] [m/s^2]	≤ 100 (EN60088-2-6)	≤ 200 (EN60088-2-6)
Shock resistance [m/s^2]	≤ 1000 (EN60088-2-27)	≤ 2000 (EN60088-2-27)
Maximum speed n_{max} [rpm]	6000	
Ambient temperature [°C]	-20 to +60 (EN60721-3-3, class 3K3)	
Degree of protection	IP66 (EN60529)	
Connection	Terminal strip in pluggable connection cover	
Clamping range of the cable gland [mm]	∅ 5 - 10	
Additional weight [kg]	1.1	1.4

For a product description, see page 285.

HTL

60602AXX

Encoder For motor size DR.	ES7C 71 - 132	EG7C 160 - 225
Mounting type	Shaft centered	
Supply voltage V_B [V]	DC 4.75- 30	
Max. current consumption I_{in} [mA]	100	
Output amplitude per track V_{high} [V_{SS}] V_{low} [V_{SS}] U_b = 4.75 - 6 V, terminating resistor = 120 Ohm	≥ 2.5 ≤ 1.1	
Output amplitude per track V_{high} [V_{SS}] V_{low} [V_{SS}] U_b = 6 - 30 V, terminating resistor = 1-3 kOhm	≥ U_b - 2.5 ≤ 3	
Signal output	HTL	
Max. pulse frequency f_{max} [kHz]	120	
Pulses (sine cycles) per revolution A, B C	1024 1	
Mark space ratio	1 : 1 ± 10 %	
Phase angle A : B	90° ± 20°	
Vibration resistance [m/s^2] (10 Hz - 2000 Hz)	≤ 100 (EN 60068-2-6)	
Shock resistance [m/s^2]	≤ 1000 (EN 60068-2-27)	≤ 2000 (EN 60068-2-27)
Maximum speed n_{max} [min^{-1}]	6000	
Ambient temperature [°C]	-30 to +85	
Degree of protection	IP66 (EN 60529)	
Connection	Terminal strip in pluggable connection cover	
Clamping range of the cable gland [mm]	∅ 5 - 10	
Additional weight [kg]	0.35	0.35

For a product description, see page 285.

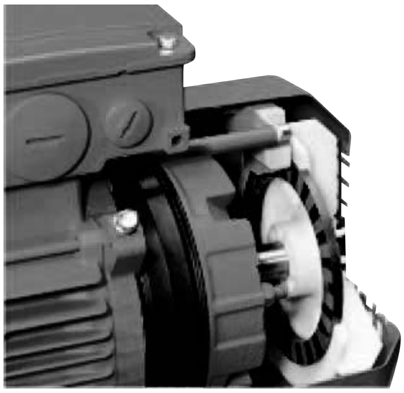
Built-in encoder

The built-in encoder is also available in a simple version with fewer pulses. Available are HTL built-in encoders with push-pull for 24, 6, 2 or 1 period(s) per motor revolution.

For a product description, see page 286.

Technical data for built-in encoders

HTL (push-pull)



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Encoder	EI7C	EI76, EI72, EI71
For motor size DR.	71 - 132	
Mounting type	Integrated	
Supply voltage V_B [V]	DC 9 - 30	
Max. current consumption I_{in} [mA]	120	
Output amplitude V_{high} [V] V_{low} [V]	$\geq U_b$ - 2.5 $\leq$ 0.5	
Signal output	HTL (push-pull)	
Output current per track I_{out} [mA]	60	
Max. pulse frequency f_{max} [kHz]	1.44	
Periods per revolution A, B C	24 0	6, 2, 1 0
Mark space ratio	1 : 1 ± 20 %	
Phase angle A : B	90° ± 20°	
Vibration resistance [10 Hz – 2 kHz] [m/s²]	≤ 100 (EN60088-2-6)	
Shock resistance [m/s²]	≤ 1000 (EN60088-2-27)	
Maximum speed n_{max} [rpm]	3600	
Ambient temperature [°C]	-30 to +60	
Degree of protection	IP65	
Connection	Terminal strip in the terminal box or M12 (8-pin)	
Additional weight [kg]	see page 314	

For a product description, see page 285.

Encoder mounting adapter

On request, DR motors can be equipped with various encoder mounting adapters for mounting customer-specific encoders from different manufacturers.

These encoders are usually attached to the synchro flange using 3 encoder mounting clamps (bolts with eccentric disks).

The encoder is not included in the scope of delivery of SEW-EURODRIVE but is purchased and installed by the customer itself.

For a product description, see page 285.

Technical data for encoder mounting adapters

For encoders from SEW-EURODRIVE

Encoder mounting adapter For motor size DR.	ES7A 71 - 132	EG7A 160 - 225	EH7A 315
Mounting type of encoder	Shaft centered		Hollow shaft
Motor shaft type	10 mm bore	14 mm bore with M6 end thread	Shaft end 38 mm × 116 mm
Suitable for encoder	ES7S ES7R AS7Y AS7W	EG7S EG7R AG7Y AG7W	EH7S - AH7Y -

For a product description, see page 285.

For dimension sheets of motors, refer to page 107 and subsequent pages.

For encoders provided by customer

AC motor with encoder mounting adapter and forced cooling fan:

60599AXX

Encoder mounting adapter For motor size DR.		XV0A	XV1A	XV2A 71 - 225	XV3A	XV4A
Mounting type of encoder		Flange centered with coupling				
Variant shaft	**Encoder** **Centering**	Any Any	6 mm 50 mm	10 mm 50 mm	12 mm 80 mm	11 mm 85 mm
Suitable for encoder		Provided by the customer or by SEW-EURODRIVE on behalf of the customer.				

For a product description, see page 286.

Please request the necessary dimension sheets, if required.

Mounting non-SEW encoders

All mounting adapters described above are available if the customer wants SEW-EURODRIVE to install a customer-specific encoder.

The encoder is usually provided by the customer. SEW-EURODRIVE can also provide the encoder if the customer submits an exact specification.

For questions, please contact your contact partner for drives at SEW-EURODRIVE.

For a product description, see page 286.

10 Additional Features

10.1 Motor protection

For general project planning notes on switching and protection devices for DR motors, see page 29.

Take the information of that chapter into account for your selection.

Thermal motor protection with PTC resistor

Unit designation /TF

Description Thermal motor protection prevents the motor from overheating and consequently from being damaged. The TF is a triplet thermistor. There is one TF in each motor phase.

The TF is available in thermal classification 155 (F) or 180 (H).

It consists of a resistor whose resistance increases with rising temperature.

/TF The PTC thermistors comply with DIN 44082.

Resistance measurement (measuring instrument with V ≥ 2.5 V or I < 1 mA):

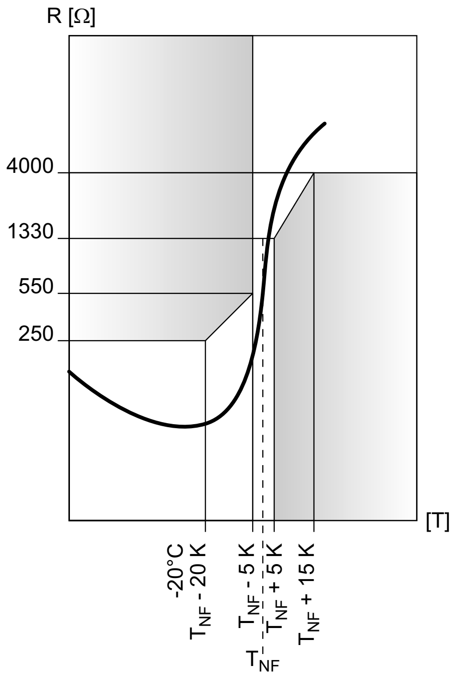
- Standard measured values: 20 - 500 Ω
- Hot resistance: > 4000 Ω

When using the temperature sensor for thermal monitoring, the evaluation function must be activated to maintain reliable isolation of the temperature sensor circuit. If the temperature reaches an excessive level, a thermal protection function must be triggered immediately.

TIP

The temperature sensor TF may not be subjected to voltages > 30 V.

Below figure shows the characteristic curve of the TF with reference to the rated response temperature (referred to as T_{NF}).



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Thermal motor protection with bimetallic switch "NC contact"

Unit designation /TH

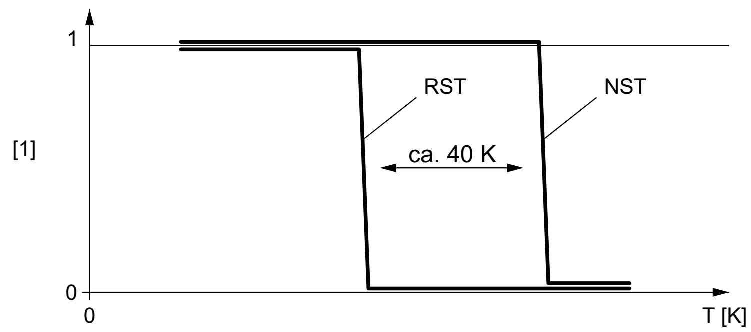
Description Thermal motor protection prevents the motor from overheating and consequently from being damaged. The two higher thermal classes 155 (F) and 180 (H) are monitored. The TH has a triplet design, which means that each motor phase contains a thermostat NC contact. These are connected in series.

The TH consists of a bimetallic switch that trips when a certain temperature is reached and opens the contact. Connection to a controller or feedback system ensures that the motor will be switched off. When the motor cools down, it does not immediately switch back to the rated switching temperature (NST) but only after approx. 40 K below the rated switching temperature (reset temperature RST).

/TH The thermostats are connected in series and open when the permitted winding temperature is exceeded. They can be connected in the drive monitoring loop.

	AC V	DC V	
Voltage U [V]	250	60	24
Current (cos φ = 1.0) [A]	2.5	1.0	1.6
Current (cos φ = 0.6) [A]	1.6	-	-
Contact resistance max. 1 ohm at DC 5 V / 1 mA			

Switching condition of the bimetallic switch "NC":



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RST Reset temperature

NST Rated switching temperature

Thermal motor information with KTY84 – 130

Unit designation /KY

Description This type detects the motor temperature continuously using a semi-conductor sensor for further processing in the inverter / controller.

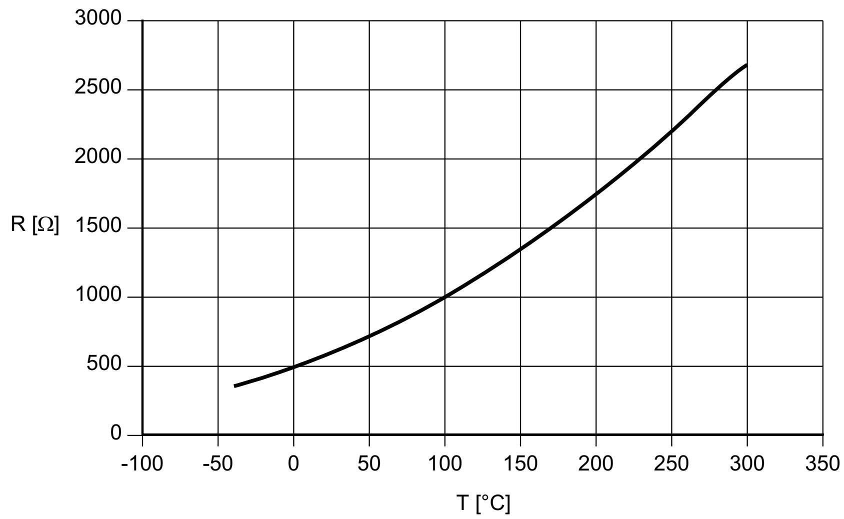
The option with a KTY does not replace the standard motor protection using TF and TH.

The inverter + /KY option can only take on the function of motor protection when it is used in combination with an inverter containing the thermal motor model.

/KY The temperature sensor KTY84 - 130 continuously detects the motor temperature.

Technical data	KTY84 - 130
Connection	Red (+) Blue (-)
Total resistance at 20 - 25 °C	540 Ω < R < 640 Ω
Test current	< 3 mA

Typical characteristic curve of KTY:



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Thermal motor information with PT100

Unit designation /PT

Description This type detects the motor temperature continuously using a linear platinum sensor for further processing in the inverter / controller.

Unlike the KTY semiconductor sensor, the platinum sensor has an almost linear characteristic curve and is more accurate.

The type with /PT does not replace the standard motor protection using /TF or /TH.

The inverter + /PT option can only take on the function of motor protection when it is used in combination with an inverter containing the thermal motor model.

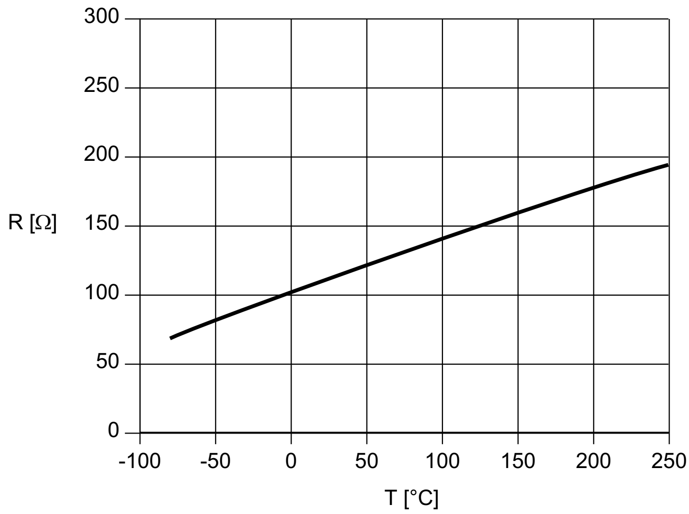
The following is installed:

- 1 sensor per stator stack
- 3 sensors per stator stack (one per phase)

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

Technical data	PT100
Connection	Red/white
Resistance at 20 - 25 °C per PT100	107 Ω < R < 110 Ω
Test current	< 3 mA

Characteristic curve of PT100:



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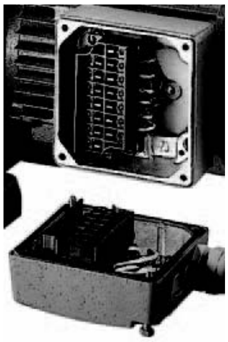
10.2 Connection alternatives

Integrated plug connector

Unit designation /IS



Description

This 12-pin plug connector is integrated in the terminal box. It replaces the terminal board and was developed by SEW-EURODRIVE in 1993. The successful market position is continued in the modular DR motor system.

Star or delta connection is implemented using a variable terminal link. One side contains the jumpers required for star connection, the other side contains the three jumpers for delta connection. Each side is clearly marked. This jumper is included in the scope of delivery.

/IS

The 12 pins of the IS plug connector are usually used as follows:

- 6 times motor winding,
- 4 times brake,
- 2 times auxiliary contacts (e.g. thermal motor protection).

The variable terminal link can be used to connect core cross section of max. 2.5 mm^2. Without jumper, the core cross section is increased to 4 mm^2. The power range of 4-pole motors with IS was extended to 7.5 kW.

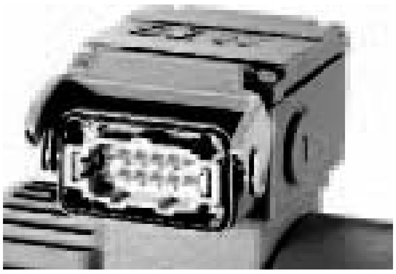
Technical data for integrated plug connectors

Plug connectors	IS
For motor size	71 - 132
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
Power range [kW]	7.5
Degree of protection	Corresponding to motor protection type (IP54, IP55, optionally IP56, IP65, IP66)
Ambient temperature [°C]	-40 to +40

As a rule, 6 power contacts are used for the winding connections and 6 for the control connections (brake, motor protection).

Mount-on plug connector

Unit designation AC.., AS.., AM.., AB.., AD.., AK..



Description

The many options of installing a plug connector at the side of the terminal box are maintained in the modular DR motor system. Plug connectors are available with single-clamp and two-clamp closure.

The assignments of the various contact types remain the same. As AC motors are more and more operated on frequency inverters, only the EMC type is taken account of.

The built-on housing of the plug connector is not a separate part anymore but is part of the terminal box.

/AS.., /AC.., /AM.., /AB.., /AD.., /AK..

The installed plug connector is based on two systems by Harting.

- HAN 10ES or HAN 10E
- HAN Modular with E, C or B modules

In the HAN modular systems, the modules contain a different number of contacts with different current carrying capacity.

The mating connector is not included in the scope of delivery of SEW-EURODRIVE.

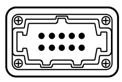
Two types of closing can basically be distinguished for the mating connector.

- Single clip longitudinal closing mechanism,
- Double clip transverse closing mechanism.

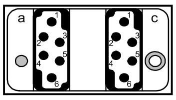
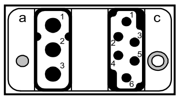
Technical data for mount-on plug connectors

Industrial plug connectors (AC.., AS.., AM.., AB.., AD.., AK..)

Technical data AC.., AS..

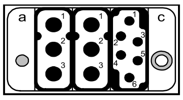
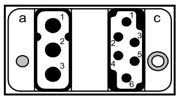
Plug connectors	ACB.., ASB..	ACE.., ASE..
For motor size	71 - 132	
Locking of mating connector	Double clamp	Single clamp
Connector viewed from motor end		
Basic connector system	Harting, Han® EMC housing 10B; terminal box: Aluminum	
Number of contacts	10	
Max. contact rating [A_{eff}]	10×16	
PE connection	2 contacts on insulator	
Max. voltage/(CSA) [V_{AC}]	500 / (600)	
Contact connection	AC = Crimp contacts / AS = cage clamps	
Contact type	Pin / (socket = from customer)	
Degree of protection	Corresponding to motor protection type (IP54, IP55, optionally IP65)	
Ambient temperature [°C]	-40 to +40	

Technical data AM.., AB..

Plug connectors	AMB..	AME..	ABB..	ABE..
For motor size	71 - 132		71 - 132; 160 - 225[1)]	
Locking of mating connector	Double clamp	Single clamp	Double clamp	Single clamp
Connector viewed from motor end				
Basic connector system	Harting, Han® EMC housing 10B; terminal box: Aluminum			
Number of contacts	2 × 6		1 × 3 + 1 × 6	
Module type	a, c: E module; b: Empty module		a : C module; b: Empty module; c: E module	
Max. contact rating [A_{eff}]	12 × 16		3 × 36 + 6 × 16	
PE connection	2 contacts on articulated frame			
Max. voltage/(CSA) [V_{AC}]	500 / (600)			
Contact connection	Crimping contacts			
Contact type	Pin / (socket = from customer)			
Degree of protection	Corresponding to motor protection type (IP54, IP55, optionally IP65)			
Ambient temperature [°C]	-40 to +40			

1) Can be mounted up to size 225 from a mechanical perspective, the rated current of the motor is decisive

Technical data for AD.., AK..

Plug connectors	ADB2	ADE2	AKB..	AKE..
For motor size	71 - 132; 160 - 225[1)]		160 - 225	
Locking of mating connector	Double clamp	Single clamp	Double clamp	Single clamp
Connector viewed from motor end				
Basic connector system	Harting, Han® EMC housing 10B; terminal box: Aluminum			
Number of contacts	2 × 3 + 1 × 6		1 × 3 + 1 × 6	
Module type	a, b: C module; c: E module		a : C module; b: Empty module; c: E module	
Max. contact rating [A_{eff}]	6 × 36 + 6 × 16		3 × 70 + 6 × 16	
PE connection	2 contacts on articulated frame			
Max. voltage/(CSA) [V_{AC}]	500 / (600)			
Contact connection	Crimping contacts		C module: Axial screw connection E module: Crimping contacts	
Contact type	Pin / (socket = from customer)			
Degree of protection	Corresponding to motor protection type (IP54, IP55, optionally IP65)			
Ambient temperature [°C]	-40 to +40			

1) Can be mounted up to size 225 from a mechanical perspective, the rated current of the motor is decisive

Contact rating depending on the temperature

Reduced current values apply to temperatures higher than the 40 °C given in the tables. The following figure shows the permitted contact load depending on the ambient temperature.

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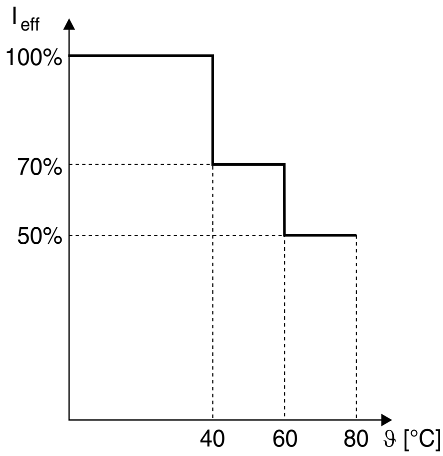

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Terminal strip with cage clamps

Unit designation /KCC

Description In this additional feature, the conventional way of connection to the bolts of the terminal board is replaced by a terminal strip.

Star or delta connection is implemented by one jumper for star connection and three jumpers for delta connection in the middle of the terminal strip. The 4 jumpers are included in the scope of delivery.

In a brakemotor, more terminal strips can be used as option for connecting the brake.

/KCC In addition to the only connection option of the motor, 6 times winding + 1 PE, two options are available when connecting brakemotors.

1. Seven terminal strips, 6 times winding + 1 PE. The brake is connected directly, not via the terminal strip.
2. Ten terminal strips, 6 times winding + 1 PE and additionally three terminals for the brake, prewired in the terminal box to the SEW rectifier, or only the terminal strip for supplying the BE brake by a rectifier in the control cabinet.

The auxiliary terminals, for example for thermal motor protection, are basically connected separately and not via the terminal strip.

Technical data for terminal strip with cage clamps

/KCC The KCC terminal strip replaces the conventional terminal board in the terminal box.

Terminal strip	KCC
For motor sizes	71 - 132
Number of terminals	6 + PE (motor) 10 + PE (brakemotor)
Contact connection	Cage clamp
Core cross section (max.)	4 mm^2 rigid 4 mm^2 flexible 2.5 mm^2 with conductor end sleeve
Connection	1 × star jumper or 3 × delta jumper in the middle of the terminal strip
Max. voltage / (CSA) [V]	AC 720 (600)
Max. contact rating [A_{eff}]	Terminal: 28 (20) Jumper: 24 (20)
Power range [kW]	Up to 9.2
Degree of protection	According to motor IP54 Optional IP55 – IP66
Ambient temperature [°C]	-40 to +60

C1 profile (VDI guideline 3643) compliant connection of the DR.80 overhead trolley system

Unit designation /KC1

Description VDI guideline 3643 contains a profile for overhead trolley systems, the so-called C1 profile.

The DR.80 motor meets this guideline with the additional feature /KC1 in terminal box positions R (0°), L (180°) and T (270°), all cable entries (X, 1, 2, 3).

Terminal box design for DRS71S and DRS71M is not necessary but can be mounted.

/KC1 The terminal box for the KC1 additional feature differs from the connection in the standard motor or brakemotor terminal box.

The 3 cable entries are integrated in the high cover of the KC1.

A terminal strip is used for connection.

- 3 terminals for the motor power
- 3 terminals for the brake
- 2 terminals for an electrical additional feature (e.g. for TF)

The maximum cross section that can be connected is 2.5 mm^2 per terminal.

Technical data for C1 profile (VDI guideline 3643) compliant connection of the DR.80 overhead trolley system

/KC1 The C1 profile compliant terminal box KC1 with terminal strip replaces the conventional terminal board in the terminal box of the standard DRS/DRE80 + BE, optionally also available for DRS71 + BE.

C1 profile	KC1
For motor sizes	80 (71)
Number of terminals	8 + PE (motor + brakemotor)
Contact connection	Cage clamp
Core cross section (max.)	2.5 mm^2 rigid 2.5 mm^2 flexible 1.5 mm^2 with conductor end sleeve
Connection	Delivery condition: Star The connection type can be changed by the customer
Max. voltage / (CSA) [V]	AC 500 (600/300)
Max. contact rating [A_{eff}]	Terminal: 24 (5/20)
Power range [kW]	Up to 1.1
Degree of protection	According to motor IP54 Optional IP55 – IP66
Ambient temperature [°C]	-40 °C to +60 °C

10.3 Ventilation

Forced cooling fan

Unit designation /V Standard design

Description

A 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 rated torque at small 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 cooling effect is at least equivalent with self-ventilation.

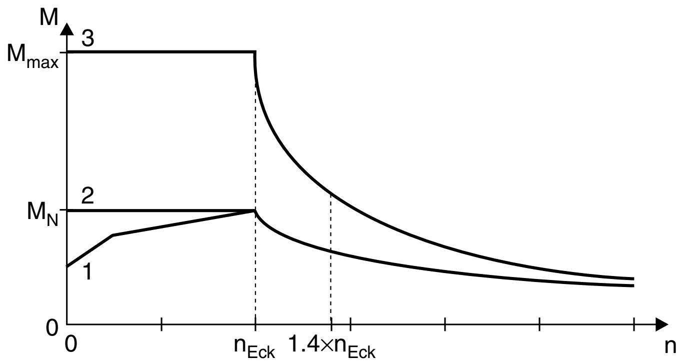
The metal cover of the forced cooling fan has the DR typical octagonal shape instead of the cylindrical shape. The length of the forced cooling fan guard varies depending on the motor options, such as brake or encoder. This also applies to the punched grooves, for example in the case of manual brake release.

/V

The motors can be equipped with a forced cooling fan if required. A forced cooling fan is usually not required for motors operated on the supply system in continuous duty. SEW-EURODRIVE recommends a forced cooling fan for the following applications:

- Drives with high starting frequency
- 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 following figure shows a typical speed-torque characteristic for a dynamic inverter drive, for example with MOVIDRIVE® MDX61B with DEH11B option in CFC operating mode.



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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 (base speed) of the motor	3	= Maximum torque

A forced cooling fan must be used if the load torque in the range 0 – n_{base} is above curve 1. The motor becomes thermally overloaded without forced cooling.

Combination with encoders

The forced cooling fan V can be combined with all encoders described in section "Additional feature - Encoder" on page 285 ff .

Please take into account that the overall drive might become longer.

Combination with MOVIMOT®

Combining the forced cooling fan V with MOVIMOT® is a novelty. In this way, the full motor torque can be achieved across the entire speed setting range.

A special design of the forced cooling fan directs part of the cooling air flow to the heat sink of MOVIMOT® where it develops its effectiveness.

Technical data for forced cooling fan

/V

For 50 Hz supply system frequency, voltage range 230 V

Forced cooling fan type			V				
For motor size DR			71	80	90	100	112/132
Supply voltage	**[V_{AC}]**	1~ △ 人	1 × 230 - 277 3 × 200 - 290 3 × 346 - 500				
Frequency	**[Hz]**		50				
Current consumption	**[A_{AC}]**	1~ △ 人	0.099 0.095 0.046	0.104 0.09 0.045	0.3 0.34 0.19	0.31 0.35 0.19	0.31 0.33 0.18
Max. power consumption	**[W]**		30	29	97	100	95
Air discharge rate	**[m^3/h]**		60		170	210	295
Ambient temperature	**[°C]**		-20 to +60				
Degree of protection			IP66				
Electrical connection			Terminal block in terminal box with 6 M4 bolts Connection 1~ with included running capacitor C_B				
Max. cable cross section	[mm^2]		4 × 1.5				
Thread for cable gland			1 × M16 × 1.5				
Additional weight	**[kg]**		1.7	1.9	2.1	2.1	DR.112: 2.35 DR.132: 2.35

Forced cooling fan type			V			
For motor size DR			160	180	200 / 225	315
Supply voltage	**[V_{AC}]**	1~ △ 人	1 × 230-277 3 × 200-290 3 × 346-500	1 × 230 - 277 3 × 220 - 330 3 × 380 - 575		
Frequency	**[Hz]**		50			
Current consumption	**[A_{AC}]**	1~ △ 人	0.39 0.44 0.24	0.45 0.52 0.29	- 0.68 0.39	- 0.87 0.50
Max. power consumption	**[W]**		138	159	200	255
Air discharge rate	**[m^3/h]**		450	780	1350	2500
Ambient temperature	**[°C]**		-20 to +60			
Degree of protection			IP66			
Electrical connection			Terminal block in terminal box with 6 M4 bolts Connection 1~ with included running capacitor C_B			
Max. cable cross section	**[mm^2]**		4 × 1.5			
Thread for cable gland			1 × M16 × 1.5			
Additional weight	**[kg]**		3.75	6.65	DR.200: 8.5 DR.225: 8.5	9.65

Voltage range DC 24 V

Forced cooling fan type			V				
For motor size DR			71	80	90	100	112/132
Supply voltage	[V_{DC}]		DC 24 V				
Current consumption	[A]		0.35	0.5	0.75	0.75/1.1	1.64
Max. power consumption	[W]		10	12	14	14/19	29
Air discharge rate	[m^3/h]		60		170	210	295
Ambient temperature	[°C]		-20 to +60				
Degree of protection			IP66				
Electrical connection			Terminal strip				
Max. cable cross section	[mm^2]		3 × 1.5				
Thread for cable gland			1 × M16 × 1.5				
Additional weight	[kg]		1.7	1.9	2.1	2.1	DR.112: 2.35 DR.132: 2.35

Additional flywheel mass

/Z

The motor can be equipped with additional flywheel mass Z, the flywheel fan, to achieve smooth startup and braking behavior of motors operated on the supply system. 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 motors with and without a brake.

Note the following points:

- Check the switching frequency. Multiply the permitted no-load switching frequency Z_0 with the factor 0.8 or use a forced cooling fan.
- Use the total mass moment of inertia $J_{ges} = J_{mot} + J_Z$ at the motor end.
- Countercurrent braking and movement against end stop are not permitted.
- Not available in vibration grade B.

Technical data for additional flywheel mass

Unit designation /Z

Description 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.

/Z

For motor	J_Z [10^{-4} kgm^2]	J_{Mot} [10^{-4} kgm^2]	$J_{Mot} + J_Z$ [10^{-4} kgm^2]	Mass m_Z [kg]
DR.71S4	21.3	4.9	26.2	1.3
DR.71M4		7.1	28.4	
DR.80S4	37.9	14.9	52.8	1.8
DR.80M4		21.5	59.4	
DR.90M4	100	35.5	135.5	3.4
DR.90L4		43.5	143.5	
DR.100M4	135	56	191	3.5
DR.100L4	150	68	218	3.8
DR.100LC4		90	240	
DR.112M4	200	146	346	4.5
DR.132S4		190	390	
DR.132M4	300	255	555	6.4
DR.132MC4		340	640	
DR.160S4	500	370	870	7.3
DR.160M4		450	950	
DR.160MC4		590	1090	

/EI7. The magnet ring in the fan of the built-in encoder increases the mass moment of inertia.

Take into account the mass moment of inertia of the magnet ring fan when determining the permitted switching frequency, see page 314.

For motor	J_{EI7} [10^{-4} kgm^2]	J_{Mot} [10^{-4} kgm^2]	J_{PA} [10^{-4} kgm^2]	$J_{Mot} + J_{EI7}$ [10^{-4} kgm^2]	Ratio [%]	Mass m_{EI7} [kg]
DR.71S4	2.68	4.9	0.34	7.2	148	0.17
DR.71M4		7.1		9.4	133	
DR.80S4	3.31	14.9	0.97	17.2	116	0.21
DR.80M4		21.5		23.8	111	
DR.90M4	11.44	35.5	1.32	45.6	129	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	15.66	146	1.28	160	110	0.51
DR.132S4		190		204	108	
DR.132M4		255		269	106	
DR.132MC4		340		354	104	

Metal fan

Unit designation /AL

Description The metal fan is used instead of the PVC fan if the expected ambient temperature exceeds +60 °C or drops below -20 °C.

It will be set as standard for ATEX motors category 2 and 3 (/2GD and /3GD) as soon as ATEX certification has been obtained for the DR motors.

/AL The metal fan is used instead of the PVC fan if the expected ambient temperature exceeds +60 °C or drops below -20 °C.

It will be set as standard for ATEX motors category 2 and 3 (/2GD and /3GD) as soon as ATEX certification has been obtained for the DR motors.

Temperature: -40 °C to +100 °C

Using the metal fan is mandatory if the upper or lower limit of the permitted temperature range of the PVC fan of -20 °C to +60 °C is exceeded.

Ambient Temperature [°C]	-40	-20	0	20	40	60	80	100

Take into account the mass moment of inertia of the metal fan when determining the permitted switching frequency, see the following table.

Technical data for metal fan

/AL Mass moments of inertia of the metal fan:

Motor	J_{AL} [10^{-4} kgm·]	J_{Mot} [10^{-4} kgm·]	J_{PA} [10^{-4} kgm·]	J_{Mot} + J_{AL} [10^{-4} kgm·]	Ratio [%]	Mass m_{AL} [kg]
DR.71S	2.69	4.9	0.33	7.26	148	0.18
DR.71M		7.1		9.46	133	
DR.80S	4.50	14.9	0.97	18.4	124	0.25
DR.80M		21.4		24.9	117	
DR.90M	6.97	35.4	1.32	41	116	0.32
DR.90L		43.7		49.3	113	
DR.100M		56		61.6	110	
DR.100L		68.3		73.9	108	
DR.100LC		89.8		95.4	106	
DR.112M	15.5	146	5.55	161.5	110	0.48
DR.132S		190		205.5	108	
DR.132M		255		270.5	106	
DR.132MC		340		355.5	105	
DR.160M	61.2	450	5.97	511.2	114	0.96
DR.160MC		590		651	110	
DR.180M	117	1110	16.27	1227	111	1.5
DR.180LC		1680		1797	107	
DR.200L	121	2360	16.85	2481	105	1.56
DR.225S		2930		3051	104	
DR.225M		3430		3551	104	
DR.225MC		4330		4451	103	
DR.315K	370	18400	86.47	18770	102	3.48
DR.315S		22500		22870	102	
DR.315M		27900		28270	101	
DR.315L		31900		32270	101	

The bigger the motor size, the less influencing the aluminum fan becomes.

Protection canopy

Unit designation	/C
Description	The canopy is used to prevent the ingress of foreign particles into the fan guard. It is particularly used for vertical mounting positions. The protection canopy can be retrofitted to the fan guards. The PVC elements are made of conductive PVC. This means they are also permitted for use in explosion-proof drives because they do not cause static charge in the 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.

AC brakemotors in a vertical mounting position with the output shaft pointing downwards must be ordered with protection canopy C. The same applies to motors in a vertical mounting position installed in the open.

Technical data for protection canopy

/C

For additional lengths due to the protection canopy, refer to the motor dimension sheets on page 107 ff.

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Non-ventilated design

Unit designation	/U or /OL
Description	*Design /U:*

This non-ventilated type is implemented by leaving out the fan (empty fan guard, protruding shaft end).

Design /OL:

In this type, the B endshield is closed and there is no fan and fan guard. This design prevents the ingress of dirt, water, etc. into the motor. Dust cannot be dispersed either. Own rotors are provided due to the design.

In combination with the brake, the input shaft is not separated directly behind the bearing but behind the seat of the carrier. The closing cap is inserted in the magnets of the brake.

/U, /OL

In both additional variants, the motor/brakemotor is no longer self-cooled.

With the remaining convection cooling, the motor/brakemotor must only be operated with a reduced load or in an intermittent periodic duty mode.

The non-ventilated motor usually has half the rated power of the self-cooled motor.

For questions, please contact your contact partner for drives at SEW-EURODRIVE.

Air filter

Unit designation	/LF
Description	The air filter, a kind of fleece mat, is mounted in front of the fan guard. It can be easily removed and mounted again for cleaning purposes.

The attached air filter avoids that dust and other particles drawn in by the air are distributed. It also prevents that the ducts between the cooling fins become clogged with dust.

/LF

The air filter protects the cooling fins from dirt or from becoming clogged in environments subject to dust.

The air filter must be cleaned or replaced depending on the amount of dust in the environment. No maintenance intervals can be specified due to the individuality of each drive and the environment where it is installed.

Low-noise fan guard

Unit designation /LN

Description The noise of the motor/gearmotor is reduced by a special plate in the fan guard.

The LN guards (Low Noise) are available for motor sizes DR.71 – DR.132 with and without BE brake.

The noise is reduced by 5 – 8 dB(A).

/LN Replacing a standard fan guard with a "Low Noise" variant does not affect project planning.

10.4 Vibration monitoring diagnostic unit

Diagnostic unit

Unit designation

/DUV

Description DUV10A: Vibration diagnostics by means of vibration sensor

The DUV10A diagnostic unit monitors roller bearings, gearings for imbalance, and possible damages. Vibration analysis is used to detect possible damages at an early stage.

This device allows for permanent vibration monitoring. The condition and development of the damage can be directly read on the device, or can be visualized externally using switch outputs.

/DUV The DUV measures the structure-borne noise and uses this value to calculate the frequency spectrum. The structure-born noise sensor and evaluation electronics are fully integrated in the diagnostic unit.

The diagnostic unit is attached to the gearmotor or motor using a fastening element. The position where the diagnostic unit is installed depends on the objects to be monitored, gear unit/motor type and mounting position.

The diagnostic unit can be used to monitor up to 5 different objects or 20 individual frequencies.

The diagnostic unit can be used with both constant and variable speeds. When using variable speeds, a 0 - 20 mA current loop or a pulse signal must be supplied. The voltage supply is DC 24 V.

As the unit requires a certain measuring time at constant speed depending on the setting and number of objects to be monitored, you should consult SEW-EURODRIVE for applications where this time is < 16 seconds.

Technical data for diagnostic units

/DUV10A

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Technical data	Value
Measuring range [g]	± 20
Frequency range [Hz]	0.125 - 500
Spectral resolution [Hz]	0.125 Hz
Diagnostic processes	FFT, envelope-FFT, trend analysis
Minimum measuring time [s]	8.0
Speed range [rpm]	12 - 3500
Operating voltage [V]	10 - 32
Current consumption at DC 24 V [mA]	100
Protection class	III
EMW	IEC 1000-4-2/3/4/6
Overload capacity [g]	100
Temperature range [°C]	-30 to +60
Degree of protection	IP67
Table continued on next page	
Housing materials	• Zinc die casting • Coating based on epoxy finish • Polyester membrane keypad
Electrical connection for supply and switching output	M12 plug connector Pin assignment: • Pin1 supply (+), brown • Pin2 switching output 2 (main alarm), white • Pin3 supply (-), blue • Pin4 switching output 2 (early warning), black • Pin5 speed input (0 - 20 mA or pulse), gray
Electrical connection for RS-323 communication	M8 plug connection
Certificates and standards	CE, UL

Part number of the basic unit

DUV10A diagnostic unit: 1406 6297

Options for DUV10A

Designation	Meaning	Part number
DUV10A-S	Configuration software	1406 6300
DUV10A-K-RS-232-M8	Cable (for software)	1406 6319
DUV10A-N24DC	Power supply unit	1406 6327
DUV10A-I	Pulse tester	1406 6335
DUV10A-K-M12-2m PUR	Cable with 1 connector, length 2 m	1406 6343
DUV10A-K-M12-5m PUR	Cable with 1 connector, length 5 m	1406 6351
DUV10A-K-M12-2m PVC	Cable with 1 connector, length 2 m	1326 6209
DUV10A-K-M12-5m PVC	Cable with 1 connector, length 5 m	1326 6217

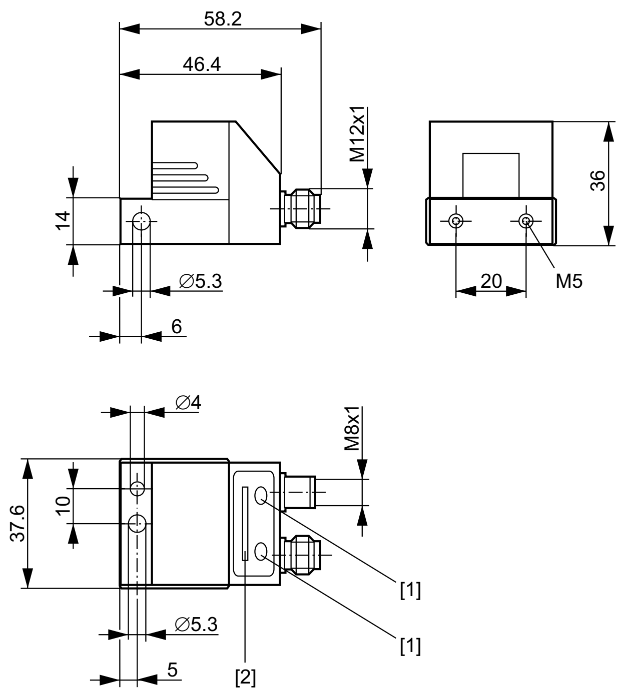
Mounted on motor

Fastening element for mounting the diagnostic unit to the motor.

The fastening element is mounted in the tapped hole for the eyebolt.

Fastening element	Assignment to the motor	Part number
M12	DR.160 - 180	1343 8425
M16	DR.200 - 225	1343 8441

Dimension drawing



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[1] Programming keys [2] LEDs

10.5 Other additional features

Second shaft end

Unit designation	/2W
Description	The 2nd shaft end allows to mount or couple elements to the B-side of the motor The dimensions of the 2nd shaft end of the DR motor do not correspond to the market standard but are usually smaller.

/2W

Motors / brakemotors of the DR series can optionally be equipped with a second shaft end.

In this case it is important that the total loads occurring at the first and second shaft end do not exceed the rated power values.

The axial load at the second shaft end is limited to 20 % of the overhung load like at the first shaft end but both loads may occur at the same time up to the limit value.

For overhung and axial load diagrams, refer to page 82 ff.

For motor dimension sheets, refer to page 107 ff.

Condensation drain hole

Unit designation	/DH
Description	The location of the condensation drain hole varies depending on the mounting position. The drain hole is located on the motor at the position nearest the center of the earth, at a point where the physical properties are favorable. The position of the hole(s) depending on the mounting position is described in an appendix to the assembly instructions. Up to degree of protection IP66, the condensation drain hole is sealed with a sealing element with labyrinth. It is always activated. Degree of protection IP66 is ensured.

/DH

Motors / brakemotors of the DR series can optionally be equipped with a condensation drain hole.

Activation is not required due to the design of the locking piece. Removing the locking piece is not permitted, else the degree of protection cannot be ensured.

Motors / brakemotors in IP56 and IP66 already come equipped with condensation drain hole.

Reinforced insulation

Unit designation	/RI
Description	For motors operated on frequency inverters at voltages > 500 V, SEW-EURODRIVE recommends to use a reinforced winding. The motor is dimensioned for star connection only.
/RI	The additional feature reinforced insulation is recommended when motors are operated with frequency inverter at voltages exceeding AC 500 V. These motors permit star connection only. For permitted pulse voltages, refer to section "DR series AC motor on frequency inverter" on page 106.

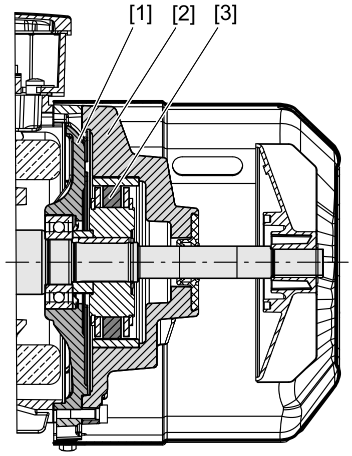
Backstop

Unit designation	/RS
Description	The backstop is used to block a direction of rotation of the motor. The blocking direction is defined as seen onto the fan guard. *Specification of blocking direction:* CW (Clockwise) CCW (Counterclockwise) The backstop is installed instead of the brake. The locking torque reaches at least double the maximum motor torque, (Exception: DRS132MC4 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:

RS

The mechanical backstop is used for protecting equipment against reverse movement when the motor is switched off.

The figure below shows the design of the RS backstop.



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1	Brake endshield
2	RS housing
3	Sprag ring

Note: Specify the direction of rotation for the motor or gearmotor in your order.

Technical data for backstop

/RS

The RS backstop operates maintenance-free above the lift-off speed. Please consult SEW-EURODRIVE for operation below lift-off speed.

Motor sizes	Rated locking torque [Nm]	Lift-off speed of sprags [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		
160	700	700		
180	1400	610		
200 / 225	2500	400	4500	
315	6300	320	4000	

Current-insulated rolling bearings

Unit designation	/NIB
Description	For motor size 315, the B-side bearings 6319-J-C3 or 6322-J-C3 are available in current-insulated design. SEW-EURODRIVE recommends these bearings for operation of the motor on a frequency inverter.

Motors with relubrication device

Unit designation	/NS
Description	Motors of size 315 and with reinforced A-side bearing (/ERF) are supplied with relubrication device as standard. The relubrication device is recommended for motors in vertical mounting positions or for continuous operation at speeds above 1800 rpm or increased ambient temperatures above 60°C. For gearmotors, reinforced A-side bearings are only available for a few gear ratios. These gear ratios are marked in the speed-performance overview. The relubrication device is incorporated in the price.

11 DR Series AC Motors with Decentralized Technology

11.1 MOVI-SWITCH® product description

Unit designation

/MSW

Description

MOVI-SWITCH® is the gearmotor with integrated switching and protection function.

The 4-pole AC (brake) motor sizes DR.71 to DR.100 can be combined with all appropriate gear units in the modular concept as part of the MOVI-SWITCH® product range. For detailed information on MOVI-SWITCH®, refer to the "Drive Systems for Decentralized Installation" catalog.

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.

MOVI-SWITCH® types

Two MOVI-SWITCH® variants are available: one for operation with one direction of rotation (MSW-1E); one for operation with direction of rotation reversal (MSW-2S).

The supply system 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.

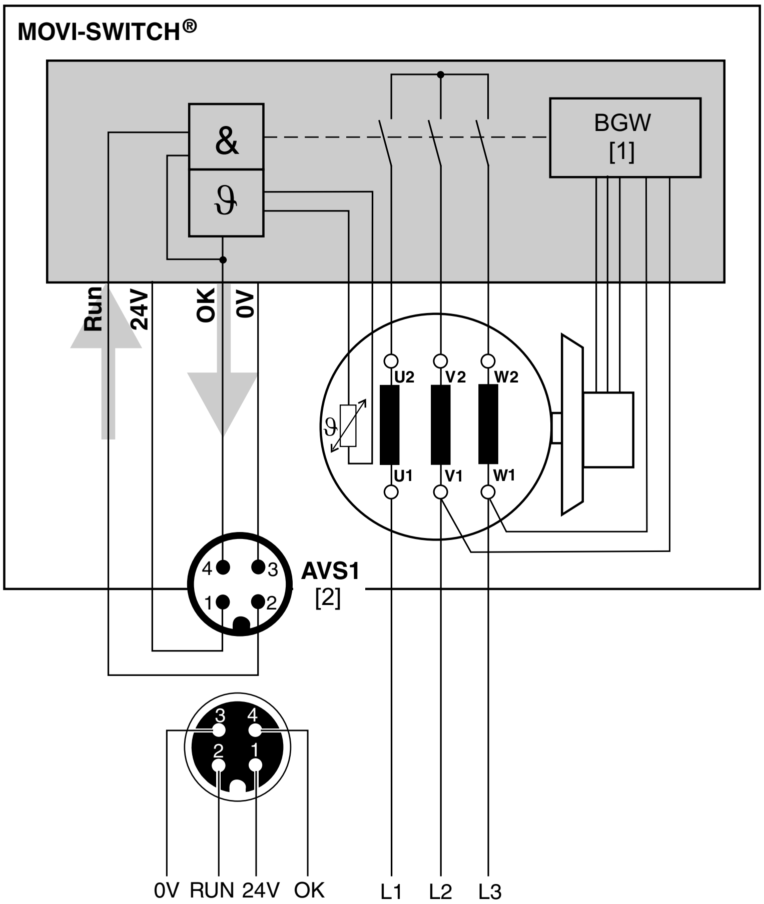
11.2 MOVI-SWITCH® project planning notes

Combination options

MOVI-SWITCH® AC motors and AC 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.

Operating principle

The following diagram illustrates how MOVI-SWITCH®-1E operates.



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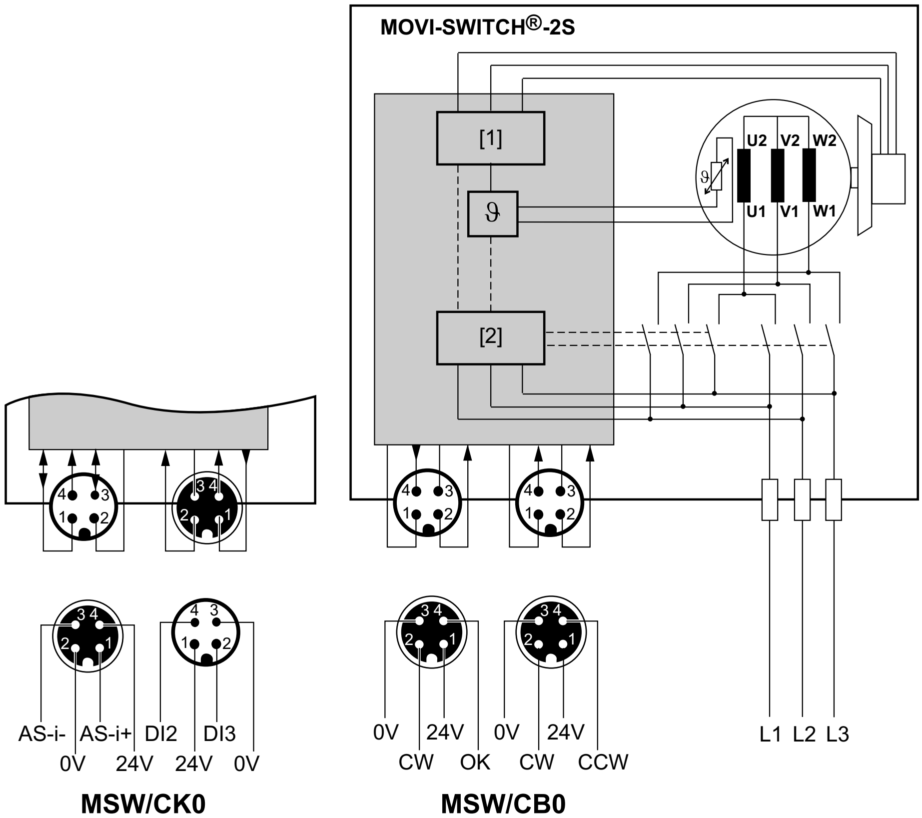
[1] = Brake control
[2] = M12 connector (standard coding)

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



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[1] Brake control
[2] Rotating field recognition

Voltage range

Motors within the following voltage range can be switched using MOVI-SWITCH®:

- 3 × 380 - 500 V, 50 / 60 Hz

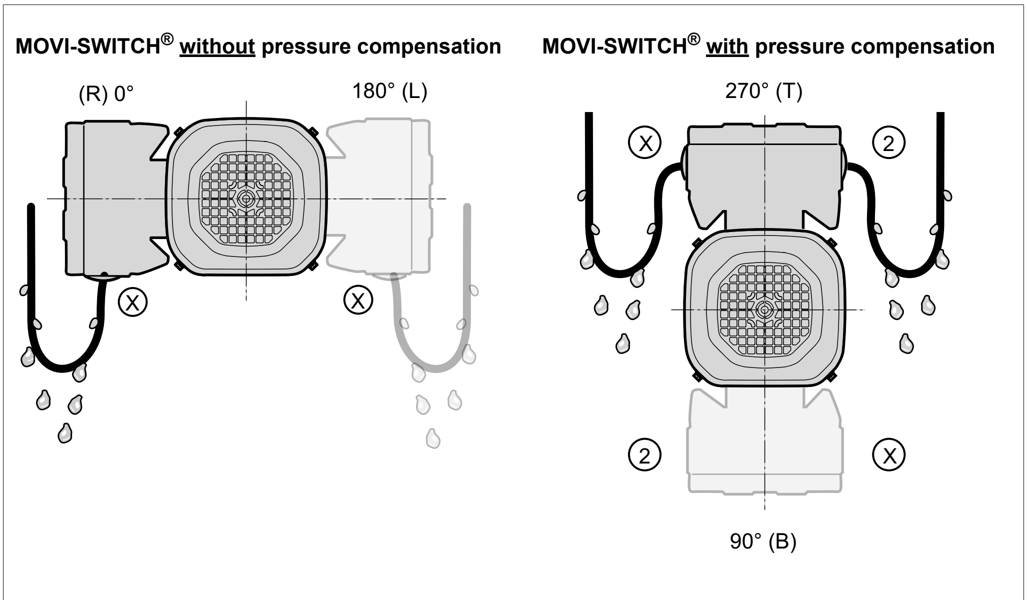
MOVI-SWITCH®-1E drives in degree of protection IP66

Characteristics

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

- IP66 motor with condensation bore and corrosion protection
- IP66 terminal box with cable outlet on one end
- Stainless steel screw plugs with seal on inside
- Stainless steel retaining screws in terminal 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



Drives	Type	Possible positions of the terminal box/cable entry
MOVI-SWITCH®-1E without pressure compensation fitting	**D../MSW/AVS1/IP66**	0°/X 180°/X
MOVI-SWITCH®-1E with pressure compensation fitting	**D../MSW/AVS1/IP66**	90°/ X 270°/X 90°/2 270°/2

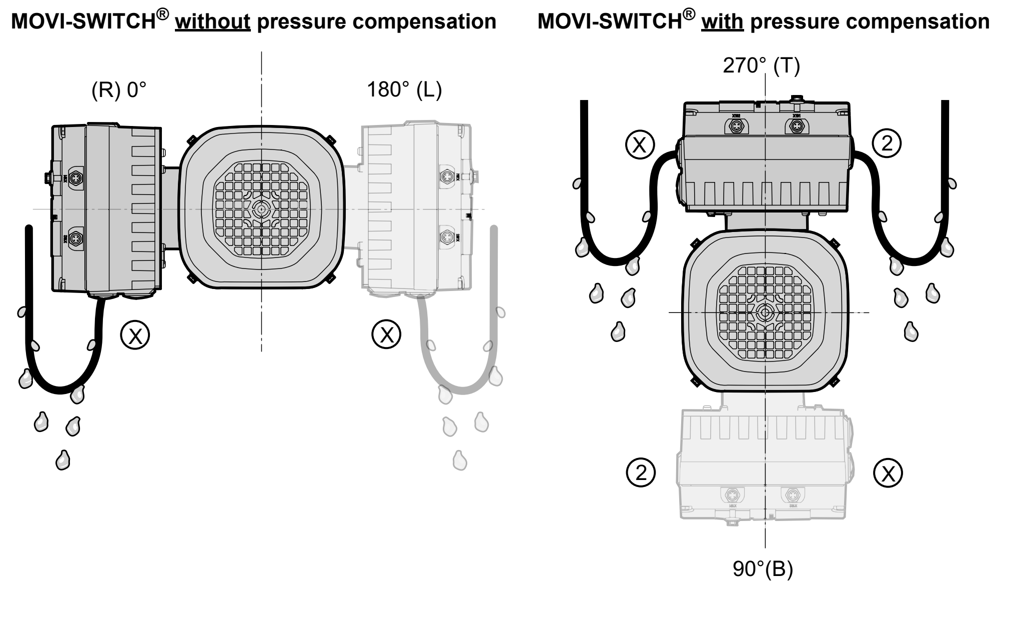
MOVI-SWITCH®-2S drives in degree of protection IP66

Characteristics

MOVI-SWITCH®-2S drives in enclosure IP66 are characterized by the following features:

- IP66 motor with condensation bore and corrosion protection
- IP66 terminal 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)

Available designs



Drives	Type	Possible positions of the terminal box/cable entry
MOVI-SWITCH®-2S without pressure compensation fitting	**D../MSW/C.. /RA2A - IP66**	0°/X 180°/X
MOVI-SWITCH®-2S with pressure compensation fitting	**D../MSW/C.. /RA2A - IP66**	90°/X 270°/X 90°/2 270°/2

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°. Consult SEW-EURODRIVE for other positions.

MSW-1E

Connection technology

Overview

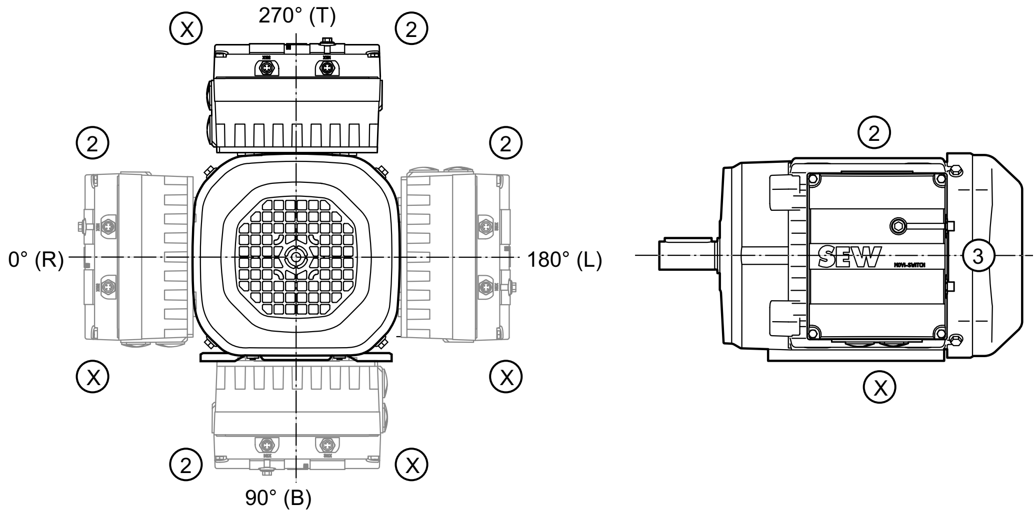
MOVI-SWITCH®-1E is supplied with AVS1 plug connector for control signals if not specified otherwise in the order. The plug connectors listed in the following table are available as standard. For other types, please contact SEW-EURODRIVE.

Order designation	Function	Manufacturer designation
MSW../AVS1	Control signals	1 x round plug connector M12 x 1
MSW../AVS1/ASA3	Control signals Power	1 x round plug connector M12 x 1+ Harting Han® 10 ES pin element (built-on housing with 2 clips)
MSW../ASAW	Connection to field distributor Z.3W or Z.6W	Harting Han® 10 ES pin element (built-on housing with 2 clips)

Possible plug connector positions

The following positions are possible for ASA3 and AVS1 plug connectors:

Plug connectors	Possible positions
AVS1	X (standard)
	2
	3
ASA3 **ASAW**	X (standard)
	2
	3
AVS1/ASA3	ASA3 = X (standard) + AVS1 = X (standard)
	ASA3 = 2 + AVS1 = 2
	ASA3 = 3 + AVS1 = 3
	ASA3 = X (standard) + AVS1 = 2
	ASA3 = 2 + AVS1 = X (standard)



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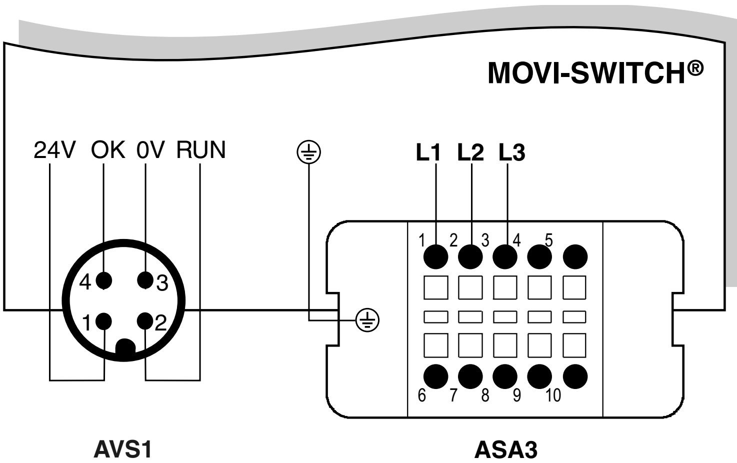
AVS1/ASA3 pin assignment

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



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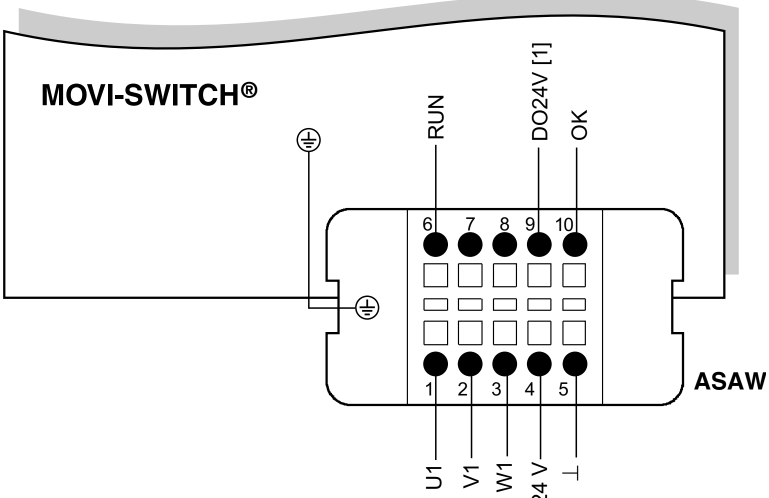
ASAW pin assignment

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



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[1] Plug connector monitoring possible with suitable connection wiring

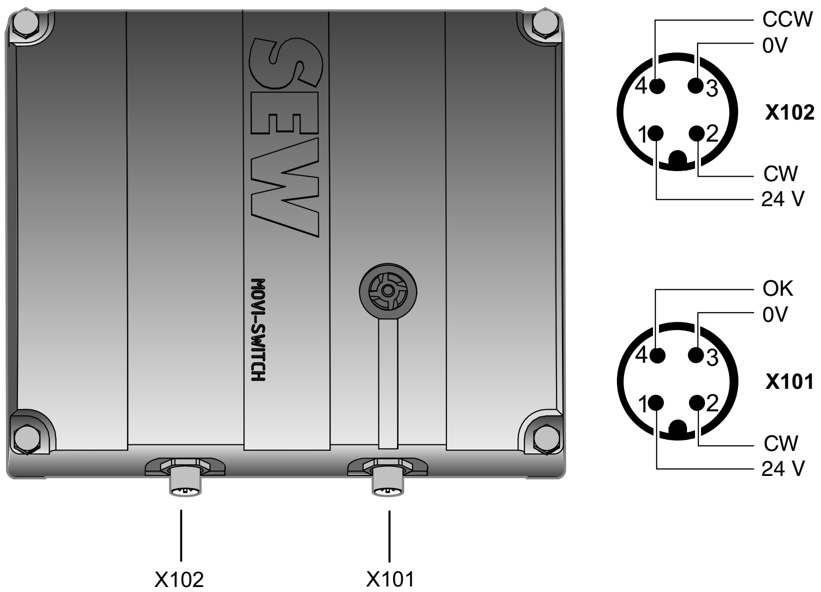
MSW-2S

Connection technology of CB0 design (binary control)

Standard version

As standard, MOVI-SWITCH®-2S is equipped with two plug connectors for connecting control signals and 24 V supply. The plug connectors are integrated in the control unit, see the following figure.

Order designation of the standard design: MSW/CB0/RA2A.



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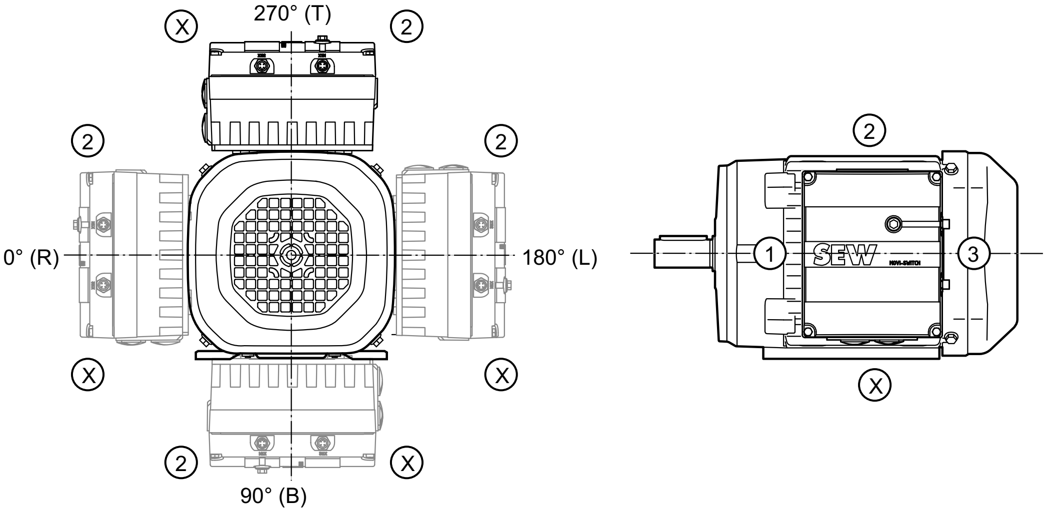
Optional plug connectors

The following table shows the plug connectors in the terminal box that are available as option for MOVI-SWITCH®-2S (CB0 design). For other types, please contact SEW-EURODRIVE.

Order designation	Function	Manufacturer designation
MSW/.../ASA3	Power	Harting Han® 10 ES pin element (built-on housing with 2 clips)
MSW/.../AND3	Power	Harting Han® Q8/0 pin element (built-on housing with 1 clip)
MSW/.../ASAW	Connection to field distributor Z.3W or Z.6W	Harting Han® 10 ES pin element (built-on housing with 2 clips)

Possible plug connector positions

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



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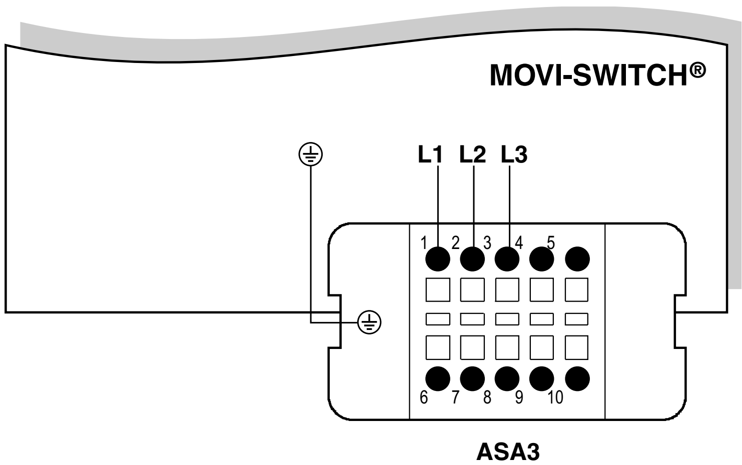
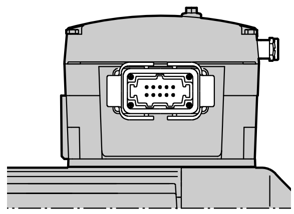
ASA3 pin assignment

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





MSW/CB0/RE2A/ASA3

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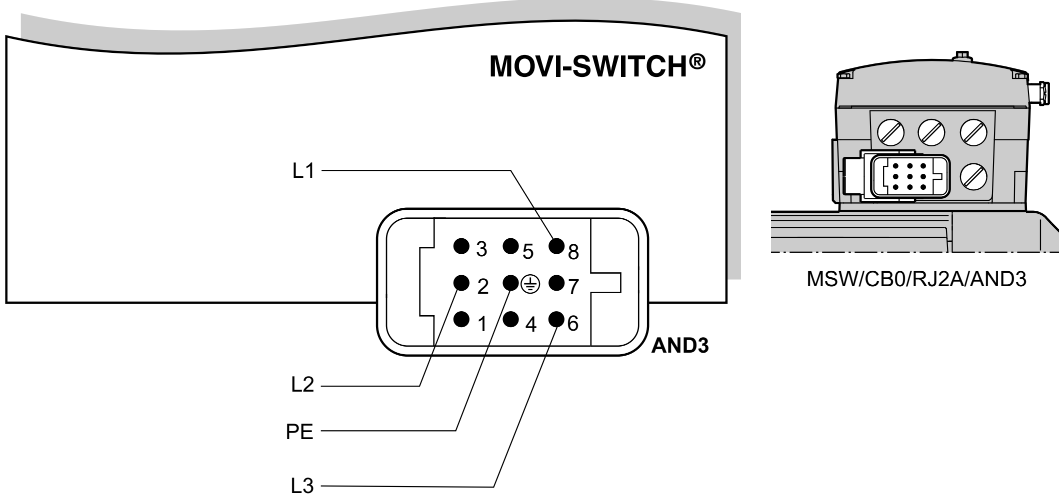
AND3 pin assignment

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



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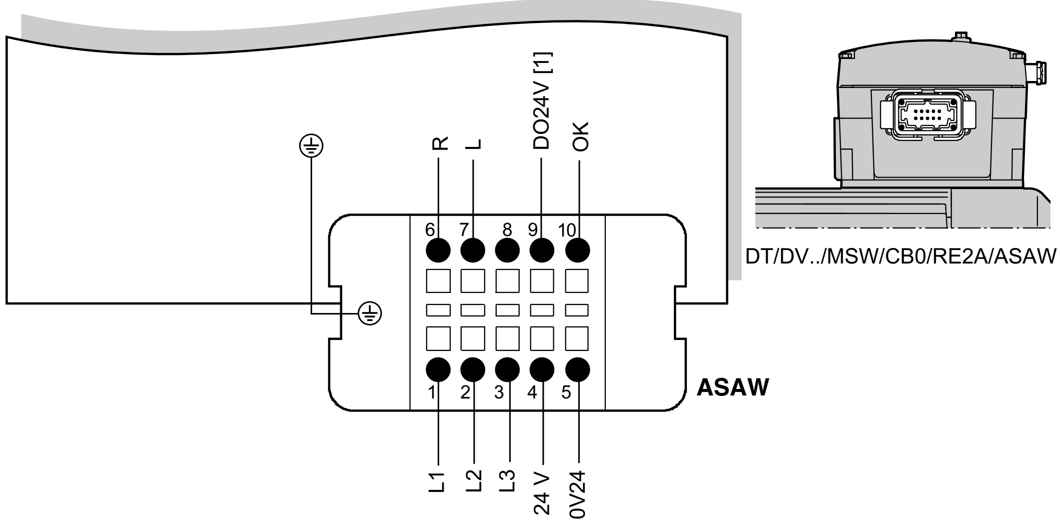
ASAW pin assignment

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



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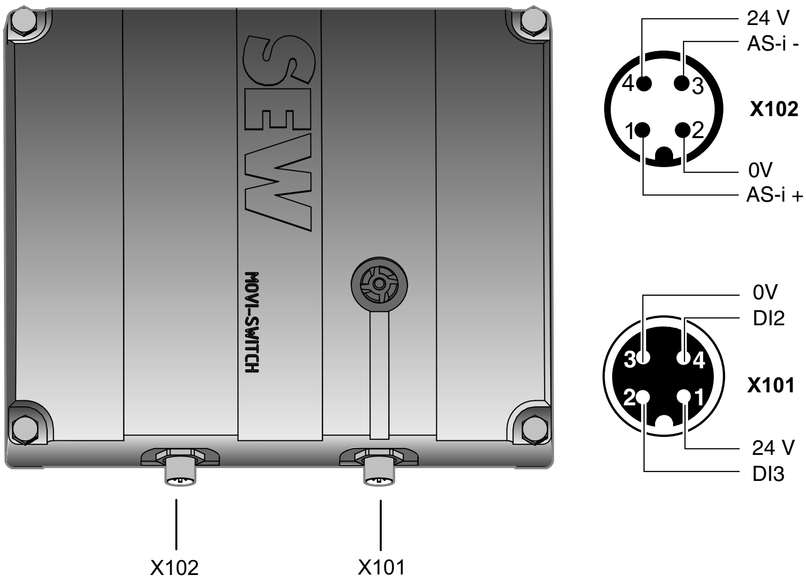
[1] Plug connector monitoring possible with suitable connection wiring

Connection technology of CK0 design (with integrated AS-Interface)

Standard version

MOVI-SWITCH®-2S is equipped with 2 plug connectors for AS-Interface and digital inputs as standard. The plug connectors are integrated in the control unit, see the following figure.

Order designation of the standard design: MSW.



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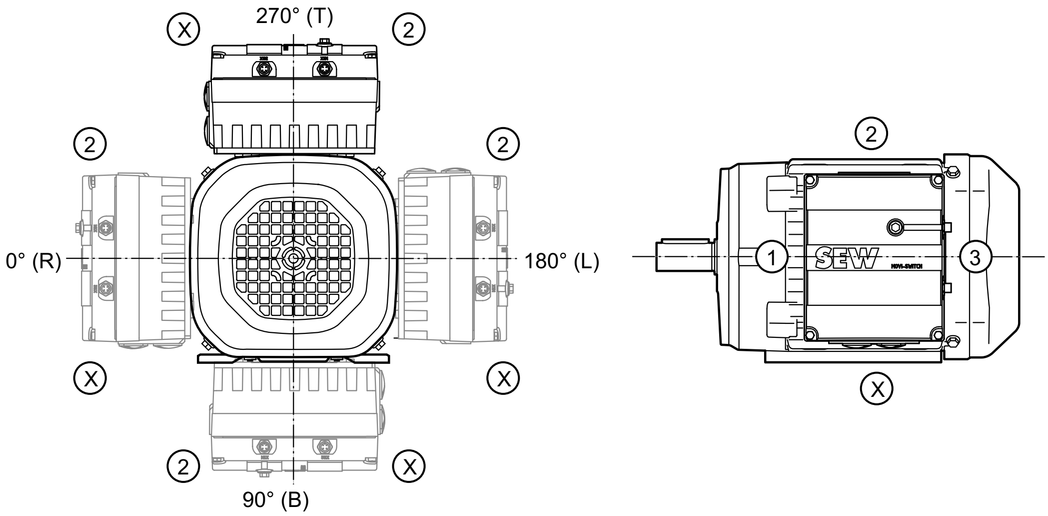
Optional plug connectors

The following table shows the optional plug connectors in the terminal box that are available for MOVI-SWITCH®-2S (CK0 design). For other types, please contact SEW-EURODRIVE.

Order designation	Function	Manufacturer designation
MSW/.../ASA3/AVS0	Power + AUX PWR	Harting Han® 10 ES pin element (built-on housing with 2 clips) + 1 x round plug connector M12 x 1
MSW/.../AND3/AVS0	Power + AUX PWR	Harting Han® Q8/0 pin element (built-on housing with 1 clip) 1 x round plug connector M12 x 1

Possible plug connector positions

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



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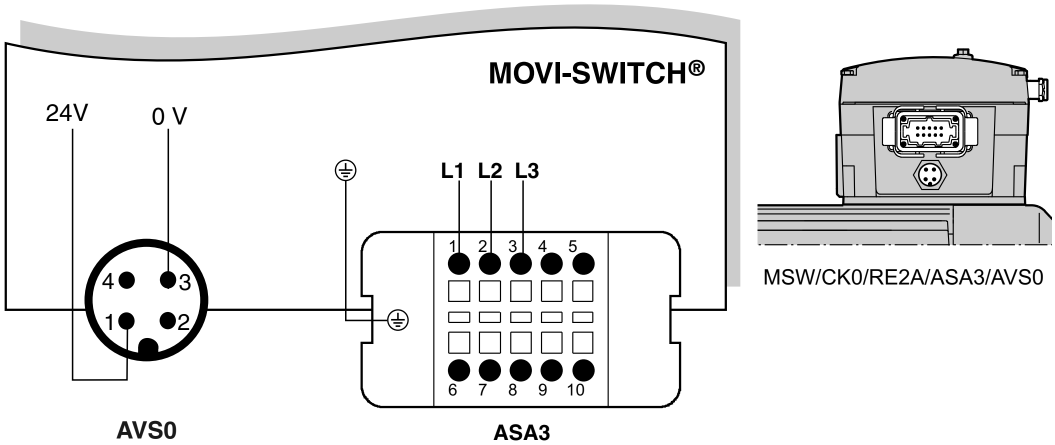
Pin assignments

AVS0/ASA3 pin assignment

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



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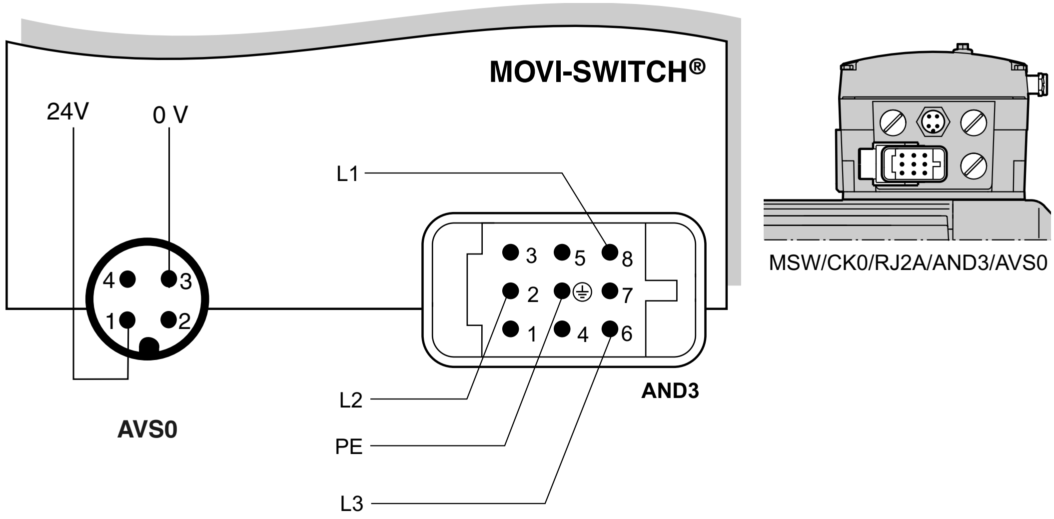
AVS0/AND3 pin assignment

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



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11.3 Key to the data tables of 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
$\cos\varphi$	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	Switching frequency for operation with BG brake controller
Z_0 BGE	Switching frequency for operation with BGE brake controller
M_B	Braking torque
m_B	Mass of the brakemotor
J_{MOT_BE}	Mass moment of inertia of the brakemotor

11.4 Technical data of MOVI-SWITCH®-1E/2S, 2-pole

DRS: 3000 rpm - S1 IE1

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 class	$\eta_{75\%}$ $\eta_{100\%}$ [%][1]	I_A/I_N	M_A/M_N M_H/M_N	m [kg][2]	J_{Mot} [10^{-4} kgm^2]
DRS71M2	0.55	1.87	2810	1.37	1.42	0.79	-	73.5 72.9	4.9	2.9 2.1	9.1	7.1
DRS80S2	0.75	2.55	2800	1.73	1.78	0.84	IE1	74.6 74.4	4.6	2.5 2.3	11.5	14.9
DRS80M2	1.1	3.7	2840	2.35	2.4	0.88	IE1	77.7 76.5	6	2.7 2.5	14.3	21.5
DRS90M2	1.5	5.1	2830	3.1	3.2	0.89	IE1	80 78.3	5.9	2.7 2.6	18.4	35.5
DRS90L2	2.2	7.4	2820	4.45	4.6	0.89	IE1	82.8 80.5	5.8	2.9 2.5	21.5	43.5
DRS100M2	3	10.1	2840	5.8	6	0.91	IE1	84.6 82.5	6.4	3.1 2.8	26	56

1) Efficiency levels according to IEC 60034-2-1 Ed.1 (2007) / PLL from Residual Losses

2) Applies for foot-mounted motor (DRS.../FI..)

DRE: 3000 rpm - S1 IE2

Motor type DRE../MSW	P_N [kW]	M_N [Nm]	n_N [rpm]	I_N 400 V [A]	I_N 380-420 V [A]	cosφ	IE class	$\eta_{75\%}$ $\eta_{100\%}$ [%][1]	I_A/I_N	M_A/M_N M_H/M_N	m [kg][2]	J_{Mot} [10^{-4} kgm^2]
DRE80M2	0.75	2.5	2890	1.54	1.6	0.89	IE2	79.2 79.2	7.9	3.4 3	14.3	21.5
DRE90M2	1.1	3.65	2870	2.2	2.3	0.89	IE2	82.2 81.2	7.2	3.2 3	18.4	35.5
DRE90M2	1.5	5.1	2830	2.95	3.05	0.89	IE2	83.5 81.8	5.9	2.7 2.6	18.4	35.5
DRE100M2	2.2	7.3	2880	4.15	4.3	0.91	IE2	85.6 84.5	8.2	3.8 3.3	26	56
DRE100L2	3	10.1	2850	5.5	5.7	0.93	IE2	87.4 85.6	7.2	3.5 3.1	29	68

1) Efficiency levels according to IEC 60034-2-1 Ed.1 (2007) / PLL from Residual Losses

2) Applies for foot-mounted motor (DRE.../FI..)

Motor type DRS../MSW	BE..	Z_0 BG[1)] BGE[2)] [1/h]	M_B [Nm][3)]	m_B [kg][4)]	J_{Mot_BE} [10^{-4} kgm^2]
DRS71M2	BE05	2000 4500	3.5	11.5	8.4
DRS80S2	BE05	1400 3300	5	14.2	16.4
DRS80M2	BE1	1300 3000	7	17.3	23
DRS90M2	BE1	1100 2700	10	22.5	37
DRS90L2	BE2	900 2200	14	26	48.5
DRS100M2	BE2	700 1800	20	30.5	61

1) Operation with BG brake control system
2) Operation with BGE brake control system
3) Standard braking torque for IEC brakemotor
4) Applies for foot-mounted motor (DRS...BE../FI..)

Motor type DRE../MSW	BE..	Z_0 BG[1)] BGE[2)] [1/h]	M_B [Nm][3)]	m_B [kg][4)]	J_{Mot_BE} [10^{-4} kgm^2]
DRE80M2	BE05	1300 3200	5	17	23
DRE90M2	BE1	1100 2700	10	22.5	37
DRE90M2	BE1	1100 2700	10	22.5	37
DRE100M2	BE2	700 1800	14	30.5	61
DRE100L2	BE2	450 1000	20	33.5	73

1) Operation with BG brake control system
2) Operation with BGE brake control system
3) Standard braking torque for IEC brakemotor
4) Applies for foot-mounted motor (DRE...BE../FI..)

DRP: 3000 rpm - S1 IE3

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 class	$\eta_{75\%}$ $\eta_{100\%}$ [%]1)	I_A/I_N	M_A/M_N M_H/M_N	m [kg]2)	J_{Mot} [10^{-4} kgm^2]
DRP80M2	0.75	2.5	2890	1.46	1.51	0.89	IE3	83.2 83.2	7.9	3.4 3	14.3	21.5
DRP90M2	1.1	3.65	2870	2.1	2.2	0.89	IE3	84.7 83.7	7.2	3.2 3	18.4	35.5
DRP100M2	1.5	4.95	2890	2.65	-	0.93	IE3	87.9 87.1	8.7	3.8 3.3	26	56
DRP100M2	2.2	7.3	2880	4	-	0.91	IE3	87.8 86.7	8.2	3.8 3.3	26	56
DRP100LC2	3	9.8	2920	5.5	-	0.9	IE3	88 87.1	9.1	3 2.4	31	90

1) Efficiency levels according to IEC 60034-2-1 Ed.1 (2007) / PLL from Residual Losses

2) Applies for foot-mounted motor (DRP.../FI..)

Motor type DRP../MSW	BE..	Z_0 BG[1)] BGE[2)] [1/h]	M_B [Nm][3)]	m_B [kg][4)]	J_{Mot_BE} [10^{-4} kgm^2]
DRP80M2	BE05	1300 3200	5	17	23
DRP90M2	BE1	1100 2700	7	22.5	37
DRP100M2	BE2	700 1800	14	30.5	61
DRP100M2	BE2	700 1800	14	30.5	61
DRP100LC2	BE2	300 700	20	36	95

1) Operation with BG brake control system
2) Operation with BGE brake control system
3) Standard braking torque for IEC brakemotor
4) Applies for foot-mounted motor (DRP...BE../FI..)

11.5 Technical data of MOVI-SWITCH®-1E/2S, 4-pole

DRS: 1500 rpm - S1 IE1

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 class	$\eta_{75\%}$ $\eta_{100\%}$ [%][1)]	I_A/I_N	M_A/M_N M_H/M_N	m [kg][2)]	J_{Mot} [10^{-4} kgm^2]
DRS71S4	0.37	2.55	1380	1.14	1.24	0.7	-	65.3 66.6	3.5	1.8 1.8	7.8	4.9
DRS71M4	0.55	3.8	1380	1.55	1.62	0.72	IE1	71.9 70.6	3.6	2.1 2.1	9.1	7.1
DRS80S4	0.75	5.1	1400	1.8	1.82	0.81	IE1	76.6 75.3	4.3	1.9 1.9	11.5	14.9
DRS80M4	1.1	7.4	1410	2.40	2.50	0.84	IE1	78.6 77	5.1	2.2 1.7	14.3	21.5
DRS90M4	1.5	10.3	1395	3.30	3.40	0.82	IE1	82 79.6	5.0	2.3 2.0	18.4	35.5
DRS90L4	2.2	15	1400	4.85	4.95	0.81	IE1	83.1 81.1	5.1	2.5 2.2	21.5	43.5
DRS100M4	3	20.5	1400	6.4	6.5	0.82	IE1	84.7 82.4	5.3	2.8 2.4	26	56

1) Efficiency levels according to IEC 60034-2-1 Ed.1 (2007) / PLL from Residual Losses
2) Applies for foot-mounted motor (DRS.../FI..)

DRE: 1500 rpm - S1 IE2

Motor type DRE../MSW	P_N [kW]	M_N [Nm]	n_N [rpm]	I_N 400 V [A]	I_N 380-420 V [A]	cosφ	IE class	$\eta_{75\%}$ $\eta_{100\%}$ [%][1)]	I_A/I_N	M_A/M_N M_H/M_N	m [kg][2)]	J_{Mot} [10^{-4} kgm^2]
DRE80M4	0.75	5.0	1435	1.68	1.75	0.79	IE2	81.3 81	6.2	2.8 2.1	14.3	21.5
DRE90M4	1.1	7.4	1420	2.45	2.55	0.79	IE2	83.5 82.4	5.9	2.8 2.3	18.4	35.5
DRE90L4	1.5	10	1430	3.35	3.45	0.77	IE2	84.7 84	6.6	3.2 2.8	21.5	43.5
DRE100M4	2.2	14.7	1425	4.6	4.7	0.80	IE2	86.7 85.4	6.4	3.3 2.7	26	56
DRE100LC4	3	19.7	1455	6.2	6.3	0.81	IE2	87.1 86.3	7.5	2.7 2.4	31	90
DRE112M4	3	19.7	1455	6	6.2	0.83	IE2	87.4 86.5	7.3	2.4 2	41.5	146

1) Efficiency levels according to IEC 60034-2-1 Ed.1 (2007) / PLL from Residual Losses
2) Applies for foot-mounted motor (DRE.../FI..)

Motor type DRS../MSW DRS../MSW/C.0	BE..	Z_0 BG[1] BGE[2] [1/h]	M_B [Nm][3]	m_B [kg][4]	J_{Mot_BE} [10^{-4} kgm^2]
DRS71S4	BE05	6000 9500	5	10.2	6.2
DRS71M4	BE1	4100 11000	10	11.7	8.4
DRS80S4	BE1	3500 9000	10	14.5	16.4
DRS80M4	BE2	3500 9000	14	18	26
DRS90M4	BE2	2900 7500	20	23	40
DRS90L4	BE5	- 5600	40	27.5	49.5
DRS100M4	BE5	- 8500	40	32	62

1) Operation with BG brake control system
2) Operation with BGE brake control system
3) Standard braking torque for IEC brakemotor
4) Applies for foot-mounted motor (DRS...BE../FI..)

Motor type DRE../MSW DRE../MSW/C.0	BE..	Z_0 BG[1] BGE[2] [1/h]	M_B [Nm][3]	m_B [kg][4]	J_{Mot_BE} [10^{-4} kgm^2]
DRE80M4	BE1	3500 9000	10	17.3	23
DRE90M4	BE2	3000 8000	14	23	40
DRE90L4	BE2	3000 8000	20	26	48.5
DRE100M4	BE5	- 8000	28	32	62
DRE100LC4	BE5	- 3800	40	37	96
DRE112M4	BE5	- 3100	40	50	151

1) Operation with BG brake control system
2) Operation with BGE brake control system
3) Standard braking torque for IEC brakemotor
4) Applies for foot-mounted motor (DRE...BE../FI..)

DRP: 1500 rpm - S1 IE3

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 class	$\eta_{75\%}$ $\eta_{100\%}$ [%][1)]	I_A/I_N	M_A/M_N M_H/M_N	m [kg][2)]	J_{Mot} [10^{-4} kgm^2]
DRP90M4	0.75	4.95	1450	1.81	1.86	0.72	IE3	82.7 83.3	7.3	3.7 3.1	18.4	35.5
DRP90L4	1.1	7.3	1440	2.4	2.5	0.78	IE3	86.0 85.3	6.8	3.2 2.7	21.5	43.5
DRP100M4	1.5	9.9	1440	3.2	3.3	0.79	IE3	87.2 86.6	7.4	3.6 3.1	26	56
DRP100L4	2.2	14.6	1440	4.75	4.85	0.77	IE3	87.5 87.1	7.7	4.1 3.2	29	68
DRP112M4	3	19.7	1455	6	6.2	0.82	IE3	88.7 88	7.3	2.4 2	41.5	146

1) Efficiency levels according to IEC 60034-2-1 Ed.1 (2007) / PLL from Residual Losses

2) Applies for foot-mounted motor (DRP.../FI..)

Motor type DRP../MSW DRP../MSW/C.0	BE..	Z_0 BG[1)] BGE[2)] [1/h]	M_B [Nm][3)]	m [kg][4)]	J_{Mot_BE} [10^{-4} kgm²]
DRP90M4	BE1	2900 7500	10	22.5	37.0
DRP90L4	BE2	2300 5600	14	26	48.4
DRP100M4	BE2	1800 8500	20	30.5	61
DRP100L4	BE5	- 7600	28	35	74
DRP112M4	BE5	- 3100	40	50	151

1) Operation with BG brake control system
2) Operation with BGE brake control system
3) Standard braking torque for IEC brakemotor
4) Applies for foot-mounted motor (DRP...BE../FI..)

11.6 Technical data of MOVI-SWITCH®-1E/2S, 6-pole

DRS: 1000 rpm - S1 IE1

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 class	$\eta_{75\%}$ $\eta_{100\%}$ [%][1)]	I_A/I_N	M_A/M_N M_H/M_N	m [kg][2)]	J_{Mot} [10^{-4} kgm^2]
DRS71S6	0.25	2.65	895	0.83	0.86	0.7	-	61.4 62.2	2.7	1.7 1.7	7.8	4.9
DRS71M6	0.37	3.9	905	1.13	1.16	0.71	-	66.4 66.5	3.1	1.9 1.9	9.1	7.1
DRS80S6	0.55	5.7	915	1.64	1.66	0.71	-	68.2 67.9	3.4	1.8 1.8	11.5	14.9
DRS80M6	0.75	7.8	915	2.15	2.15	0.71	IE1	71.6 70.7	3.6	2 1.9	14.3	21.5
DRS90L6	1.1	11.3	930	3.1	3.15	0.68	IE1	76.3 75	4.2	2.3 2.3	21.5	43.5
DRS100M6	1.5	15.5	925	4.25	4.25	0.68	IE1	77.3 75.7	4.2	2.7 2.7	26	56
DRS112M6	2.2	22	955	5.4	5.5	0.74	IE1	80.5 79.3	5.5	2.1 1.8	41.5	146
DRS112M6	3	30.5	945	7	7.2	0.76	IE1	83 81	5.1	1.9 1.6	41.5	146

1) Efficiency levels according to IEC 60034-2-1 Ed.1 (2007) / PLL from Residual Losses
2) Applies for foot-mounted motor (DRS.../FI..)

DRE: 1000 rpm - S1 IE2

Motor type DRE../MSW DRE../MSW/C.0	P_N [kW]	M_N [Nm]	n_N [rpm]	I_N 400 V [A]	I_N 380-420 V [A]	cosφ	IE class	$\eta_{75\%}$ $\eta_{100\%}$ [%][1)]	I_A/I_N	M_A/M_N M_H/M_N	m [kg][2)]	J_{Mot} [10^{-4} kgm^2]
DRE90L6	0.75	7.6	940	2.15	2.2	0.65	IE2	77.8 77.2	4.6	2.4 2.4	21.5	43.5
DRE100M6	1.1	11.2	940	3.1	3.15	0.64	IE2	79.4 78.7	4.7	3 2.9	26	56
DRE100L6	1.5	15.2	940	4	4.05	0.66	IE2	81.5 80.9	5	3.3 3.1	29	68
DRE112M6	2.2	22	955	5.2	5.3	0.74	IE2	84.2 83	5.5	2.1 1.8	41.5	146
DRE132S6	3	30	955	6.8	7	0.74	IE2	85.8 84.4	5.5	2.3 2.1	46.5	190

1) Efficiency levels according to IEC 60034-2-1 Ed.1 (2007) / PLL from Residual Losses
2) Applies for foot-mounted motor (DRE.../FI..)

Motor type DRS../MSW DRS../MSW/C.0	BE..	Z_0 BG[1)] BGE[2)] [1/h]	M_B [Nm][3)]	m_B [kg][4)]	J_{Mot_BE} [10^{-4} kgm^2]
DRS71S6	BE05	7000 16000	5	10.2	9.4
DRS71M6	BE1	6600 15000	10	11.7	13
DRS80S6	BE2	6000 14000	14	15.2	19.4
DRS80M6	BE2	4300 10000	20	18	26
DRS90L6	BE5	3500 8000	28	27.5	49.5
DRS100M6	BE5	- 7000	40	32	62
DRS112M6	BE11	- 4000	80	56	156
DRS112M6	BE11	- 3600	80	56	156

1) Operation with BG brake control system
2) Operation with BGE brake control system
3) Standard braking torque for IEC brakemotor
4) Applies for foot-mounted motor (DRS...BE../FI..)

Motor type DRE../MSW DRE../MSW/C.0	BE..	Z_0 BG[1)] BGE[2)] [1/h]	M_B [Nm][3)]	m_B [kg][4)]	J_{Mot_BE} [10^{-4} kgm^2]
DRE90L6	BE2	3500 8000	20	26	48
DRE100M6	BE5	- 7000	28	32	62
DRE100L6	BE5	- 6000	40	35	74
DRE112M6	BE5	- 4000	55	50	150
DRE132S6	BE11	- 3500	80	61	199

1) Operation with BG brake control system
2) Operation with BGE brake control system
3) Standard braking torque for IEC brakemotor
4) Applies for foot-mounted motor with brake (DRE...BE../FI..)

DRP: 1000 rpm - S1 IE3

Motor type DRP../MSW DRP../MSW/C.0	P_N [kW]	M_N [Nm]	n_N [rpm]	I_N 400 V [A]	I_N 380-420 V [A]	cosφ	IE class	$\eta_{75\%}$ $\eta_{100\%}$ [%][1)]	I_A/I_N	M_A/M_N M_H/M_N	m [kg][2)]	J_{Mot} [10^{-4} kgm^2]
DRP90L6	0,75	7.6	940	2.05	-[3)]	0.65	IE3	80 79.5	4,6	2,4 2.4	21.5	43.5
DRP100L6	1,1	11,1	950	3,1	-[3)]	0.63	IE3	82.4 82.4	5,3	3,6 3.1	29	68
DRP112M6	1.5	14.8	965	3.5	-[3)]	0.7	IE3	86.1 85.8	6.2	2.4 1.7	41.5	145
DRP132S6	2.2	22	965	5.1	-[3)]	0.72	IE3	86.5 85.6	6	2.5 2.2		188

1) Efficiency levels according to IEC 60034-2-1 Ed.1 (2007) / PLL from Residual Losses
2) Applies for foot-mounted motor (DRP.../FI..)
3) In preparation

Motor type DRP../MSW DRP../MSW/C.0	**BE..**	**Z_0 BG[1)] BGE[2)] [1/h]**	**M_B [Nm][3)]**	**m_B [kg][4)]**	**J_{Mot_BE} [10^{-4} kgm^2]**
DRP90L6	BE2	3500 8000	20	26	48.5
DRP100L6	BE5	- 6000	28	35	74
DRP112M6	BE5	- 4000	40	50	151
DRP132M6	BE5	- 3500	55		195

1) Operation with BG brake control system
2) Operation with BGE brake control system
3) Standard braking torque for IEC brakemotor
4) Applies for foot-mounted motor with brake (DRP...BE../FI..)

11.7 Notes on the dimension sheets

Observe the following notes regarding dimension sheets for 4-pole DR series AC motors:

- The collective term IV (= industrial plug connectors) in the dimension sheets includes the plug connectors AC.., AS.., AM.. and AB.
- Leave a clearance of at least half the fan guard diameter to provide unhindered air access.

Software support

Not any cable entry position [X, 1, 2, 3] and terminal box position [0°(R), 90°(B), 180°(L), 270°(T)] can be chosen. Some additional features 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.

For a thorough check of the possible positions of your drive, you can use the DRIVECAD software in DriveGate on the SEW-EURODRIVE website.

- If you are already a registered DriveGate user: https://portal.drivegate.biz/drivecad.
- If you are not yet a registered DriveGate user: www.sew-eurodrive.de: DriveGate login.

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:

∅	≤ 28 mm	→ ISO j6
∅	≤ 50 mm	→ ISO k6
∅	> 50 mm	→ ISO m6

Center bores according to DIN 332, shape DR:

∅	= 7 - 10 mm	→ M3	∅	> 30 - 38 mm	→ M12
∅	> 10 - 13 mm	→ M4	∅	> 38 - 50 mm	→ M16
∅	> 13 - 16 mm	→ M5	∅	> 50 - 85 mm	→ M20
∅	> 16 - 21 mm	→ M6	∅	> 85 - 130 mm	→ M24
∅	> 21 - 24 mm	→ M8	∅	> 130 mm	→ M30
∅	> 24 - 30 mm	→ M10			

Keys: according to DIN 6885 (domed type)

Flanges

Centering shoulder tolerance:

∅	≤ 230 mm (flange sizes A120 – A300)	→ ISO j6
∅	> 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.

Motor dimensions

Motor options

The motor dimensions may change when installing motor options. Refer to the dimension drawings of the motor options.

Special designs

The terminal box dimensions in special designs might vary from the standard.

EN50347

European standard EN50347 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 IEC72-1 standard.

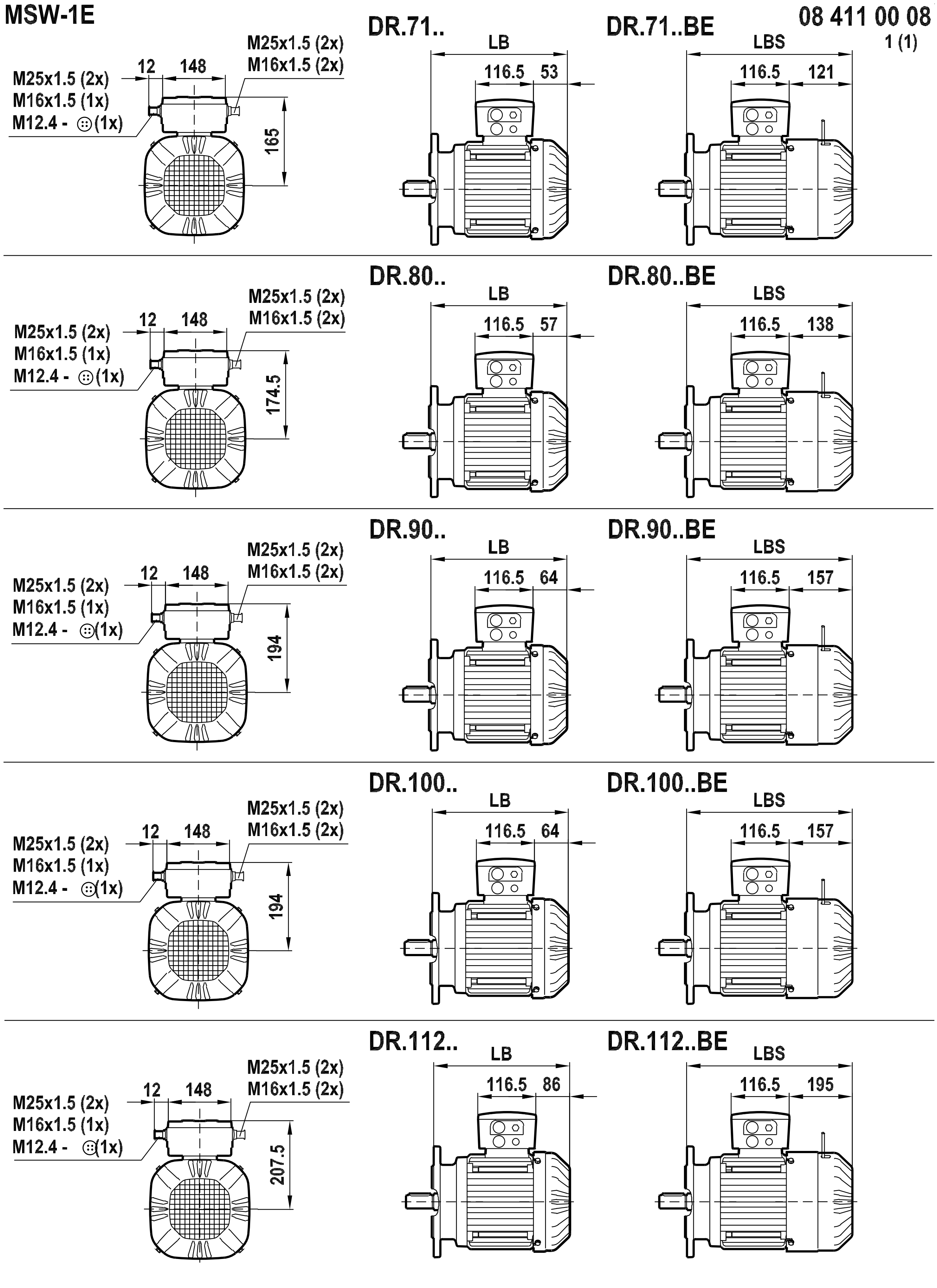
The new dimension designations according to EN50347/IEC72-1 are used for the relevant dimensions in the dimension sheet tables.

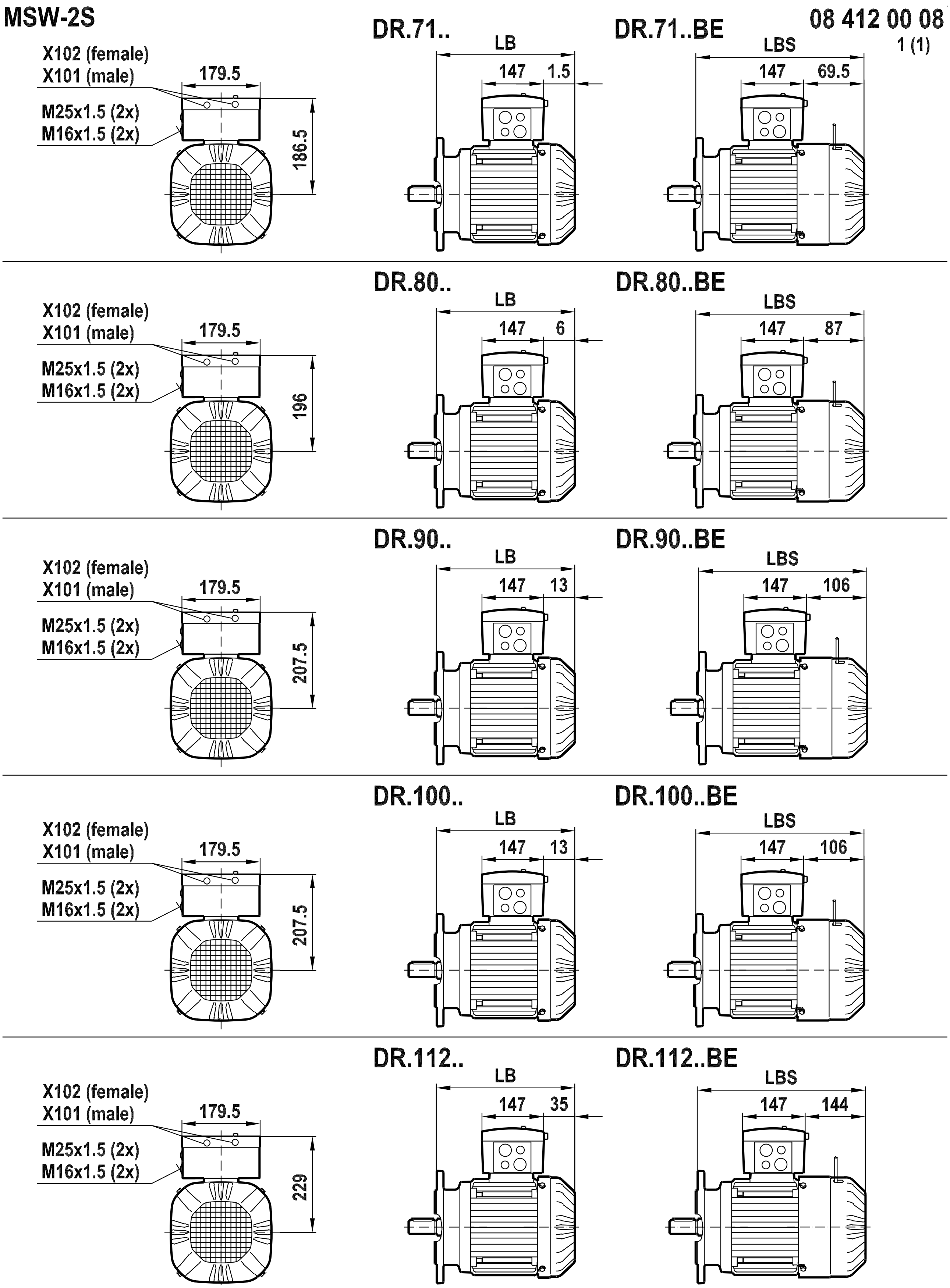
Notes on the dimension sheets of the DRL motors

Special designs

The DRL motor dimension sheets show the standard motors. For other designs, please refer to the dimension sheets of the DR. series AC motors.

11.8 Dimension sheets of DR. series AC motors with MOVI-SWITCH®




MSW-2S
DR.71..
DR.71..BE
08 412 00 08
1 (1)
X102 (female)
X101 (male)
M25x1.5 (2x)
M16x1.5 (2x)
179.5
186.5
LB
147
1.5
LBS
147
69.5
DR.80..
DR.80..BE
X102 (female)
X101 (male)
M25x1.5 (2x)
M16x1.5 (2x)
179.5
196
LB
147
6
LBS
147
87
DR.90..
DR.90..BE
X102 (female)
X101 (male)
M25x1.5 (2x)
M16x1.5 (2x)
179.5
207.5
LB
147
13
LBS
147
106
DR.100..
DR.100..BE
X102 (female)
X101 (male)
M25x1.5 (2x)
M16x1.5 (2x)
179.5
207.5
LB
147
13
LBS
147
106
DR.112..
DR.112..BE
X102 (female)
X101 (male)
M25x1.5 (2x)
M16x1.5 (2x)
179.5
229
LB
147
35
LBS
147
144

11.9 MOVIMOT® product description

MOVIMOT® version D

Unit 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 standard.
- Diagnostics and manual operation using SEW MotionStudio.
- 4-quadrant operation as standard.
- Integrated brake management:
  - For motors with mechanical brake, the brake coil is used as braking resistor.
  - For motors without brake, MOVIMOT® is supplied with internal braking resistor as standard.
- Control takes place either via binary signals, via the serial interface RS-485 or optionally via AS-Interface or all common fieldbus interfaces (PROFIBUS, PROFIsafe, INTERBUS, DeviceNet, CANopen).
- MOVIMOT® can be supplied with UL approval (UL listed) on request.

Advantages of MOVIMOT®

MOVIMOT® offers the following advantages:

- Low total volume.
- Interference-free connection between inverter and motor.
- Closed design with integrated protection functions.
- Inverter cooling independent of the motor speed.
- No space required in the control cabinet.
- Optimum default settings of the parameters for the expected applications.
- Compliance with EMC standards EN 50 081 (interference suppression level A) and EN 50 082.
- Easy installation, startup and maintenance.
- Easy to service for retrofitting and replacement.

MOVIMOT® can be used to equip extensive systems in a modular manner or can be integrated into existing systems. MOVIMOT® is also the electronic replacement for pole-changing motors or mechanical variable speed drives.

MOVIMOT® is available as motor, brakemotor, gearmotor or geared brakemotor in many different standard variants 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 is used.

Designation	Description
BEM	Brake controller
URM	Voltage relay
MLU13A	Internal DC 24 V voltage supply (380 - 500 V)
MNF11A	Internal line filter option (MM03 - MM15)
MLU11A MLU21A	DC 24 V voltage supply (380 - 500 V) DC 24 V voltage supply (200 - 240 V)
MLG11A MLG21A	Setpoint generator DC 24 V voltage supply (380 - 500 V) Setpoint generator DC 24 V voltage supply (200 - 240 V)
MFP...	PROFIBUS interface
MFI...	INTERBUS interface
MFD...	DeviceNet interface
MFO...	CANopen interface

For detailed information and project planning notes on the MOVIMOT® options, refer to the "Drive Systems for Decentralized Installation" manual and the "MOVIMOT® Gearmotors" catalog.

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 DR. motor / brakemotor is ordered without MOVIMOT®, a DIM can be supplied for the DR. motor according to its energy efficiency class. The DIM is attached in the standard terminal box of the DR. motor or DR...BE brakemotor. In the unit designation of the DR. motor / brakemotor, the DIM is indicated by /MI.

11.10 Project planning, technical data for MOVIMOT®

MOVIMOT®

/MM03 - /MM40

Note the following points during project planning for MOVIMOT® AC motors:

- The suitable 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 the communication of MOVIMOT® via fieldbus interfaces or RS-485, 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®.

Technical data of MOVIMOT®

/MM03 - /MM40

For detailed information about MOVIMOT®, refer to the "MOVIMOT® Gearmotors" catalog.

MOVIMOT® gearmotor:

11851axxf

- 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 (up to 2.2 kW)
- Rated speeds: 1400, 1700 and 2900 rpm

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. The following cables are available in 1 m steps:

- Hybrid cable
- Encoder cable

Prefabricated cables are divided into:

- Power cables (motor cable, brakemotor cable, extension cable)
- Feedback cables (encoder cable, extension cable).

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.

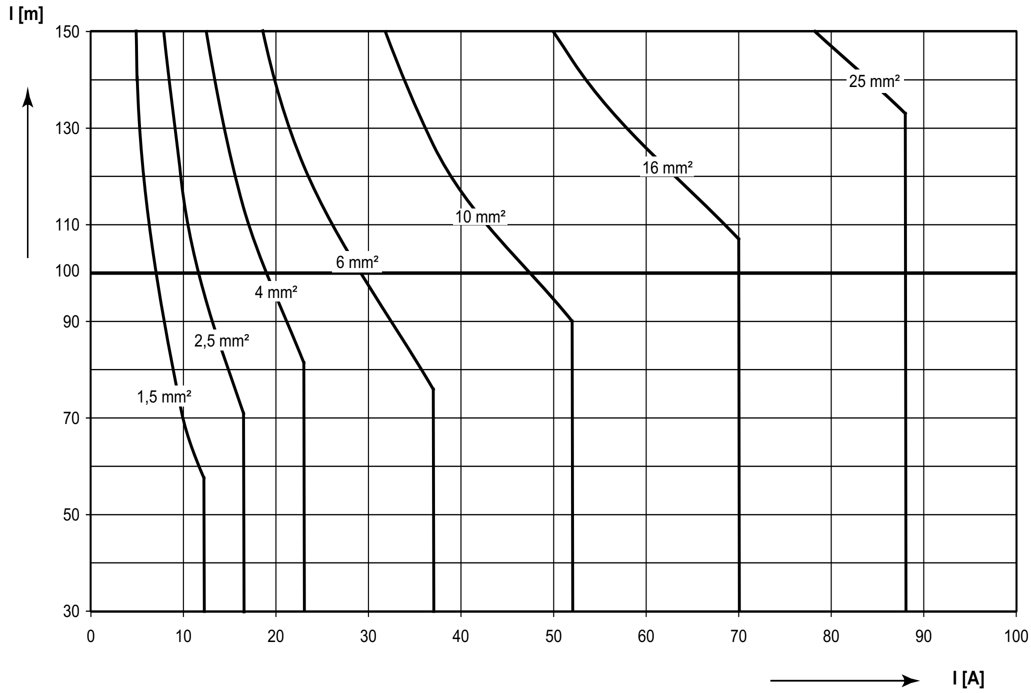
Using other standards for the machine construction can result in diverging cross sections.

12.2 Dimensioning the cable cross section

Project planning for cable cross section

Cable dimensioning according to EN 60204

The following figure shows the minimum required cable cross section depending on cable length and current.



54038AXX

Hybrid cables with cross sections of 1.5 mm^2 to 10 mm^2 can be ordered from SEW-EURODRIVE.

Cable load table

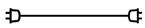
Cable load through current **I** in [A] according to EN 60204-1 table 5, ambient temperature 40 °C.

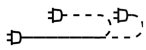
Cable cross section [mm^2]	Three-core sheathed cable in pipe or cable [A]	Three-core sheathed cable on top of each other on wall [A]	Three-core sheathed cable lined up horizontally [A]
1.5	12.2	15.2	16.1
2.5	16.5	21.0	22
4	23	28.0	30
6	29	36.0	37
10	40	50.0	52
16	53	66.0	70
25	67	84.0	88
35	83	104.0	114

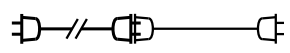
These data are merely recommended values and are **no substitute for the detailed project planning** of the cables depending on the concrete application considering the applicable regulations.

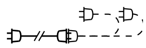
Observe the voltage drop that occurs along the cable in particular with the DC 24 V brake coil when dimensioning the cross sections for the brake cable. The accelerator current is decisive for the calculation.

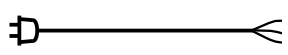
12.3 Key to the cable assignments

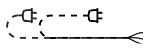

Cable with plug connector on motor, fixed installation

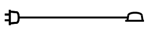

Cable with plug connector on motor, cable carrier installation

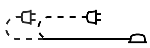

Extension cable with plug connector on motor, fixed installation

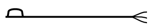

Extension cable with plug connector on motor, cable carrier installation


Cable with conductor end sleeves, fixed installation


Cable with conductor end sleeves, cable carrier installation

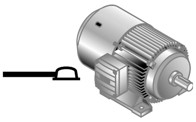

Cable connected via encoder cover


Cable connected via encoder cover, cable carrier installation

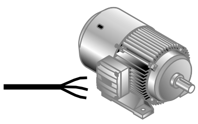
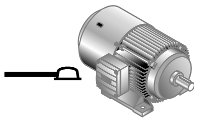

Cable with ISU plug connector

12.4 Cable assignments for DR motors at a glance

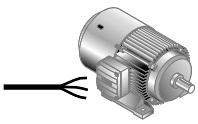
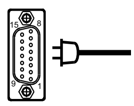
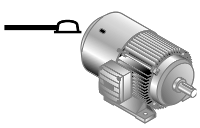
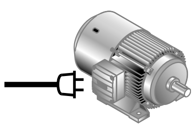
Brakemotor cable with IS

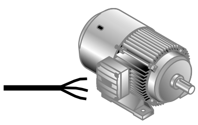
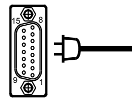
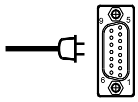
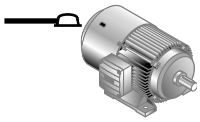
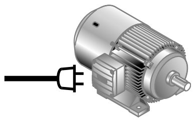
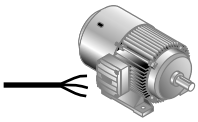
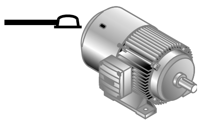
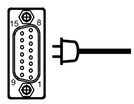
Motor type	Plug connectors	Motor	Cables	Control cabinet Field distributor	Details
DR71 - DR132	ISU		0817 8127 W (cable type A) 0817 8178 m (cable type A)	I/O	page 364 page 372 page 386

Motor cable for field-oriented MOVI-SWITCH®

Motor type	Plug connectors	Motor	Cables	MOVI-SWITCH® mounted in the field	Details
DR71 - DR100	--		0817 8879 (cable type C) 0817 8860 (cable type C)	/APG4 /ALA4	page 364 page 372 page 386
	/ASB4 /ISU		0817 8887 (cable type C) 0817 8895 (cable type C) 0593 7558 (cable type A)		

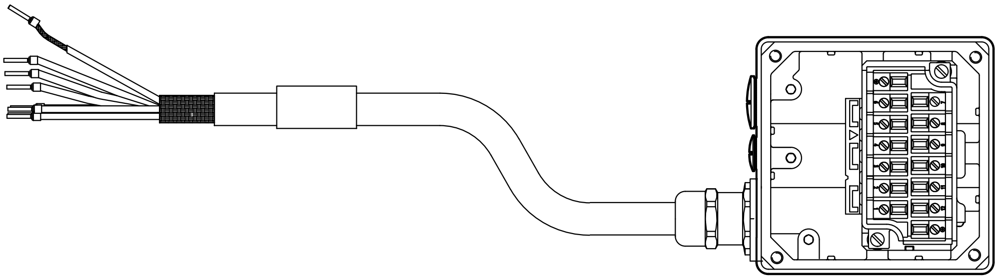
Encoder cable

Encoder on DR series AC motors Ð MOVIDRIVE®					
Motor type	**Encoders**	**Motor**	**Cables**	**MOVIDRIVE® inverter**	**Details**
DR71 - DR132	ES7S ES7R AS7W		1362 2021 1362 2048	X15 	page 367 page 376 page 389
DR160 - DR225	EG7S EG7R AG7W				
DR71 - DR132	ES7S ES7R AS7W		1361 7621 1361 7648		
DR160 - DR225	EG7S EG7R AG7W				
DR315	EH7S		1360 2659 1362 3206		
Table continued on next page					

DR71 - DR132	AS7Y		1360 2640 1362 3265	X15  X62 	page 367 page 376 page 389
DR160 - DR225	AG7Y				
DR315	AH7Y				
DR71 - DR132	AS7Y		1362 6299 1362 6302		
DR160 - DR225	AG7Y				
DR71 - DR132	EI7C EI76 EI72 EI71		1362 3273 1362 3281	I/O	page 369 page 381 page 389
Encoder on DR series AC motors - intermediate sockets - MOVIDRIVE®					
Motor type	**Encoders**	**Motor**	**Cables**	**M23**	**Details**
DR71 - DR132	ES7S ES7R AS7W		1362 3184		page 370 page 382 page 389
DR160 - DR225	EG7S EG7R AG7W				
DR71 - DR132	ES7S ES7R AS7W		1362 1963		
DR160 - DR225	EG7S EG7R AG7W				
Motor type	**Encoders**	**M23**	**Cables**	**M23**	**Details**
DR71 - DR132	ES7S ES7R AS7W		1362 3192 1362 1971		page 370 page 382 page 389
DR160 - DR225	EG7S EG7R AG7W				
Motor type	**Encoders**	**M23**	**Cables**	**MOVIDRIVE® inverter**	**Details**
DR71 - DR132	ES7S ES7R AS7W		1362 1998		page 370 page 382 page 389
DR160 - DR225	EG7S EG7R AG7W				

12.5 Description of power cables for DR motors

Brakemotor cable with IS



65388axx

Figure 1: IS brakemotor cable with motor protection, conductor end sleeves and ring-type cable lugs

Motor side

On the motor end, all 12 contacts of the integrated plug connector are used for connecting motor, brake, and motor protection.

The cables are available with variable terminal link in star or delta connection.

The brakemotor can then be supplied in ISU design.

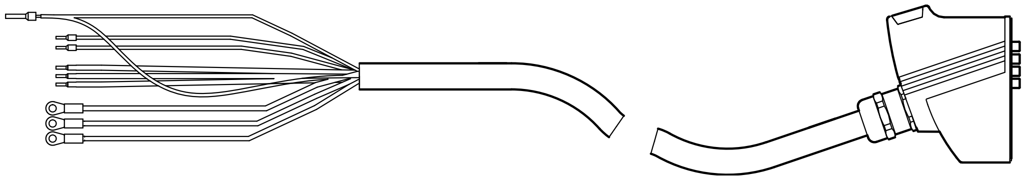
Control cabinet /field distributor

For wiring in the control cabinet and field distributors, the cores are fitted with ring-type cable lugs or conductor end sleeves.

Cable specification

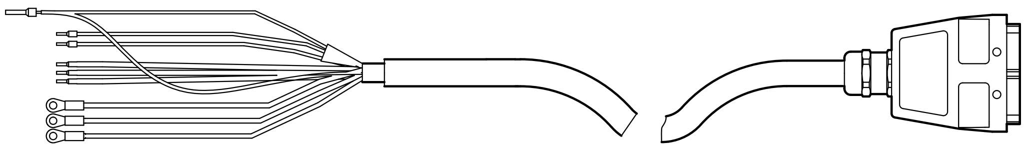
The used cable types for fixed and cable carrier installation are listed in chapter "Cable specifications for power cables" page 386.

Brakemotor cable for decentralized MOVI-SWITCH®



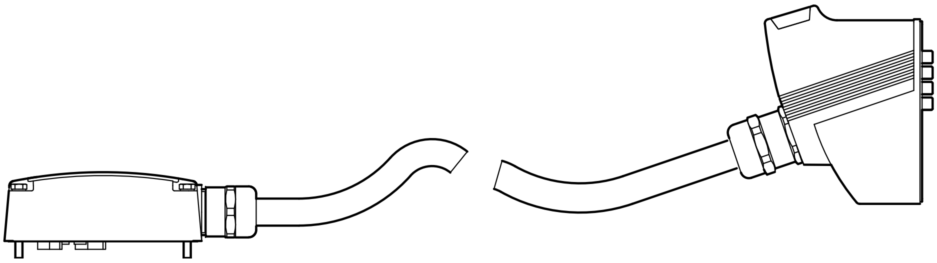
64047axx

Figure 2: Brakemotor cable with motor protection; conductor end sleeves/ring-type cable lugs, PLUSCON VC



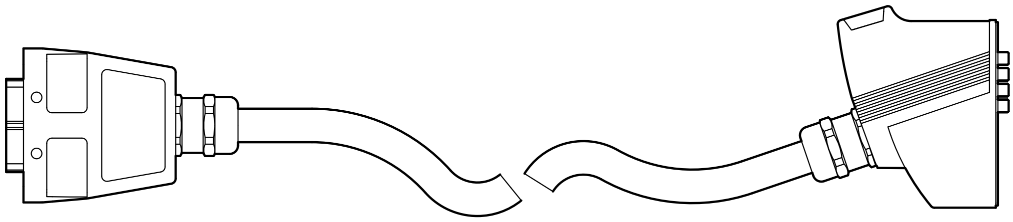
64048axx

Figure 3: Brakemotor cable with motor protection; conductor end sleeves/ring-type cable lugs, HAN 10E



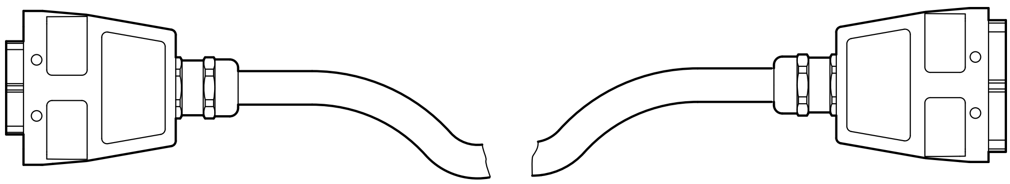
64049axx

Figure 4: Brakemotor cable with motor protection; IS and PLUSCON VC



64050axx

Figure 5: Brakemotor cable with motor protection; HAN 10E and PLUSCON VC



64051axx

Figure 6: Brakemotor cable with motor protection; HAN 10E and HAN 10E

Motor side

The connection options are available for the motor end:

Figure 2 and Figure 3: Conductor end sleeves are used for classical terminal box connection.

Figure 4: The integrated IS plug connector from SEW-EURODRIVE is used for connection to the motor.

Figure 5 and Figure 6: The mounted HAN 10E plug connectors are used for motor connection.

Decentralized MOVI-SWITCH®

The decentralized MOVI-SWITCH® offers two connection options:

At Figure 2, Figure 4, Figure 5 the PHOENIX PLUSCON VC plug connector is used for connection to MOVI-SWITCH®.

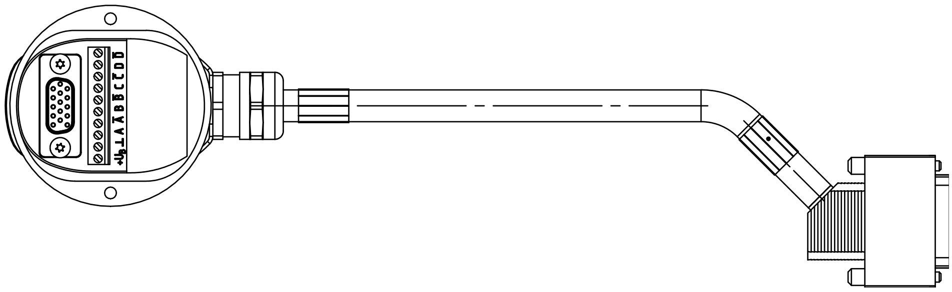
At Figure 3 and Figure 6 the mounted HAN 10E plug connector is used to connect MOVI-SWITCH®.

Cable specification

The used cable types for fixed and cable carrier installation are listed in chapter "Cable specifications for power cables" page 386.

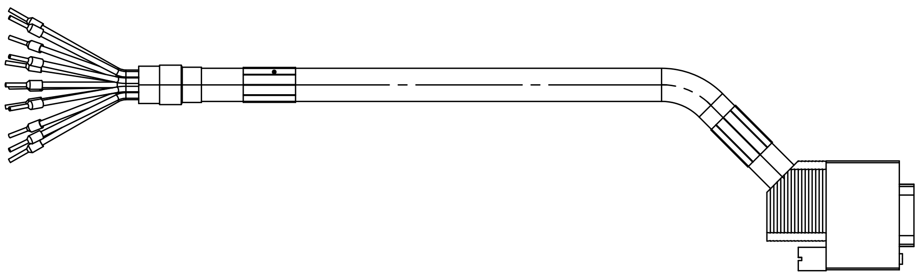
12.6 Description of add-on encoder cables for DR motors

Encoder cable with D-sub



64038axx

Figure 7: Connection cover with sub-D



64039axx

Figure 8: Conductor end sleeves with sub-D

Prefabrication on encoder/motor end

The prefabricated encoder cables for the add-on encoders on the DR motor are available with two different designs on the encoder/motor end.

- Figure 7: 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.
- Figure 8: If the encoder on the motor is ordered and delivered with a connection cover, the prefabricated cable is fitted with conductor end sleeves on the encoder end. 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.

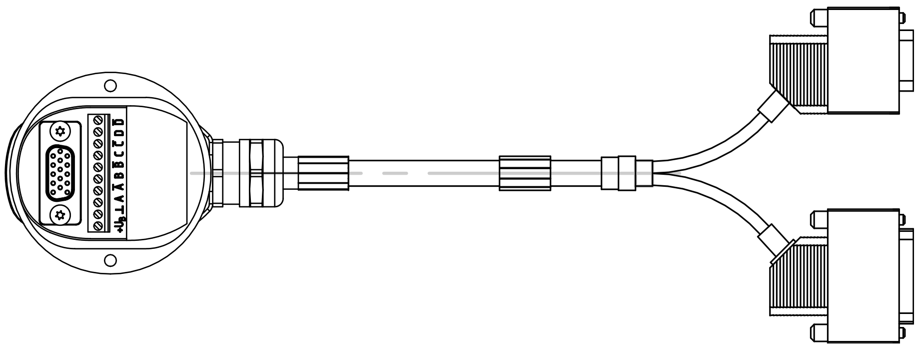
Prefabrication on MOVIDRIVE®/ inverter end

A commercial sub-D EMC connector with pin contacts is used on the inverter end of the prefabricated encoder cable for connection to MOVIDRIVE®. A 15-pin plug is available that matches the inverter interface.

Cable specification

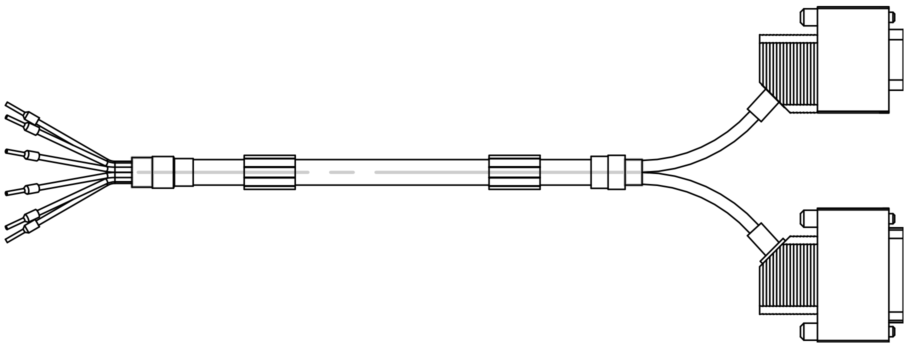
The used cable types for fixed and cable carrier installation are listed in chapter "Cable specifications for encoder cables" page 389.

Encoder cable with 2 sub-D



64041axx

Figure 9: Connection cover with 2 D-sub (1 × 9-pole and 1 × 15-pole)



64040axx

Figure 10: Connector end sleeves with 2 D-sub (1 × 9-pole and 1 × 15-pole)

Prefabrication on encoder/motor end

The prefabricated encoder cables for the add-on encoders on the DR motor are available with two different designs on the encoder/motor end.

- Figure 9: 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.
- Figure 10: If the encoder on the motor is ordered and delivered with a connection cover, the prefabricated cable is fitted with conductor end sleeves on the encoder end. 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.

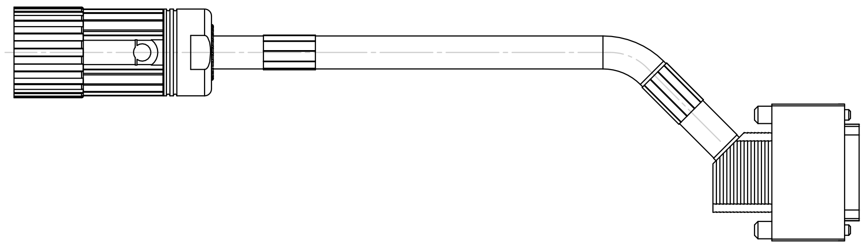
Prefabrication on MOVIDRIVE®/ inverter end

A commercial D-sub EMC connector with pin contacts is used on the inverter end of the prefabricated encoder cable for connection to MOVIDRIVE®. A 9-pin and 15-pin plug is available, depending on the inverter interface.

Cable specification

The used cable types for fixed and cable carrier installation are listed in chapter "Cable specifications for encoder cables" page 389.

Encoder cable with one M23



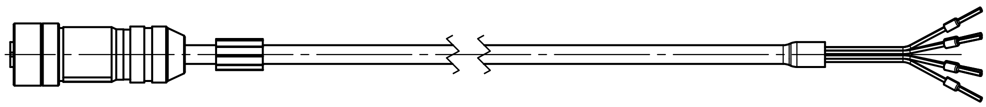
64042axx

Figure 11: M23 with sub-D

Prefabrication on encoder/motor end	Prefabricated encoder cables for add-on encoders on DR315 motors are available with a M23 coupling connector with socket contacts on the encoder/motor end.
Prefabrication on MOVIDRIVE®/ inverter end	A commercial sub-D EMC connector with pin contacts is used on the inverter end of the prefabricated encoder cable for connection to MOVIDRIVE®. A 15-pin plug is available that matches the inverter interface.
Cable specification	The used cable types for fixed and cable carrier installation are listed in chapter "Cable specifications for encoder cables" page 389.

12.7 Description of built-in encoder cables for DR motors

Encoder cable with M12



64143axx

Figure 12: M12 with conductor end sleeves

Prefabrication on encoder/motor end	Prefabricated encoder cables for built-in encoders on DR motors are available with an 8-pole M12 coupling connector with socket contacts on the encoder/motor end for connection to the terminal box.
Prefabrication on MOVIDRIVE®/ inverter end	Conductor end sleeves are used on the inverter end of the prefabricated encoder cable for connection to the digital inputs (DI02/DI03) of MOVIDRIVE®.
Cable specification	The used cable types for fixed and cable carrier installation are listed in chapter "Cable specifications for encoder cables" page 389.

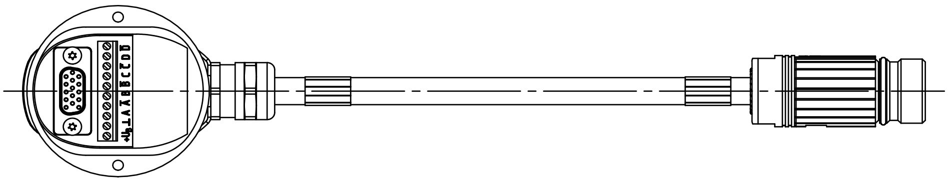
12.8 Description of extensions of add-on encoder cables for DR motors

Intermediate sockets

Intermediate sockets are used whenever

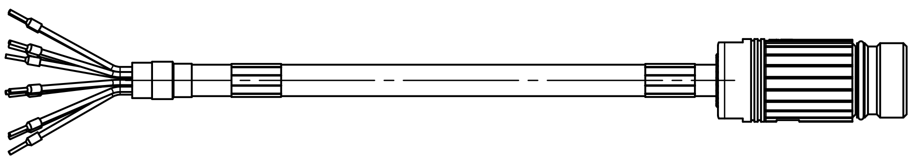
- Part of the wiring is routed in a cable carrier, or
- Connecting several cable sections is easier for very long distances.

The encoder cables are available with intermediate sockets for this purpose.



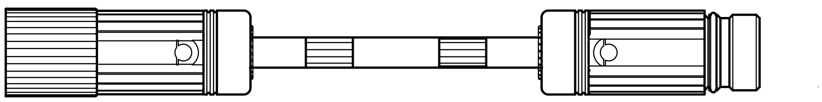
64044axx

Figure 13: Connection cover with M23



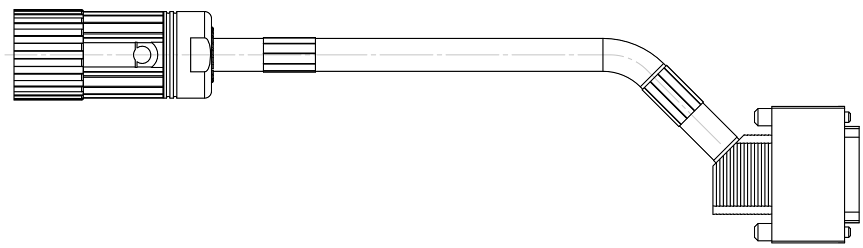
64043axx

Figure 14: Conductor end sleeve with M23



64045axx

Figure 15: M23 with M23



64042axx

Figure 16: M23 with sub-D

Prefabrication on encoder/motor end

The prefabricated encoder cables for the add-on encoders on the DR motor are available with two different designs on the encoder/motor end.

- Figure 14: If the encoder on the motor is ordered and delivered with a connection cover, the prefabricated cable is fitted with conductor end sleeves on the encoder end. 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.
- Figure 13: 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.

Figure 13 and Figure 14: The cables now end in a M23 round plug connector with pin contacts.

Extension

Figure 15: The extension is fitted with 2 M23 round plug connectors. The cable has a coupling plug with socket contacts on the encoder end and a plug with pins on the inverter end.

Prefabrication on MOVIDRIVE®/ inverter end

Figure 16: A commercial sub-D EMC connector with pin contacts on the inverter end of the extension cable is used for connecting MOVIDRIVE®. A 15-pin plug is used that matches the inverter interface.

Cable specification

The used cable types for fixed and cable carrier installation are listed in chapter "Cable specifications for encoder cables" page 389.

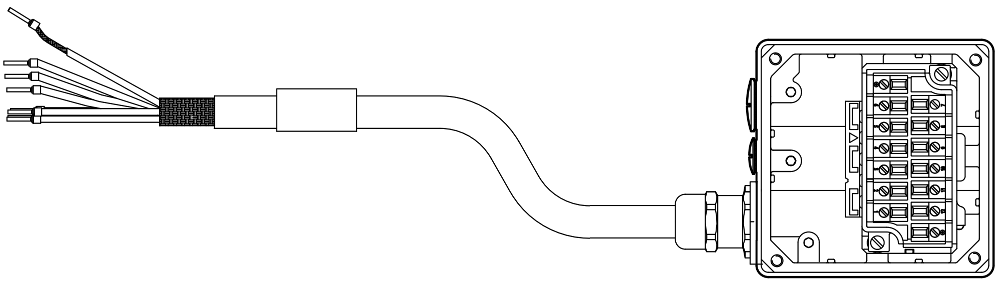
12.9 Power cables for DR motors

Brakemotor cable with IS

Brakemotor types

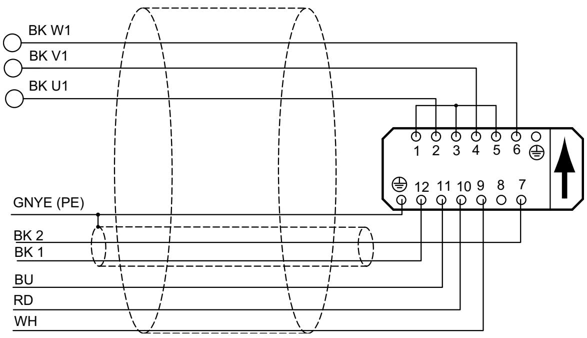
Motor type	Brake type	Plugs
DR.71	BE05, BE1	/ISU
DR.80	BE05, BE1, BE2	
DR.90	BE1, BE2, BE5	
DR.100	BE2, BE5	
DR.112	BE5, BE11	
DR.132	BE5, BE11	

Cable drawing, wiring



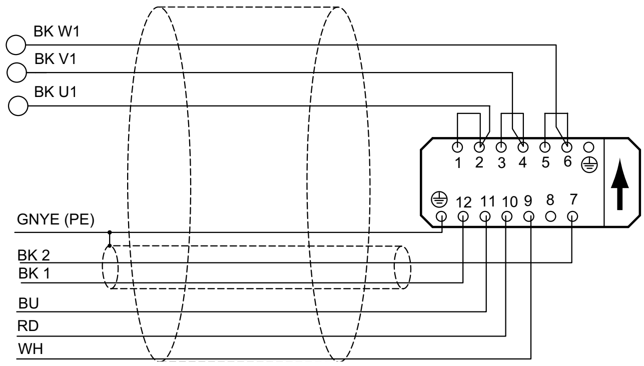
65388axx

Figure 17: IS brakemotor cable with motor protection, conductor end sleeves and ring-type cable lugs



64052axx

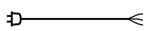
Star connection



64053axx

Delta connection

Part numbers

Variable terminal link	Star connection	Delta connection
	0817 8127	0817 8178

Brakemotor cable for decentralized MOVI-SWITCH®

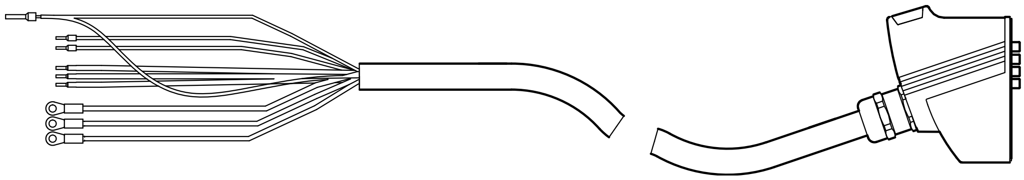
Brakemotor types

Motor type	Brake type	Plugs
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

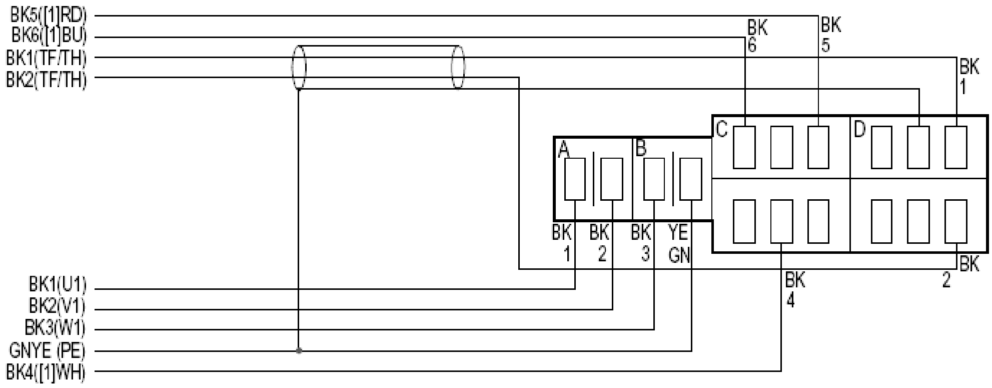
Cable drawing, wiring



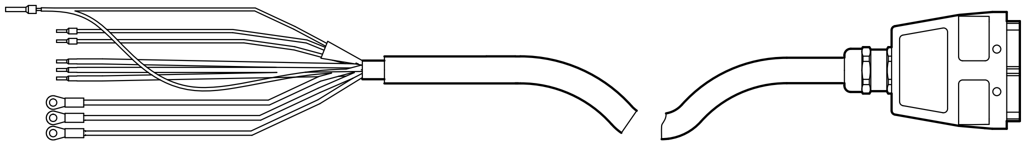
64047axx

Figure 18: Brakemotor cable with motor protection; conductor end sleeves/ring-type cable lugs, PLUSCON VC

Conductor end sleeves/ring-type cable lugs, PLUSCON VC



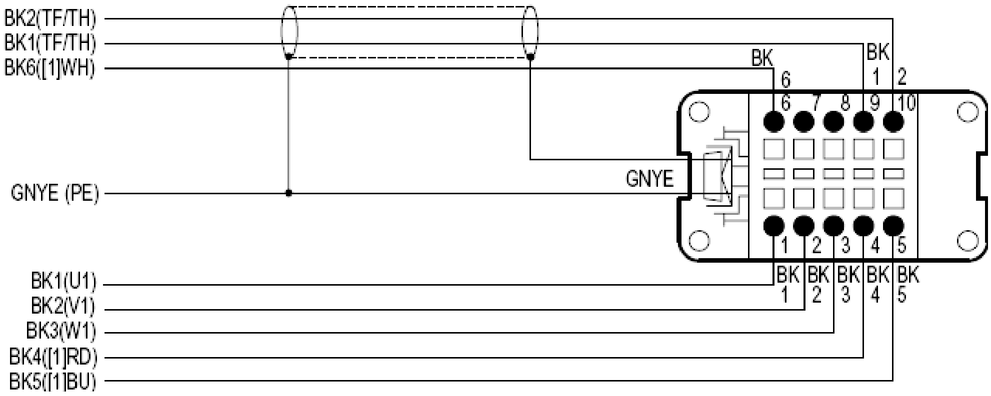
64054axx



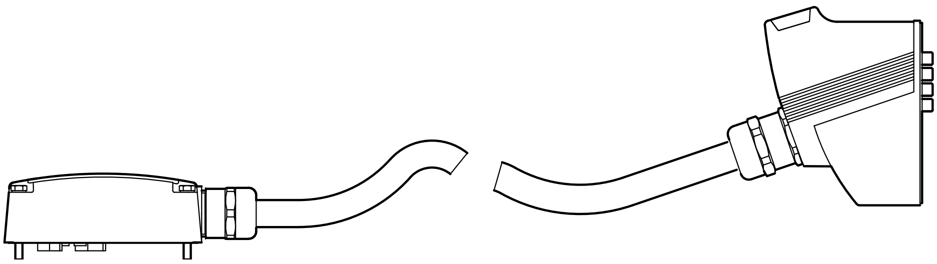
64048axx

Figure 19: Brakemotor cable with motor protection; conductor end sleeves/ring-type cable lugs, HAN 10E

Conductor end sleeves/ring-type cable lugs, HAN 10E:



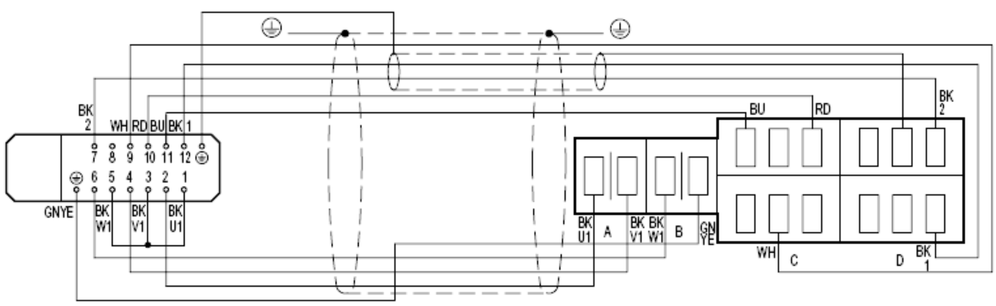
64055axx



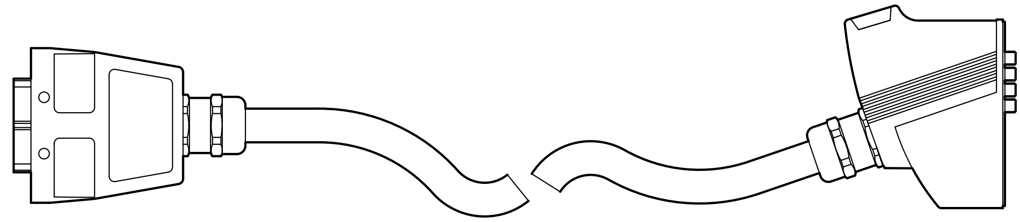
64049axx

Figure 20: Brakemotor cable with motor protection; IS and PLUSCON VC

IS and PLUSCON VC:



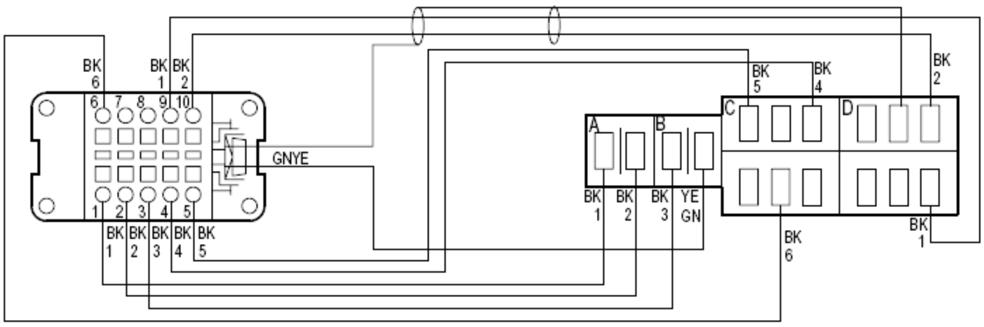
64056axx



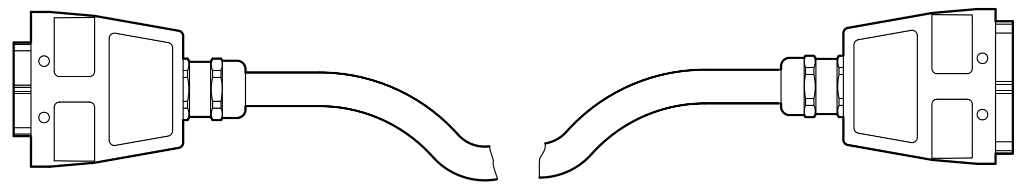
64050axx

Figure 21: Brakemotor cable with motor protection; HAN 10E and PLUSCON VC

HAN 10E and PLUSCON VC:



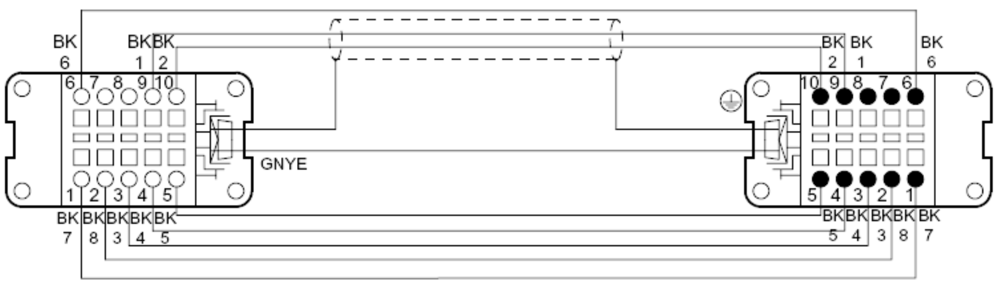
64057axx



64051axx

Figure 22: Brakemotor cable with motor protection; HAN 10E and HAN 10E

HAN 10E and HAN 10E:



64058axx

12

Part numbers

Motor DR.71 - DR.100	MOVI-SWITCH® PLUSCON VC	MOVI-SWITCH® HAN 10E
	Figure 18: 0417 8879	Figure 19: 0817 8860
/IS	Figure 20: 0593 7558	--
/ASB4	Figure 21: 0817 8895	Figure 22: 0817 8887

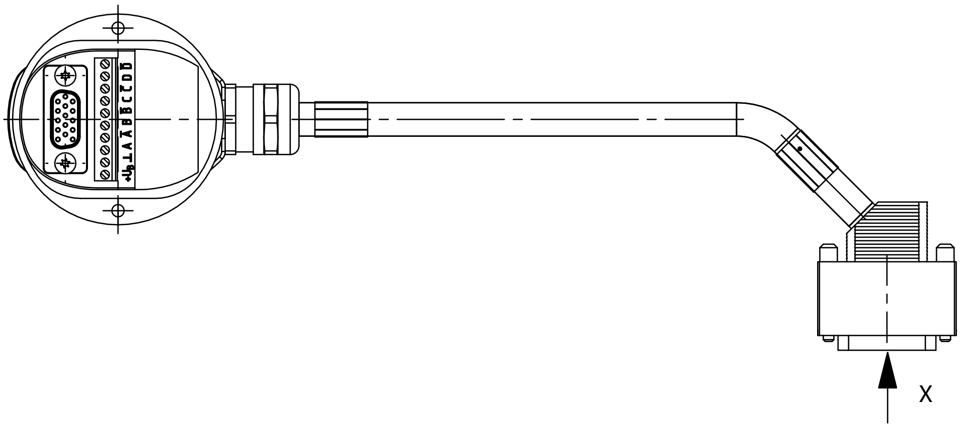
12.10 Add-on encoder cables for DR motors

Encoder cable with D-sub

Prefabricated cables for encoders

Encoder types	DR.71 - 132	DR.160 - 225
Sine encoder	ES7S	EG7S
TTL (U_B = DC 9-30 V)	ES7R	EG7R
RS485	AS7W	AG7W

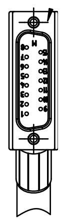
Cable drawing, wiring



Connector assignment

A Contact	Signal	Stranding	Cable Core color	Signal MDX	B Contact
360° contact A-side			Shielding	360° contact B-side	
A	cos+		Red (RD)	A	1
$\overline{A}$	cos-		Blue (BU)	$\overline{A}$	9
B	sin+		Yellow (YE)	B	2
$\overline{B}$	sin-		Green (GN)	$\overline{B}$	10
C	C +		Brown (BN)	C	3
$\overline{C}$	C -		White (WH)	$\overline{C}$	11
D	Data +		Black (BK)	D	4
$\overline{D}$	Data -		Violet (VT)	$\overline{D}$	12
UB	UB		Red-blue-gray (RD-BU-GY)	UB	15
	DGND		Gray-pink-pink (GY-PK-PK)		8
			Shielding		

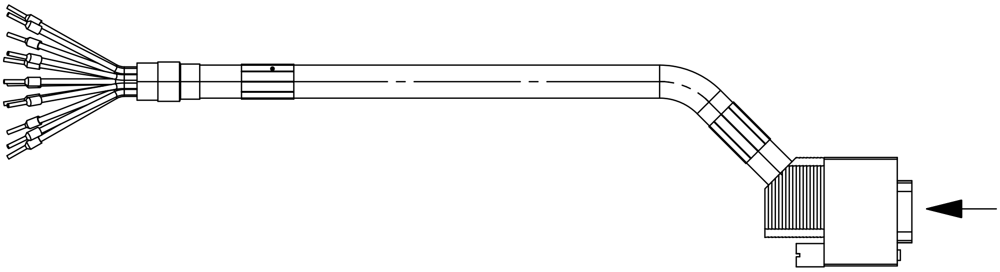
X



63951aen

Figure 23: Connection cover with sub-D

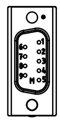
Cable drawing, wiring



Connector assignment

A Contact	Signal	Stranding	Cable Core color	Signal MDX	B Contact
360°contact A-side			Shielding	360°contact B-side	
	A (cos+)		Red (RD)	A (cos+)	1
	$\overline{A}$ (cos-)		Blue (BU)	$\overline{A}$ (cos-)	9
	B (sin+)		Yellow (YE)	B (sin+)	2
	$\overline{B}$ (sin-)		Green (GN)	$\overline{B}$ (sin-)	10
	C +		Brown (BN)	C +	3
	C -		White (WH)	C -	11
	D +		Black (BK)	D +	4
	D -		Violet (VT)	D -	12
	UB		Red-blue-gray (RD-BU-GY)	UB	15
	GND		Gray-pink-pink (GY-PK-PK)	GND	8
			Shielding		

Y

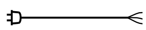
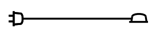
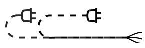
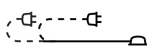


63980aen

Figure 24: Conductor end sleeves with sub-D

12

Part numbers

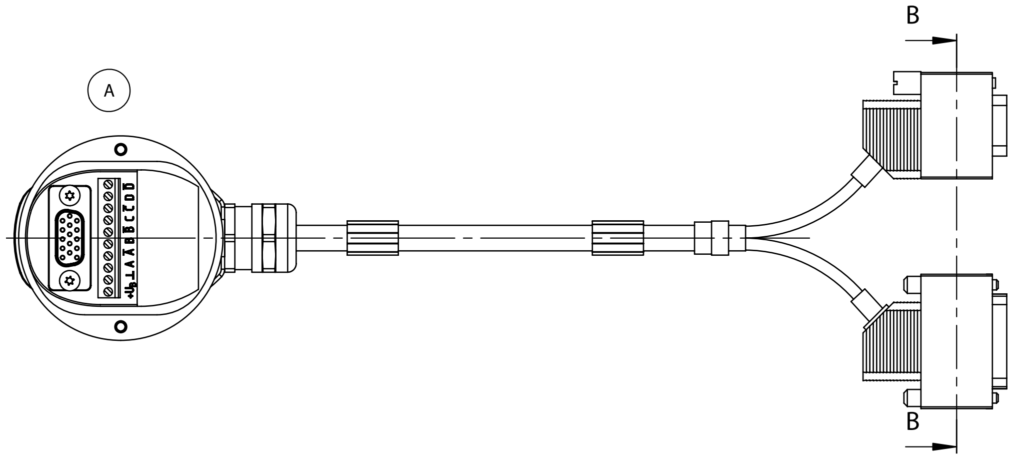
Cable type	Connection cover or conductor end sleeves, D-sub
	Figure 24: 1362 2021
	Figure 23: 1361 7621
	Figure 24: 1362 2048
	Figure 23: 1361 7648

Encoder cable with 2 sub-D

Prefabricated cables for encoders

Encoder types	DR.71 - 132	DR.160 - 225	DR.315
M-SSI	AS7Y	AG7Y	AH7Y

Cable drawing, wiring

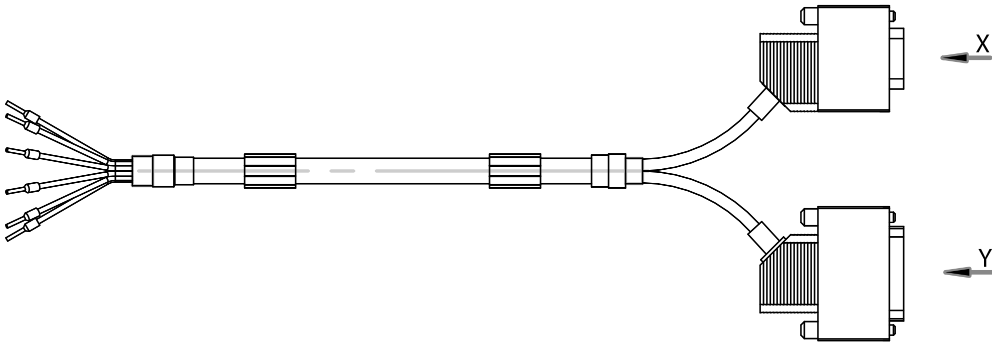


A	Connector assignment			B-B
Contact	Stranding	Cable core color	Signal	Pin
		Shielding		
A	R	Red (RD)	cos+	1
$\overline{A}$	B	Blue (BU)	cos-	9
B	G	Yellow (YE)	sin+	2
$\overline{B}$		Green (GN)	sin-	10
C +		Brown (BN)	C +	3
C -		White (WH)	C -	8
D +		Black (BK)	D +	1
D -		Violet (VT)	D -	6
UB		Red-blue-gray (RD-BU-GY)	UB	9
GND		Gray-pink-pink (GY-PK-PK)	GND	5
		Shielding		

64138aen

Figure 25: Connection cover with 2 D-sub (1 × 9-pole and 1 × 15-pole)

Cable drawing, wiring



Connector assignment

A Contact	Signal	Stranding	Cable Core color	Signal MDX	B	Sub-D
360° contact A-side		Stranding	Shielding			9-Pins male X 180
	D+		Black (BK)	D+	1	
	D-		Violet (VT)	D-	6	
	C+		Brown (BN)	C+	3	
	C-		White (WH)	C-	8	
	GND		Pink (PK)	GND	5	
	UB		Gray (GY)	UB	9	X62
	A (cos+)/ K1		Red (RD)	A (cos+)/ K1	1	Sub-D Y
	A (cos-)/ K2		Blue (BU)	A (cos-)/ K2	9	
	B (sin+)/ K2		Yellow (YE)	B (sin+)/ K2	2	15-Pins
	B (sin-)/ K2		Green (GN)	B (sin-)/ K2	10	male
			Shielding			X15

63956aen

Figure 26: Connector end sleeves with 2 D-sub (1 × 9-pole and 1 × 15-pole)

Part numbers

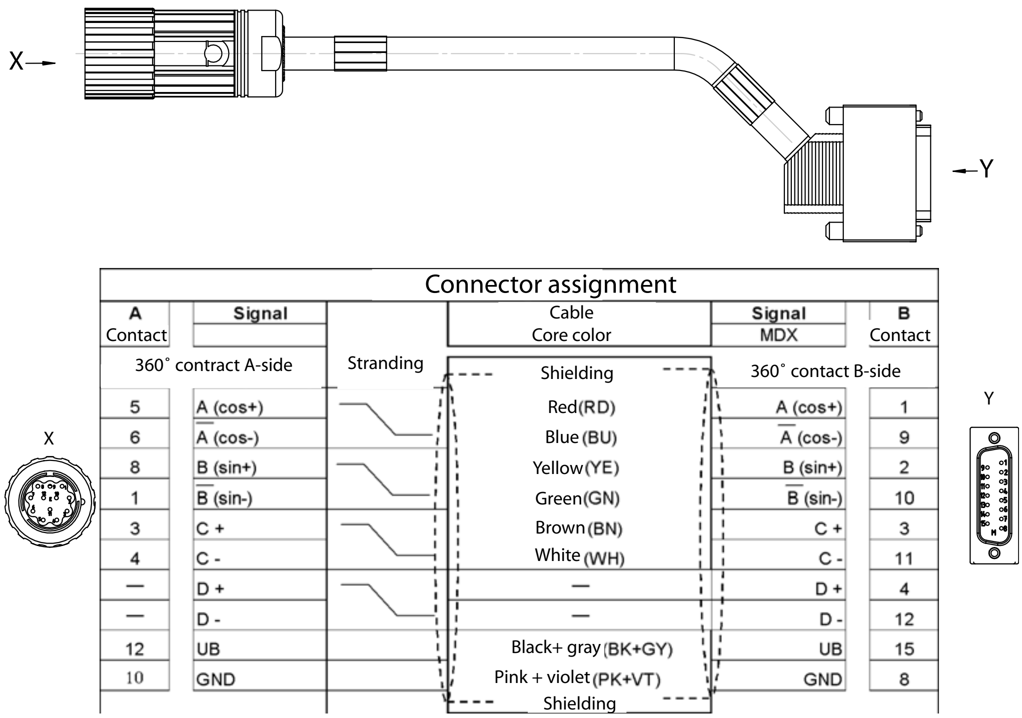
Cable type	Connection cover or conductor end sleeves, 2 × D-sub
	Figure 26: 1360 2640
	Figure 25: 1362 6299
	Figure 26: 1362 3265
	Figure 25: 1362 6302

Encoder cable with one M23

Prefabricated cables for encoders

Encoder types	DR.315
Sine encoder	EH7S

Cable drawing, wiring



63957aen

Figure 27: M23 with sub-D

Part numbers

Cable type	M23, D-sub 15
	1360 2659
	1362 3206

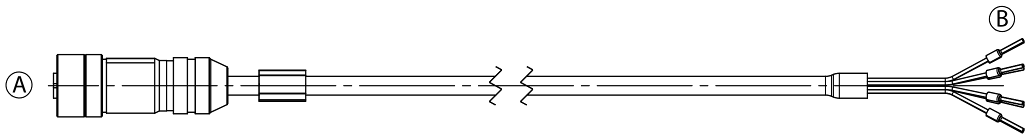
12.11 Built-in encoder cables for DR motors

Encoder cables on a M12

Prefabricated cables

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

Cable drawing, wiring

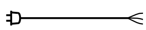
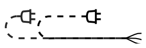


Connector assignment					
A Contact	**Signal**		Cable Core color	**Signal** MDX	**B** Contact
360° contact A-side		Stranding	Shielding	360° contact B-side	
3	A (cos+)		Brown (BN)	A (cos+)	
4	$\overline{\text{A}}$ (cos-)		White(WH)	$\overline{\text{A}}$ (cos-)	
5	B (sin+)		Yellow (YE)	B (sin+)	
6	$\overline{\text{B}}$ (sin-)		Green (GN)	$\overline{\text{B}}$ (sin-)	
7	TF		Red (RD)	TF	
8	TF		Blue (BU)	TF	
1	UB		Gray (GY)	UB	
2	GND		Pink (PK)	GND	
			Shielding		

64141aen

Figure 28: Encoder cable on a M12

Part numbers

Cable type	M12, D-sub 15
	1362 3273
	1362 3281

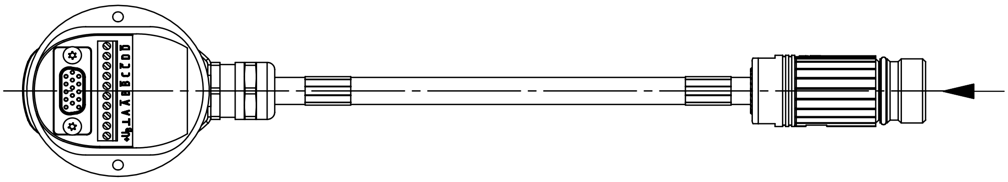
12.12 Extensions for add-on encoder cables for DR motors

Extensions with one M23

Prefabricated cables for encoders

Encoder types	DR.71 - 132	DR.160 - 225
Sine encoder	ES7S	EG7S
TTL (U_B = DC 9-30 V)	ES7R	ES7R
RS485	AS7W	AG7W

Cable drawing, wiring



Connector assignment

A Contact	Signal	Stranding	Cable Core color	Signal MDX	B Contact
360° contact A-side			Shielding	360° contact B-side	
	A (cos+)		Red (RD)	A (cos+)	3
	$\overline{A}$ (cos-)		Blue (BU)	$\overline{A}$ (cos-)	4
	B (sin+)		Yellow (YE)	B (sin+)	5
	$\overline{B}$ (sin-)		Green (GN)	$\overline{B}$ (sin-)	6
	C +		Brown (BN)	C +	1
	C -		White (WH)	C -	2
	D +		Black (BK)	D +	8
	D -		Violet (VT)	D -	7
	UB		Red-blue-gray (RD-BU+GY)	UB	12
	GND		Gray-pink-pink (GY-PK+PK)	GND	11
			Shielding		

X

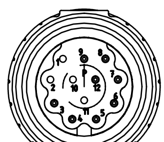


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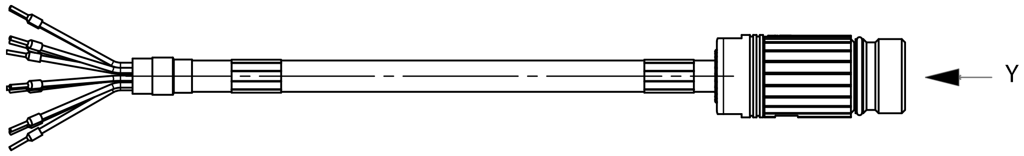
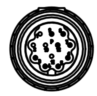
Figure 29: Connection cover with M23

Cable drawing, wiring



Connector assignment

A Contact	Signal	Stranding	Cable Core color	Signal MDX	B Contact
360° contact A-side			Shielding	360° contact B-side	
	A (cos+)		Red (RD)	A (cos+)	3
	$\overline{A}$ (cos-)		Blue (BU)	$\overline{A}$ (cos-)	4
	B (sin+)		Yellow (YE)	B (sin+)	5
	$\overline{B}$ (sin-)		Green (GN)	$\overline{B}$ (sin-)	6
	C +		Brown (BN)	C +	1
	C -		White (WH)	C -	2
	D +		Black (BK)	D +	8
	D -		Violet (VT)	D -	7
	UB		Red-blue-gray (RD-BU+GY)	UB	12
	GND		Gray-pink-pink (GY-PK+PK)	GND	11
			Shielding		


AKUA 020

63979axx

Figure 30: Conductor end sleeves with M23

Part numbers

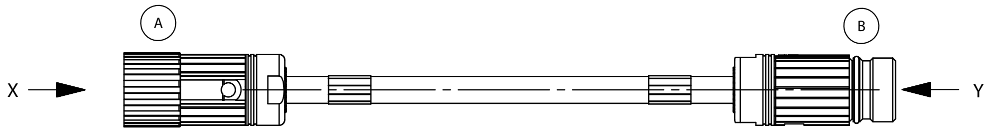
Cable type	Connection cover or conductor end sleeves, M23
	Figure 30: 1362 3184
	Figure 29: 1362 1963

Extensions with two M23

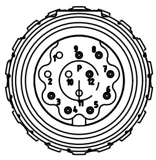
Prefabricated cables for encoders

Encoder types	DR.71 - 132	DR.160 - 225
Sine encoder	ES7S	EG7S
TTL (U_B = DC 9-30 V)	ES7R	ES7R
RS485	AS7W	AG7W

Cable drawing, wiring



X



Connector assignment

A Contact	Signal		Cable Core color	Signal MDX	B Contact
360° contact A-side		Stranding	Shielding	360° contact B-side	
3	A (cos+)		Red(RD)	A (cos+)	3
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	D +		Black (BK)	D +	8
7	D -		Violet (VT)	D -	7
12	UB		Red+blue+gray (RD-BU+GY)	UB	12
11	GND		Gray+pink+pink (GY-PK+PK)	GND	11
			Shielding		

Y

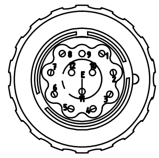


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Figure 31:

Part numbers

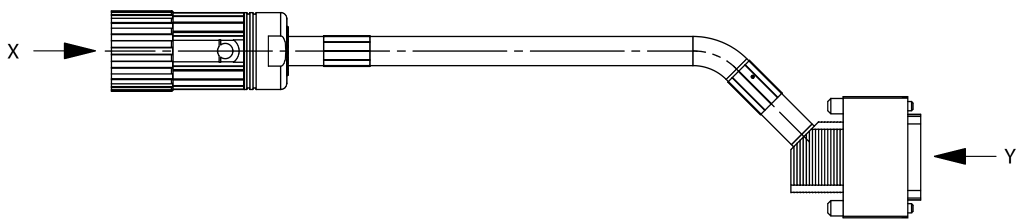
Cable type	M23 - M23
	1362 3192
	1362 1971

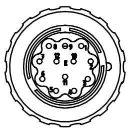
Extension with M23 with sub-D

Prefabricated cables for encoders

Encoder types	DR.71 - 132	DR.160 - 225
Sine encoder	ES7S	EG7S
TTL (U_B = DC 9-30 V)	ES7R	ES7R
RS485	AS7W	AG7W

Cable drawing, wiring





Connector assignment

A Contact	Signal	Stranding	Cable Core color	Signal MDX	B Contact
360° contact A-side			Shielding	360°contact B-side	
3	A (cos+)		Red (RD)	A (cos+)	1
4	$\overline{A}$ (cos-)		Blue (BU)	$\overline{A}$ (cos-)	9
5	B (sin+)		Yellow (YE)	B (sin+)	2
6	$\overline{B}$ (sin-)		Green (GN)	$\overline{B}$ (sin-)	10
1	C +		Brown (BN)	C +	3
2	C -		White (WH)	C -	11
8	D +		Black (BK)	D +	4
7	D -		Violet (VT)	D -	12
12	UB		Red-blue-gray (RD-BU+GY)	UB	15
11	GND		Gray-pink-pink (GY-PK+PK)	GND	8
			Shielding		

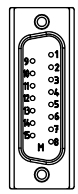


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Figure 32: M23 with sub-D

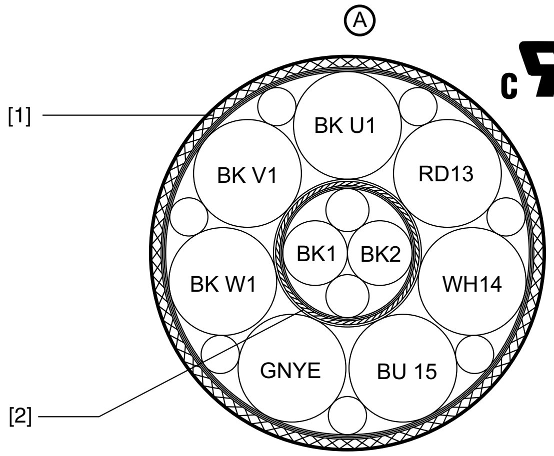
Part numbers

Cable type	M23 – Sub-D
	1362 1998

12.13 Cable specifications of DR. power cables

Cable type A

Mechanical design



55292AXX

Cable type (A) Connection between Z.7 or Z.8 field distributors and AC motors
Connection between MOVIMOT® or MOVI-SWITCH® 2S and AC motors
(for mounting close to the motor)

[1] Overall shield
[2] Shielding

- 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 $\leq$ 0.1 mm
- Shield: Tinned E-Cu wire.
- Overall diameter: 13.2 - 15.9 mm
- Color of outer cable sheath: Black

Electrical properties

- Conductor resistance for 1.5 mm^2 (at 20 °C): max. 13 Ω/km
- Conductor resistance for 0.75 mm^2 (at 20 °C): max. 26 Ω/km
- Operating voltage for 1.5 mm^2 core: max. 750 V (cULus 600 V)
- Operating voltage for 0.75 mm^2 core: max. 350 V (cULus 600 V)
- Insulation resistance at 20 °C: min. 20 MΩ x km

Mechanical properties

- Suitable for cable carriers
  - Bending cycles > 2.5 million
  - Traveling velocity ≤ 3 m/s
- Bending radius in the cable carrier: 10 x diameter
  for fixed routing: 5 x diameter
- Torsional strength (e.g. rotary table applications)
  - Torsion ±180° at a cable length of > 1 m
  - Torsional cycles > 100.000

If reversed bending and high torsional load occur for a length of < 3 m, you must check the mechanical margin conditions more closely. Please contact SEW-EURODRIVE in such cases.

Thermal properties

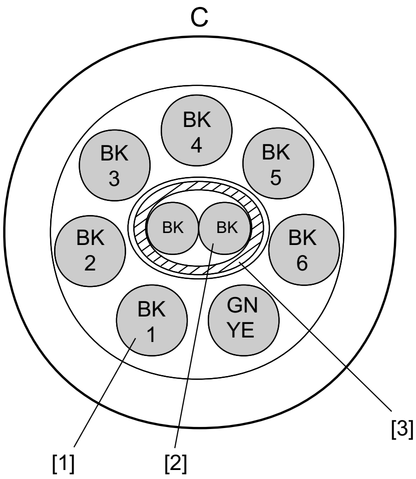
- Processing and operation: -30 °C to +90 °C (cULus: -30 °C to +80 °C)
- Transport and storage: -40 °C Up to +90 °C (cULus: -30 °C to +80 °C)
- Flame-retardant according to UL1581 Vertical Wiring Flame Test (VW1)
- Flame-retardant according to CSA C22.2 Vertical Wiring Flame Test

Chemical properties

- Oil-resistant according to VDE 0472 part 803 method B
- General fuel resistance (such as diesel, gasoline) according to DIN ISO 6722 parts 1 and 2
- General resistance to acids, alkalis, cleaning agents
- General resistance against dusts (e.g. bauxite, magnesite)
- Insulation and cable jacket material is halogen free according to VDE 0472 part 815 as well as silicone free
- Within the specified temperature range, free from substances interfering with wetting agents

Cable type C

Mechanical design



52790AXX

Cable type (C) Connection between MOVI-SWITCH® 2S and AC motors
(for mounting close to the motor with option P2.A)

[1] 2,5 mm cores^2
[2] 0.75 mm cores^2
[3] Shielding

- SEW works standard W3251 (015 207 2)
- Supply cores: 7 x 2.5 mm^2
- Control cores: 2 x 0.75 mm^2
- Insulation: PVC / special PVC
- Conductor: Fine wires to VDE class 5, copper strand conductor
- Shield: Braided tinned copper shield
- Overall diameter: 15.2 mm

Electrical properties

- Conductor resistance for 2.5 mm^2: 8.5 Ω/km
- Conductor resistance for 0.75 mm^2: 26 Ω/km
- Operating voltage for 2.5 mm^2 cores: 600 V/1000 V
- Operating voltage for cores 0.75 mm^2: AC 48 V
- Insulation resistance: 20 MΩ x km

Mechanical properties

- Bending radius in the cable carrier: 20 x diameter
  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 Up to +80 °C

12.14 Cable specifications for encoder cables

Fixed installation of feedback cables

Accessory designation		ES7S / EG7S / ES7R / EG7R / ES7C / EG7C / AS7W / AG7W / AH7Y / AS7Y / AG7Y	EH7S / AH7Y / EI7C
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
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/ cULus	
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-retardant/ self-extinguishing		no	
Conductor material		Cu blank	
Shielding		Braided tinned Cu	
Weight (cable)	[kg/km]	107	78

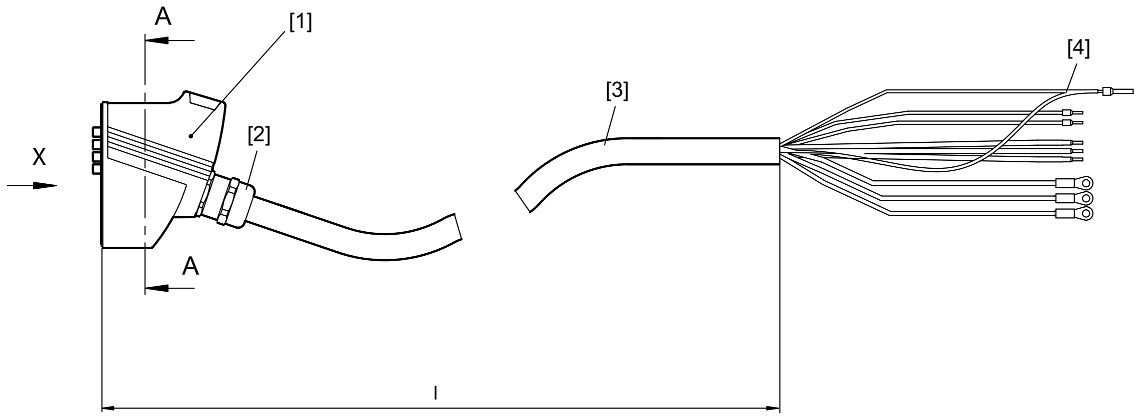
Cable carrier installation of feedback cables

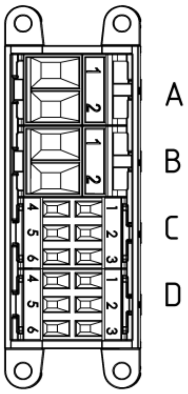
Accessory designation		ES7S / EG7S / ES7R / EG7R / ES7C / EG7C / AS7W / AG7W / AH7Y / AS7Y / AG7Y	EH7S / AH7Y	EI7C
Cable cross sections		**6 x 2 x 0.25 mm²**	**5 x 2 x 0.25 mm²**	**4 x 2 x 0.25 mm²**
Manufacturer		**Nexans**		
Manufacturer designation		SSL18YC11Y 6 x 2 x 0.25/ SSL11YC11Y 5 x 2 x 0.25		
Operating voltage V_0 / V AC	[V]	300		
Temperature range	[°C]	-20 to +60		-20 to +80
Max. temperature	[°C]	+90 (on conductor)		+80
Min. bending radius	[mm]	100	95	63
Diameter D	[mm]	9.8 ± 0.2	9.5 ± 0.2	8.4 ± 0.2
Maximum acceleration	[m/s²]	20		
Max. velocity	[m/min]	200		
Core identification		WH/BN, GN/YE, GY/PK, BU/RD, BK/VT, GY-PK/RD-BU	WH/BN, GN/YE, GY/PK, BU/RD, BK/VT	WH/BN, GN/YE, GY/PK
Sheath color		Green similar to RAL 6018		
Approval(s)		DESINA/VDE/ cULus		
Capacitance core/shielding	[nF/km]	100		110
Capacitance core / core	[nF/km]	55		70
Table continued on next page				

Accessory designation		ES7S / EG7S / ES7R / EG7R / ES7C / EG7C / AS7W / AG7W / AH7Y / AS7Y / AG7Y	EH7S / AH7Y	EI7C
Cable cross sections		**6 x 2 x 0.25 mm^2**	**5 x 2 x 0.25 mm^2**	**4 x 2 x 0.25 mm^2**
Manufacturer		**Nexans**		
Halogen-free		yes		
Silicone-free		yes		
CFC-free		yes		
Inner insulation (core)		PP		TPE-EE
Outer insulation (sheath)		TPE-U		PUR
Flame-retardant/self-extinguishing		yes		
Conductor material		E-Cu blank		
Shielding		Braided tinned Cu		
Weight	[kg/km]	130	120	89
Min. bending cycles		≥ 5 million		

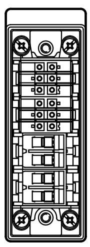
12.15 Prefabricated cables for MOVI-SWITCH®

Cable 0817 8879



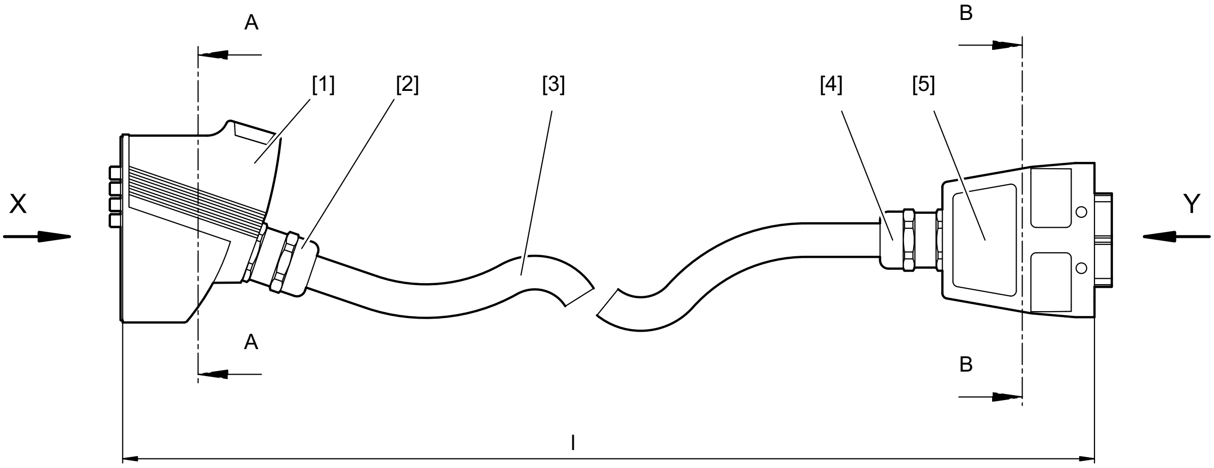
A-A		Connector assignm.		B
	Pin	Cable Core color	Signal	Contact
	A1	BK \ U1	U1	CL
	A2	BK \ V1	V1	CL
	B1	BK \ W1	W1	CL
	B2	GNYE \	⏚	CES
	C1	BU \ 15	Brake 15	CES
	C3	RD \ 13	Brake 13	CES
	C5	WH \ 14	Brake 14	CES
	D2	Shielding		
	D3	BK \ 1	24V	CES
	D6	BK \ 2	TF / TH	CES
	Cable gland	Shielding		Cable gland
	C2, C4, C6, D1, D4, D5		n.c.	

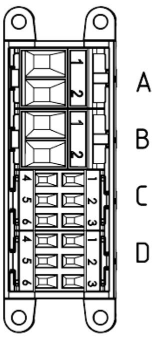
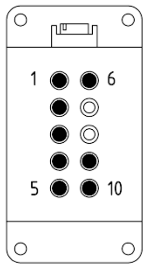
View X



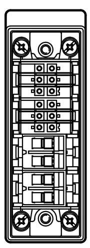
[1] Phoenix - PLUSCON-VC VARIOCON T3 plug connector, female
[2] EMC cable gland
[3] Hybrid cable
[4] Shield of control core group 2 x 0.75 mm^2

Cable 0817 8895



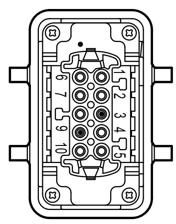
A-A		Connector assignment		B-B	
	Pin	Cable Core color	Signal	Pin	
	A1	BK \ 7	U1	1	
	A2	BK \ 8	V1	2	
	B1	BK \ 3	W1	3	
	B2	GNYE \	⏚	PE-Frame	
	C1	BK \ 6	Brake 15	5	
	C3	BK \ 5	Brake 13	4	
	C5	BK \ 4	Brake 14	6	
	D2	Shielding		PE-Frame	
	D3	BK \ 1	24V	10	
	D6	BK \ 2	TF / TH	9	
	C2, C4, C6, D1, D4, D5		n.c.	7, 8	

View X

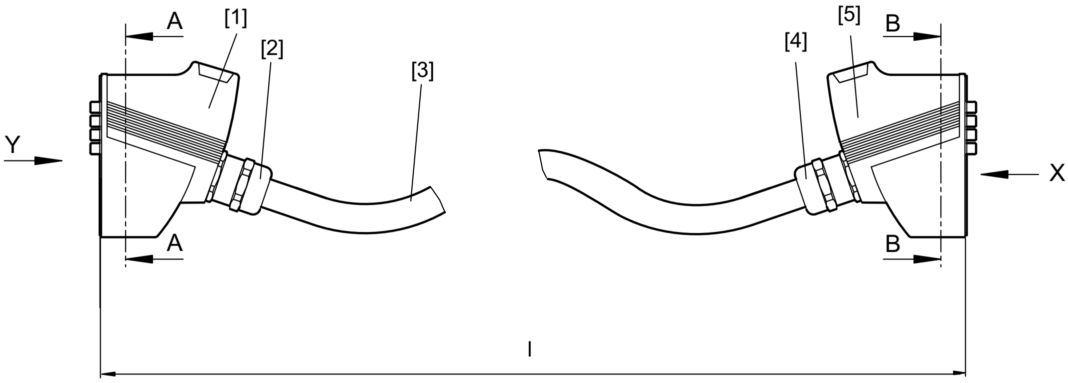


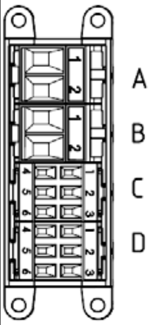
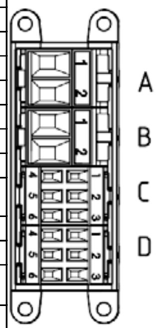
[1] Phoenix - PLUSCON-VC VARIOCON T3 plug connector, female
[2] EMC cable gland
[3] Hybrid cable
[4] EMC cable gland
[5] HAN® 10 plug connector, female

View Y

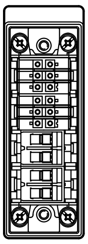


Cable 0186 7415



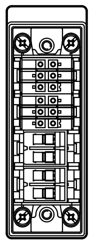
A-A	Connector assignment			B-B	
	Pin	Cable Core color	Signal	Pin	
	A1	BK \ U1	U1	A1	
	A2	BK \ V1	V1	A2	
	B1	BK \ W1	W1	B1	
	B2	GNYE \	⏚	B2	
	C1	BU \ 15	Brake 15	C1	
	C3	RD \ 13	Brake 13	C3	
	C5	WH \ 14	Brake 14	C5	
	D2	Shielding (Control cable)		D2	
	D3	BK \ 1	24V	D3	
	D6	BK \ 2	TF / TH	D6	
	Cable gland	Shielding (Outer)		Cable gland	
	C2, C4, C6, D1, D4, D5		n.c.	C2, C4, C6, D1, D4, D5	

View Y

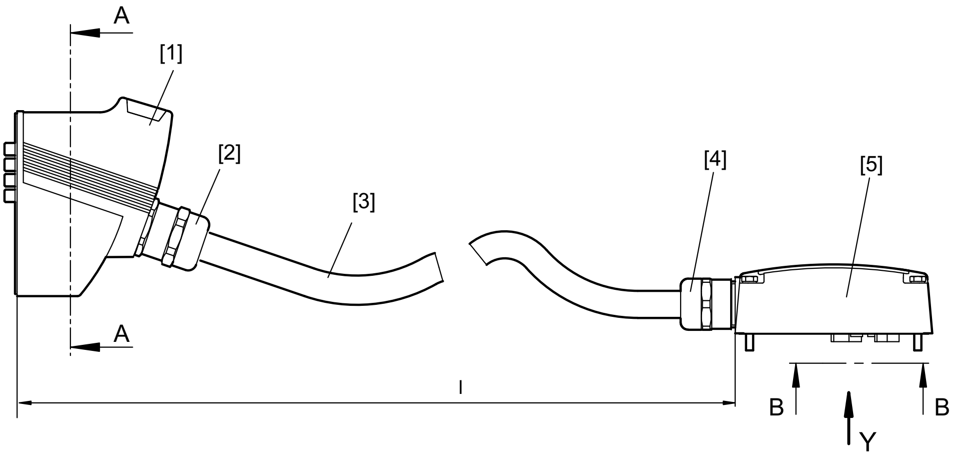


[1] PLUSCON-VC VARIOCON T3 plug connector, female
[2] EMC cable gland
[3] Hybrid cable
[4] EMC cable gland
[5] PLUSCON-VC VARIOCON T3 plug connector, female

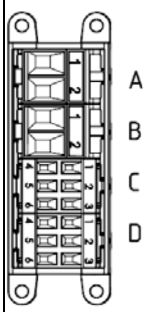
View X

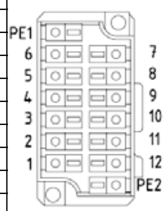


Cable 0593 7558

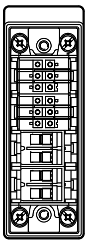


A-A	Connector assignm.			B-B
Pin	Cable Core color	Signal	Variable terminal link	Pin
A1	BK \ U1	U1		2
A2	BK \ V1	V1		4
B1	BK \ W1	W1		6
B2	GNYE \	PE		PE1
C1	BU \ 15	Brake 15		11
C3	RD \ 13	Brake 13		10
C5	WH \ 14	Brake 14		9
C2				1
C4				3
C6				5
D2	Shielding (Control cable)			PE2
D3	BK \ 1	24V		7
D6	BK \ 2	TF / TH		12
Cable gland	Shielding (Outer)			Cable gland
D1, D4, D5		n.c.		8

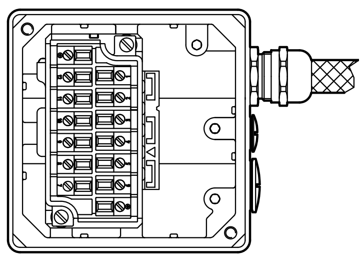




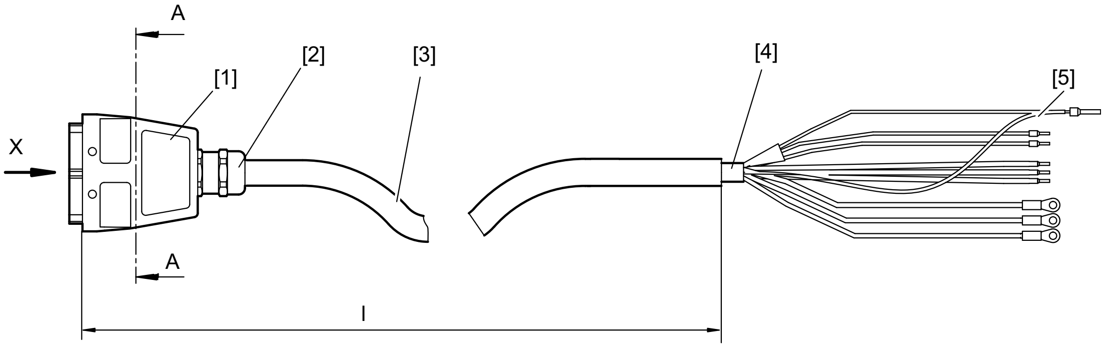
View Y

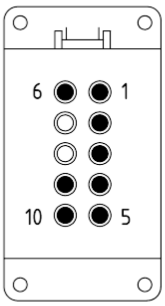


[1] Phoenix - PLUSCON-VC VARIOCON T3 plug connector, female
[2] EMC cable gland
[3] Hybrid cable
[4] EMC cable gland
[5] IS upper part

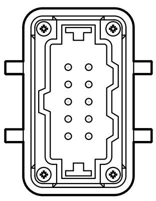


Cable 0817 8860



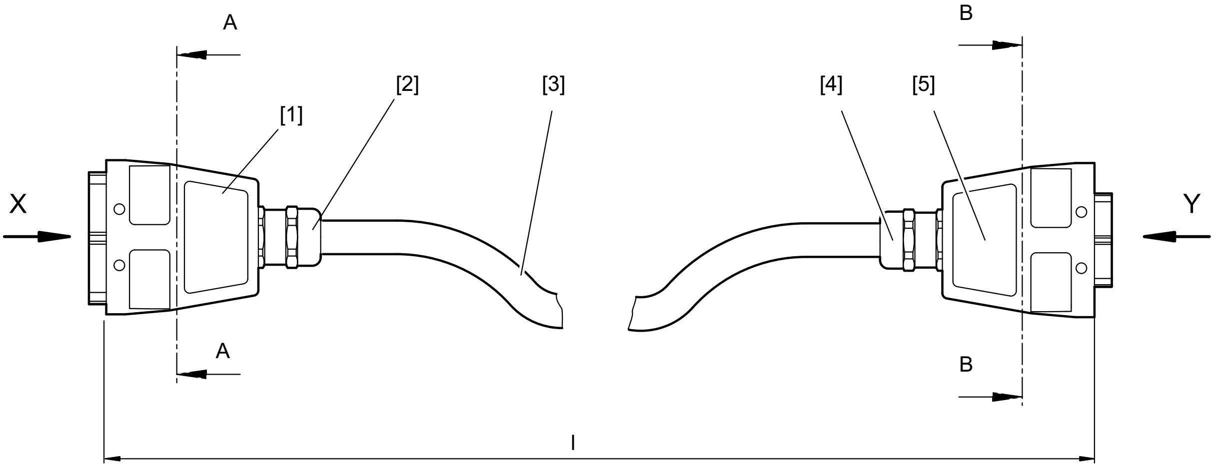
A-A	Connector assignment			B-B
	Pin	Cable Core color	Signal	Contact
	1	BK \ 7	U1	CL
	2	BK \ 8	V1	CL
	3	BK \ 3	W1	CL
	4	BK \ 5	Brake 13	CES
	5	BK \ 6	Brake 15	CES
	6	BK \ 4	Brake 14	CES
	9	BK \ 1	24V	CES
	10	BK \ 2	TF / TH	CES
	PE-Frame	Shielding (Control cable)		
	PE-Frame	GNYE \	⏚	CES
	7, 8		n.c.	

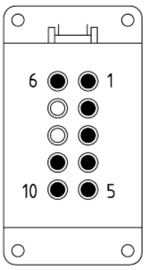
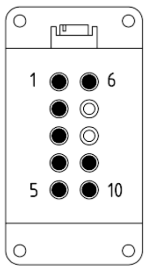
View X



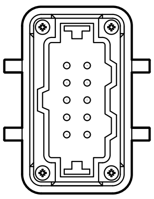
[1] HAN® 10E plug connector, male
[2] EMC cable gland
[3] Hybrid cable
[4] Stripped braided screen
[5] Shield of control core group 2 x 0.75 mm²

Cable 0817 8887



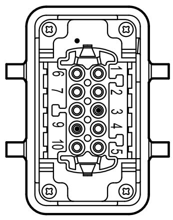
A-A		Connector assignment			B-B
	Pin	Cable Core color	Signal	Pin	
	1	BK \ 7	U1	1	
	2	BK \ 8	V1	2	
	3	BK \ 3	W1	3	
	4	BK \ 5	Brake 13	4	
	5	BK \ 6	Brake 15	5	
	6	BK \ 4	Brake 14	6	
	9	BK \ 1	24V	9	
	10	BK \ 2	TF / TH	10	
	PE-frame	Shielding (Control cable)		PE-frame	
	PE-frame	GNYE \	⏚	PE-frame	
	7, 8		n.c.	7, 8	

View X



[1] HAN® 10 plug connector, male
[2] EMC cable gland
[3] Hybrid cable
[4] EMC cable gland
[5] HAN® 10 plug connector, female

View Y



13 DT56, DR63, DV250/280 AC Motors

13.1 Technical data of DT56, DR63, DV250/280

3000 1/min - S1

Motor type	P_N M_N	n_N	I_N 380-415 V (400 V)	cosφ	IE class	$\eta_{75\%}$ $\eta_{100\%}$	I_A/I_N	M_A/M_N M_H/M_N	J_{Mot} 2)	 3)	Z_0 BG[4] BGE[5]	M_{Bmax}	m[1] 2)	 3)
	[kW] [Nm]	[rpm]	[A]			[%]			$[10^{-4}\ kgm^2]$		[1/h]	[Nm]	[kg]	
DR63S2	0.18 0.63	2720	0.46 (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 system
5) Operation with BGE brake control system

1500 1/min - S1

Motor type	P_N M_N	n_N	I_N 380-415 V (400 V)	cosφ	IE class	$\eta_{75\%}$ $\eta_{100\%}$	I_A/I_N	M_A/M_N M_H/M_N	J_{Mot} 2)	 3)	Z_0 BG[4] BGE[5]	M_{Bmax}	m[1] 2)	 3)
	[kW] [Nm]	[rpm]	[A]			[%]			$[10^{-4}\ kgm^2]$		[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	In combination with helical gear units R07, RF07, R07F or Spiroplan® gear units W10, WF10, WA10, WAF10 only	
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
DV250M4	55 356	1475	106 (102)	0.83	IE1	92.7 92.5	6.0	2.7 2.0	6300	6600 6730[6]	- 200	600 1200[6]	448	528 538[6]
DV280S4	75 484	1480	142 (138)	0.83	IE1	93.1 93.3	7.2	3.2 2.2	8925	9225 9355[6]	- 150	600 1200	520	600 610[6]
DV280M4	90 581	1480	173 (170)	0.81	IE1	93.4 93.5	7.1	3.3 2.2	8925	9225 9355[6]	- 100	600 1200[6]	520	600 610[6]

1) Applies to flange motor
2) Without brake
3) With brake
4) Operation with BG brake control system
5) Operation with BGE brake control system
6) Double disk brake

IE2 motors (energy-efficient motors): 1500 rpm - S1

Motor type	P_N M_N	n_N	I_N 380-415 V (400 V)	cosφ	IE class	$\eta_{75\%}$ $\eta_{100\%}$	I_A/I_N	M_A/M_N M_H/M_N	J_{Mot} 2)	 3)	Z_0 BG[4] BGE[5]	M_{Bmax}	m[1] 2)	 3)
	[kW] [Nm]	[rpm]	[A]			[%]			[10^{-4} kgm²]		[1/h]	[Nm]	[kg]	
DVE250M4	45 290	1480	88 (86)	0.81	IE2	93.2 93.4	7.1	3.3 2.5	6300	6600 6730[6]	- -	300 600[6]	448	528 538[6]
DVE250M4	55 356	1475	106 (102)	0.83	IE2	94 93.7	6.0	2.7 2.0	6300	6600 6730[6]	- -	600 1200[6]	520	600 610[6]
DVE280S4	75 484	1480	142 (137)	0.83	IE2	94.2 94.2	7.2	3.2 2.2	8925	9225 9355[6]	- -	600 1200[6]	520	600 610[6]
DVE280M4	90 581	1480	171 (168)	0.81	IE2	94.6 94.5	7.1	3.3 2.2	8925	9225 9355[6]	- -	600 1200[6]	520	600 610[6]

1) Applies to flange motor
2) Without brake
3) With brake
4) Operation with BG brake control system
5) Operation with BGE brake control system
6) Double disk brake

1000 1/min - S1

Motor type	P_N	M_N	n_N	I_N 380-415 V (400 V)	cosφ	IE class	$\eta_{75\%}$ $\eta_{100\%}$	I_A/I_N	M_A/M_N M_H/M_N	J_{Mot} 2)	 3)	Z_0 BG[4] BGE[5]	M_{Bmax}	m[1] 2)	 3)
	[kW]	[Nm]	[rpm]	[A]			[%]			[10^{-4} kgm²]		[1/h]	[Nm]	[kg]	
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
DV250M6	37	360	980	85 (82)	0.71	IE1	91.5 91.3	4.5	2.4 1.6	6300	6600 6730[6]	- 240	600 1200[6]	448	528 538[6]
DV280S6	45	436	985	105 (103)	0.68	IE1	92 92	4.9	2.6 1.8	8925	9225 9355[6]	- 180	600 1200[6]	520	600 610[6]

1) Applies to flange motor
2) Without brake
3) With brake
4) Operation with BG brake control system
5) Operation with BGE brake control system
6) Double disk brake

13.2 General notes on the product description

Noise

The noise levels of all motors from SEW-EURODRIVE are well within the maximum permitted noise levels set forth in IEC/EN60034-9.

Coating

The motors from SEW-EURODRIVE are painted with "blue/gray" / RAL 7031 machine paint according to DIN 1843 as standard. Special paints are available on request.

Surface and 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.

Air admission and accessibility

The motors/brakemotors must be mounted on the driven machine in such a way that both axially and radially there is enough space left for unimpeded air admission, for maintenance work on the brake and, if required, for the MOVIMOT® inverter. Please also refer to the notes in the motor dimension sheets.

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. You will either receive a manual lever with automatic reset or an adjustable setscrew for this purpose. The brake is controlled by a brake controller 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 end shield is a part of both the motor and the brake. The integrated construction of the SEW-EURODRIVE brakemotor permits particularly compact and sturdy solutions.

International markets

On request, SEW-EURODRIVE supplies UL registered motors or CSA certified motors with connection conditions according to CSA and NEMA standard.

On request, SEW-EURODRIVE supplies UL registered MOVIMOT® drives with connection conditions according to NEMA standards.

For the Japanese market, SEW-EURODRIVE offers motors conforming to JIS standard. Contact your sales representative to assist you in such cases.

13.3 Energy-efficient motors

CEMEP, the association of European electric motor manufacturers, has reached an agreement with the European Commission's General Directorate for Energy that all 2 and 4-pole low-voltage AC motors from 1 to 100 kW will be classified on the basis of their efficiency, and that this classification will be identified on the nameplate and in catalogs. The classification distinguishes between EFF3, EFF2 and EFF1 classes. EFF3 refers to motors without any particular efficiency requirement. EFF2 indicates improved efficiency motors and EFF1 is for high-efficiency motors.

EFF 2

Type DV 4-pole AC motors of motor sizes 250M to 280M meet the requirements of efficiency class EFF2.

EFF 1

Type DVE 4-pole AC motors of motor sizes 250M to 280M meet the requirements of efficiency class EFF1. These motors are referred to as energy efficient motors.

International regulations

Type /DV and /DVE 4-pole AC motors comply with the energy efficiency standards and energy efficiency regulations of the following countries:

- Australia
- New Zealand
- Brazil
- Canada
- USA

13.4 Special markets

CSA/NEMA/UL-R

SEW-EURODRIVE offers the NEMA MG1 version or the "CSA/UL-R" option for drives delivered to North America (see "Motors for the USA and Canada" on page 409). These versions have the following characteristic features:

- Terminal designation T1, T2, etc. in addition to U1, V1.
- In MOVIMOT® drives additional earth connection via an external terminal.
- Some terminal boxes are made of gray-cast iron and others of aluminum:

Motor size	Terminal box material
DT56/DR63	Aluminum (part of the motor housing)
DV250/DV280	Always gray cast iron

- 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)
DV250M ... DV280S	2 × 2 1/2' NPT + 2 × 1/2' NPT

The NPT openings are sealed with plugs for transportation and storage.

- For AC motors/AC brakemotors, there is a modified nameplate with the following information: TEFC, K.V.A. code and design. With CSA/UL-R option, also CSA and UR identification (UL registration no. E189357).

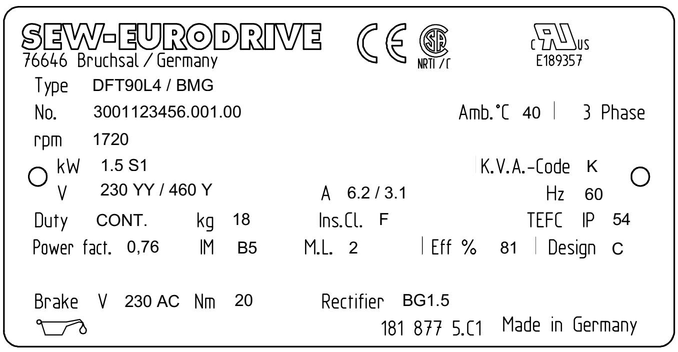


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Figure 33: Example: Motor nameplate for CSA/UL-R variant

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.

V.I.K. (German Association of the Energy and Power Generation Industry)

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. The following deviations from the standard are taken into account:

- Motor protection at least IP55.
- Motor of thermal class F, permitted overtemperature only as in thermal class B.
- Corrosion protection of motor parts.
- Terminal box made of gray cast iron.
- Protection canopy for vertical motor mounting positions with fan guard on top.
- Additional ground connection via external terminal.
- Nameplate with V.I.K. information. A second nameplate on the inside of the terminal box cover.

Note

Technical requirements issued by the V.I.K. must be applied analogously to gearmotors, pole-changing motors and motors for high inertia starting, switching operation and speed control. The requirements result in the following necessary deviations:

- Mounting position: The position of the breather valves and the lubricant fill quantities, which depend on the mounting position, means that gearmotors cannot be used in either horizontal or vertical mounting positions.
- Sign: No bores are provided for attaching an additional identification sign.

CCC

After joining the World Trade Organization (WTO), the People’s Republic of China issued a certification system - CCC "China Compulsory Certification" - for products. CCC became effective on 1 May 2002 and replaced the marks "Great Wall" (CCEE China Commission for Conformity of Electric Equipment) for domestic products and "CCIB" (China Commodity Inspection Bureau) for imported products. The Chinese government is trying to improve the safety for household appliances by introducing the CCC certification. The certification requirement became effective on 1 August 2003 for many products in household applications.

That means machines and systems supplied by our customers with permanently installed motors and gearmotors are usually not subject to this mandatory certification. The only known exception are welding machines. That means CCC certification will only become an issue for machine and system supplier in case they are exporting individual products, such as spare parts.

This certification affects SEW-EURORDRIVE products as well. The drive solutions from SEW-EURODRIVE received the necessary certification on 29 July 2003.

The SEW-EURODRIVE products affected by this certification are:

- 2-pole motors up to 2.2 kW
- 4-pole motors up to 1.1 kW
- 6-pole motors up to 0.75 kW
- 8-pole motors up to 0.55 kW

These motors may be identified with the CCC mark upon request and will be delivered with the certificate attached to the drive.

13.5 Corrosion and surface protection

See chapter "Corrosion and surface protection" on page 20.

13.6 Unit designations for AC motors and options

Standard AC motor of the series

DV..	Foot-mounted design
DR.., ..DT.., ..DV..	Attached motor for gear units
DFR.., DFT.., DFV..	Flange-mounted design
DV..F	Foot and flange-mounted design

Motor options

/BR, /BM(G)	Brake (noise-reduced)
../HF	.. with lock-type manual brake release
../HR	.. with self-reengaging manual brake release
/RI	Reinforced insulation for inverter operation > 500 V
/RS	Backstop
/TF	Thermistor (PTC resistor)
/TH	Thermostat (bimetallic switch)
/U	Non-ventilated
/V	Forced cooling fan, 3 × 380 – 415 V_{AC}, 50 Hz
/C	Protection canopy for the fan guard

Plug connector on AC motor options

/IS	Integrated plug connector
/AMD..	HAN modular 10B plug connector on the terminal box with one-clamp closure
/AME..	HAN modular 10B plug connector on terminal box with one-clamp closure and EMC housing
/ASD..	HAN 10ES plug connector on terminal box with one-clamp closure
/ASE..	HAN 10ES plug connector on terminal box with one-clamp closure and EMC housing

Encoder on AC motor options

/AV1Y	Multi-turn absolute encoder with solid shaft, MSI and sin/cos signals
/AV1H	Multi-turn absolute encoder with solid shaft, HIPERFACE¨ and sin/cos signals
/EV1T	Encoder with solid shaft, TTL (RS-422), signals
/EV1S	Encoder with solid shaft, sin/cos signals
/EV1R	Encoder with solid shaft, TTL (RS-422), signals
/EV1H	Single-turn absolute encoder with solid shaft, HIPERFACE¨ and sin/cos signals
/EH1T	Encoder with hollow shaft, TTL (RS-422), signals
/EH1S	Encoder with hollow shaft, sin/cos signals
/EH1R	Encoder with hollow shaft, TTL (RS-422), signals

Mounting device for encoders on AC motor options

EV1A	.. with solid shaft

13.7 Important order information

Position of the motor terminal box and the cable entry

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-end (see Figure 34). A change in the product standard EN 60034 specifies that the following designations will have to be used for terminal box positions for foot-mounted motors in the future:

- As viewed onto the output shaft = A-end
- 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. Figure 34 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. The positions are "X" (= standard position), "1", "2" or "3" (see Figure 34).

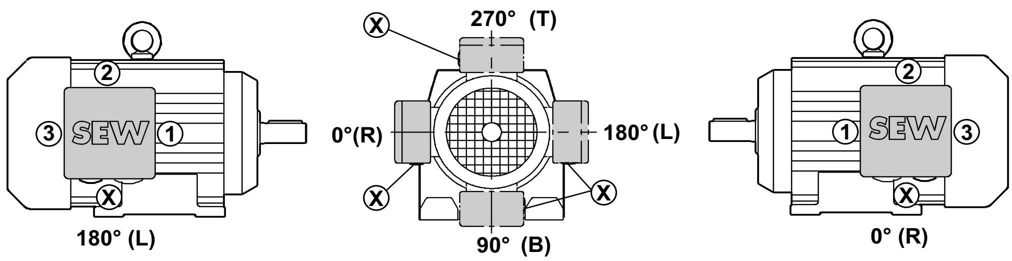

Figure 34: Position of terminal box and cable entry

Unless indicated otherwise, you will receive the terminal box type 0° (R) with "X" cable entry. We recommend selecting cable entry "2" with mounting position M3.

TIP

- **When the terminal box is in the 90° (B) position**, check to see if the gearmotor has to be supported.
- **Only** cable entries **"X"** and **"2"** are possible for **DT56 and DR63** motors. **Exception:** For DR63 **with IS plug connector**, **cable entry "3" is also** possible.

Terminal box position	0° (R)	90° (B)	180° (L)	270° (T)
Possible cable entries	"X", "3"	"X", "1", "3"	"1", "2"	"X", "1", "3"

13.8 Mounting position designations of the motors

See chapter "Mounting position designation for motors" on page 42.

13.9 Available motor options

Overview

The following motor options are available in various combinations:

- Disk brakes BM(G)/BR (→ page 446)
- IS integrated plug connector (→ page 415)
- Plug connectors AS.., AC.., AM.., AB..(→ page 416)
- Encoders and pre-fabricated cables for encoder connection (→ page 419)
- Encoder mounting adapter (→ page 420)
- Forced cooling fan /V (→ page 428)
- Backstop RS (→ page 431)
- Protection canopy C (→ page 432)

13.10 Standards and regulations

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 enclosures of electrical equipment.
- IEC 60072

  Dimensions and performance of rotating electrical machinery.
- EN 50262

  Metric threads of cable glands.
- EN 50347

  Standardized dimensions and power ranges.

Rated data

See section "Rated data" page 27.

Tolerances

See section "Tolerance" page 28.

13.11 Electrical characteristics

Suitability for use with an inverter

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.

The winding option "reinforced insulation" is available for voltages higher than AC 500 V. The SEW unit designation for this option is "/RI".

Frequency

AC motors from SEW-EURODRIVE are designed for a system frequency of 50 Hz or 60 Hz on request. As standard, the technical data for AC motors refer to a 50 Hz supply frequency.

Motor voltage

AC motors are available for rated voltages from 220 – 690 V. Pole-changing motors of sizes 63 only from 220 – 500 V.

The standard variant 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	
	56 (4-pole only)	63
	Motor voltage	
2, 4 and 6-pole motors, applies to the voltage range	AC 220-240 V ⅄ AC 380-415 V ⅄	AC 220-240 / 380-415 V △/⅄
Single-speed	-	AC 230/400 V △/⅄ AC 290/500 V △/⅄
Multi-speed, Dahlander	-	AC 400 V △/⅄⅄
Multi-speed, separate winding	-	AC 400 V ⅄ / ⅄
	Brake voltage	
2, 4 and 6-pole motors, applies to the voltage range	AC 220-240 V AC 380-415 V	AC 220-240 V AC 380-415 V
Standard voltages	DC 24 V / AC 230 V / AC 400 V	
	Forced cooling fan voltage	
Standard voltage VR	-	DC 24 V[1)]
Voltage range VS	-	1 × AC 220-266 V[1)]

1) not applicable for motor size

Motors	Motor size
	250, 280
	Motor voltage
4 and 6-pole motors, applies to the voltage range	AC 220-240 / 380-415 V △/⅄ AC 380-415 / 660-690 V △/⅄
Single-speed	AC 230/400 V △/⅄ AC 290/500 V △/⅄ AC 400/690 V △/⅄ AC 500 V △
	Brake voltage
4 and 6-pole motors, applies to the voltage range	AC 220-240 V AC 380-415 V
Standard voltages	DC 24 V / AC 230 V / AC 400 V
	Forced cooling fan voltage
Voltage range V	AC 3 × 346-500 V

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. 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 [rpm]	Connection
2	3000	⅄ / △
4	1500	⅄ ; ⅄ / △
6	1000	⅄ / △

50 Hz motor on 60 Hz supply system

The rated data of motors designed for 50 Hz supply systems are slightly different when the motors are operated on 60 Hz supply systems.

Motor voltage At 50 Hz	Motor connection	U [V] at 60 Hz	Modified rated data			
			n_N	P_N	M_N	M_A/M_N
AC 230/400 V △/⅄	△	230	+20%	0%	-17%	-17%
AC 230/400 V △/⅄	⅄	460	+20%	+20%	0%	0%
AC 400/690 V △/⅄	△					

For 60 Hz power supply

The **standard voltages** are indicated in **bold**:

Motors	**Motor size**	
	56	**63**
	Motor voltage	
2, 4 and 6-pole motors, applies to the voltage range	**AC 240-266 V ⅄** **AC 415-460 V ⅄**	**AC 240-266 / 415-460 V △/⅄**
Single-speed	-	**AC 266/460 V △/⅄** AC 220/380 V △/⅄ AC 330/575 V △/⅄
Multi-speed, Dahlander	-	AC 460 V △/⅄⅄
Multi-speed, separate winding	-	-
	Brake voltage	
2, 4 and 6-pole motors, applies to the voltage range	**AC 240-266 V** **AC 415-460 V**	**AC 240-266 V** **AC 415-460 V**
Standard voltages	**DC 24 V / AC 230 V / AC 266 V / AC 460 V**	
	Forced cooling fan voltage	
Standard voltage VR	-	-
Voltage range VS	-	-

Motors	**Motor size**
	250...280
	Motor voltage
4 and 6-pole motors, applies to the voltage range	**AC 240-266 / 415-460 V △/⅄** **AC 415-460 V △**
Single-speed	**AC 266/460 V △/⅄** AC 220/380 V △/⅄ AC 330/575 V △/⅄ AC 200/400 V ⅄⅄/⅄ AC 220/440 V ⅄⅄/⅄ AC 230/460 V ⅄⅄/⅄
	Brake voltage
4 and 6-pole motors, Applies to the voltage range	**AC 240-266 V** **AC 415-460 V**
Standard voltages	**DC 24 V / AC 230 V / AC 266 V / AC 460 V**
	Forced cooling fan voltage
Voltage range V	**AC 3 × 346-500 V**

Standard connections 60 Hz motors

Number of poles	Synchronous speed n_{syn} at 60 Hz [rpm]	Connection
2	3600	△/⅄; ⅄⅄ / ⅄
4	1800	△/⅄; ⅄⅄ / ⅄
6	1200	△/⅄; ⅄⅄ / ⅄

60 Hz motor on 50 Hz supply system

The rated data of motors designed for 60 Hz supply systems are slightly different when these motors are operated on 50 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 [V] at 50 Hz	Modified rated data			
			n_N	P_N	M_N	M_A/M_N
AC 230/460 V ⅄⅄/⅄	⅄	400	-17%	-17%	0%	0%

Motors for USA and Canada

Motors for USA and Canada are designed according to NEMA or CSA regulations. Single-speed motors in NEMA or CSA design are registered by Underwriters Laboratories (UL). The following voltage assignments (60 Hz) are customary in the USA and Canada:

	Rated voltage of the supply power	Rated voltage of the motor
USA	208 V	200 V
	240 V	230 V
	480 V	460 V
Canada	600 V	575 V

The motor voltage may deviate up to ±10 % from the rated voltage. This deviation roughly corresponds to tolerance B.

The standard in the USA are AC 230/460 V / 60 Hz motors (see section 'Special markets' on page 401).

13.12 Circuit breakers and protective equipment

See section "Circuit breaker and protective equipment" on page 29.

Secure switching of inductances

Note the following notes for switching of inductances:

- Switching of low-speed motor windings.

  If the cable is installed unfavorably, 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, we recommend installing suppressor circuits on the switching devices.

13.13 Thermal characteristics

Thermal classification according to IEC 60034-1 (EN 60034-1)

AC motors, AC brakemotors and MOVIMOT® drives are available in the following thermal classes:

- Single-speed AC motors/AC brakemotors and Dahlander motors are designed in thermal class 130 (B) as standard. Thermal classes 155 (F) or 180 (H) are available on request.
- The standard design for all multi-speed AC motors/AC brakemotors with separate winding is thermal class 155 (F). Thermal class 180 (H) is available on request.

The table below lists the overtemperatures to IEC 60034-1 (EN 60034-1).

Thermal class		Overtemperature limit [K]
Old	New	
B	**130**	80 K
F	**155**	105 K
H	**180**	125 K

Power reduction

The rated power P_N of an AC motor or the thermally permitted torque M_N of an asynchronous servomotor depends on the ambient temperature and the altitude. The rated power stated on the nameplate or the rated torque stated on the nameplate applies to an ambient temperature of 40 °C and a maximum altitude of 1,000 m above sea level. The rated power or the rated torque must be reduced according to the following formula in the case of higher ambient temperatures or 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 and asynchronous servomotors

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

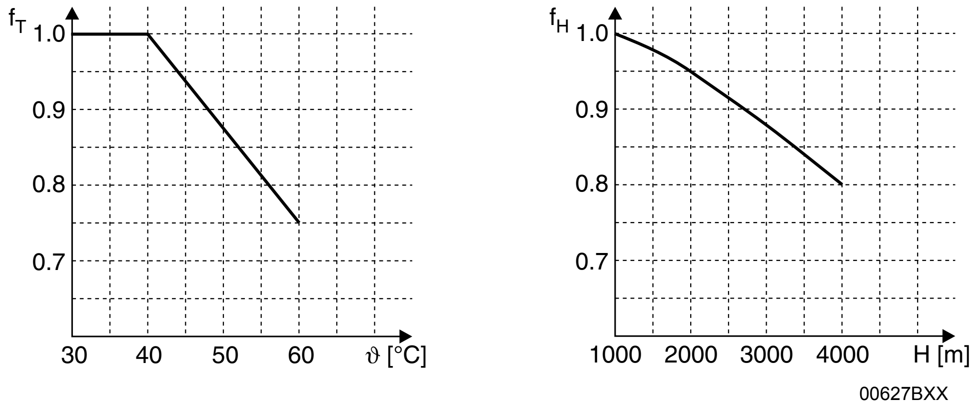

Figure 35: Power reduction dependent on ambient temperature and altitude

ϑ = Ambient temperature
H = Altitude above sea level

13

Duty types See section "Operating modes" page 77.

13.14 Switching frequency

See chapter "Switching frequency" page 79.

Permitted switching frequency of the brake

If you are using a brakemotor, you have to check whether the brake is approved for use with the required switching frequency Z.

13.15 Mechanical characteristics

See chapter "Mechanical characteristics" page 81.

13.16 Overhung and axial loads

The following table lists the permitted overhung loads (top value) and axial forces (bottom value) of DR/DT/DV series AC motors:

Mounting position	[rpm] Number of poles	Permitted overhung load F_R [N] Permitted axial force F_A [N]; $F_{A\_Zug} = F_{A\_Druck}$ Size 63	250 280
Foot mounted motor	**1000** **6**	- -	8000 2500
	1500 **4**	- -	8000 2500
	3000 **2**	- -	- -
Flange-mounted motor	**1000** **6**	600 150	11000 3000
	1500 **4**	500 110	9000 2600
	3000 **2**	400 70	- -

Overhung load conversion for off-center force application

The permitted overhung loads must be calculated using the following formulae in the event that force is not applied at 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. Note that the calculations apply to M_N.

F_{xL} based on bearing life

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

F_{xW} from the shaft strength

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

F_R	= Permitted overhung load (x = l/2) [N]
x	= Distance from the shaft shoulder to the force application point in [mm]
a, b, f	= Motor constants for overhung load conversion [mm]
c	= Motor constant for overhung load conversion [Nmm]

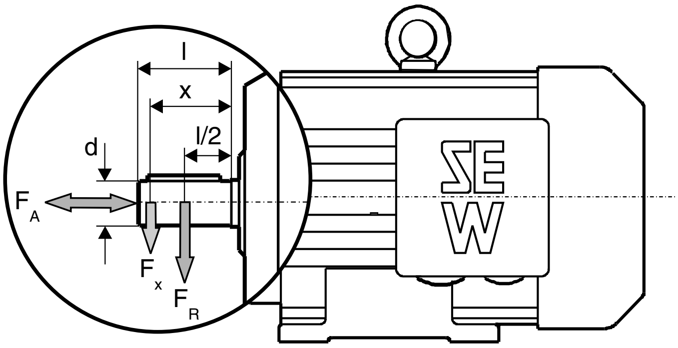

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Figure 36: Overhung load FX for off-center force application

Motor constants for overhung load conversion

Size	a [mm]	b [mm]	c 2-pole [Nmm]	4-pole [Nmm]	6-pole [Nmm]	f [mm]	d [mm]	l [mm]
63	161	146	$11.2 \bullet 10^3$	$16.8 \bullet 10^3$	$19 \bullet 10^3$	13	14	30
250	658	588	-	$630 \bullet 10^3$	-	0	65	140
280	658	588	-	$630 \bullet 10^3$	-	0	75	140

2nd motor shaft end

Contact SEW-EURODRIVE regarding permitted load for 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
250 / 280	6316-2Z-J-C3			6315-2Z-J-C3	

13.17 Project planning, technical data for plug connectors

Contact rating depending on the temperature

The "Technical data" tables for plug connectors list 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 40 °C. Higher ambient temperatures apply for reduced current values. The following illustration shows the permitted contact load as a function of the ambient temperature.

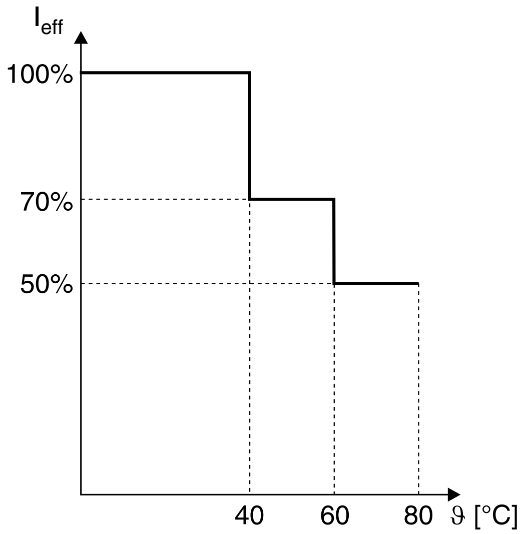

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Figure 37: Permitted contact load as a function of the ambient temperature

I_{eff}	=	Current value of the maximum permitted contact load, 100% = value as listed in the "Technical data" table (see "Gearmotors" price catalog/catalog).
ϑ	=	Ambient temperature

IS integrated plug connector

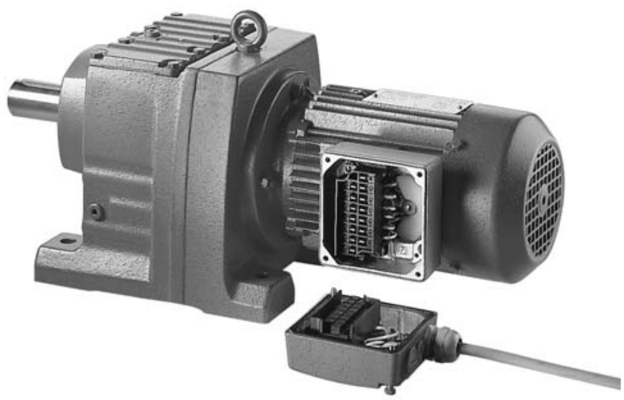

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Figure 38: AC gearmotor with IS integrated plug connector

AC (brake) motors in series DR63 can be supplied on request with the integrated 12-pole plug connector IS 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-speed pole-changing
- Brake
- Temperature monitoring (TF or TH)

As with the terminal box, the cable run with the integrated plug connector IS can be from four different directions offset at 90°.

TIP

- 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 plug connector. Other brake control systems must be installed in the control cabinet.

Plug connectors AS.., AC.., AM.., AB..

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Figure 39: AC motor with ASE.. plug connector

The plug connector systems AS.., AC.., AM.., AB.. are based on the plug connector systems made by Harting.

- AS.., AC.. → Han 10E/10ES
- 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 AC.. and AS.. 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 two-speed pole-changing motors.

Types AS.. and AC.. differ as follows:

- AS = Spring cages
- AC = Crimp contacts and shortened contacts for thermal motor protection

TIP

Applies to AS.1 and AC.1:

For brakemotors, you can select the version with brake control in the terminal box only. 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).

AM.., AB..

Plug connectors AM.., AB... can be used for connecting both single speed motors and double pole-changing motors.

With brakemotors, the brake control system can be either located in the terminal box or in the control cabinet. All versions of the brake control system are possible.

Pre-fabricated cable

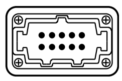
SEW-EURODRIVE offers a pre-fabricated cable for connecting the field distributor and the AC (brake) motor with option APG4. The cable is prefabricated up to a maximum length of 15 meters in increments of half a meter. The cable can be ordered from SEW-EURODRIVE. Specify the required length (max. 5 m).

IS integrated plug connector

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 protection type (IP54, IP55, optionally IP56, IP65, IP66)
Ambient temperature [°C]	-40 to +40

Installed plug connectors AS.., AC.., AM.., AB..

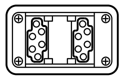
Technical data AS.., AC..

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 AS = Spring cages
Contact type	Pin / (socket = from customer)
Degree of protection	Corresponding to motor protection type (IP54, IP55, optionally IP65)
Ambient temperature [°C]	-40 to +40

1) Harting, aluminum standard housing (painted) 10E / 10ES

13

Technical data AM.., AB..

Plug connectors	AMD..
For motors	DR63
Locking of mating connector	Single clamp
Connector viewed from motor end	
Basic connector system	1)
Number of contacts	2 × 6
Module type[2)]	2 × E-module
Max. contact rating [A_{eff}]	12 × 16
PE connection	2 contacts on articulated frame
Max. voltage/(CSA) [V_{AC}]	500 / (600)
Contact connection	Crimping contacts
Contact type	Pin / (socket = from customer)
Degree of protection	Corresponding to motor protection type (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.

13.18 Project planning, technical data for encoders

Tachometer

Various types of tachometers are available for installation on DR/DT/DV series AC motors as standard depending on the application and motor size. With rare exceptions, the encoders can be combined with other optional components installed in the motor, such as brakes and forced cooling fans.

Overview of encoders

Designation	For motor	Encoder type	Shaft	Specification	Power supply	Signal
EH1T	DR63	Encoder	Hollow shaft	1024 pulses/ revolution	DC 5 V controlled	TTL/RS-422
EH1S					$9\ V_{DC}$ - $26\ V_{DC}$	1 V_{SS} sin/cos
EH1R						TTL/RS-422
EV1T	DV250/DV280		Solid shaft		DC 5 V controlled	TTL/RS-422
EV1S					$10\ V_{DC}$ - $30\ V_{DC}$	1 V_{SS} sin/cos
EV1R						TTL/RS-422
AV1Y	DV250/DV280	Multi-turn-absolute encoder	Solid shaft	-	$10\ V_{DC}$ - $30\ V_{DC}$	MSSI interface and 1 V_{SS} sin/cos
AV1H[1)]	DV250/DV280	Multi-turn HIPERFACE® encoder	Solid shaft	-	$7\ V_{DC}$ - $12\ V_{DC}$	RS-485 interface and 1 V_{SS} sin/cos

1) recommended encoder for operation with MOVIDRIVE¨ MDX61B with option DEH11B

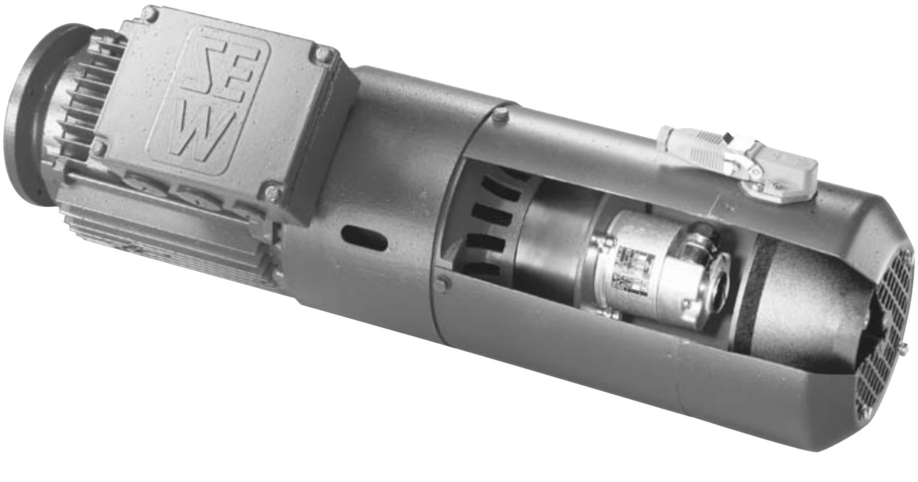
Encoder connection

When connecting the encoders to the inverters, always follow the operating instructions for the relevant inverter and the wiring diagrams supplied with the encoders!

- Maximum line length (inverter - encoder): 100 m with a cable capacitance per unit length ≤ 120 nF/km
- Core cross section: 0.25 - 0.5 mm^2
- Use shielded cable with twisted pair conductors and apply shield over large area on both ends:
  - At the encoder in the cable gland or in the encoder plug
  - To the inverter on the electronics shield clamp 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.
- Encoder with cable gland: Observe the permitted diameter of the encoder cable to ensure that the cable gland functions correctly.

13

Solid shaft encoder



01935CXX

Figure 40: AC motor with solid shaft encoder and forced cooling fan VR

Encoder mounting adapter

The motors can be equipped with various encoder mounting adapters for installing encoders from different manufacturers.

01949CXX

Figure 41: AC motor with encoder mounting adapter EV1A and forced cooling fan VR

The encoder is attached to the EV1A (synchro flange) using 3 encoder mounting clamps (bolts with eccentric disks) for 3 mm flange thickness.

Absolute encoder The absolute encoders AV1Y from SEW-EURODRIVE are combination encoders. They contain a multi-turn absolute encoder and a high-resolution sinusoidal encoder.

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Figure 42: AC motor with absolute encoder and forced cooling fan VR

HIPERFACE® encoder

HIPERFACE® encoders are available as single-turn or multi-turn combination encoder. They contain an absolute encoder and a high-resolution sinusoidal encoder.

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Figure 43: AC motor with HIPERFACE® encoder AS3H

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 pre-fabricated in 1 m steps to the required length.

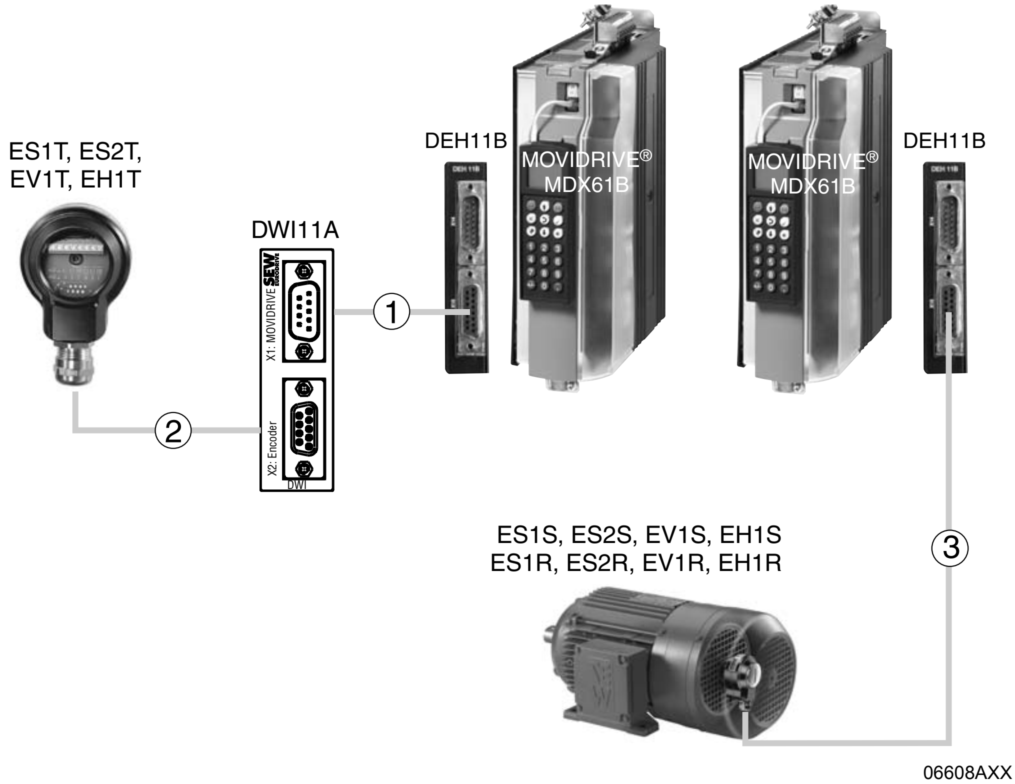

Figure 44: Pre-fabricated cables for encoder connection and encoders

Figure 45: Pre-fabricated cables for HIPERFACE® encoders

(1) Prefabricated cables for encoder connection:

Part number	817 957 3
Installation	Fixed installation
for encoders with 5 V voltage supply	EH1T
Cable cross section	4×2×0.25 mm^2 (AWG23) + 1×0.25 mm^2 (AWG23)
Conductor colors	A: Yellow (YE) A: Green (GN) B: Red (RD) B: Blue (BU) C : Pink (PK) C : Gray (GY) UB: White (WH) ⊥: Brown (BN) Sensor cable: Violet (VT)
Manufacturer and type Lapp Helukabel	 Unitronic Li2YCY (TP) Paar-Tronic-CY
For inverter	MOVIDRIVE® MDX61B with DEH11B option
Connection on the DWI11A on the inverter	 with 9-pin sub D socket With 15-pin D-sub plug

(2) Prefabricated cables for incremental TTL encoders with 5 V power supply:

Part number	198 829 8	198 828 X
Installation	Fixed installation	Cable carrier installation
For encoder	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) A: Green (GN) B: Red (RD) B: Blue (BU) C : Pink (PK) C : Gray (GY) UB: White (WH) ⊥: Brown (BN) Sensor cable: Violet (VT)	
Manufacturer and type Lapp Helukabel	 Unitronic Li2YCY (TP) Paar-Tronic-CY	 Unitronic LiYCY Super-Paar-Tronic-C-PUR
For inverter	MOVIDRIVE® MDX61B with DEH11B option	
Connection to encoder / motor DWI11A	 with conductor end sleeves Connect the violet conductor (VT) with the encoder at UB. With 9-pin D-sub plug	

3

Pre-fabricated cables for incremental TTL sensors and sin/cos encoders with 24 V power supply:

Part number	**1332 459 4**	**1332 458 6**
Installation	Fixed installation	Cable carrier installation
For encoder	EH1S, EH1R	
Cable cross section	4×2×0.25 mm^2 (AWG23) + 1×0.25 mm^2 (AWG23)	
Conductor colors	A: Yellow (YE) A: Green (GN) B: Red (RD) B: Blue (BU) C : Pink (PK) C : Gray (GY) UB: White (WH) ⊥: Brown (BN) Sensor cable: Violet (VT)	
Manufacturer and type **Lapp** **Helukabel**	 Unitronic Li2YCY (TP) Paar-Tronic-CY	 Unitronic LiYCY Super-Paar-Tronic-C-PUR
For inverter	MOVIDRIVE® MDX61B with DEH11B option	
Connection to **encoder / motor** **Inverter**	 with conductor end sleeves Cut off the violet conductor (VT) of the cable at the encoder end. With 15-pin D-sub plug	

4

Pre-fabricated cables for HIPERFACE® encoders:

Part number	**1332 453 5**	**1332 455 1**
Installation	Fixed installation	Cable carrier installation
For encoder	AV1H	
Cable cross section	6 × 2 × 0.25 mm^2 (AWG 23)	
Conductor colors	cos+: Red (RD) cos-: Blue (BU) sin+: Yellow (YE) sin-: Green (GN) D+: Black (BK) D-: Violet (VT) TF/TH/KTY+: brown (BN) TF/TH/KTY-: White (WH) GND: Gray/pink + pink (GY-PK + PK) U_S: Red/blue + gray (RD-BU + GY)	
Manufacturer and type	Lapp, PVC/C/PP 303 028 1	Nexans, 493 290 70
For inverter	MOVIDRIVE® MDX61B with DEH11B option	
Connection to **encoder / motor** **Inverter**	 With 12-pin round connector plug (Intercontec, type ASTA021NN00 10 000 5 000) With 15-pin D-sub plug	

Extension cables for HIPERFACE® cables

Part number	**199 539 1**	**199 540 5**
Installation	Fixed installation	Cable carrier installation
Cable cross section	6 × 2 × 0.25 mm^2 (AWG 23)	
Conductor colors	→ HIPERFACE® cable	
Manufacturer and type	Lapp, PVC/C/PP 303 028 1	Nexans, 493 290 70
Connection to **encoder / motor** **HIPERFACE® cable**	 With 12-pin round connector plug (Intercontec, type ASTA021NN00 10 000 5 000) with 12-pin round connector plug (Intercontec, type AKUA20)	

Incremental encoder

Hollow shaft encoder and spreadshaft encoder

Incremental encoder with 1024 pulses/revolution:

Hollow shaft encoders for AC motors DR63		EH1T	EH1S[1)]	EH1R
Supply voltage	U_B	DC 5 V ±5%	DC 9 V - DC 26 V	
Max. current consumption	I_{in}	180 mA	160 mA	180 mA
Output amplitude per track	U_{high} U_{low}	≥ DC 2.5 V ≤ DC 0.5 V	1 V_{SS}	≥ DC 2.5 V ≤ DC 0.5 V
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 revolution	A, B C	1024 1		
Mark space ratio		1 : 1 ±20%		
Phase angle A : B		90° ±20%		
Vibration resistance (10 Hz ... 2000 Hz)		≤ 100 m/s^2 (EN 60068-2-6)		
Shock resistance		≤ 1000 m/s^2 (EN 60068-2-27)		
Ambient temperature	ϑ_U	-30 °C to +60 °C (EN 60721-3-3, class 3K3)		
Degree of protection		IP66 (EN 60529)		
Connection		Terminal box on encoder		

1) recommended encoder for operation with MOVIDRIVE

Encoder mounting adapter

Type	EV1A
For motors	DV250/280
For	Solid shaft encoders (synchronous flange)
Flange diameter	58 mm
Center bore diameter	50 mm
Shaft end diameter	6 mm
Length of shaft end	10 mm

Absolute encoder

Absolute encoders for AC motors DT71 ... DV280		**AV1Y**
Supply voltage	U_B	DC 10 - **15** - **24** - 30 V, polarity reversal protected
Max. current consumption	I_{in}	250 mA
Cut-off frequency	f_{Grenz}	≥ 100 kHz
Pulses (sine cycles) per revolution	**A, B**	512
Output amplitude per track		1 V_{SS} sin/cos
Scanning code		Gray code
Single-turn resolution		4096 increments/revolution (12 bit)
Multi-turn resolution		4096 revolutions (12 bits)
Data transmission absolute values		synchronous, serial (SSI)
Serial data output		Driver to EIA RS-485
Serial clock input		Optocoupler, recommended driver to EIA RS-485
Clock frequency		Permitted range: 90 - **300** - 1100 kHz (max. 100m cable length with 300 kHz)
Clock-pulse space period		12 - 35 ms
Vibration resistance (10 Hz ... 2000 Hz)		≤ 100 m/s^2 (EN 60068-2-6)
Maximum speed	n_{max}	6000 min^{-1}
Mass	**m**	0.30 kg
Ambient temperature	ϑ_U	-40 °C to +60 °C (EN 60721-3-3, class 3K3)
Degree of protection		IP66 (EN 60529)
Connection		1 m cable with 17-pin round connector, matching encoder cable with SPUC 17B FRAN female connector

HIPERFACE® encoder

HIPERFACE® solid shaft encoders for AC motors DT71 ... DV280		Multi-turn encoder AV1H[1)]
Supply voltage	**U_B**	DC 7 - **12** V, polarity reversal protected
Max. current consumption	**I_{in}**	80 mA
Cut-off frequency	**f_{Grenz}**	200 kHz
Pulses (sine cycles) per revolution	**A, B**	1024
Output amplitude per track		0.9 - 1.1 V_{SS} sin/cos
Scanning code		Binary code
Single-turn resolution		32768 increments/revolution (15 bit)
Multi-turn resolution		4096 revolutions (12 bits)
Data transmission absolute values		asynchronous, serial
Serial data output		Driver to EIA RS-485
Available memory in EEPROM (electronic nameplate)		1792 bytes
Vibration resistance (10 Hz ... 2000 Hz)		≤ 200 m/s^2 (EN 60068-2-6)
Maximum speed	**n_{max}**	6000 min^{-1}
Mass	**m**	0.55 kg
Ambient temperature	**ϑ_U**	-20 °C to +60 °C (EN 60721-3-3, class 3K3)
Degree of protection		IP66 (EN 60529)
Connection		1 m cable with 12-pin round connector, suitable for Hiperface® cable with Intercontec female connector Type ASTA021NN00 10 000 5 000

1) Recommended encoder for operation with MOVIDRIVE® MDX61B with option DEH11B

13.19 Technical data for forced cooling fan

Forced cooling fan V

The motors can be equipped with a forced cooling fan if required. A forced cooling fan is usually not required for motors operated on the supply system in continuous duty. SEW-EURODRIVE recommends a forced cooling fan for the following applications:

- Drives with high switching frequency
- Inverter drives with a setting range ≥ 1:20
- Inverter drives that have to produce rated torque at low speeds or even at standstill.

The following figure shows a typical speed-torque characteristic for a dynamic inverter drive, for example with MOVIDRIVE® MDX61B with DEH11B option in CFC operating mode.

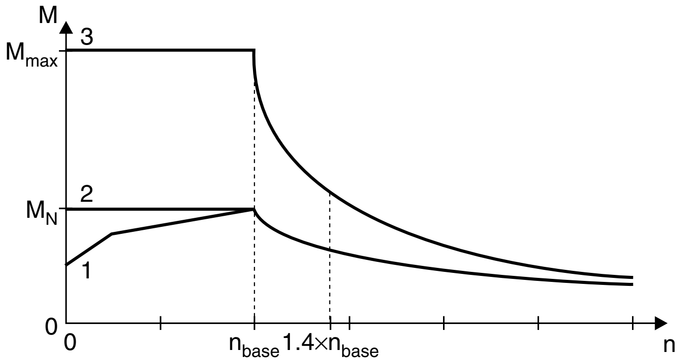

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Figure 46: Speed/torque characteristic curve in CFC operating mode

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 (base speed) of the motor	3	= Maximum torque

A forced cooling fan must be used if the load torque in the 0 ... n_{base} is above curve 1. The motor becomes thermally overloaded without forced cooling.

Combination with encoders

Forced cooling fans can be combined with the following motor encoders:

Motor encoder	For motor size	Forced cooling fan V
EV1T, EV1R, EV1S	DV250/DV280	•
AV1Y, AV1H	DV250/DV280	•

In DV250M/DV280 motors, the motor encoder can only be installed in conjunction with a forced cooling fan.

V forced cooling fan

Forced cooling fan type	V	
For motor size	250 / 280	
Supply voltage[1)] [V_{AC}] △ ⅄	3×200-290 3×346-500	3×200-330 3×346-575
Frequency [Hz]	50	60
Current consumption [A_{AC}] △ ⅄	1.0 0.57	0.9 0.52
Power consumption [W]	130 - 320	170 - 310
Air discharge rate [m^3/h]	750	
Ambient temperature [°C]	-20 to +60	
Degree of protection	IP55	
Electrical connection	Terminal block in terminal box	
Max. cable cross section [mm^2]	4 × 1.5	
Thread for cable gland	2 × M16 × 1.5	

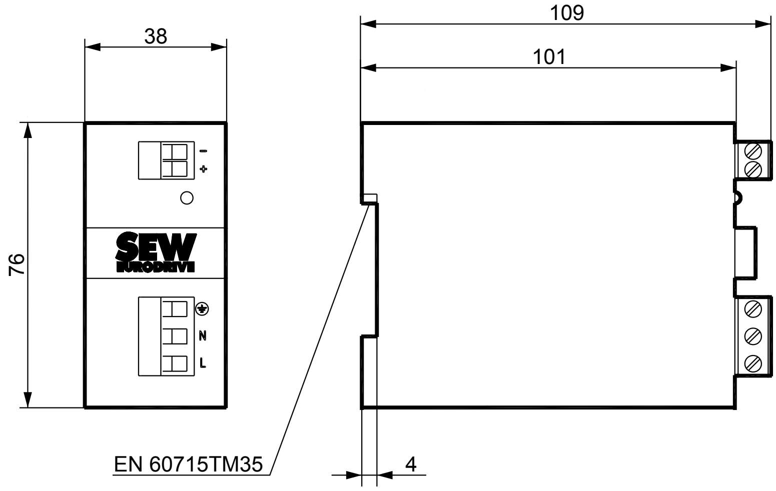
1) Other supply voltages upon request.

Technical data

Switched-mode power supply	UWU52A
Part number	188 181 7
for forced cooling fan	VR
Input voltage	1 × AC 110-240 V
Voltage range	AC 95-265 V, DC 110-300 V
Frequency	50/60 Hz
Max. no-load current	AC 40 mA
Rated input current at 1 × AC 110 V at 1 × AC 230 V	 AC 1.04 A AC 0.63 A
Output voltage	DC 24 V (-1%/+3%)
Rated output current at 40 °C at 55 °C	 DC 2.5 A DC 2.0 A
Residual ripple	< 50 mV_{eff}
Interference voltage	< 120 mV_{SS}
Power loss	< 5.5 W
Mass	0.23 kg
Working temperature	0 ... +55 °C (condensation not permitted)
Degree of protection	IP20 (EN 60529)
Protection class	I
Connection	Screw terminals for line cross section 0.20-2.5 mm^2

The power supply is short-circuit proof and protected against overload. Input and output are electrically isolated.

Dimension drawing



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Leave a clearance of at least 50 mm at top and bottom of venting slots.

13.20 Project planning, technical data for backstop RS and canopy C

Backstop RS

The mechanical backstop RS is used for protecting equipment against reverse movement when the motor is switched off.

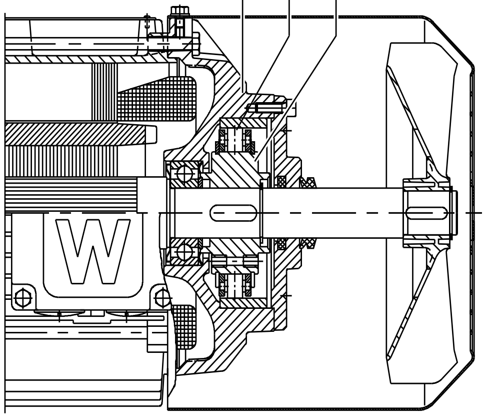

Figure 47: Design of the RS backstop

1 B-side endshield
2 Wedge element train
3 Driver

	TIP
	Specify the direction of rotation for the motor or gearmotor when placing your order. CW rotation means the output shaft rotates clockwise as viewed onto its face end and is blocked to prevent it from turning counterclockwise. CCW vice versa accordingly.

Technical data

Motor type	Rated locking torque [Nm]	Lift-off speed of sprags [rpm]	Ambient temperature
DV250, DV280../RS	2600	400	-40 °C to +60 °C

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.

All explosion-proof AC motors and AC brakemotors in a vertical mounting position with their output shaft pointing downwards come equipped with protection canopy C. The same applies to motors in a vertical mounting position installed in the open.

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Figure 48: AC motor with canopy C

13.21 WPU smooth pole-change unit

See chapter "WPU smooth pole-change unit" on page 60.

13.22 Project planning for AC motors with inverter

See chapter "Project planning for AC motors with inverter" on page 100 ff.

14 Dimension Sheets – DT56, DR63, DV250/280

14.1 Dimension sheet information

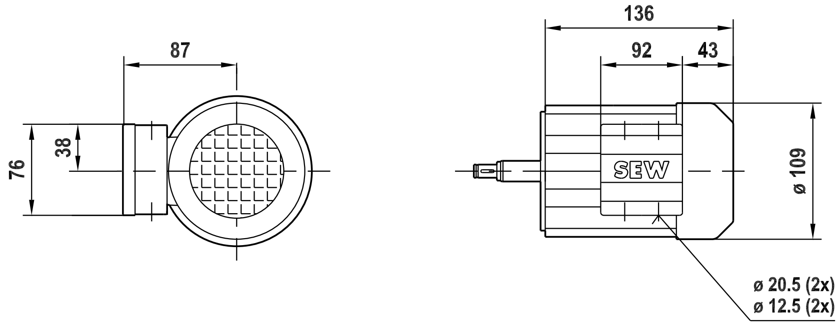
Please observe the following points regarding dimension sheets for AC (brake)motors (DR/DT/DV):

- The foot dimensions of the DV/DVE250 motors differ from the IEC dimensions.
- DT56.. motors are only available in combination with R..07 helical gear units or Spiroplan® W..10 gear units.
- Cutouts for cable glands are provided on the terminal box of DT56.. and DR63.. motors.
- Manual brake release is pivoted through 90° together with the terminal box, with the exception of DR63.
- For brakemotors, do not forget to add the space required for removing the fan guard (= fan guard diameter).
- Leave a clearance of at least half the fan guard diameter to provide unhindered air access.
- Motors of size DV250../280 are equipped with lifting eyebolts. The lifting eyebolts can be unscrewed.

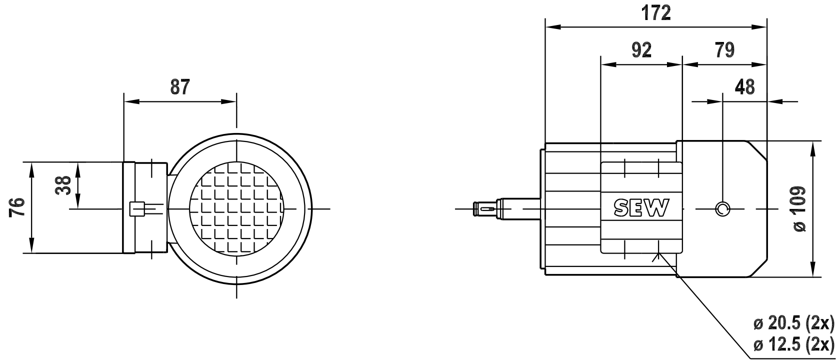
14.2 Dimension sheets for DR/DT/DV series AC motors

08 181 01 02

DT56

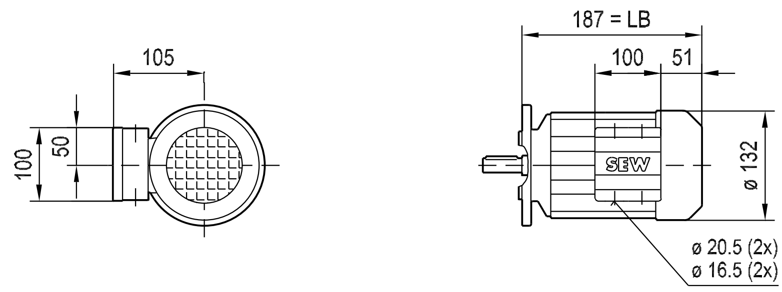


DT56 / B

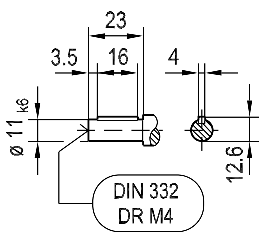


DFR63

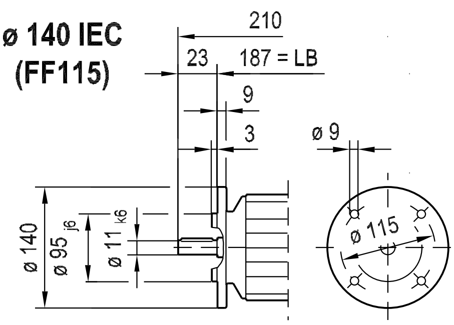
08 182 02 02
1 (2)



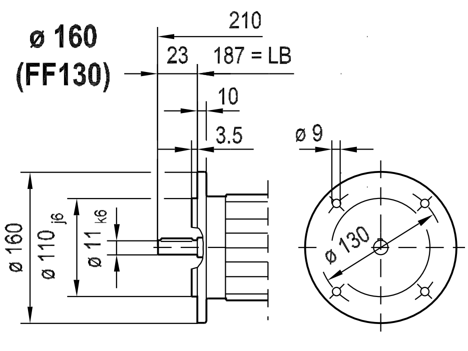
ø 11 k6



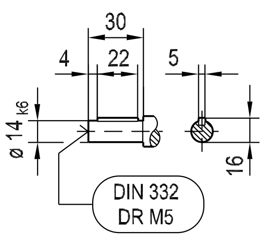
ø 140 IEC (FF115)



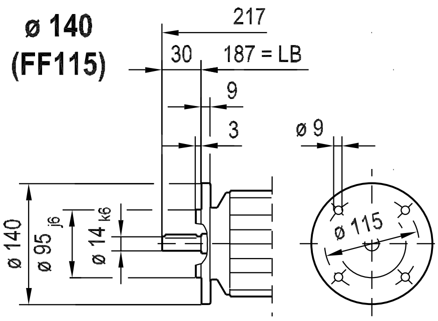
ø 160 (FF130)



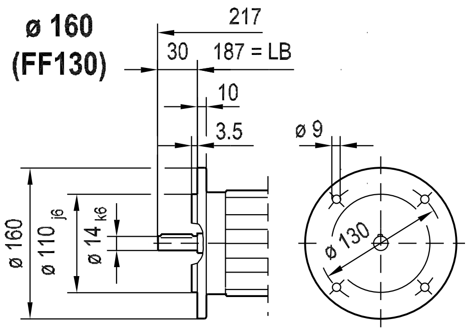
ø 14 k6



ø 140 (FF115)



ø 160 (FF130)



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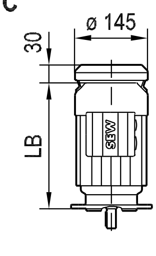

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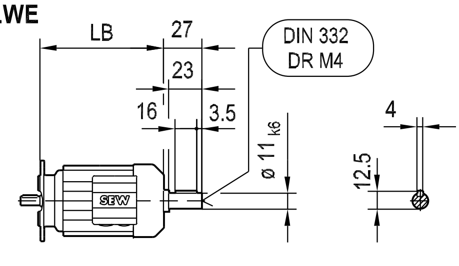
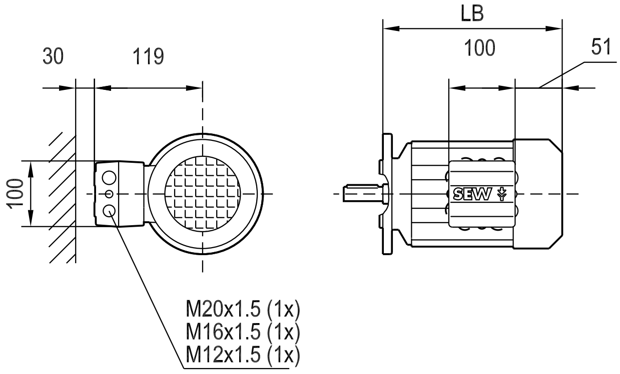


14

08 182 02 02
2 (2)

D(F)R63

/ IS



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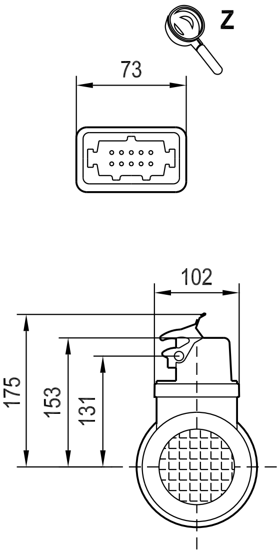

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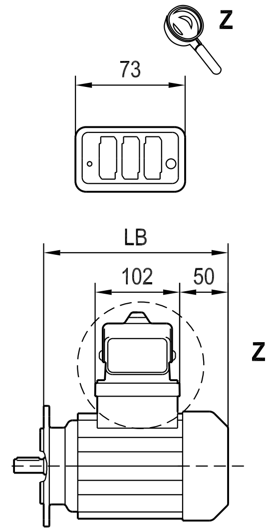

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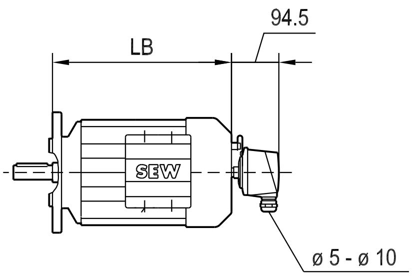

DFR63 / BR03

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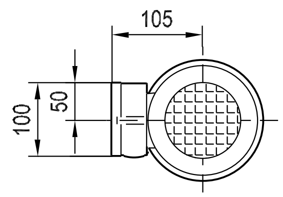
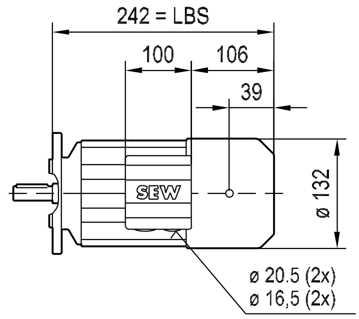
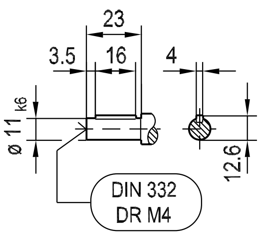




ø 11 k6



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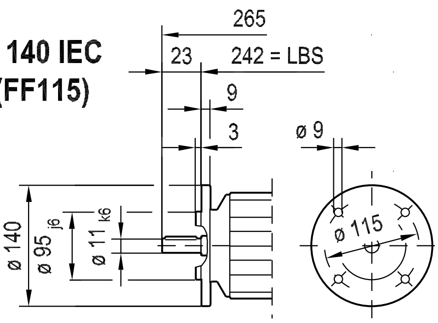

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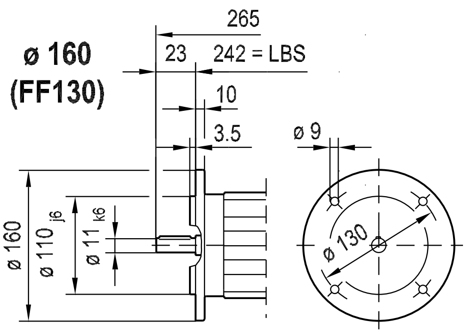

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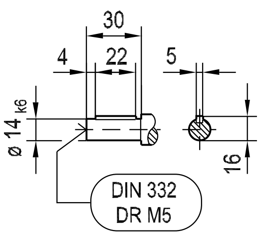

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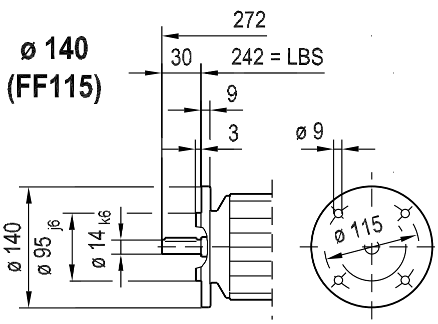

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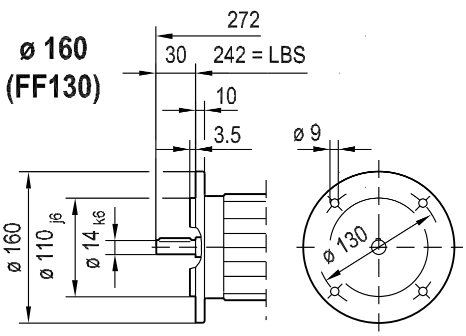

14

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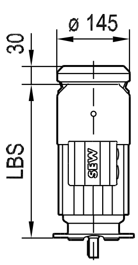

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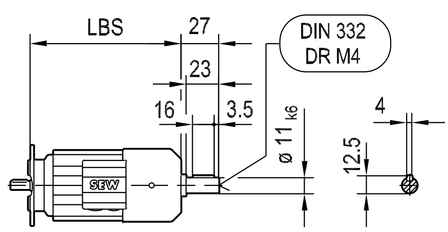

DFR63 / BR03

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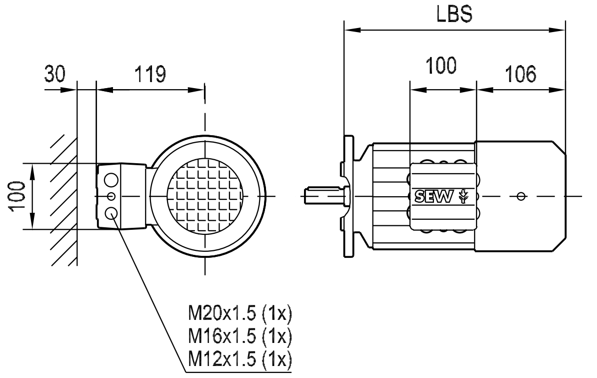

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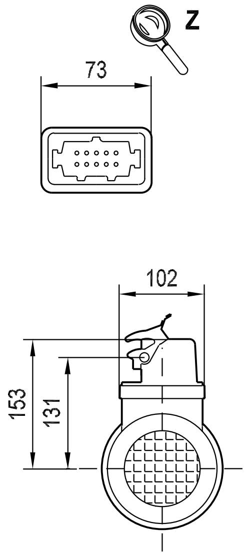

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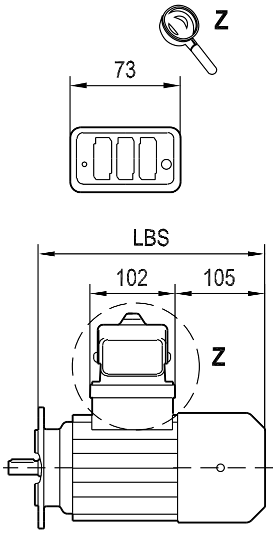

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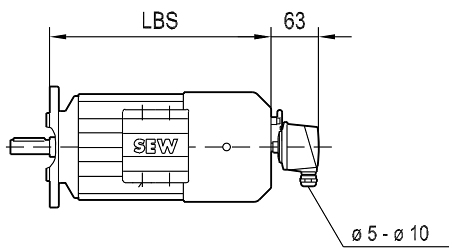

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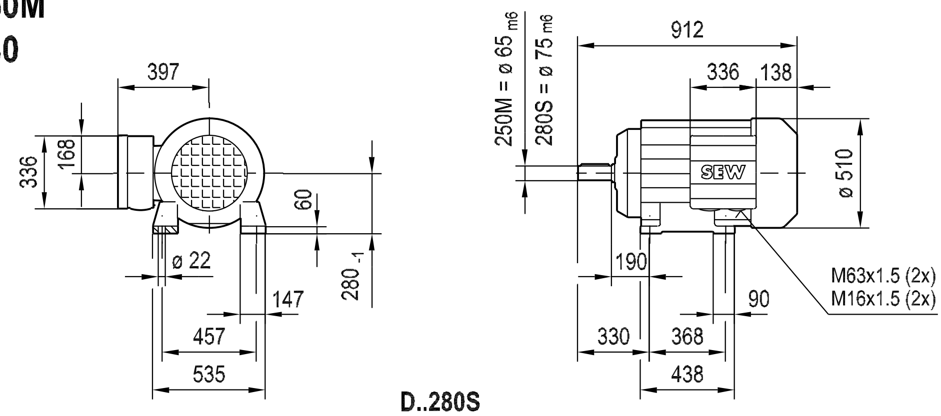
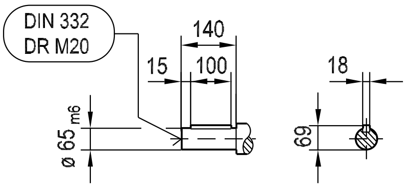
1 (1)

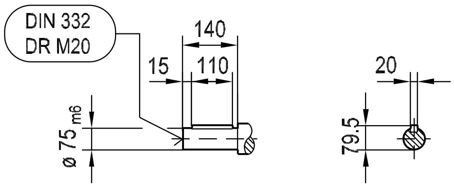
DV/DVE250M
DV/DVE280



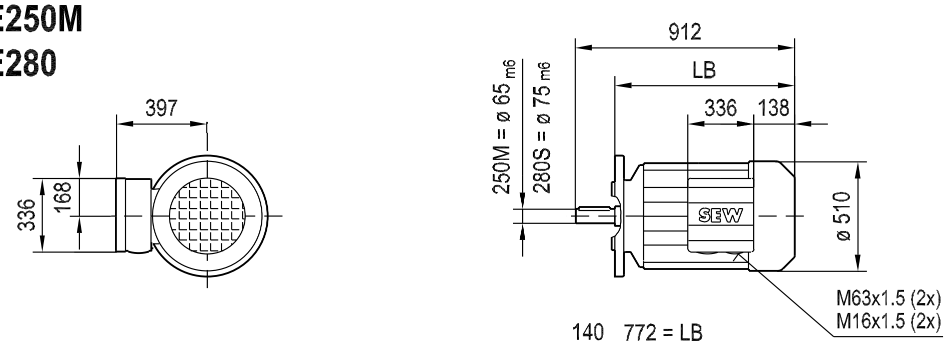
D..250M



D..280S



DFV/DFVE250M
DFV/DFVE280



IEC ø 550
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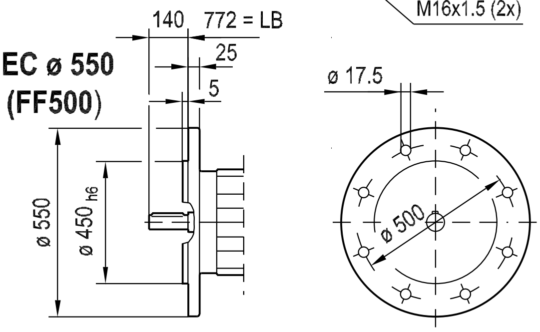
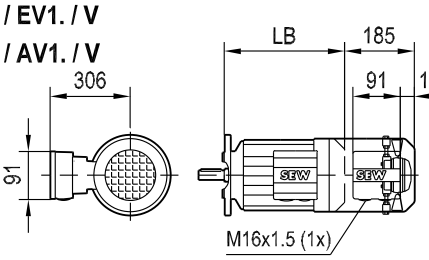


/ V
/ EV1. / V
/ AV1. / V



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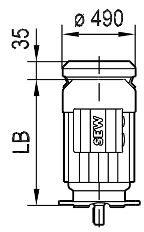

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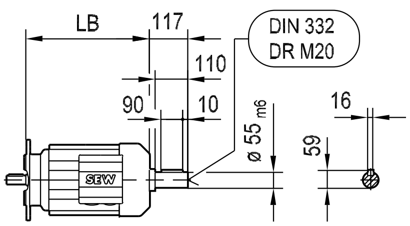

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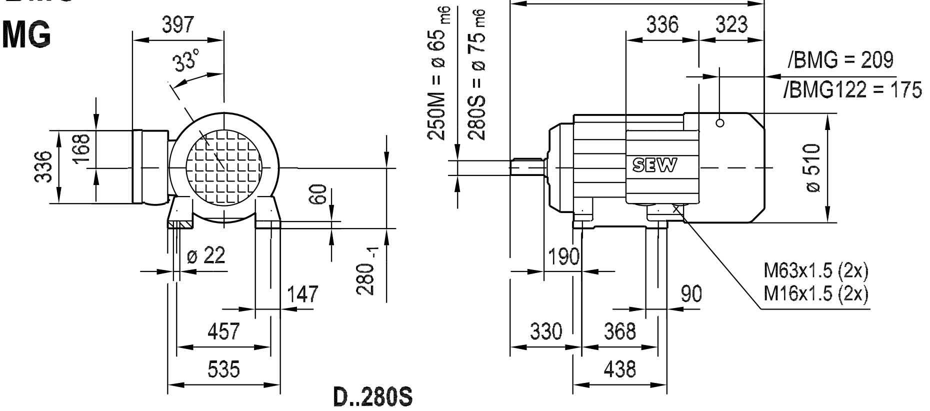
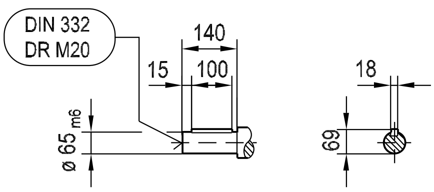
1 (1)

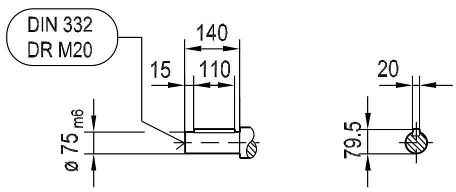
DV/DVE250M / BMG
DV/DVE280 / BMG
DV.. / RS



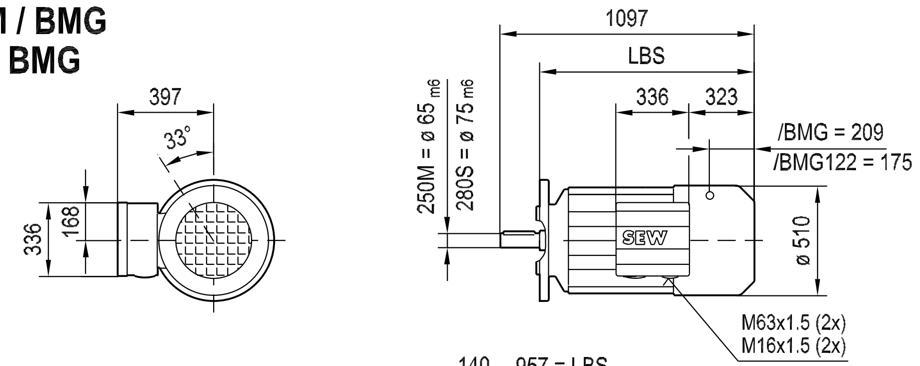
D..250M



D..280S



DFV/DFVE250M / BMG
DFV/DFVE280 / BMG
DV.. / RS



IEC ø 550
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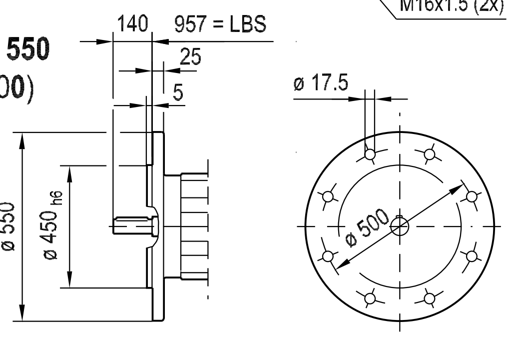
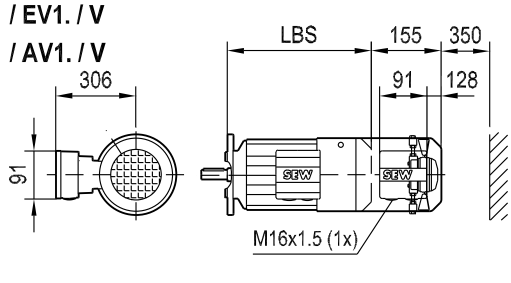


/ V
/ EV1. / V
/ AV1. / V



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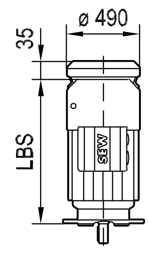

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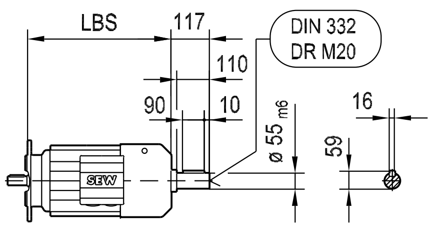
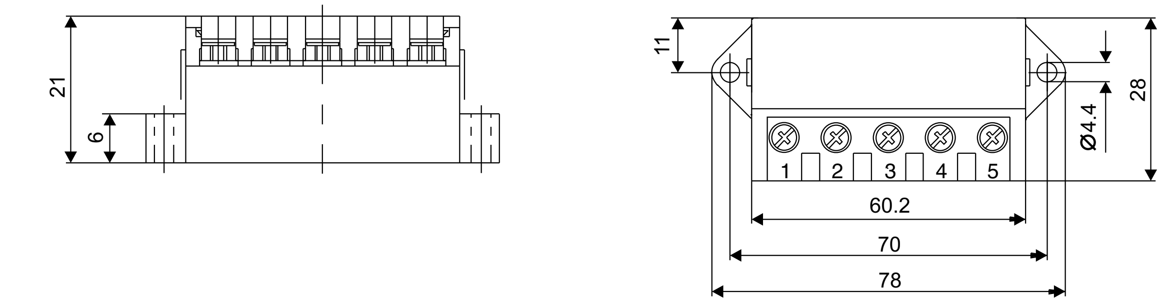


14.3 WPU smooth pole-change unit

See chapter "Dimension sheets for WPU smooth pole-change unit" on page 60 ff.

14.4 Dimension sheets for brake controllers

BG1.0, BGE1



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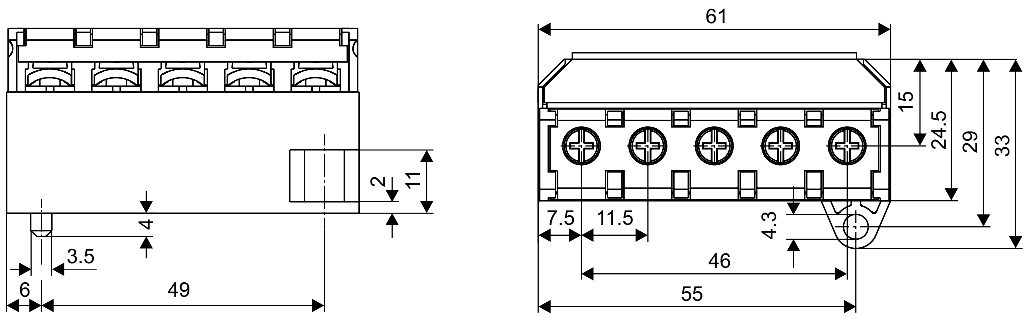
BG1.2, BG2.4



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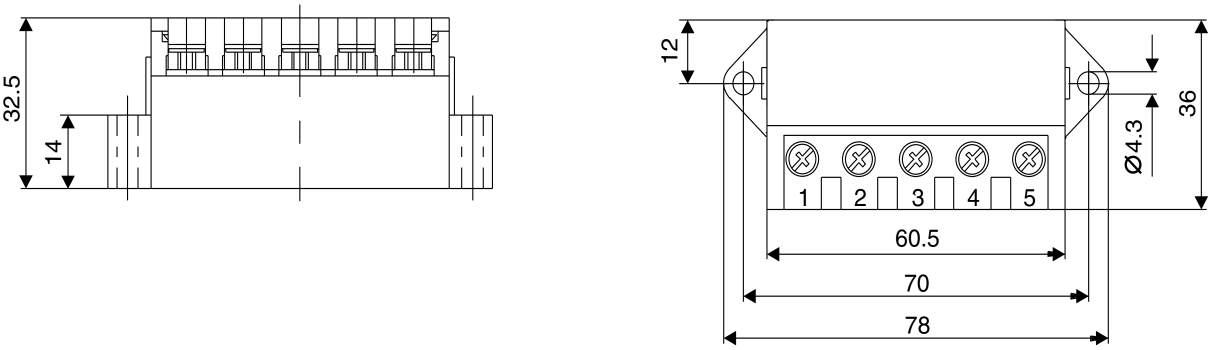
BG1.5, BG3, BGE, BS, BSG



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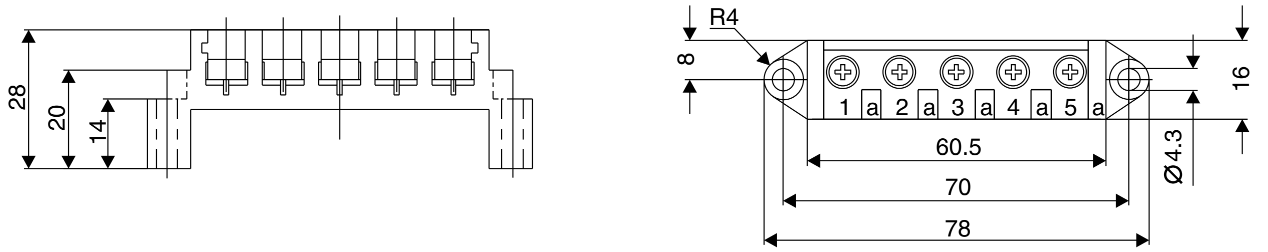
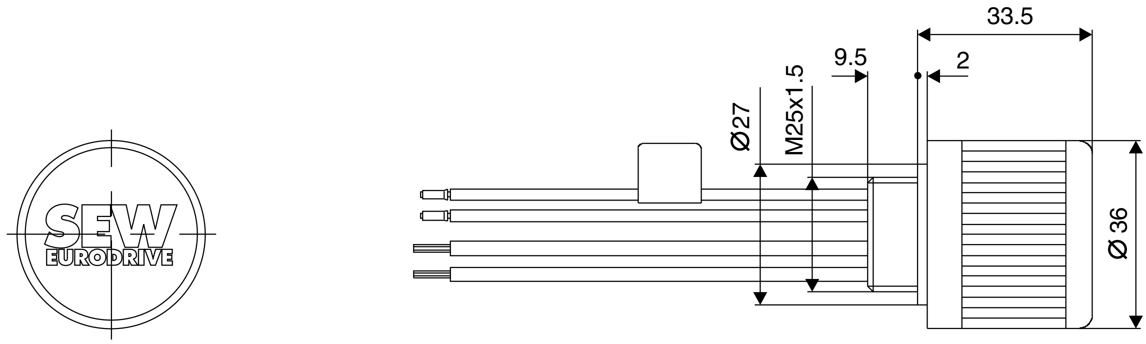
Auxiliary terminal strip For connection of the brake coil or TF/TH and strip heaters in the wiring space of the motor



01622BXX

SR, UR



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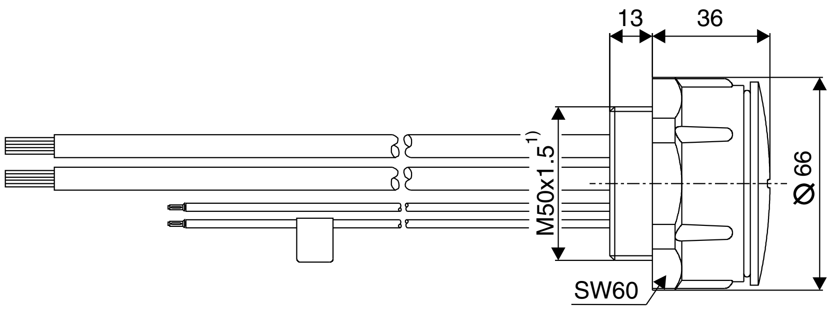
SR19



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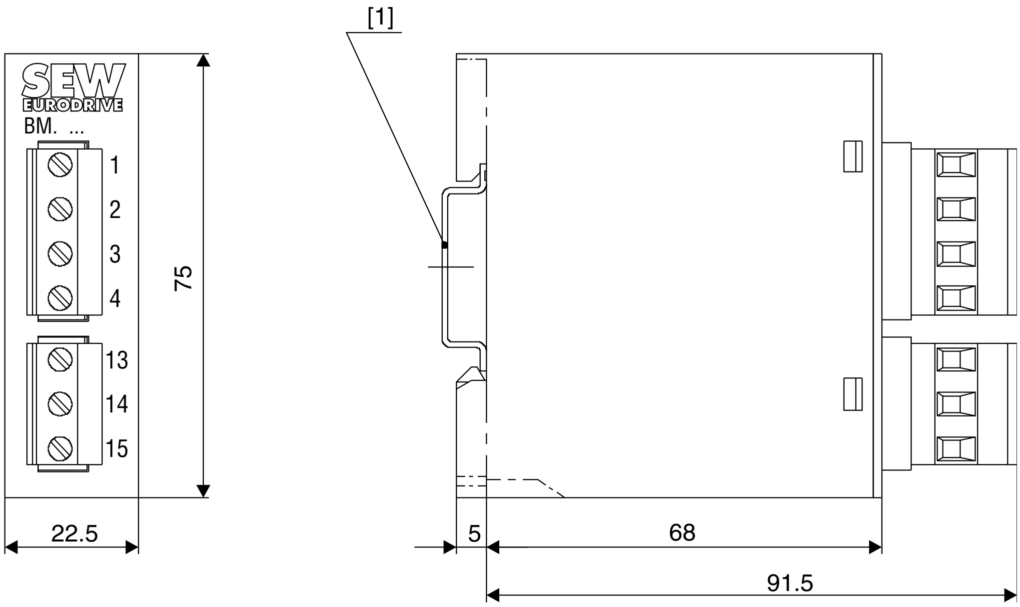
1) With reducing sleeve to M50x1.5

BMS, BME, BMH, BMP, BMK



1) Support rail mounting EN 50022-35-7.5

15 Brakes from SEW-EURODRIVE – DT56, DR63, DV250/280

General

On request, SEW-EURODRIVE motors and gearmotors are 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 setscrew is supplied.

The brake is controlled by a brake controller 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 bearing end shield is a part of both the motor and the brake. The integrated construction of the brakemotor permits particularly compact and sturdy solutions.

Short 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.

Emergency stop features

In hoist applications, the limits of the permitted maximum braking work (including emergency stops) 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 need values for increased emergency stop braking work.

Brake control

Various brake controllers are available for controlling disk brakes with a DC coil, depending on the requirements and the operating conditions. All brake control systems are fitted as standard with varistors to protect against overvoltage. For detailed information on brakes from SEW-EURODRIVE, refer to the publication "Drive Engineering – Practical Implementation – SEW Disk Brakes."

The brake control systems are either installed directly on the motor in the wiring space or in the control cabinet. For motors of thermal class 180 (H), the control system must be installed in the control cabinet.

15.1 Principles of the SEW brake

Basic structure

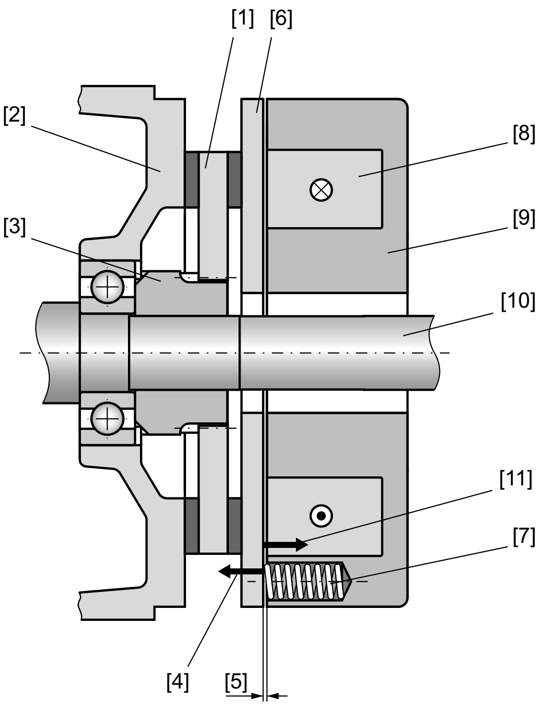
The SEW brake is an electromagnetic disk brake with a DC coil that releases electrically and brakes using spring force. The system meets all fundamental safety requirements: The brake is applied automatically if the power fails.

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 length: 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.

Basic functions

In contrast to other disk brakes with a DC coil, the 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 deenergized. The brake is applied to the motor. The type and number of brake springs determines the braking torque. When the brake coil is connected to the appropriate DC voltage, the spring force [4] is overcome by magnetic force [11], thereby bringing the pressure plate into contact with the coil body. The brake disk moves clear and the rotor can turn.



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

Particularly short response times at switch-on

See section "Particularly short response times at switch-on" page 232.

15.2 Details of the SEW brake system

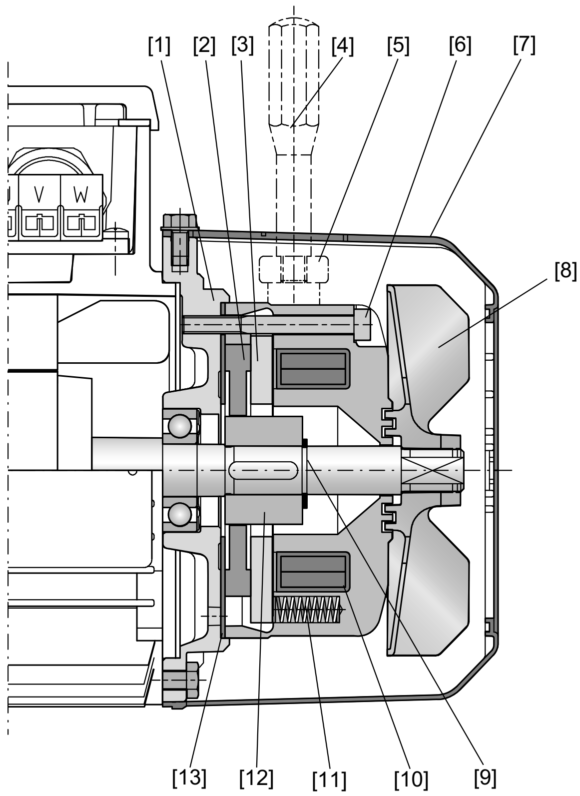
Brake BMG02

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 contacting
- The number of brake springs determines the braking torque



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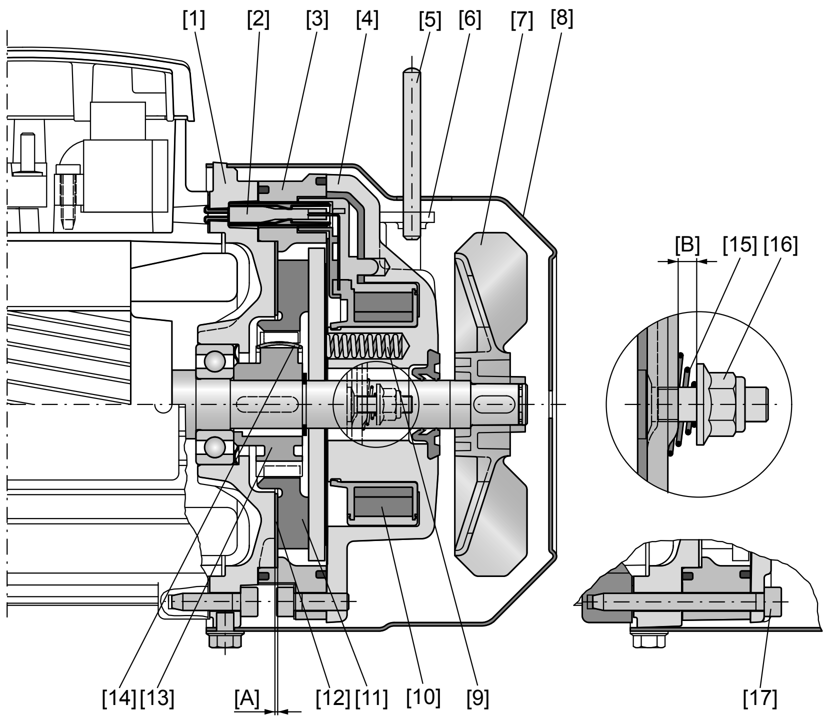
[1] Brake bearing end shield	[8] Fan
[2] Brake disk (complete)	[9] Retaining ring
[3] Pressure plate	[10] Brake coil
[4] Hand lever	[11] Brake spring
[5] Release lever	[12] Carrier
[6] Retaining screw	[13] Friction plate
[7] Fan guard	

Brake BR03

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 contacting
- The number of brake springs determines the braking torque



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[1] Brake bearing end shield	[10] Brake coil
[2] Contact box	[11] Brake disk
[3] Guide ring	[12] Friction plate
[4] Magnet	[13] Carrier
[5] Hand lever	[14] Clip
[6] Release lever	[15] Conical spring
[7] Fan	[16] Hex nut
[8] Fan guard	[17] Retaining screws
[9] Brake spring	[A] Working air gap
	[B] Floating clearance of the manual brake release

15.3 Brake control system

Various brake controllers are available for controlling disk brakes with a DC coil, depending on the requirements and the operating conditions. All brake control systems are fitted as standard with varistors to protect against overvoltage.

The brake control systems are either installed directly on the motor in the wiring space or in the control cabinet. For motors of thermal class 180 (H), the control system must be installed in the control cabinet.

Brake control system 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 pole-changing motors and for operation with a frequency inverter, the supply voltage for the brake must be supplied separately.

Furthermore, bear in mind that the brake response is delayed by the residual voltage of the motor if the brake is powered by the motor supply voltage. The brake application time t_2I specified in the technical data for cut-off in the AC circuit applies to a separate supply only.

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} [A]	Type	Part number	Color code
BG	One-way rectifier	AC 90...500 V	1.2	BG 1.2	826 992 0	Black
		AC 24...500 V	2.4	BG 2.4	827 019 8	Brown
		AC 150...500 V	1.5	BG 1.5	825 384 6	Black
		AC 24...500 V	3.0	BG 3	825 386 2	Brown
BGE	One-way rectifier with electronic switching	AC 150...500 V	1.5	BGE 1.5	825 385 4	Red
		AC 42...150 V	3.0	BGE 3	825 387 0	Blue
BSR	One-way rectifier + current relay for cut-off in the DC circuit	AC 90...500 V	1.0	BG1.2 + SR 11	826 992 0 + 826 761 8	
		AC 42...87 V	1.0	BG2.4 + SR 11	827 019 8 + 826 761 8	
		AC 150...500 V	1.0	BGE 1.5 + SR 11	825 385 4 + 826 761 8	
			1.0	BGE 1.5 + SR 15	825 385 4 + 826 762 6	
			1.0	BGE 1.5 + SR 19	825 385 4 + 826 246 2	
		AC 42...150 V	1.0	BGE 3 + SR11	825 387 0 + 826 761 8	
			1.0	BGE 3 + SR15	825 387 0 + 826 762 6	
			1.0	BGE 3 + SR19	825 387 0 + 826 246 2	
BUR	One-way rectifier + voltage relay for cut-off in the DC circuit	AC 90...150 V	1.0	BG 1.2 + UR 11	826 992 0 + 826 758 8	
		AC 42...87 V	1.0	BG 2.4 + UR 11	827 019 8 + 826 758 8	
		AC 150...500 V	1.0	BG 1.2 + UR 15	826 992 0 + 826 759 6	
		AC 150...500 V	1.0	BGE 1.5 + UR 15	825 385 4 + 826 759 6	
		AC 42...150 V	1.0	BGE 3 + UR 11	825 387 0 + 826 758 8	
BS	Varistor protection circuit	DC 24 V	5.0	BS24	826 763 4	Aqua
BSG	Electronic switching	DC 24 V	5.0	BSG	825 459 1	White

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} [A]	Type	Part number	Color code
BMS	One-way rectifier as BG	AC 150...500 V	1.5	BMS 1.5	825 802 3	Black
		AC 42...150 V	3.0	BMS 3	825 803 1	Brown
BME	One-way rectifier with electronic switching as BGE	AC 150...500 V	1.5	BME 1.5	825 722 1	Red
		AC 42...150 V	3.0	BME 3	825 723 X	Blue
BMH	One-way rectifier with electronic switching and heating function	AC 150...500 V	1.5	BMH 1.5	825 818 X	Green
		AC 42...150 V	3	BMH 3	825 819 8	Yellow
BMP	One-way rectifier with electronic switching, integrated voltage relay for cut-off in the DC circuit	AC 150...500 V	1.5	BMP 1.5	825 685 3	White
		AC 42...150 V	3.0	BMP 3	826 566 6	Light blue
BMK	One-way rectifier with electronic switching, DC 24 V control input and cut-off in the DC circuit	AC 150...500 V	1.5	BMK 1.5	826 463 5	Aqua
		AC 42...150 V	3.0	BMK 3	826 567 4	Bright red
BMV	Brake control unit with electronic switching, DC 24 V control input and fast cut-off	DC 24 V	5.0	BMV	13000063	White

15.4 AC brakemotors DR/DT...BR/BMG

The BR03 brake is only used for size DR63.... For size DT56, BMG is used.

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 made.

Standard brake control system

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 line voltage for pole-changing motors. The table below lists the standard AC brakemotors.

Motor type	AC connection	DC 24 V connection
DT56..BMG	BG	No control unit[1]
DR63..BR		

1) The overvoltage protection must be implemented by the customer, for example using varistors.

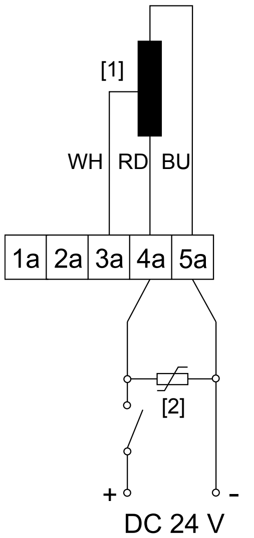
Either cut-off in the AC circuit or cut-off in both the DC and AC circuits is possible with standard types for AC connection.

The brake voltage can either be supplied separately (particularly with pole-changing motors) or taken directly from the motor terminal board (with single-speed motors).

The response times t_2I for cut-off in the AC circuit apply to the separate power supply. 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 control systems have powerful overvoltage protection for the brake coil and switching contact.

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



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[1] Brake coil

[2] Varistor

WH = White

RD = Red

BU = Blue

Example: Varistor for protecting the brake coil

Varistor type	Manufacturer
SIOV-S10 K300	EPCOS
10M 250 VB	Conradty

Brakemotors for special require-ments

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 types of protection, plug connections and special brake control systems (see the 'Gearmotor' catalog).

High switching frequency

A high switching frequency in combination with significant external mass moments of inertia is often a requirement for brakemotors.

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 switching frequency.

Motors DV250..BMG and DV280...BMG are designed for a high switching frequency as standard.

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 $\pm$ 12 %. The shorter the response times, the smaller the absolute value of the variation.

Cut-off in the DC and AC circuits makes it possible to shorten the brake application time t_2II considerably (see the section "Technical Data" page 455).

Cut-off in the DC and AC circuits with mechanical contact:

The section 'Standard brake controller' page 449 already refers to the possibility of achieving this solution by conventional means by using an extra contact.

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 BGE (BG for size 64) 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 or BUR in conjunction with the motor or brake voltage. The SEW order processing system assigns a suitable relay.

Refer to page 448 ff for relay retrofitting options suited to the motor and voltage. The electronic relays can switch up to 1 A brake current and thereby limit the selection to BSR and BUR.

Principle and selection of the BSR brake control system

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 supply 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 brake current and the motor current into account for the assignment of the SR relay.

Motor	BSR (BGE + SR..) for motor voltage (AC V) in W connection																				
	40 - 58	59 - 66	67 - 73	74 - 82	83 - 92	93 - 104	105 - 116	117 - 131	132 - 147	148 - 164	165 - 185	186 - 207	208 - 233	234 - 261	262 - 293	294 - 329	330 - 369	370 - 414	415 - 464	465 - 522	523 - 690
DR63..BR	Not possible	SR11	SR11	SR11	SR11	SR11	SR11	SR11	SR11	SR11	SR11	SR11	SR11	SR11	SR11	SR11	SR11	SR11	SR11	SR11	SR11

SR11 SR15 SR19 Not possible

TIP

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 system (AC V)																				
	40 - 58	59 - 66	67 - 73	74 - 82	83 - 92	93 - 104	105 - 116	117 - 131	132 - 147	148 - 164	165 - 185	186 - 207	208 - 233	234 - 261	262 - 293	294 - 329	330 - 369	370 - 414	415 - 464	465 - 522	523 - 690
DR63..BR	Not possible	UR11	UR11	UR11	UR11	UR11	UR11	UR11	UR11	UR15	UR15	UR15	UR15	UR15	UR15	UR15	UR15	UR15	UR15	UR15	Not possible

UR11 UR15 Not possible

	TIP
	Motor sizes 250/280 cannot be combined with a UR.

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 control systems 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 DC 24 V direct connection for the special case of "electrical brake release when motor is at standstill" for motor sizes 71-100.

Special versions of brakemotors 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 function "anti-condensation heating".

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 approx. 25 K in relation to the ambient temperature.

The heating function (via K16 in the sample circuits) must be ended before the brake starts its normal switching function again.

BMH is available for all motor sizes and is only mounted in the control cabinet.

Brake control system in the control cabinet

The SEW brake control systems are also available for control cabinet installation. The following aspects favor control cabinet installation:

- 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 system for service purposes

When the brake control system is installed in the control cabinet, 3 cables must always be routed between the brake coil and the control system. An auxiliary terminal strip with 5 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 DC 24 V connection
DR63..BR03	BMS, BME, BMH, BMP, BMK	BSG BMV
DV250..BMG	BME	-
DV280..BMG		

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 any particular group of brakes in parallel to one brake control system.

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 system.

TIP

If a fault occurs in one brake, all brakes must be cut-off in the AC circuit.

15.5 AC brakemotors DR/DT...BM(G) with frequency inverter

Important: The supply voltage for the brake must always be routed separately. It cannot be taken from the terminal board of the motor due to the variable motor supply voltage.

Under normal circumstances in the frequency inverter mode of the motor, the mechanical brake only displays the characteristics of a holding brake for holding a position which has been reached and of a security brake for an emergency (emergency stop). Consequently, its size is determined by a defined number of emergency stop braking operations of the drive at full load from maximum speed.

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 the precise moment is selected. This allows the load to be safely taken over by the mechanical brake, thereby avoiding, for example, any sag on hoist drives.

The table below gives an overview of all brake control systems possible in conjunction with frequency inverter supply to the motor.

Brakemotor type	Terminal box installation	Control cabinet installation
DR63..BR03	BG, BUR No control unit	BMS, BME, BMP, BMH BSG, BMV
DV250..BMG	BGE	BME
DV280..BMG		

15.6 Block diagrams

For block diagrams and a key, see chapter "Brake control block diagrams" on page 253 ff.

15.7 Technical data

Technical data of BR/BMG/BE brakes for DT/DR series AC motors

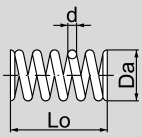
The following table lists the technical data of the brakes. The type and number of brake springs determines the level of the braking torque. Maximum braking torque $M_{B\ max}$ is installed as standard, unless specified otherwise in the order. Other brake spring combinations can result in reduced braking torque values $M_{B\ red}$.

Brake 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 t_2II [10^{-3}s]	t_2I [10^{-3}s]	P_B [W]
BMG02	**DT56**	1.2	0.8							15	28	10	100	25
BR03	**DR63**	3.2	2.4	1.6	0.8					200	25	3	30	26

$M_{B\ max}$ Maximum braking torque
$M_{B\ red}$ Reduced braking torque
W Braking work until maintenance
t_1 Response time
t_2I Brake application time for cut-off in the AC circuit
t_2II Brake application time for cut-off in the DC and AC circuits
P_B Braking power

The response and application times are recommended values in relation to the maximum braking torque.

Table for setting different braking torques for type BMG/BR03



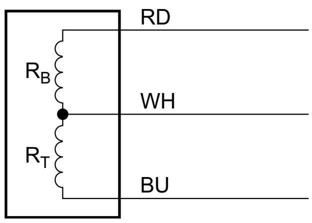
Brake	Mounting on motor	Braking torque [Nm]	Number and type of brake springs: Normal	Red	Part (order) no. and brake spring dimensions — Normal: Lo	Da	d	w	Part no.	Lo	Da	d	w	Part no. Brake spring
BR03	**DR63**	3.2	6	-	32	7	0.9	13.5	01858157	32	7	0.65	13.5	01858734
		2.4	4	2										
		1.6	3	2										
		0.8	-	6										
BMG61	**DV250 DV280**	600	8	-	59.7	24	4.8	8	01868381	59.5	24	4.0	9.5	0186839x
		500	6	2										
		400	4	4										
		300	4	-										
		200	-	8										
BMG122	**DV250 DV280**	1200	8	-										
		1000	6	2										
		800	4	4										
		600	4	-										
		400	-	8										

15

Brake coil resistance

BMG02 / BR03

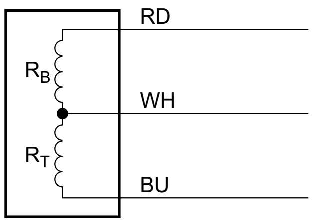
Brake		BMG02		BR03	
Max. braking torque [Nm]		1.2		3.2	
Coil power [W]		25		26	
Voltage V_N		BS	TS	BS	TS
AC V	DC V	R_B	R_T	R_B	R_T
	24	8.46	24.2	6.0	18.0
24 (23-26)	10			0.95	2.8
42 (40-45)	18			3.0	8.9
60 (57-63)	24			6.0	18.0
110 (99-110)	44			19.0	56.5
120 (111-123)	48			23.9	71.2
133 (124-138)	54			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		



BS Accelerator coil
TS Coil section
R_B Accelerator coil resistance at 20 °C [Ω]
R_T Coil section resistance at 20 °C [Ω]
U_N Rated voltage (rated voltage range)
RD Red
WH White
BU Blue

BMG61/122

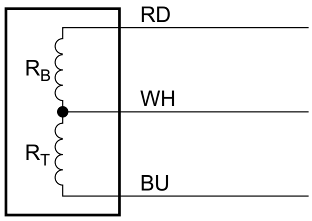
Brake Max. braking torque [Nm] Coil power [W]	BMG61/122 600 / 1200 195	
V_N AC V	BS R_B	TS R_T
208 (194-217)	4.0	32.6
230 (218-243)	5.0	41.0
254 (244-273)	6.3	51.6
290 (274-306)	7.9	65
318 (307-343)	10.0	81.8
360 (344-379)	12.6	103
400 (380-431)	15.8	130
460 (432-484)	19.9	163
500 (485-542)	25.1	205
575 (543-600)	31.6	259



BS Accelerator coil
TS Coil section
R_B Accelerator coil resistance at 20 °C [Ω]
R_T Coil section resistance at 20 °C [Ω]
U_N Rated voltage (rated voltage range)
RD Red
WH White
BU Blue

BR1 / BR2 / BR8

Brake		**BR1**		**BR2**		**BR8**	
Max. braking torque [Nm]		**20**		**40**		**90**	
Coil power [W]		**45**		**55**		**75**	
Voltage V_N		**BS**	**TS**	**BS**	**TS**	**BS**	**TS**
AC V	**DC V**	**R_B**	**R_T**	**R_B**	**R_T**	**R_B**	**R_T**
	24	3.7	11.2	3.3	9.8	1.4	7.2
110 (98-110)		11.8	35.4	10.5	31	4.4	22.7
230 (217-242)		59.2	178	52.6	156	21.9	114
400 (385-431)		187	561	158	469	69.3	359
460 (432-484)		236	707	199	590	87.2	452

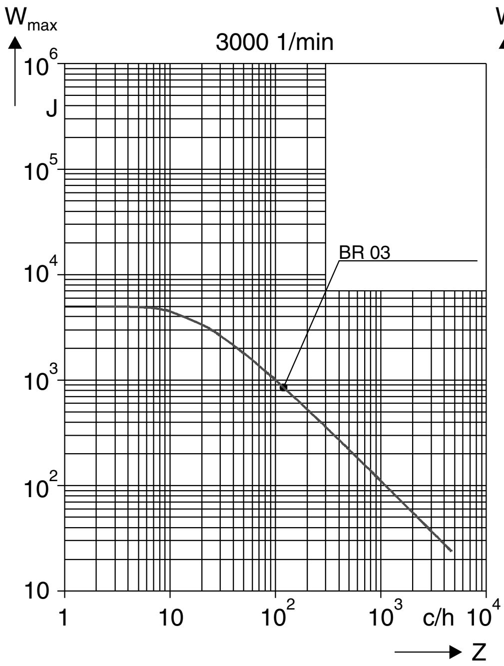


BS Accelerator coil
TS Coil section
R_B Accelerator coil resistance at 20 °C [Ω]
R_T Coil section resistance at 20 °C [Ω]
U_N Rated voltage (rated voltage range)
RD Red
WH White
BU Blue

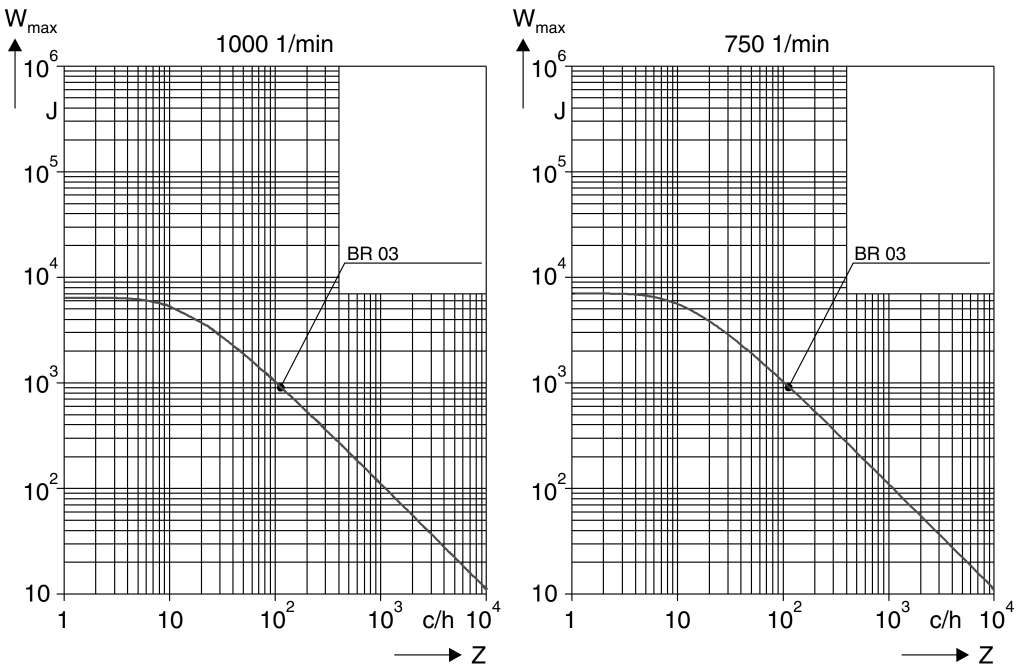
Permitted braking work of BM(G), BR and BE brakes for AC motors and asynchronous servomotors

If you are using a brakemotor, you have to check whether the brake is approved for use with the required switching frequency Z. The following diagrams show the permitted braking work W_{max} per braking operation for different brakes and rated speeds. The values are given with reference to the required switching frequency Z in cycles/hour (1h).

Example: The rated speed is 1500 min^{-1} and the brake BM 32 is used. At 200 braking operations per hour, the permitted braking work per braking operation is 9000 J.



65515axx



65516axx

BMG61, BMG122 Contact SEW-EURODRIVE for the values for the permitted braking work of the BMG61 and BMG122 brakes.

Working air gap for SEW brakes

Motor size	Brake type	Working air gap [mm]	
		New value[1]	Adjust at
250/280	**BMG122**	min 0.4	max 1.2

1) The measured value can differ from the specified value by 0.1 mm after the test run

TIP

An air gap setting is not required for BR brakes.

15.8 Project planning information

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 system and connection type
- Size and routing of the cable
- Selection of the brake contactor
- Design specifications
- Motor protection switch if necessary to protect the brake coil

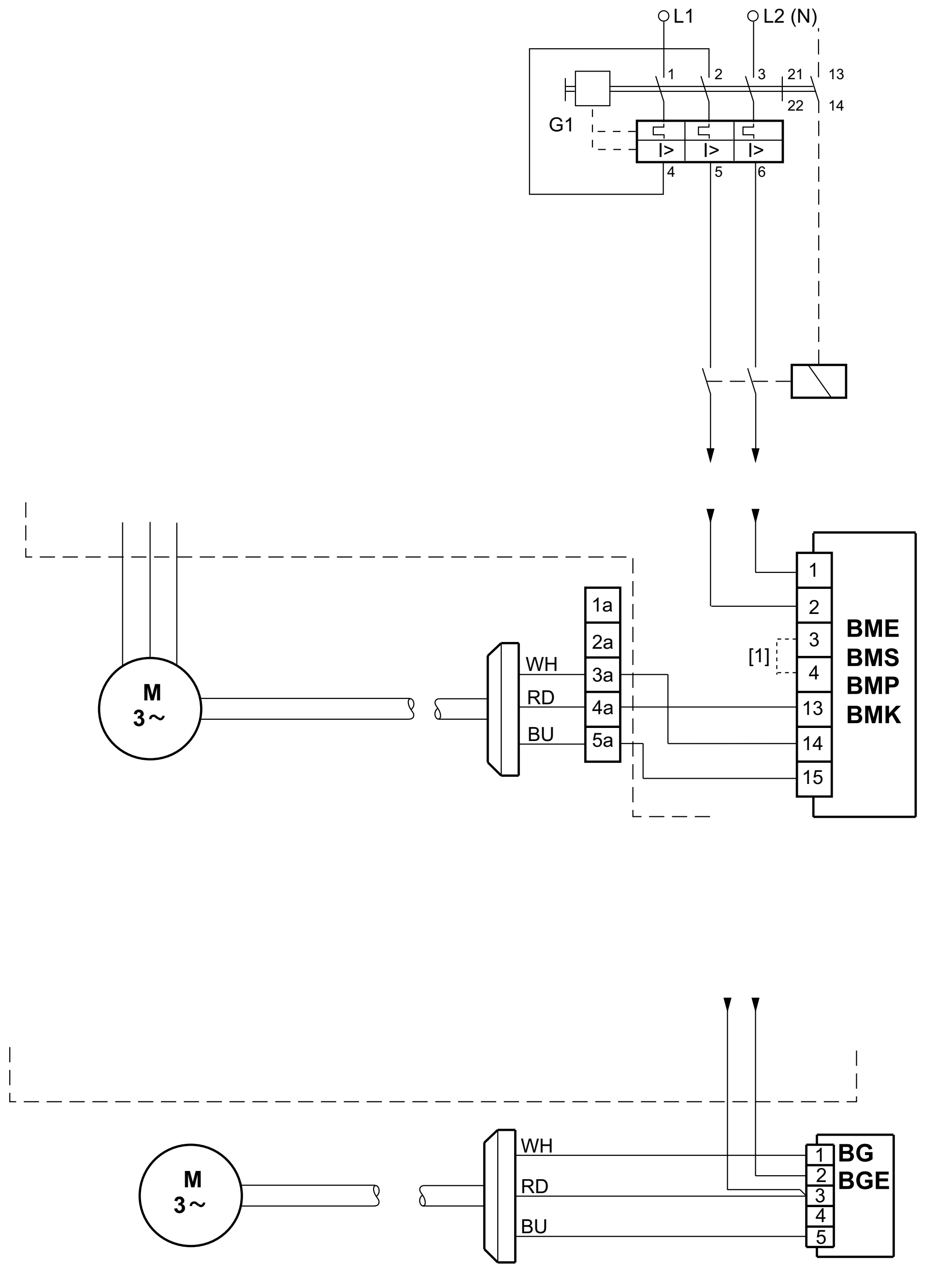
Protective circuit breaker

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). For holding currents, see 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.

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).



58075AXX

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

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 drive 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 and number of emergency braking operations
- Working brake or holding brake
- Amount of braking torque ("soft braking"/"hard braking")
- Hoist application
- Minimum/maximum deceleration

Values determined/calculated during motor selection:

Basic specification	Link / addition / comment
Motor type	Brake type/brake controller
Braking torque[1)]	Brake springs
Brake application time	Connection type of the brake control system (important for the electrical design for wiring diagrams)
Braking time **Braking distance** **Braking deceleration** **Braking accuracy**	The required data can only be observed if the aforementioned parameters meet the requirements
Braking work **Brake service life**	Maintenance interval (important for service)

1) The braking torque is determined from the requirements of the application with regards to the maximum deceleration and the maximum permitted distance or time.

For detailed information on selecting the size of the brakemotor and calculating the braking data, refer to the documentation Drive Engineering - Practical Implementation "Project Planning for Drives".

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 types for which the supply 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 system is installed in the terminal box.

Extra-low voltages 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 DC 24 V 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 rated voltage.

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 rated voltage. The data sheets for the brakes (see the section Technical Data) provide information on the possible supply voltages and the result operating currents.

Refer to the table below for 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.

Brake type	Minimum cross section in mm² (AWG) of the brake cables for cable lengths ≤ 50 m and brake voltage (AC V)							
	42	48	56 DC24V	110	125-153	175-200	230	254-500
BR03	1.5 (16)	1.5 (16)	1.5 (16)	1.5 (16)	1.5 (16)	1.5 (16)	1.5 (16)	1.5 (16)
BMG05	2.5 (12)	1.5 (16)	1.5 (16)	1.5 (16)	1.5 (16)	1.5 (16)	1.5 (16)	1.5 (16)
BMG1	2.5 (12)	2.5 (12)	1.5 (16)	1.5 (16)	1.5 (16)	1.5 (16)	1.5 (16)	1.5 (16)
BMG2	2.5 (12)	2.5 (12)	2.5 (12)	1.5 (16)	1.5 (16)	1.5 (16)	1.5 (16)	1.5 (16)
BMG4	4 (10)	2.5 (12)	2.5 (12)	1.5 (16)	1.5 (16)	1.5 (16)	1.5 (16)	1.5 (16)
BMG8	Not available	Not available	4 (10)	1.5 (16)	1.5 (16)	1.5 (16)	1.5 (16)	1.5 (16)
BM15	Not available	Not available	10 (8)	2.5 (12)	1.5 (16)	1.5 (16)	1.5 (16)	1.5 (16)
BM 30 - 62	Not available	Not available	10 (8)	2.5 (12)	2.5 (12)	1.5 (16)	1.5 (16)	1.5 (16)
BMG61-122	Not available	Not available	Not available	Not available	Not available	Not available	2.5 (12)	1.5 (16)

Values in brackets = AWG (American Wire Gauge)

Conductor cross sections of max. 2.5 mm² can be connected to the terminals of the brake control systems. Intermediate terminals must be used if the cross sections are larger.

b) Routing information:

Brake cables must always be routed separately from other power cables with phased currents unless they are shielded.

Ensure adequate equipotential bonding between the drive and the control cabinet (for an example, see the documentation Drive Engineering - Practical Implementation "EMC in Drive Engineering").

Power cables with phased currents are in particular

- Output cables from frequency inverters and servo controllers, soft start units and brake units
- Supply cables to braking resistors

Selection of the brake 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 brake contactor for supply system 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 DC3 operation with DC 24 V.

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).

Important design data

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 on the supply system.

Additional instructions in the frequency inverter documentation must also be taken into account for operation with frequency inverters.

The EMC instructions in the servo controller documentation must also be taken into account for the operation of SEW servomotors with brake.

You must always adhere to the cable routing instructions (see page 26).

b) Connection type

The electrical design team and, in particular the installation and startup personnel, must be given detailed information on the connection type and the intended brake function.

Maintaining certain brake application times may be relevant to safety. The decision to implement cut-off in the AC circuit or cut-off in the DC and AC circuits must be passed on clearly and unambiguously to the people undertaking the work.

The brake application times t_2I specified in the data summary (see section "Technical data" page 455**) 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 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 contactor (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 system.

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.

16 Appendix

16.1 Cable dimensions to AWG

AWG stands for **A**merican **W**ire **G**auge and refers to the size of wires. This number specifies the diameter or cross section of a wire in code. This type of cable designation is usually only used in the USA. However, the designations can also be seen in catalogs or data sheets in Europe.

AWG designation	Cross section in mm^2
000000 (6/0)	185
00000 (5/0)	150
0000 (4/0)	120
000 (3/0)	90
00 (2/0)	70
0 (1/0)	50
1	50
2	35
3	25
4	25
5	16
6	16
7	10
8	10
9	6
10	6
11	4
12	4
13	2.5
14	2.5
15	2.5
16	1.5
16	1
18	1
19	0.75
20	0.5
21	0.5
22	0.34
23	0.25
24	0.2

16.2 Index

R

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Assembly **Sales** **Service**	**Buenos Aires**	SEW EURODRIVE ARGENTINA S.A. Centro Industrial Garin, Lote 35 Ruta Panamericana Km 37,5 1619 Garin	Tel. +54 3327 4572-84 Fax +54 3327 4572-21 sewar@sew-eurodrive.com.ar http://www.sew-eurodrive.com.ar
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Assembly **Sales** **Service**	**Melbourne**	SEW-EURODRIVE PTY. LTD. 27 Beverage Drive Tullamarine, Victoria 3043	Tel. +61 3 9933-1000 Fax +61 3 9933-1003 http://www.sew-eurodrive.com.au enquires@sew-eurodrive.com.au
	Sydney	SEW-EURODRIVE PTY. LTD. 9, Sleigh Place, Wetherill Park New South Wales, 2164	Tel. +61 2 9725-9900 Fax +61 2 9725-9905 enquires@sew-eurodrive.com.au
Sales **Service**	**Adelaide**	SEW-EURODRIVE PTY. LTD. 9C Park Way Mawson Lakes, SA 5095	Tel. +61 8 8161 4000 Fax +61 8 8161 4002 enquires@sew-eurodrive.com.au
	Brisbane	SEW-EURODRIVE PTY.LTD. 1 /34 Collinsvale St Rocklea, Queensland, 4106	Tel. +61 7 3272-7900 Fax +61 7 3272-7901 enquires@sew-eurodrive.com.au
	Perth	SEW-EURODRIVE PTY. LTD. 105 Robinson Avenue Belmont, W.A. 6104	Tel. +61 8 9478-2688 Fax +61 8 9277-7572 enquires@sew-eurodrive.com.au
Technical Office	**Townsville**	SEW-EURODRIVE PTY. LTD. 12 Leyland Street Garbutt, QLD 4814	Tel. +61 7 4779 4333 Fax +61 7 4779 5333 enquires@sew-eurodrive.com.au
Austria			
Assembly **Sales** **Service**	**Wien**	SEW-EURODRIVE Ges.m.b.H. Richard-Strauss-Strasse 24 A-1230 Wien	Tel. +43 1 617 55 00-0 Fax +43 1 617 55 00-30 http://www.sew-eurodrive.at sew@sew-eurodrive.at
Technical Offices	**Linz**	SEW-EURODRIVE Ges.m.b.H. Reuchlinstr. 6/3 A-4020 Linz	Tel. +43 732 655 109-0 Fax +43 732 655 109-20 tb-linz@sew-eurodrive.at
	Graz	SEW-EURODRIVE Ges.m.b.H. Grabenstraße 231 A-8045 Graz	Tel. +43 316 685 756-0 Fax +43 316 685 755 tb-graz@sew-eurodrive.at
	Dornbirn	SEW-EURODRIVE Ges.m.b.H. Lustenauerstraße 27/1 A-6850 Dornbirn	Tel. +43 5572 3799-0 Fax +43 5572 3725 99-20 tb-dornbirn@sew-eurodrive.at
Bangladesh			
Sales	**Dhaka**	Jainex Industrial and Engineering Ltd B 12 Apon Nibash East Nasirabad Bangladesh	Tel. +880 1713103502 Fax +880 31 613041 jainexbd@onlinectg.net
Belarus			
Sales	**Minsk**	SEW-EURODRIVE BY RybalkoStr. 26 BY-220033 Minsk	Tel.+375 (17) 298 38 50 Fax +375 (17) 29838 50 sales@sew.by

Belgium			
Assembly **Sales** **Service**	**Brüssel**	**SEW Caron-Vector** Avenue Eiffel 5 B-1300 Wavre	Tel. +32 10 231-311 Fax +32 10 231-336 http://www.sew-eurodrive.be info@caron-vector.be
Service Competence Center	**Industrial Gears**	**SEW Caron-Vector** Rue de Parc Industriel, 31 BE-6900 Marche-en-Famenne	Tel. +32 84 219-878 Fax +32 84 219-879 http://www.sew-eurodrive.be service-wallonie@sew-eurodrive.be
	Antwerp	**SEW Caron-Vector** Glasstraat, 19 BE-2170 Merksem	Tel. +32 3 64 19 333 Fax +32 3 64 19 336 http://www.sew-eurodrive.be service-antwerpen@sew-eurodrive.be

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

Bulgaria			
Sales	**Sofia**	BEVER-DRIVE GmbH Bogdanovetz Str.1 BG-1606 Sofia	Tel. +359 2 9151160 Fax +359 2 9151166 bever@fastbg.net

Cameroon			
Sales	**Douala**	Electro-Services Rue Drouot Akwa B.P. 2024 Douala	Tel. +237 33 431137 Fax +237 33 431137

Canada			
Assembly **Sales** **Service**	**Toronto**	SEW-EURODRIVE CO. OF CANADA LTD. 210 Walker Drive Bramalea, Ontario L6T3W1	Tel. +1 905 791-1553 Fax +1 905 791-2999 http://www.sew-eurodrive.ca marketing@sew-eurodrive.ca
	Vancouver	SEW-EURODRIVE CO. OF CANADA LTD. 7188 Honeyman Street Delta. B.C. V4G 1 E2	Tel. +1 604 946-5535 Fax +1 604 946-2513 marketing@sew-eurodrive.ca
	Montreal	SEW-EURODRIVE CO. OF CANADA LTD. 2555 Rue Leger LaSalle, Quebec H8N 2V9	Tel. +1 514 367-1124 Fax +1 514 367-3677 marketing@sew-eurodrive.ca
	Additional addresses for service in Canada provided on request!		

Chile			
Assembly **Sales** **Service**	**Santiago de Chile**	SEW-EURODRIVE CHILE LTDA. Las Encinas 1295 Parque Industrial Valle Grande LAMPA RCH-Santiago de Chile P.O. Box Casilla 23 Correo Quilicura - Santiago - Chile	Tel. +56 2 75770-00 Fax +56 2 75770-01 http://www.sew-eurodrive.cl ventas@sew-eurodrive.cl

China			
Production **Assembly** **Sales** **Service**	**Tianjin**	SEW-EURODRIVE (Tianjin) Co., Ltd. No. 46, 7th Avenue, TEDA Tianjin 300457	Tel. +86 22 25322612 Fax +86 22 25322611 info@sew-eurodrive.cn http://www.sew-eurodrive.cn

China			
Assembly **Sales** **Service**	**Suzhou**	SEW-EURODRIVE (Suzhou) Co., Ltd. 333, Suhong Middle Road Suzhou Industrial Park Jiangsu Province, 215021	Tel. +86 512 62581781 Fax +86 512 62581783 suzhou@sew-eurodrive.cn
	Guangzhou	SEW-EURODRIVE (Guangzhou) Co., Ltd. No. 9, JunDa Road East Section of GETDD Guangzhou 510530	Tel. +86 20 82267890 Fax +86 20 82267891 guangzhou@sew-eurodrive.cn
	Shenyang	SEW-EURODRIVE (Shenyang) Co., Ltd. 10A-2, 6th Road Shenyang Economic Technological Development Area Shenyang, 110141	Tel. +86 24 25382538 Fax +86 24 25382580 shenyang@sew-eurodrive.cn
	Wuhan	SEW-EURODRIVE (Wuhan) Co., Ltd. 10A-2, 6th Road No. 59, the 4th Quanli Road, WEDA 430056 Wuhan	Tel. +86 27 84478398 Fax +86 27 84478388
	Xi'An	SEW-EURODRIVE (Xi'An) Co., Ltd. No. 12 Jinye 2nd Road Xi'An High-Technology Industrial Development Zone Xi'An 710065	Tel. +86 29 88241718 Fax +86 29 68686296 logistic-xa@sew-eurodrive.cn

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

Croatia			
Sales **Service**	**Zagreb**	KOMPEKS d. o. o. PIT Erdödy 4 II HR 10 000 Zagreb	Tel. +385 1 4613-158 Fax +385 1 4613-158 kompeks@inet.hr

Czech Republic			
Sales	**Praha**	SEW-EURODRIVE CZ S.R.O. Business Centrum Praha Lužná 591 CZ-16000 Praha 6 - Vokovice	Tel. +420 255 709 601 Fax +420 220 121 237 http://www.sew-eurodrive.cz sew@sew-eurodrive.cz
Technical Offices	**Brno**	SEW-EURODRIVE CZ S.R.O. Křenová 52 CZ -60200 Brno	Tel. +420 543 256 151 +420 543 256 163 Fax +420 543 256 845
	Hradec Králové	SEW-EURODRIVE CZ S.R.O. Čechova 498 CZ-50202 Hradec Králové	Tel. +420 495 510 141 Fax +420 495 521 313
	Plzeň	SEW-EURODRIVE CZ S.R.O. Areal KRPA a.s. Zahradni 173/2 CZ-32600 Plzeň	Tel. +420 378 775 300 Fax +420 377 970 710
	Ostrava	SEW-EURODRIVE CZ S.R.O. Studenská 6202/17 CZ-708 00 Ostrava-Poruba	Tel. +420 738 339 044 Mobile +420 724 889 965
	Klatovy	SEW-EURODRIVE CZ S.R.O. Technická kancelář Klatovy Domažlická 800 CZ-33901 Klatovy	Tel. +420 376 310 729 Fax +420 376 310 725

Denmark			
Assembly **Sales** **Service**	**Kopenhagen**	SEW-EURODRIVEA/S Geminivej 28-30 DK-2670 Greve	Tel. +45 43 9585-00 Fax +45 43 9585-09 http://www.sew-eurodrive.dk sew@sew-eurodrive.dk

Egypt			
Sales **Service**	**Cairo**	Copam Egypt for Engineering & Agencies 33 El Hegaz ST, Heliopolis, Cairo	Tel. +20 2 22566-299 + 1 23143088 Fax +20 2 22594-757 http://www.copam-egypt.com/ copam@datum.com.eg
Service	**Sharjah**	Copam Middle East (FZC) Sharjah Airport International Free Zone P.O. Box 120709 Sharjah **United Arabian Emirates**	Tel. +971 6 5578-488 Fax +971 6 5578-499 copam_me@eim.ae

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

Finland			
Assembly **Sales** **Service**	**Lahti**	SEW-EURODRIVE OY Vesimäentie 4 FIN-15860 Hollola 2	Tel. +358 201 589-300 Fax +358 3 780-6211 sew@sew.fi http://www.sew-eurodrive.fi
Technical Offices	**Helsinki**	SEW-EURODRIVE OY Luutnantintie 5 FIN-00410 Helsinki	Tel. +358 201 589-300 Fax + 358 9 5666-311 sew@sew.fi
	Vaasa	SEW-EURODRIVE OY Hietasaarenkatu 18 FIN-65100 Vaasa	Tel. +358 201 589-300 Fax +358 6 3127-470 sew@sew.fi
	Rovaniemi	SEW-EURODRIVE OY Valtakatu 4 A FIN-96100 Rovaniemi	Tel. +358 201 589-300 Fax +358 201 589-239 sew@sew.fi
Production **Assembly**	**Karkkila**	SEW Industrial Gears Oy Valurinkatu 6, PL 8 FI-03600 Karkkila, 03601 Karkkila	Tel. +358 201 589-300 Fax +358 201 589-310 sew@sew.fi http://www.sew-eurodrive.fi

Gabon			
Sales	**Libreville**	ESG Electro Services Gabun Feu Rouge Lalala 1889 Libreville Gabun	Tel. +241 741059 Fax +241 741059

Great Britain			
Assembly **Sales** **Service**	**Normanton**	SEW-EURODRIVE Ltd. Beckbridge Industrial Estate P.O. Box No.1 GB-Normanton, West- Yorkshire WF6 1QR	Tel. +44 1924 893-855 Fax +44 1924 893-702 http://www.sew-eurodrive.co.uk info@sew-eurodrive.co.uk
Technical Offices	**London**	SEW-EURODRIVE Ltd. 764 Finchely Road, Temple Fortune GB-London N.W.11 7TH	Tel. +44 20 8458-8949 Fax +44 20 8458-7417

Great Britain			
	Midlands	SEW-EURODRIVE Ltd. 5 Sugar Brook court, Aston Road, Bromsgrove, Worcs B60 3EX	Tel. +44 1527 877-319 Fax +44 1527 575-245
	Scotland	SEW-EURODRIVE Ltd. Scottish Office No 37 Enterprise House Springkerse Business Park GB-Stirling FK7 7UF Scotland	Tel. +44 17 8647-8730 Fax +44 17 8645-0223
Greece			
Sales **Service**	**Athen**	Christ. Boznos & Son S.A. 12, Mavromichali Street P.O. Box 80136, GR-18545 Piraeus	Tel. +30 2 1042 251-34 Fax +30 2 1042 251-59 http://www.boznos.gr info@boznos.gr
Technical Office	**Thessaloniki**	Christ. Boznos & Son S.A. Asklipiou 26 562 24 Evosmos, Thessaloniki	Tel. +30 2 310 7054-00 Fax +30 2 310 7055-15 info@boznos.gr
Hong Kong			
Assembly **Sales** **Service**	**Hong Kong**	SEW-EURODRIVE LTD. Unit No. 801-806, 8th Floor Hong Leong Industrial Complex No. 4, Wang Kwong Road Kowloon, Hong Kong	Tel. +852 36902200 Fax +852 36902211 contact@sew-eurodrive.hk
Hungary			
Sales **Service**	**Budapest**	SEW-EURODRIVE Kft. H-1037 Budapest Kunigunda u. 18	Tel. +36 1 437 06-58 Fax +36 1 437 06-50 office@sew-eurodrive.hu
Iceland			
Sales	**Reykjavik**	Vélaverk ehf. Bolholti 8, 3h. IS - 105 Reykjavik	Tel. +354 568 3536 Fax +354 568 3537 velaverk@velaverk.is
India			
Registered Office **Assembly** **Sales** **Service**	**Vadodara**	SEW-EURODRIVE India Private Limited Plot No. 4, GIDC POR Ramangamdi • Vadodara - 391 243 Gujarat	Tel. +91 265 3045200, +91 265 2831086 Fax +91 265 3045300, +91 265 2831087 http://www.seweurodriveindia.com sales@seweurodriveindia.com subodh.ladwa@seweurodriveindia.com
Assembly **Sales** **Service**	**Chennai**	SEW-EURODRIVE India Private Limited Plot No. K3/1, Sipcot Industrial Park Phase II Mambakkam Village Sriperumbudur - 602105 Kancheepuram Dist, Tamil Nadu	Tel. +91 44 37188888 Fax +91 44 37188811 c.v.shivkumar@seweurodriveindia.com
Technical Offices	**Bengaluru**	SEW-EURODRIVE India Private Limited 308, Prestige Centre Point 7, Edward Road Bengaluru - 560052 - Karnataka	Tel. +91 80 22266565 Fax +91 80 22266569 salesbang@seweurodriveindia.com ganesh@seweurodriveindia.com
	Kolkata	SEW EURODRIVE India Private Limited 2nd floor, Room No. 35 Chowringhee Court 55, Chowringhee Road Kolkata - 700 071 - West Bengal	Tel. +91 33 22827457 Fax +91 33 22894204 saleskal@seweurodriveindia.com a.j.biswas@seweurodriveindia.com

India			
	Chandigarh	SEW EURODRIVE India Private Limited Sujit Kumar Mishra H.No.5464/3 Modern Housing Complex Manimajra Chandigarh -160101	Tel. +91 9878469579 Fax +91 1722738664 saleschand@seweurodriveindia.com
	Chennai	SEW-EURODRIVE India Private Limited 2nd Floor, Josmans Complex, No. 5, McNichols Road, Chetpet Chennai - 600031 - Tamil Nadu	Tel. +91 44 42849813 Fax +91 44 42849816 saleschen@seweurodriveindia.com c.v.shivkumar@seweurodriveindia.com
	Coimbatore	SEW-EURODRIVE India Private Limited Office No 60 Arpee Centre (Opp Annapoorna Hotel) 420 N, NSR Road, Saibaba Colony Coimbatore 641 0111 - Tamil Nadu	Tel. +91 422 2455420 Fax +91 422 2443988 salescmb@seweurodriveindia.com p.selvakumar@seweurodriveindia.com
	Cuttack	SEW-EURODRIVE India Private Limited Plot No.- 1764, Nuasahi, Nayapalli Bhubaneswar-12 Orissa	Tel. +91 9937446333 manoranjan.sahoo@seweurodriveindia.com
	Madgaon	SEW-EURODRIVE India Private Limited Flat No.-G1, Shivas-Laxmi Prasad Co-Operative Housing Society, Padmanarayan Estate, Near Jivottaam Math, Gagole Madgao, Goa - 403 602	samrat.chakravorty@seweurodriveindia.com
	Hyderabad	SEW-EURODRIVE India Private Limited 408, 4th Floor, Meridian Place Green Park Road Amerpeet Hyderabad - 500016 - Andhra Pradesh	Tel. +91 40 23414698 Fax +91 40 23413884 saleshyd@seweurodriveindia.com ma.choudary@seweurodriveindia.com
	Jamshedpur	SEW-EURODRIVE India Private Limited Flat No.: B/2, B.S. Apartment Road No.: 4, Contractor's area, Bistupur Jamshedpur 831 001 - Chhattisgarh	Tel. +91 9934123671 siddaratha.mishra@seweurodriveindia.com
	Lucknow	SEW-EURODRIVE India Private Limited 69, Shiv Vihar Colony Vikas Nagar-5 Lucknow 226022 - Uttar Pradesh	Tel. +91 9793627333 amit.nigam@seweurodriveindia.com
	Mumbai	SEW-EURODRIVE India Private Limited 312 A, 3rd Floor, Acme Plaza, J.B. Nagar, Andheri Kurla Road, Andheri (E) Mumbai - 400059 - Maharashtra	Tel. +91 22 28348440 Fax +91 22 28217858 salesmumbai@seweurodriveindia.com p.s.ray@seweurodriveindia.com
	New Delhi	SEW-EURODRIVE India Private Limited 418-419, Suneja Tower-1 District Centre, Janak Puri New Delhi 110 058	Tel. +91 11 25544111 Fax +91 11 25544113 salesdelhi@seweurodriveindia.com vikram.juneja@seweurodriveindia.com
	Pune	SEW-EURODRIVE India Private Limited Lunawat Prism 4th floor, S. No. 148, Neena Co-Operative Housing Society, Paud Road, Pune 411038 - Maharashtra	Tel. +91 20 25380730 / 735 Fax +91 20 25380721 salespune@seweurodriveindia.com praveen.hosur@seweurodriveindia.com
	Raipur	SEW-EURODRIVE India Private Limited A-42, Ashoka Millenium Complex, Ring Road-1, Raipur 492 001 - Chhattisgarh	Tel. +91 771 4090765 Fax +91 771 4090765 sutanu.sarkar@seweurodriveindia.com

Indonesia			
Represented by	**Singapore**	SEW-EURODRIVE PTE. LTD. No 9, Tuas Drive 2 Jurong Industrial Estate Singapore 638644	Tel. +65 68621701 Fax +65 68612827 http://www.sew-eurodrive.com.sg sewsingapore@sew-eurodrive.com
Ireland			
Sales **Service**	**Dublin**	Alperton Engineering Ltd. 48 Moyle Road Dublin Industrial Estate Glasnevin, Dublin 11	Tel. +353 1 830-6277 Fax +353 1 830-6458 info@alperton.ie http://www.alperton.ie
Israel			
Sales	**Tel-Aviv**	Liraz Handasa Ltd. Ahofer Str 34B / 228 58858 Holon	Tel. +972 3 5599511 Fax +972 3 5599512 http://www.liraz-handasa.co.il office@liraz-handasa.co.il
Italy			
Assembly **Sales** **Service**	**Milano**	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Via Bernini,14 I-20020 Solaro (Milano)	Tel. +39 02 96 9801 Fax +39 02 96 799781 http://www.sew-eurodrive.it sewit@sew-eurodrive.it
Technical Offices	**Bologna**	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Via della Grafica, 47 I-40064 Ozzano dell'Emilia (Bo)	Tel. +39 051 65-23-801 Fax +39 051 796-595
	Caserta	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Viale Carlo III Km. 23,300 I-81020 S. Nicola la Strada (Caserta)	Tel. +39 0823 219011 Fax +39 0823 421414
	Pescara	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Viale Europa,132 I-65010 Villa Raspa di Spoltore (PE)	Tel. +39 085 41-59-427 Fax +39 085 41-59-643
	Torino	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Filiale Torino c.so Unione Sovietica 612/15 - int. C I-10135 Torino	Tel. +39 011 3473780 Fax +39 011 3473783
	Verona	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Via P. Sgulmero, 27/A I-37132 Verona	Tel. +39 045 89-239-11 Fax +39 045 97-6079
Ivory Coast			
Sales	**Abidjan**	SICA Ste industrielle et commerciale pour l'Afrique 165, Bld de Marseille B.P. 2323, Abidjan 08	Tel. +225 2579-44 Fax +225 2584-36
Japan			
Assembly **Sales** **Service**	**Iwata**	SEW-EURODRIVE JAPAN CO., LTD 250-1, Shimoman-no, Iwata Shizuoka 438-0818	Tel. +81 538 373811 Fax +81 538 373814 http://www.sew-eurodrive.co.jp sewjapan@sew-eurodrive.co.jp
Technical Offices	**Fukuoka**	SEW-EURODRIVE JAPAN CO., LTD. C-go, 5th-floor, Yakuin-Hiruzu-Bldg. 1-5-11, Yakuin, Chuo-ku Fukuoka, 810-0022	Tel. +81 92 713-6955 Fax +81 92 713-6860 sewkyushu@jasmine.ocn.ne.jp
	Osaka	SEW-EURODRIVE JAPAN CO., LTD. Higobashi Shimizu Bldg. 10th flor 1-3-7 Tosabori, Nishi-ku Osaka, 550-0001	Tel. +81 6 6444--8330 Fax +81 6 6444--8338 sewosaka@crocus.ocn.ne.jp

Japan			
	Tokyo	SEW-EURODRIVE JAPAN CO., LTD. Omarimon Yusen Bldg. 13th floor 3-23-5 Nishinbashi, Minato-ku Tokyo 105-0003	Tel. +81 3 3239-0469 Fax +81 3 3239-0943 sewtokyo@basil.ocn.ne.jp
Korea			
Assembly **Sales** **Service**	**Ansan-City**	SEW-EURODRIVE KOREA CO., LTD. B 601-4, Banweol Industrial Estate 1048-4, Shingil-Dong Ansan 425-120	Tel. +82 31 492-8051 Fax +82 31 492-8056 http://www.sew-korea.co.kr master@sew-korea.co.kr
	Busan	SEW-EURODRIVE KOREA Co., Ltd. No. 1720 - 11, Songjeong - dong Gangseo-ku Busan 618-270	Tel. +82 51 832-0204 Fax +82 51 832-0230 master@sew-korea.co.kr
Technical Offices	**Daegu**	SEW-EURODRIVE KOREA Co., Ltd. No.1108 Sungan officetel 87-36, Duryu 2-dong, Dalseo-ku Daegu 704-712	Tel. +82 53 650-7111 Fax +82 53 650-7112
	DaeJeon	SEW-EURODRIVE KOREA Co., Ltd. No. 1502, Hongin officetel 536-9, Bongmyung-dong, Yusung-ku Daejeon 305-301	Tel. +82 42 828-6461 Fax +82 42 828-6463
	Kwangju	SEW-EURODRIVE KOREA Co., Ltd. 4fl., Dae-Myeong B/D 96-16 Unam-dong, Buk-ku Kwangju 500-170	Tel. +82 62 511-9172 Fax +82 62 511-9174
	Seoul	SEW-EURODRIVE KOREA Co., Ltd. No.504 Sunkyung officetel 106-4 Kuro 6-dong, Kuro-ku Seoul 152-054	Tel. +82 2 862-8051 Fax +82 2 862-8199
Latvia			
Sales	**Riga**	SIA Alas-Kuul Katlakalna 11C LV-1073 Riga	Tel. +371 7139253 Fax +371 7139386 http://www.alas-kuul.com info@alas-kuul.com
Lebanon			
Sales	**Beirut**	Gabriel Acar & Fils sarl B. P. 80484 Bourj Hammoud, Beirut	Tel. +961 1 4947-86 +961 1 4982-72 +961 3 2745-39 Fax +961 1 4949-71 ssacar@inco.com.lb
	Beirut	Middle East Drives S.A.L. (offshore) Sin El Fil. B. P. 55-378 Beirut	Tel. +961 1 494 786 Fax +961 1 494 971 philipppe.acar@medrives.com
Lithuania			
Sales	**Alytus**	UAB Irseva Naujoji 19 LT-62175 Alytus	Tel. +370 315 79204 Fax +370 315 56175 info@irseva.lt http://www.sew-eurodrive.lt

Luxembourg			
Assembly **Sales** **Service**	**Brüssel**	CARON-VECTOR S.A. Avenue Eiffel 5 B-1300 Wavre	Tel. +32 10 231-311 Fax +32 10 231-336 http://www.sew-eurodrive.lu info@caron-vector.be

Malaysia			
Assembly **Sales** **Service**	**Johore**	SEW-EURODRIVE SDN BHD No. 95, Jalan Seroja 39, Taman Johor Jaya 81000 Johor Bahru, Johor West Malaysia	Tel. +60 7 3549409 Fax +60 7 3541404 sales@sew-eurodrive.com.my
Technical Offices	**Kota Kinabalu**	SEW-EURODRIVE Sdn Bhd (Kota Kinabalu Branch) Lot No. 2,1st Floor, Inanam Baru Phase III, Miles 5.1 /2, Jalan Tuaran, Inanam 89350 Kota Kinabalu Sabah, Malaysia	Tel. +60 88 424792 Fax +60 88 424807
	Kuala Lumpur	SEW-EURODRIVE Sdn. Bhd. No. 2, Jalan Anggerik Mokara 31/46 Kota Kemuning Seksyen 31 40460 Shah Alam Selangor Darul Ehsan	Tel. +60 3 5229633 Fax +60 3 5229622 sewpjy@po.jaring.my
	Kuching	SEW-EURODRIVE Sdn. Bhd. Lot 268, Section 9 KTLD Lorong 9, Jalan Satok 93400 Kuching, Sarawak East Malaysia	Tel. +60 82 232380 Fax +60 82 242380
	Penang	SEW-EURODRIVE Sdn. Bhd. No. 38, Jalan Bawal Kimsar Garden 13700 Prai, Penang	Tel. +60 4 3999349 Fax +60 4 3999348 seweurodrive@po.jaring.my

Mauritania			
Sales	**Zouérate**	AFRICOM - SARL En Face Marché Dumez P.B. 88 Zouérate	Tel. +222 54 40134 Fax +222 54 40538 cybertiris@mauritel.mr

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

Morocco			
Sales	**Casablanca**	Afit 5, rue Emir Abdelkader MA 20300 Casablanca	Tel. +212 522618372 Fax +212 522618351 ali.alami@premium.net.ma

Netherlands			
Assembly **Sales** **Service**	**Rotterdam**	VECTOR Aandrijftechniek B.V. Industrieweg 175 NL-3044 AS Rotterdam Postbus 10085 NL-3004 AB Rotterdam	Tel. +31 10 4463-700 Fax +31 10 4155-552 http://www.vector.nu info@vector.nu

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

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

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

Philippines			
Represented by	**Singapore**	SEW-EURODRIVE PTE. LTD. No 9, Tuas Drive 2 Jurong Industrial Estate Singapore 638644	Tel. +65 68621701 Fax +65 68612827 http://www.sew-eurodrive.com.sg sewsingapore@sew-eurodrive.com

Poland			
Assembly **Sales** **Service**	**Lodz**	SEW-EURODRIVE Polska Sp.z.o.o. ul. Techniczna 5 PL-92-518 Łódź	Tel. +48 42 676 53 00 Fax +48 42 676 53 45 http://www.sew-eurodrive.pl sew@sew-eurodrive.pl
		24 Hour Service	Tel. +48 602 739 739 (+48 602 SEW SEW) serwis@sew-eurodrive.pl
Technical Office	**Tychy**	SEW-EURODRIVE Polska Sp.z.o.o. ul. Nad Jeziorem 87 PL-43-100 Tychy	Tel. +48 32 32 32 610 Fax +48 32 32 32 649
	Bydgoszcz	SEW-EURODRIVE Polska Sp.z.o.o. ul. Fordońska 246 PL-85-959 Bydgoszcz	Tel. +48 52 3606590 Fax +48 52 3606591
	Poznan	SEW-EURODRIVE Polska Sp.z.o.o. ul. Romana Maya 1 PL-61-371 Poznań	Tel. +48 61 8741640 Fax +48 61 8741641
	Szczecinek	SEW-EURODRIVE Polska Sp.z.o.o. ul. Mickiewicza 2 pok. 36 PL-78-400 Szczecinek	Tel. +48 94 3728820 Fax +48 94 3728821

Portugal			
Assembly **Sales** **Service**	**Coimbra**	SEW-EURODRIVE, LDA. Apartado 15 P-3050-901 Mealhada	Tel. +351 231 20 9670 Fax +351 231 20 3685 http://www.sew-eurodrive.pt infosew@sew-eurodrive.pt

Portugal			
Technical Offices	**Lisboa**	SEW-EURODRIVE, LDA. Núcleo Empresarial I de São Julião do Tojal Rua de Entremuros, 54 Fracção I P-2660-533 São Julião do Tojal	Tel. +351 21 958-0198 Fax +351 21 958-0245 esc.lisboa@sew-eurodrive.pt
	Porto	SEW-EURODRIVE, LDA. Av. 25 de Abril, 68 4440-502 Valongo	Tel. +351 229 350 383 Fax +351 229 350 384 MobilTel. +351 9 32559110 esc.porto@sew-eurodrive.pt

Romania			
Sales **Service**	**Bucureşti**	Sialco Trading SRL str. Madrid nr.4 011785 Bucuresti	Tel. +40 21 230-1328 Fax +40 21 230-7170 sialco@sialco.ro

Russia			
Assembly **Sales** **Service**	**St. Petersburg**	ZAO SEW-EURODRIVE P.O. Box 36 195220 St. Petersburg Russia	Tel. +7 812 3332522 +7 812 5357142 Fax +7 812 3332523 http://www.sew-eurodrive.ru sew@sew-eurodrive.ru
Technical Office	**Yekaterinburg**	ZAO SEW-EURODRIVE Kominterna Str. 16 Office 614 RUS-620078 Ekaterinburg	Tel. +7 343 310 3977 Fax +7 343 310 3978 eso@sew-eurodrive.ru
	Irkutsk	ZAO SEW-EURODRIVE 5-Armii Str., 31 RUS-664011 Irkutsk	Tel. +7 3952 25 5880 Fax +7 3952 25 5881 iso@sew-eurodrive.ru
	Moskau	ZAO SEW-EURODRIVE RUS-107023 Moskau	Tel. +7 495 9337090 Fax +7 495 9337094 mso@sew-eurodrive.ru
	Novosibirsk	ZAO SEW-EURODRIVE pr. K Marksa, d.30 RUS-630087 Novosibirsk	Tel. +7 383 3350200 Fax +7 383 3462544 nso@sew-eurodrive.ru
	Togliatti	ZAO SEW-EURODRIVE Sportivnaya Str. 4B, office 2 Samarskaya obl. RUS-445057 Togliatti	Tel. +7 8482 710529 Fax +7 8482 810590

Senegal			
Sales	**Dakar**	SENEMECA Mécanique Générale Km 8, Route de Rufisque B.P. 3251, Dakar	Tel. +221 338 494 770 Fax +221 338 494 771 senemeca@sentoo.sn

Serbia			
Sales	**Beograd**	DIPAR d.o.o. Ustanicka 128a PC Košum, IV floor SCG-11000 Beograd	Tel. +381 11 347 3244 / +381 11 288 0393 Fax +381 11 347 1337 office@dipar.co.yu

Singapore			
Assembly **Sales** **Service**	**Singapore**	SEW-EURODRIVE PTE. LTD. No 9, Tuas Drive 2 Jurong Industrial Estate Singapore 638644	Tel. +65 68621701 Fax +65 68612827 http://www.sew-eurodrive.com.sg sewsingapore@sew-eurodrive.com

Slovakia			
Sales	**Bratislava**	SEW-Eurodrive SK s.r.o. Rybničná 40 SK-831 06 Bratislava	Tel. +421 2 33595 202 Fax +421 2 33595 200 sew@sew-eurodrive.sk http://www.sew-eurodrive.sk
	Žilina	SEW-Eurodrive SK s.r.o. Industry Park - PChZ ulica M.R.Štefánika 71 SK-010 01 Žilina	Tel. +421 41 700 2513 Fax +421 41 700 2514 sew@sew-eurodrive.sk
	Banská Bystrica	SEW-Eurodrive SK s.r.o. Rudlovská cesta 85 SK-974 11 Banská Bystrica	Tel. +421 48 414 6564 Fax +421 48 414 6566 sew@sew-eurodrive.sk
	Košice	SEW-Eurodrive SK s.r.o. Slovenská ulica 26 SK-040 01 Košice	Tel. +421 55 671 2245 Fax +421 55 671 2254 sew@sew-eurodrive.sk

Slovenia			
Sales **Service**	**Celje**	Pakman - Pogonska Tehnika d.o.o. UI. XIV. divizije 14 SLO - 3000 Celje	Tel. +386 3 490 83-20 Fax +386 3 490 83-21 pakman@siol.net

South Africa			
Assembly **Sales** **Service**	**Johannesburg**	SEW-EURODRIVE (PROPRIETARY) LIMITED Eurodrive House Cnr. Adcock Ingram and Aerodrome Roads Aeroton Ext. 2 Johannesburg 2013 P.O.Box 90004 Bertsham 2013	Tel. +27 11 248-7000 Fax +27 11 494-3104 http://www.sew.co.za info@sew.co.za
	Cape Town	SEW-EURODRIVE (PROPRIETARY) LIMITED Rainbow Park Cnr. Racecourse & Omuramba Road Montague Gardens Cape Town P.O.Box 36556 Chempet 7442 Cape Town	Tel. +27 21 552-9820 Fax +27 21 552-9830 Telex 576 062 cfoster@sew.co.za
	Durban	SEW-EURODRIVE (PROPRIETARY) LIMITED 2 Monaco Place Pinetown Durban P.O. Box 10433, Ashwood 3605	Tel. +27 31 700-3451 Fax +27 31 700-3847 cdejager@sew.co.za
	Nelspruit	SEW-EURODRIVE (PTY) LTD. 7 Christie Crescent Vintonia P.O.Box 1942 Nelspruit 1200	Tel. +27 13 752-8007 Fax +27 13 752-8008 robermeyer@sew.co.za
Technical Offices	**Port Elizabeth**	SEW-EURODRIVE PTY LTD. 8 Ruan Access Park Old Cape Road Greenbushes 6000 Port Elizabeth	Tel. +27 41 3722246 Fax +27 41 3722247 dtait@sew.co.za
	Richards Bay	SEW-EURODRIVE PTY LTD. 103 Bulion Blvd Richards Bay P.O. Box 458 Richards Bay, 3900	Tel. +27 35 797-3805 Fax +27 35 797-3819 jswart@sew.co.za

Spain			
Assembly **Sales** **Service**	**Bilbao**	SEW-EURODRIVE ESPAÑA, S.L. Parque Tecnológico, Edificio, 302 E-48170 Zamudio (Vizcaya)	Tel. +34 94 43184-70 Fax +34 94 43184-71 http://www.sew-eurodrive.es sew.spain@sew-eurodrive.es
Technical Offices	**Barcelona**	Delegación Barcelona Avenida Francesc Maciá 40-44 Oficina 4.2 E-08208 Sabadell (Barcelona)	Tel. +34 93 7162200 Fax +34 93 7233007
	Lugo	Delegación Noroeste Apartado, 1003 E-27080 Lugo	Tel. +34 639 403348 Fax +34 982 202934
	Madrid	Delegación Madrid Gran Via. 48-2° A-D E-28220 Majadahonda (Madrid)	Tel. +34 91 6342250 Fax +34 91 6340899
	Seville	MEB Pólogono Calonge, C/A Nave 2 - C E-41.077 Sevilla	Tel. +34 954 356 361 Fax +34 954 356 274 mebsa.sevilla@mebsa.com
	Valencia	MEB Músico Andreu i Piqueres, 4 E-46.900 Torrente (Valencia)	Tel. +34 961 565 493 Fax +34 961 566 688 mebsa.valencia@mebsa.com

Sri Lanka			
Sales	**Colombo**	SM International (Pte) Ltd 254, Galle Raod Colombo 4, Sri Lanka	Tel. +94 1 2584887 Fax +94 1 2582981

Sweden			
Assembly **Sales** **Service**	**Jönköping**	SEW-EURODRIVE AB Gnejsvägen 6-8 S-55303 Jönköping Box 3100 S-55003 Jönköping	Tel. +46 36 3442 00 Fax +46 36 3442 80 http://www.sew-eurodrive.se jonkoping@sew.se
Sales	**Göteborg**	SEW-EURODRIVE AB Gustaf Werners gata 8 S-42132 Västra Frölunda	Tel. +46 31 70968 80 Fax +46 31 70968 93 goteborg@sew.se
	Stockholm	SEW-EURODRIVE AB Björkholmsvägen 10 S-14146 Huddinge	Tel. +46 8 44986 80 Fax +46 8 44986 93 stockholm@sew.se
	Malmö	SEW-EURODRIVE AB Borrgatan 5 S-21124 Malmö	Tel. +46 40 68064 80 Fax +46 40 68064 93 malmo@sew.se
	Skellefteå	SEW-EURODRIVE AB Trädgårdsgatan 8 S-93131 Skellefteå	Tel. +46 910 7153 80 Fax +46 910 7153 93 skelleftea@sew.se

Switzerland			
Assembly **Sales** **Service**	**Basel**	Alfred Imhof A.G. Jurastrasse 10 CH-4142 Münchenstein bei Basel	Tel. +41 61 417 1717 Fax +41 61 417 1700 http://www.imhof-sew.ch info@imhof-sew.ch
Technical Offices	**Rhaetian Switzerland**	André Gerber Es Perreyres CH-1436 Chamblon	Tel. +41 24 445 3850 Fax +41 24 445 4887
	Bern / Solothurn	Rudolf Bühler Muntersweg 5 CH-2540 Grenchen	Tel. +41 32 652 2339 Fax +41 32 652 2331
	Central Switzerland and Ticino	Beat Lütolf Baumacher 11 CH-6244 Nebikon	Tel. +41 62 756 4780 Fax +41 62 756 4786

Switzerland			
	Central Switzerland, Aargau	Armin Pfister Stierenweid CH-4950 Huttwill, BE	Tel. +41 62 962 54 55 Fax +41 62 962 54 56
	Zürich, Ticino	Gian-Michele Muletta Fischerstrasse 61 CH-8132 Egg bei Zürich	Tel. +41 44 994 81 15 Fax +41 44 994 81 16
	Bodensee and East Switzerland	Markus Künzle Eichweg 4 CH-9403 Goldach	Tel. +41 71 845 2808 Fax +41 71 845 2809

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

Thailand			
Assembly **Sales** **Service**	**Chonburi**	SEW-EURODRIVE (Thailand) Ltd. 700/456, Moo.7, Donhuaroh Muang Chonburi 20000	Tel. +66 38 454281 Fax +66 38 454288 sewthailand@sew-eurodrive.com
Technical Offices	**Bangkok**	SEW-EURODRIVE (Thailand) Ltd. 6th floor, TPS Building 1023, Phattanakarn Road Suanluang Bangkok,10250	Tel. +66 2 7178149 Fax +66 2 7178152 sewthailand@sew-eurodrive.com
	Hadyai	SEW-EURODRIVE (Thailand) Ltd. Hadyai Country Home Condominium 59/101 Soi.17/1 Rachas-Utid Road. Hadyai, Songkhla 90110	Tel. +66 74 359441 Fax +66 74 359442 sewthailand@sew-eurodrive.com
	Khonkaen	SEW-EURODRIVE (Thailand) Ltd. 4th Floor, Kaow-U-HA MOTOR Bldg, 359/2, Mitraphab Road. Muang District Khonkaen 40000	Tel. +66 43 225745 Fax +66 43 324871 sew-thailand@sew-eurodrive.com

Tunisia			
Sales	**Tunis**	T. M.S. Technic Marketing Service Zone Industrielle Mghira 2 Lot No. 39 2082 Fouchana	Tel. +216 71 4340-64 + 71 4320-29 Fax +216 71 4329-76 tms@tms.com.tn

Turkey			
Assembly **Sales** **Service**	**Istanbul**	SEW-EURODRIVE Hareket Sistemleri San. ve Tic. Ltd. Sti. Bagdat Cad. Koruma Cikmazi No. 3 TR-34846 Maltepe ISTANBUL	Tel. +90 216 4419163 / 4419164 Fax +90 216 3055867 http://www.sew-eurodrive.com.tr sew@sew-eurodrive.com.tr
Technical Offices	**Adana**	SEW-EURODRIVE Hareket Sistemleri San. ve Tic. Ltd. Sti. Kizilay Caddesi 8 Sokak No 6 Daðtekin Is Merkezi Kat 4 Daire 2 TR-01170 SEYHAN / ADANA	Tel. +90 322 359 94 15 Fax +90 322 359 94 16

Turkey			
	Ankara	SEW-EURODRIVE Hareket Sistemleri San. ve Tic. Ltd. Sti. Özcelik Is Merkezi, 14. Sok, No. 4/42 TR-06370 Ostim/Ankara	Tel. +90 312 385 33 90 Fax +90 312 385 32 58
	Bursa	SEW-EURODRIVE Hareket Sistemleri San. ve Tic. Ltd. Sti. Üçevler Mah. Bayraktepe Sok. Akay İş Merkezi Kat:3 No: 7/6 TR Nilüfer/Bursa	Tel. +90 224 443 45 60 Fax +90 224 443 45 58
	Izmir	SEW-EURODRIVE Hareket Sistemleri San. ve Tic. Ltd. Sti. 1203/11 Sok. No. 4/613 Hasan Atli Is Merkezi TR-35110 Yenisehir-İzmir	Tel. +90 232 469 62 64 Fax +90 232 433 61 05

Ukraine			
Sales **Service**	**Dnepropetrovsk**	SEW-EURODRIVE Str. Rabochaja 23-B, Office 409 49008 Dnepropetrovsk	Tel. +380 56 370 3211 Fax +380 56 372 2078 http://www.sew-eurodrive.ua sew@sew-eurodrive.ua
Sales	**Kiev**	SEW-EURODRIVE GmbH S. Oleynika str. 21 02068 Kiev	Tel. +380 44 503 95 77 Fax +380 44 503 95 78 kso@sew-eurodrive.ua
	Donetsk	SEW-EURODRIVE GmbH 25th anniversary of RKKA av. 1-B, of. 805 Donetsk 83000	Tel. +380 62 38 80 545 Fax +380 62 38 80 533 dso@sew-eurodrive.ua

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

USA			
Production **Assembly** **Sales** **Service** **Corporate Offices**	**Southeast Region**	SEW-EURODRIVE INC. 1295 Old Spartanburg Highway P.O. Box 518 Lyman, S.C. 29365	Tel. +1 864 439-7537 Fax Sales +1 864 439-7830 Fax Manufacturing +1 864 439-9948 Fax Assembly +1 864 439-0566 Fax Confidential/HR +1 864 949-5557 http://www.seweurodrive.com cslyman@seweurodrive.com
Assembly **Sales** **Service**	**Northeast Region**	SEW-EURODRIVE INC. Pureland Ind. Complex 2107 High Hill Road, P.O. Box 481 Bridgeport, New Jersey 08014	Tel. +1 856 467-2277 Fax +1 856 845-3179 csbridgeport@seweurodrive.com
	Midwest Region	SEW-EURODRIVE INC. 2001 West Main Street Troy, Ohio 45373	Tel. +1 937 335-0036 Fax +1 937 440-3799 cstroy@seweurodrive.com
	Southwest Region	SEW-EURODRIVE INC. 3950 Platinum Way Dallas, Texas 75237	Tel. +1 214 330-4824 Fax +1 214 330-4724 csdallas@seweurodrive.com
	Western Region	SEW-EURODRIVE INC. 30599 San Antonio St. Hayward, CA 94544	Tel. +1 510 487-3560 Fax +1 510 487-6433 cshayward@seweurodrive.com
	Additional addresses for service in the USA provided on request!		

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

Inquiry/Order

SEW EURODRIVE

Customer data:

Company: ______________________ Customer no.: ______________________
Department: ______________________
Name: ______________________ Phone: ______________________
Street/P.O. Box: ______________________ Fax: ______________________
______________________ Email: ______________________
ZIP code/city: ______________________

Your contact partner at SEW:

Name: ______________________ Phone: ______________________
Technical Office: ______________________ Fax: ______________________

Technical data:

Quantity: ________ Requested delivery date: ______________________
Catalog designation: ______________________

Gear unit type:

☐ Helical ☐ Parallel shaft helical ☐ Helical-bevel ☐ Helical-worm ☐ Spiroplan®
☐ Multi-stage ☐ Servo ☐ Variable speed ☐ EMS ☐ Other: ________

Power: ________ kW **Output speed:** ________ rpm **Output torque:** ________ Nm

Cycles/h: ________ c/h **Cyclic duration factor:** S ________ / ________ % cdf

☐ 1-shift operation ☐ 2-shift operation ☐ 3-shift operation
☐ Uniform ☐ Non-uniform ☐ Extremely non-uniform

Mounting position:

M1 ☐ M2 ☐ M3 ☐ M4 ☐ M5 ☐ M6 ☐ Pivoting ☐

Housing type:

☐ Foot-mounted ☐ Flange (bore) ☐ Flange (thread)
☐ Torque arm ☐ Other: ______________________

Shaft type:

☐ Solid shaft with key ☐ Shrink disk Shaft/hollow shaft ∅: ________ mm
☐ Hollow shaft with key ☐ TorqLOC® Flange ∅: ________ mm

Shaft position (right-angle 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 ☐

Mains voltage: ________ V
Mains 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
☐ Encoder: ______________________
☐ Plug connection: ______________________
☐ Inverter: ______________________
☐ RAL 7031 or ☐ RAL ________

Other options:

Special ambient conditions:

Temperature from ________ °C to ________ °C | ☐ Outdoor use | ☐ Installation >1000m above msl
Other ambient conditions: ______________________
Other: ______________________

Place, date ______________________ **Signature:** ______________________




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