SEW EURODRIVE

DTE / DVE
Energy Efficient Motors

EFF I

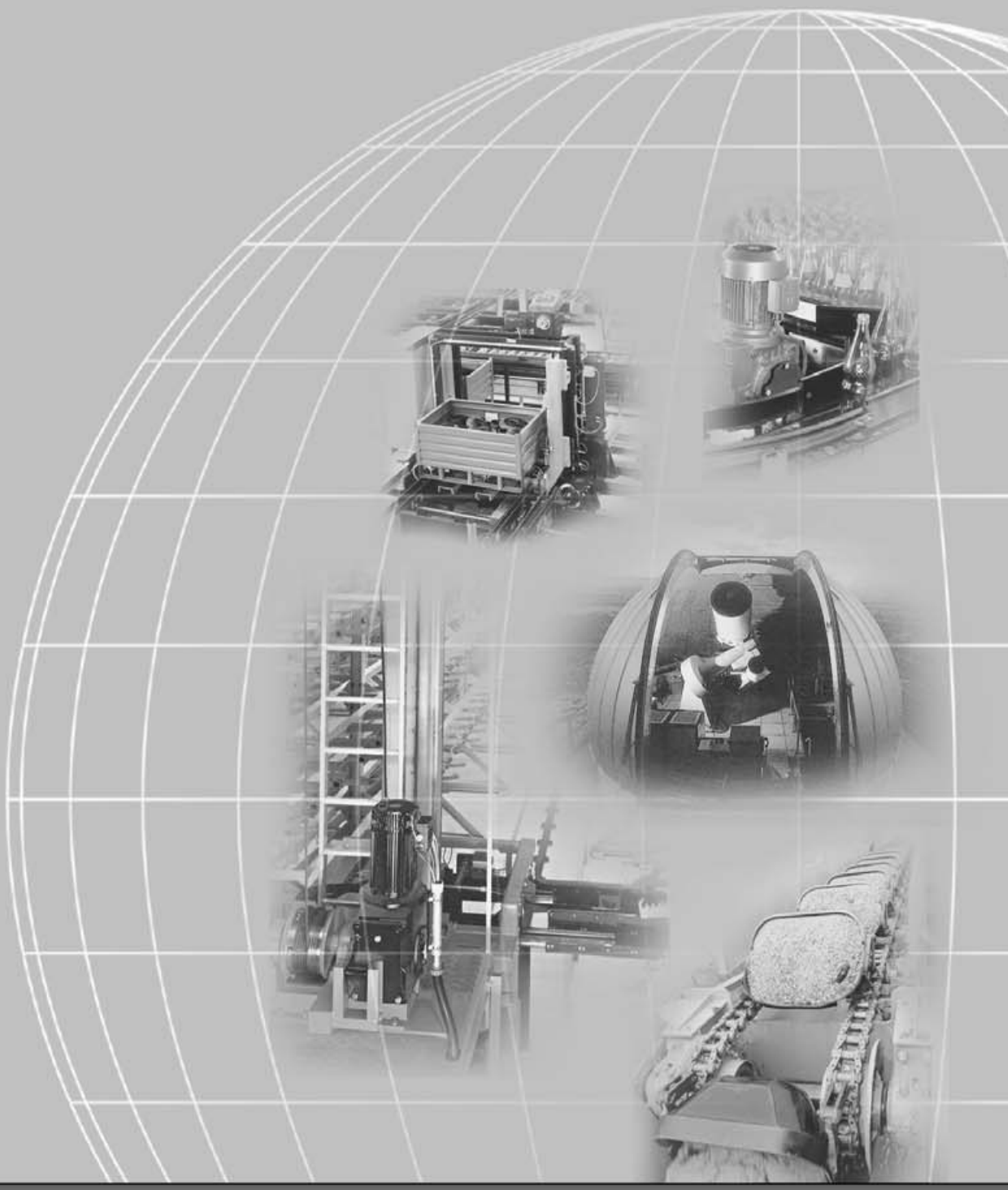
Edition

10/2003

Catalog

11239115 / EN

SEW
EURODRIVE



SEW-EURODRIVE

Contents

1 The SEW-EURODRIVE Group of Companies

Introduction

SEW-EURODRIVE is a leading company in the global market for electrical drive engineering. SEW-EURODRIVE's global presence, extensive product range and broad spectrum of services mean it is the ideal partner for the machinery and plant construction industry when it comes to providing drive systems for demanding applications.

SEW-EURODRIVE possesses many years of experience in drive engineering which it puts to good use when developing, producing and selling all its drives with components drawn from mechanical and electrical engineering and electronics.

The headquarters of the group of companies is located in Bruchsal, Germany. Components for SEW-EURODRIVE's modular drive system are manufactured to the highest quality standards in production plants sited in Germany, France, the USA, Brazil and China. These stocked components are utilized in assembly plants in over 30 industrialized countries all over the world. The assembly plants offer close proximity to customers and particularly short delivery times for individual drive systems – with a constantly high standard of quality. SEW-EURODRIVE's sales, consulting, customer and spare parts services are to be found in more than 50 countries all over the world.

The product range

- Gearmotors, gear units and motors
  - Helical gear units/gearmotors
  - Parallel shaft helical gear units/gearmotors
  - Helical-bevel gear units/gearmotors
  - Helical-worm gear units/gearmotors
  - Spiroplan® right-angle gearmotors
  - Planetary gearmotors
  - Industrial gear units
  - Low backlash gear units/gearmotors
  - Brake motors
  - Drives for overhead trolley systems
  - Geared torque motors
  - Pole-changing gearmotors

- Electronically controlled drives
  - MOVITRAC® frequency inverters
  - MOVIDRIVE® drive inverters
  - MOVIDYN® servo controllers
  - Technology and communication options for the inverters
  - Asynchronous AC motors and AC gearmotors
  - Asynchronous and synchronous servomotors and geared servomotors
  - DC motors, brake motors and gearmotors
  - Asynchronous and synchronous linear motors

- Components for decentralized installation
  - MOVIMOT® gearmotors with integrated frequency inverter
  - MOVI-SWITCH® gearmotors with integrated circuit breaker and protective function
  - Field distributors, fieldbus interfaces

- Mechanical variable speed drives
  - VARIBLOC® wide V-belt variable speed gearmotors
  - VARIMOT® friction disk variable speed gearmotors

- Explosion-proof drives to ATEX 95 for category 2 and 3

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

Content of the catalog

This catalog describes SEW-EURODRIVE AC gearmotors and brake motors in "High Efficiency EFF1" design. It contains project planning notes, mounting positions, technical data, selection tables and dimension sheets. Please refer to separate catalogs for more information about gear units, pole-changing gearmotors, variable speed gearmotors, geared servomotors and DC gearmotors.

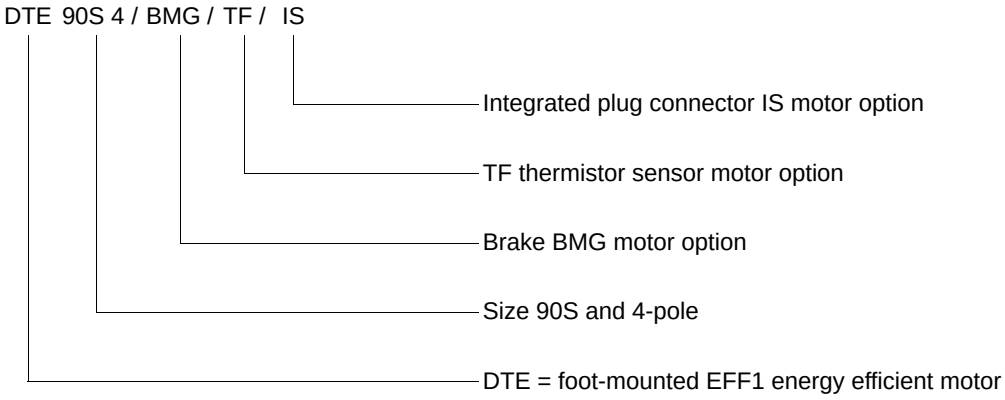
Additional catalogs

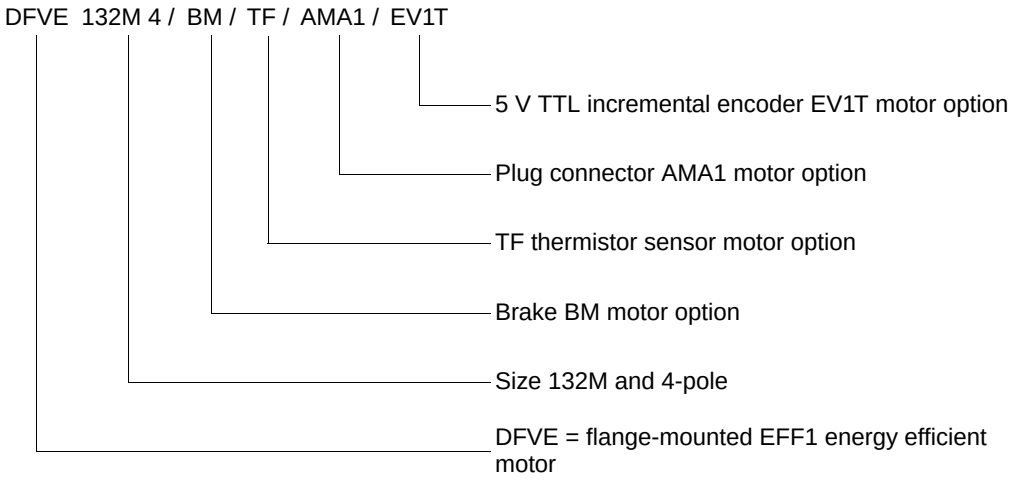
- Gearmotors
- Low backlash planetary gear units
- MOVIMOT® gearmotors
- Geared servomotors
- Pole-changing gearmotors
- Variable speed gearmotors
- Drives for overhead trolley systems
- Explosion-proof drives
- Geared torque motors
- Planetary gearmotors
- Compact gear units

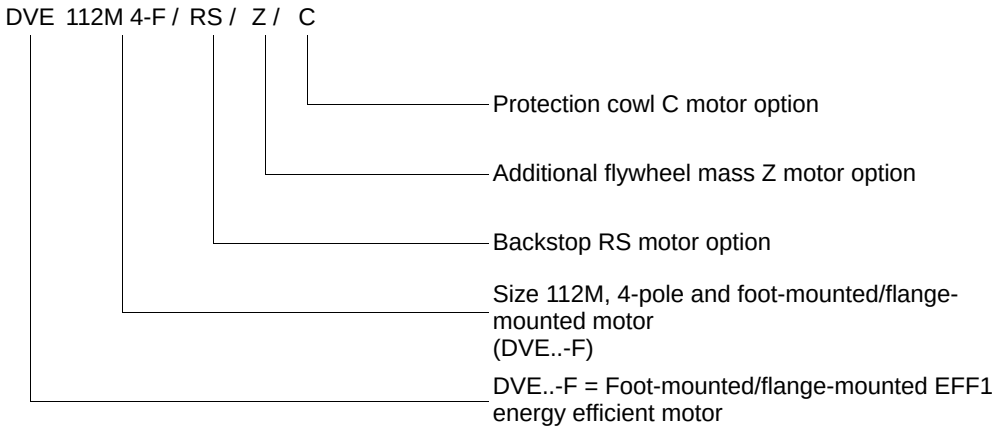
2 Product Description

2.1 Unit designation of energy efficient motors

Examples







2.2 Standards and regulations

Conformance to standards

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

- IEC 60034-1, EN 60034-1

  Electrical rotating machinery, rating and performance.
- EN 60529

  IP degrees of protection for housings of electrical equipment.
- IEC 60072

  Dimensions and performance of electrical rotating machinery.
- EN 50262

  Metric threads of cable glands.
- EN 50347

  Standardized dimensions and power values.

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 two and four-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 following different categories will be used: EFF3, EFF2 and EFF1. EFF3 refers to motors without any particular efficiency requirement. EFF2 indicates improved efficiency motors and EFF1 is for high-efficiency motors.

All energy efficient motors listed in this catalog meet the requirements of efficiency EFF 1

All four-pole AC motors from the Gearmotors catalog meet the requirements of efficiency EFF 2

Rated data

The specific data of an asynchronous AC motor (AC squirrel-cage motor) are its size, rated power, cyclic duration factor, rated speed, rated current, rated voltage, power factor cosφ, enclosure, thermal classification and efficiency category. These data are indicated on the nameplate of the motor. 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.

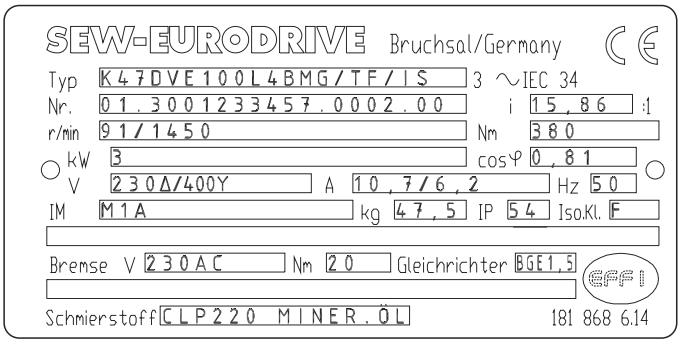


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Figure 1: Motor nameplate

2.3 Electrical characteristics

Suitable for use with an inverter

Energy efficient motors can be operated on inverters, for example SEW-EURODRIVE MOVIDRIVE® and MOVITRAC®, thanks to the high quality of insulation (including phase separator) with which they are equipped as standard.

Frequency

SEW-EURODRIVE energy efficient motors are designed for 50 Hz or 60 Hz on request. As standard, the technical data for energy efficient motors refers to a 50 Hz supply frequency.

Motor voltage

Energy efficient motors are available for rated voltages from 220 to 690 V.

Motor sizes 90 to 132S are normally supplied configured for the AC 220...240/380 ... 415 V, 50 Hz voltage range. The jumpers for setting the star or delta connection are supplied with the motor in a bag in the terminal box. For motor sizes >132S, the standard design is AC 380 to 415/660 ... 690 V, 50 Hz. The star or delta jumpers are mounted on the terminal board.

For 50 Hz supply systems

The **standard voltages** are:

Motors	**Motor size**		
	90	**100...132S**	**132M...225**
	Motor voltage		
4-pole motors, applies to voltage range	220...240/ AC 380...415 V Δ/人		AC 220...240/380...415V Δ/人 AC 380...415/660...690V Δ/人
	Brake voltage		
4-pole motors, applies to 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		
Standard voltage VR	DC 24 V AC 1x100...240 V		-
Voltage range VS	AC 1 × 220..266 V		-
Voltage range V	-	-	AC 3 × 380...415 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. The voltage-dependent data are then slightly different.

50 Hz motor on 60 Hz supply system

The rated data of motors designed for 50 Hz supply systems are slightly altered when 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 Δ/人	Δ	230	+20%	0%	-17%	-17%
AC 230/400 V Δ/人	人	460	+20%	+20%	0%	0%
AC 400/690 V Δ/人	Δ					

Motors for the USA and Canada

Motors for the USA and Canada are designed to meet NEMA, CSA, UL and EPACT standards. These four-pole motors are in preparation. In case of questions please contact SEW-EURODRIVE.

The following voltage assignments (60 Hz) are usual in the USA and Canada:

	Rated voltage of the supply system	Rated voltage of the motor
USA	208 V	200 V
	240 V	230 V
	480 V	460 V
Canada	600 V	575 V

2.4 Operation on inverter

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

- **MOVITRAC® MC07, also with LOGODrive graphic programming interface:** Compact and inexpensive frequency inverter for the power range 0.37 ... 37 kW. Single-phase and three-phase mains connection for AC 230 V.
- **MOVITRAC® MC31C:** Compact frequency inverters for the power range 0.55 to 55 kW with modular expansion options. Three-phase mains connection for AC 230 V and AC 400 ... 500 V.
- **MOVIDRIVE® compact MCF/MCV40/41A:** Compact and high-performance drive inverter for dynamic drives in the power range 1.5 ... 90 kW. Three-phase mains connection for AC 230 V and AC 400 ... 500 V.
- **MOVIDRIVE® compact MCH40/41/42A:** Compact and high-performance drive inverter with Hiperface interface for dynamic drives in the power range 1.5 ... 90 kW. Three-phase mains connection for AC 230 V and AC 400 ... 500 V.
- **MOVIDRIVE® MDF/MDV60A:** High-performance drive inverter for dynamic drives in the power range 1.5 ... 90 kW. Wide range of applications thanks to extensive expansion options with technology and communication options. Three-phase mains connection for AC 230 V and AC 400 ... 500 V.
- **MOVIDRIVE® MDX60B:** High-performance drive inverter for dynamic drives in the power range 0.55 ... 160 kW. Wide range of applications thanks to extensive expansion options with technology and communication options. Three-phase mains connection for AC 230 V and AC 400 ... 500 V.

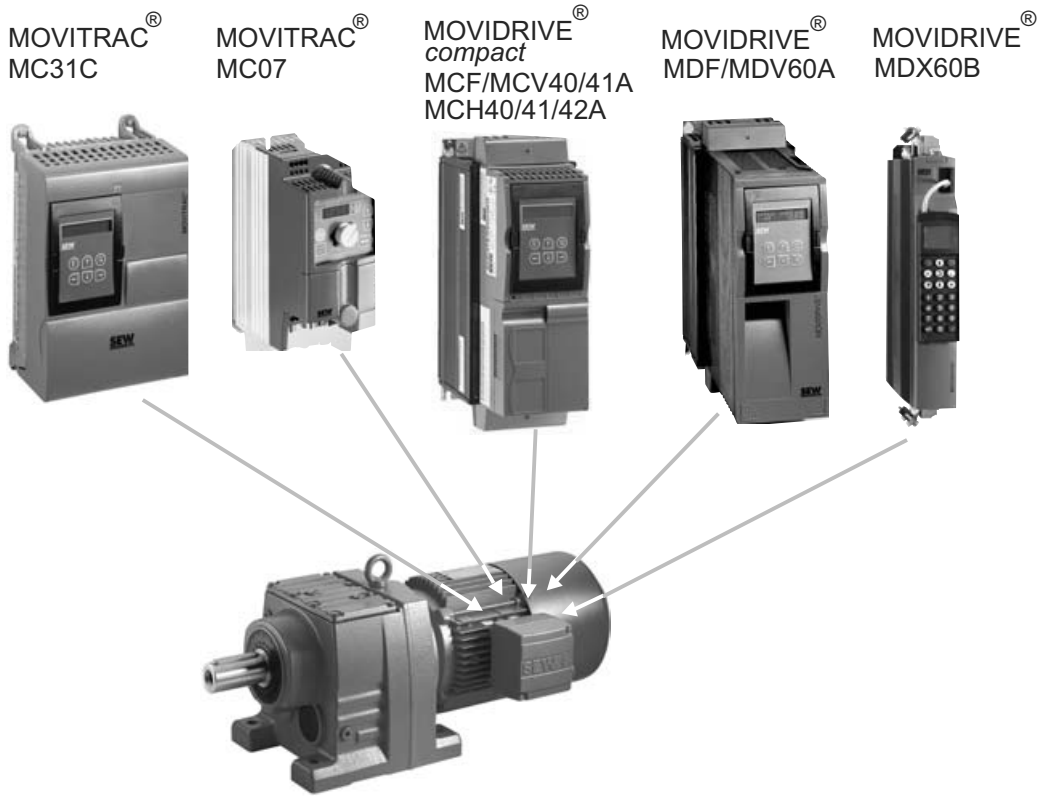
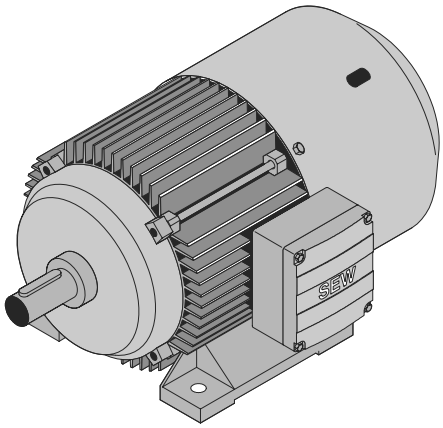


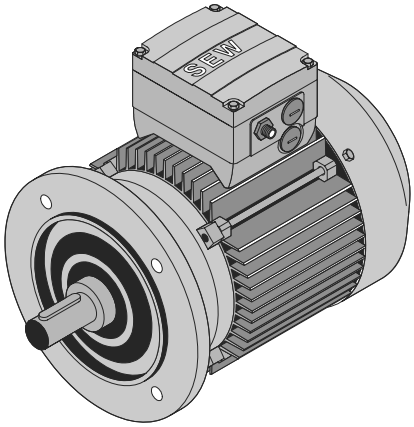
Figure 2: Range of inverters for energy efficient motors

3 Project Planning for Energy Efficient Motors

3.1 Examples of different types



DTE, DVE../BM(G)



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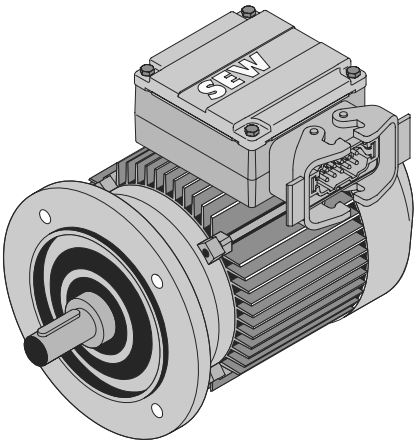

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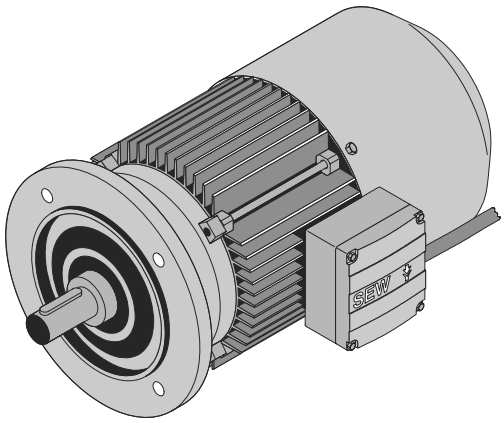

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Figure 3: Energy efficient (brake) motors

3.2 SEW takes a new approach to reducing energy losses

The common measures for reducing losses and consequently improving the efficiency are:

- Using sheet metal with lower iron losses.

  Disadvantage: Higher no-load currents and poorer power factor.

- Reducing thermal utilization.

  Disadvantage: Motors are longer, in some cases even with greater diameter than the standard motor. This means, the energy efficient motor often does not match the same gear units anymore as the standard motor.

SEW-EURODRIVE was the first manufacturer to take a new, more modern approach. Using cast copper instead of aluminum for the rotor cage allows for significantly reducing losses without having to put up with many of the technical drawbacks of conventional energy efficient motors.

In addition, the motors feature excellent control characteristics due to their stable torque characteristic curve when operated on an inverter.

3.3 Project planning for energy efficient motors

Energy efficient motors are not equally suited for any application due to the higher costs and mass moment of inertia of the rotor.

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 must not be an energy efficient motor either. 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, or cooling tower drives, agitators, drives in wastewater treatment plant, 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 are used with electronic control and energy efficient motors in a meaningful way and in combinations. The new technology for EFF1 or EPAct motors enables SEW-EURODRIVE to offer high motor efficiency without having to change mounting diameters.

3.4 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.

The current SEW documentation in various languages can be ordered or downloaded from the SEW homepage (http://www.sew-eurodrive.com).

The high rated speeds of energy efficient motors result in slightly increased gear unit output speeds (see table "Technical data of AC motor" in section "Technical data and dimension sheets for AC motors"). Take this increase into consideration when referring to the values in the selection tables of the Gearmotors catalog. An overview of selection tables for energy efficient gearmotors is available in the EKAT electronic catalog.

3.5 Amortization calculation for 100 % motor load in shift operation

Comparison calculation

Motor data

	DV112M4	DVE112M4
P_n	4 kW	4 kW
Load factor	100 %	100 %
h	84,2 %	89 %

Actual power consumed

$$P_{cons} = \frac{P_n \times \text{load factor}}{\text{Eta} \times 100}$$

	DV112M4	DVE112M4
P_{in}	4.75 kW	4.49 kW

Operating time

Annual operating time = daily operating time x annual operating days

Shift operation	Operation	
	DV112M4	DVE112M4
1-shift	2000 h/year	2000 h/year
2-shift	4000 h/year	4000 h/year
3-shift	6000 h/year	6000 h/year

Power consumption

Energy per year = P_{in} x operating time

Shift operation	Energy		
	DV112M4 E1	DVE112M4 E2	Difference E1 - E2
1-shift	9500 kWh/year	9000 kWh/year	500 kWh/year
2-shift	19000 kWh/year	18000 kWh/year	1000 kWh/year
3-shift	28500 kWh/year	27000 kWh/year	1500 kWh/year

Energy cost difference

Cost difference = energy difference x energy price

Energy price = 0.08 / kWh

Shift operation	Cost difference
1-shift	40 €/year
2-shift	80 €/year
3-shift	120 €/year

Cost saving/amortization

Saving in the year X = expenditure in the year X - (cost difference in the year X)

Price extras for DVE112M4 efficiency motor = 120 €

Interest rate (pa) = 6.0 %

Years	Cost savings			Expenditure gross	Expenditure with 20 % discount
	1-shift	2-shift	3-shift		
0	0 €	0 €	0 €	120 €	96 €
1	40 €	80 €	120 €	127 €	102 €
2	80 €	160 €	240 €	135 €	108 €
3	120 €	240 €	360 €	143 €	114 €
4	160 €	320 €	480 €	151 €	121 €
5	200 €	400 €	600 €	161 €	128 €

Amortization/years

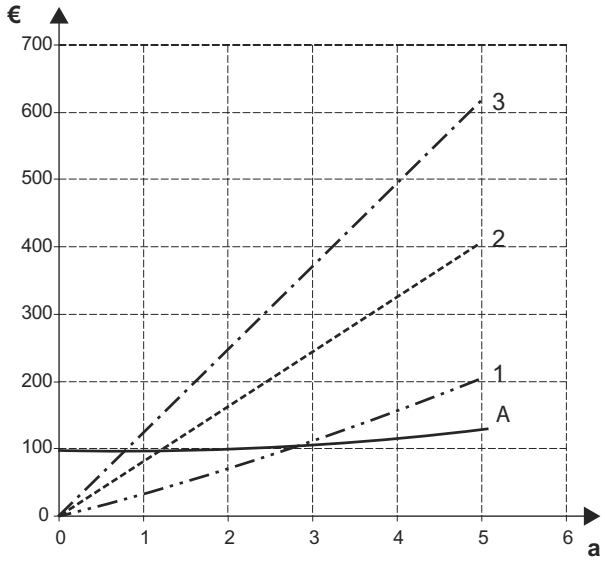

Figure 4: Investment calculation

Legend:

[A] Expenditure with 20 % discount
[1] 1-shift with 100 % motor load
[2] 2-shift with 100 % motor load
[3] 3-shift with 100 % motor load

3.6 Amortization calculation for 75 % motor load in shift operation

Comparison calculation

Motor data

	DV112M4	DVE112M4
P_n	4 kW	4 kW
Load factor	75 %	75 %
h	85.9 %	89.7 %

Actual power consumed

$$P_{cons} = \frac{P_n \times \text{load factor}}{\text{Eta} \times 100}$$

	DV112M4	DVE112M4
P_{in}	3.49 kW	3.34 kW

Operating time

Annual operating time = daily operating time x annual operating days

Shift operation	Operation	
	DV112M4	DVE112M4
1-shift	2000 h/year	2000 h/year
2-shift	4000 h/year	4000 h/year
3-shift	6000 h/year	6000 h/year

Power consumption

Energy per year = P_{in} x operating time

Shift operation	Energy		
	DV112M4 E1	DVE112M4 E2	Difference E1 - E2
1-shift	7000 kWh/year	6700 kWh/year	300 kWh/year
2 -shift	14000 kWh/year	13400 kWh/year	600 kWh/year
3-shift	21000 kWh/year	20100 kWh/year	900 kWh/year

Energy cost difference

Cost difference = energy difference x energy price

Energy price = 0.08 / kWh

Shift operation	Cost difference
1-shift	24 €/year
2-shift	48 €/year
3-shift	72 €/year

Cost saving/amortization

Saving in the year X = expenditure in the year X - (cost difference in the year X)

Price extra for DVE112M4 energy efficient motor = 120 €

Interest rate (pa) = 6.0 %

Years	Cost savings			Expenditure	Expenditure for
	1-shift	2-shift	3-shift	gross	20 % discount
0	0 €	0 €	0 €	120 €	96 €
1	24 €	48 €	72 €	127 €	102 €
2	48 €	96 €	144 €	135 €	108 €
3	72 €	144 €	216 €	143 €	114 €
4	96 €	192 €	288 €	151 €	121 €
5	120 €	240 €	360 €	161 €	128 €

Amortization/years

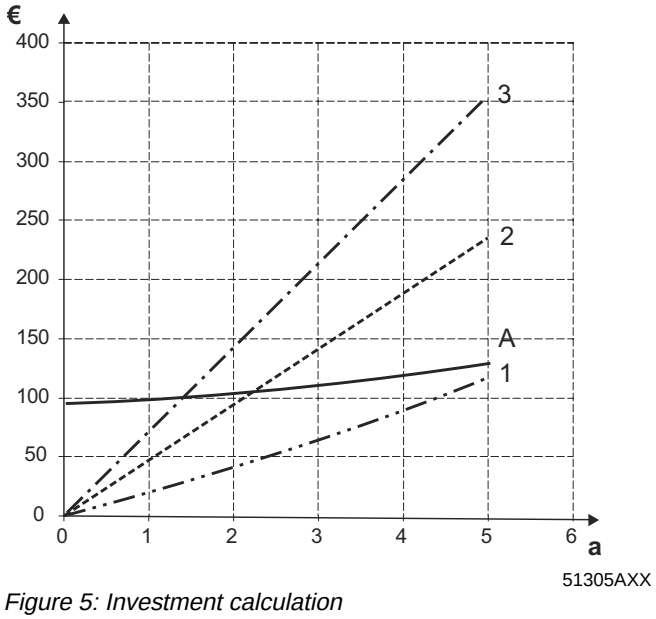

Figure 5: Investment calculation

Legend:

[A] Expenditure with 20 % discount

[1] 1-shift with 75 % motor load

[3] 2-shift with 75 % motor load

[4] 3-shift with 75 % motor load

3.7 Overhung loads

Refer to Sec. "Project planning for gear units/overhung and axial loads " in the Gearmotor catalog (publication number 10541608 / 0602) for general information about overhung loads. The following table lists the permitted overhung loads (top value) and axial forces (bottom value) of AC motors.

Mounting position	[1/min] No. of poles	Permitted overhung load F_R [N] Permitted axial load F_A [N]; $F_{A\_tens.} = F_{A\_comp.}$ Size									
		90	100	112	132S	132M	160M	160L	180	200	225
Foot-mounted motor	**1500 4**	1040 210	1300 270	1400 270	1500 270	2000 400	2600 640	3100 640	4500 940	4700 2400	7000 2400
Flange-mounted motor	**1500 4**	1300 250	1650 350	1750 350	1900 350	2500 500	3200 800	3900 800	5600 1200	5900 3000	8700 3000

Overhung load conversion for off-center force application

The permitted overhung loads must be calculated using the following formulae in the event of force application not in the center of the shaft end. The smaller of the two values F_{xL} (according to bearing service life) and F_{xW} (according to shaft strength) is the permitted value for the overhung load at point x. Note that the calculations apply to $M_{a\ max}$.

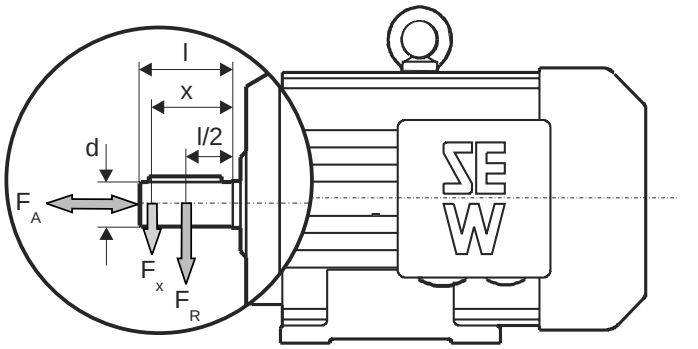

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Figure 6: Overhung load F_X for off-center force application

F_{xL} based on bearing service life

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

F_{xW} from the shaft strength

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

F_R= Permitted overhung load (x = l/2) [N]

x = Distance from the shaft shoulder to the force application point [mm]

a, b, f = Motor constants for overhung load conversion [mm]

c = Motor constant for overhung load conversion [Nmm]

3.8 Possible motor options

Overview

The following motor options can be supplied in various combinations:

- BM(G) disc brake
- Integrated plug connector IS
- Plug connector AM.., AS.., APG1
- Backstop RS
- Additional flywheel mass Z (flywheel fan)
- Protection cowl C
- Encoders and pre-fabricated cables for encoder connection
- Mounting devices for encoders
- Forced cooling fan VR/VS/V
- MOVI-SWITCH® integrated motor circuit breaker / motor protection

For technical data and dimension sheets for the motor options, refer to the Gearmotor catalog (publication number 10541608 / 0602).

4 Technical Data and Dimension Sheets for Energy Efficient Motors

4.1 Mounting position designations for energy efficient motors

Position of motor terminal box and cable entry

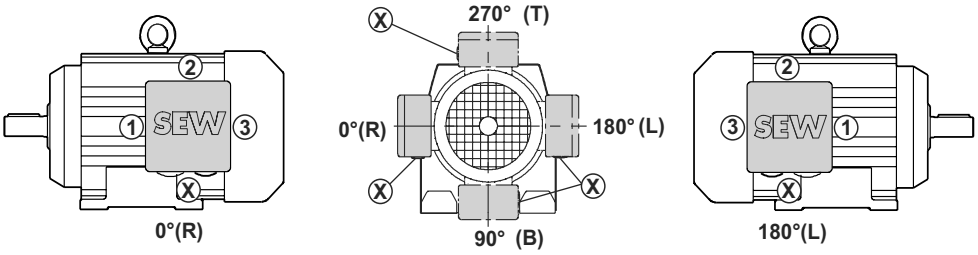


Figure 7: Position of terminal box and cable entry

Mounting positions

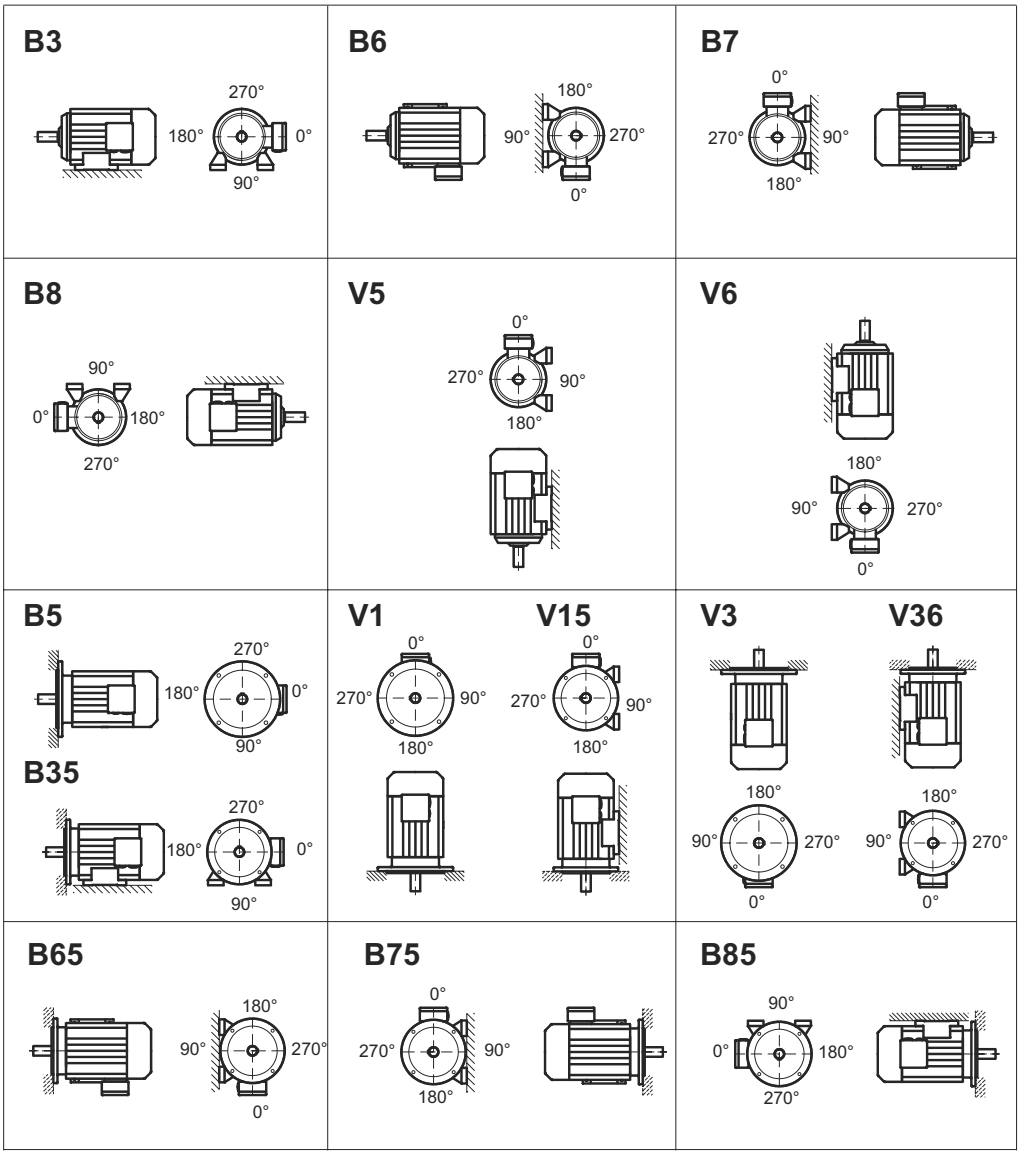


Figure 8: Mounting positions for energy efficient motors

4.2 Technical data of EFF1 energy efficient motors

1500 1/min-S1

Motor type	P_N M_N [kW] [Nm]	n_N [1/min]	K_N	I_N 380-415 V (400 V) [A]	cosφ	$\eta_{75\%}$ $\eta_{100\%}$ [%]	I_A/I_N	M_A/M_N M_H/M_N	J_{Mot} 1 [10^{-4} kgm^2]	J_{Mot} 2 [10^{-4} kgm^2]	Z_0 BG[3] BGE[4] [1/h]	M_{Bmax} [Nm]	m 1 [kg]	m 2 [kg]
DTE90S4	1.1 7.2	1460	1.043	2.45 (2.4)	0.78	84.9 84.5	7.0	2.1 1.9	48	54	1850 4700	20	19	29
DTE90L4	1.5 9.8	1455	1.032	3.3 (3.15)	0.80	86.0 85.7	7.1	2.2 2.2	58	64	2200 5600	20	23	33
DVE100M4	2.2 14.4	1455	1.032	4.7 (4.6)	0.80	87.6 87.0	7.6	2.5 2.1	74	80	950 4500	40	29	39
DVE100L4	3 19.8	1455	1.039	6.4 (6.2)	0.80	88.0 87.6	7.6	2.4 2.1	89	95	950 4000	40	32	42
DVE112M4	4 26	1460	1.028	8.4 (8.1)	0.80	89.7 89.0	6.0	2.2 1.8	188	200	- 2550	55	46	58
DVE132S4	5.5 36	1455	1.017	11.2 (10.7)	0.83	90.7 89.6	6.0	2.1 1.7	248	260	- 2000	75	61	76
DVE132M4	7.5 49	1465	1.024	15.6 (14.9)	0.81	91.4 90.8	5.7	1.9 1.7	427	477	- 1500	100	78	102
DVE160M4	11 72	1460	1.014	22.5 (22.0)	0.81	92.4 91.6	5.8	2.0 1.7	556	606	- 1050	150	96	121
DVE160L4	15 98	1475	1.010	30.5 (29.5)	0.81	93.3 93.0	5.3	2.0 1.5	1216	1351	- 870	200	141	183
DVE180M4	18.5 120	1475	1.007	37 (35)	0.82	94.0 93.6	5.6	2.1 1.7	1516	1651 1746[5]	- 740	300 300[5]	193	234 238[5]
DVE180L4	22 142	1475	1.007	42.5 (40)	0.84	94.4 94.0	5.7	2.1 1.7	1816	1951 2046[5]	- 570	300 300[5]	195	237 241[5]
DVE200L4	30 193	1485	1.010	58 (56)	0.83	94.3 94.4	7.1	2.1 1.8	3278	3413 3508[5]	- 530	300 600[5]	273	324 328[5]
DVE225S4	37 240	1485	1.010	71 (67)	0.85	94.8 94.7	6.8	2.1 1.7	4078	4213 4308[5]	- 320	300 600[5]	327	378 382[5]

1 Without brake

2 With brake

3 Operation with BG brake control system

4 Operation with BGE brake control system

5 Double disc brake

Determining the gear unit output speed at full load

The high rated speeds of energy efficient motors result in an increase of the gear unit output speeds. The correction factor K_N is used to adjust the output speeds listed in the selection tables of the Gearmotors catalog.

$$K_N = \frac{n_{\text{eff1 motors}}}{n_{\text{eff2 motors}}}$$

$$n_{\text{out new}} = n_{\text{out (Gearmotors catalog)}} \times K_N$$

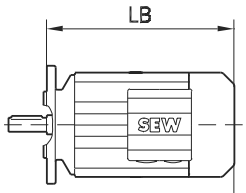
4.3 Notes regarding dimension sheets

- The technical data and dimensions for the motor options are listed in Sec. "Mounting Positions, Technical Data and Dimension Sheets for AC Motors."
- The dimensions of the D(F)TE90L motor differ from those of the EFF2 standardmotor D(F)T90L. Please refer to the dimension sheets on the following pages.
- For all other dimensions, refer to the dimension sheets of the Gearmotors catalog by taking into account the extra length LK (see following pages).
- Regarding foot-mounted (brake) motors of size DTE90L and DVE132M, the shaft height corresponds to the next larger IEC standard motor (100 mm / 160 mm). The foot dimensions of DTE90, DVE180 and DVE225 motors differ from the IEC dimensions, see Sec. "Notes regarding dimension sheets" in the Gearmotors catalog.

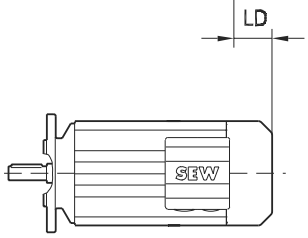
4.4 Dimension sheets

08 222 002

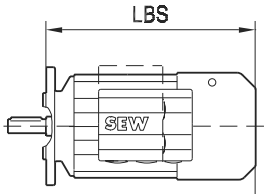
D(F)T..
D(F)V..



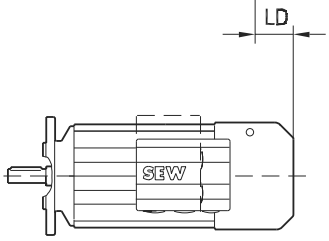
D(F)TE..
D(F)VE..



D(F)T.. /BMG
D(F)V.. /BM(G)



D(F)TE.. /BMG
D(F)VE.. /BM(G)

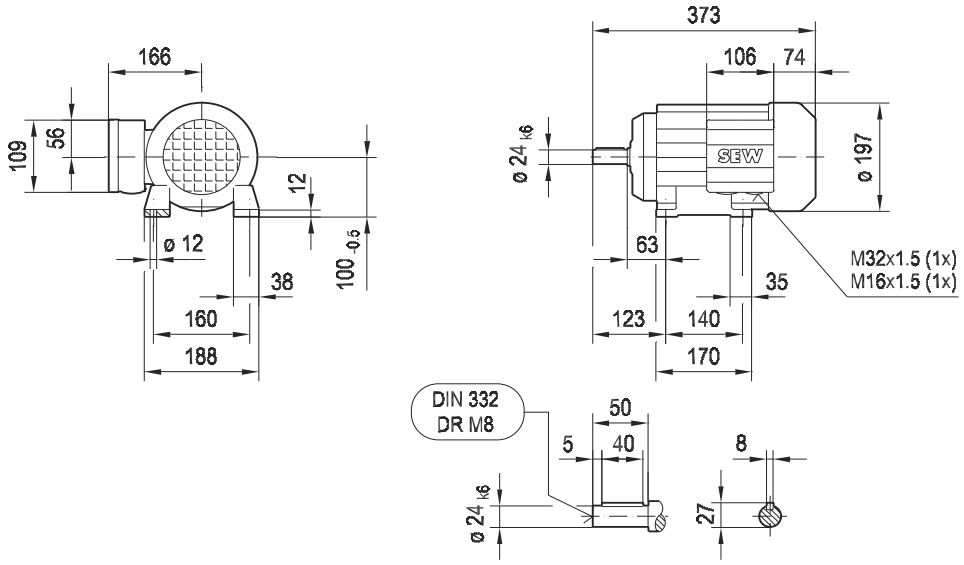


	D(F)TE90S..	D(F)TE90L..	D(F)VE100M..	D(F)VE100L..	D(F)VE112M..	D(F)VE132S..	
LD	0	50	0	0	45	40	

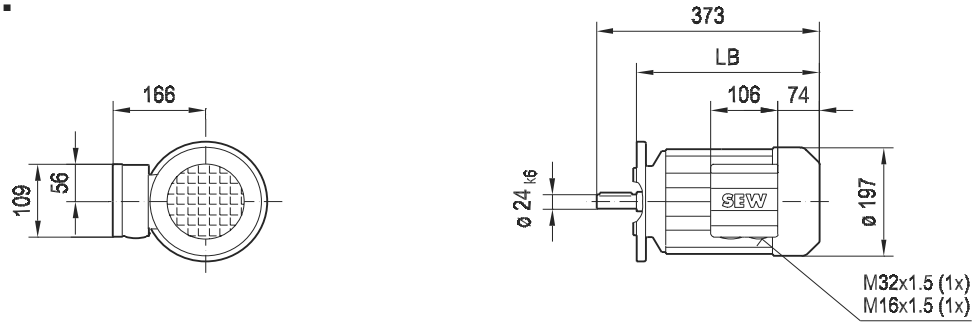
	D(F)VE132M..	D(F)VE160M..	D(F)VE160L..	D(F)VE180M..	D(F)VE180L..	D(F)VE200L..	D(F)VE225S..
LD	60	40	0	0	30	0	0

DTE90L ..

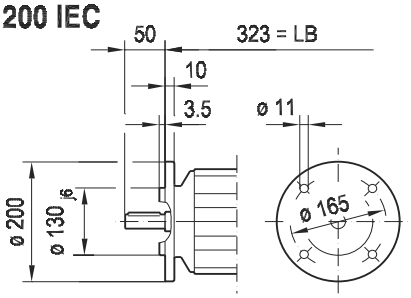
08 224 002



DFTE90L ..



ø 200 IEC



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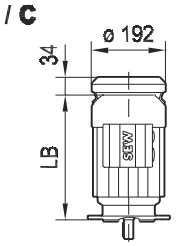

D(F)TE90L ..

08 224 002

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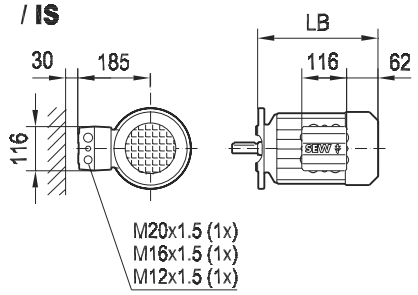

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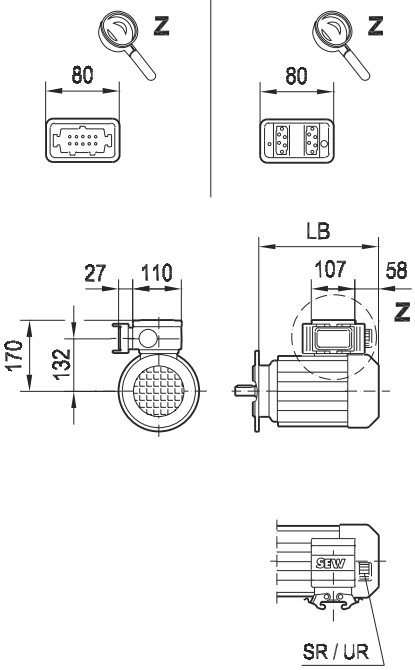

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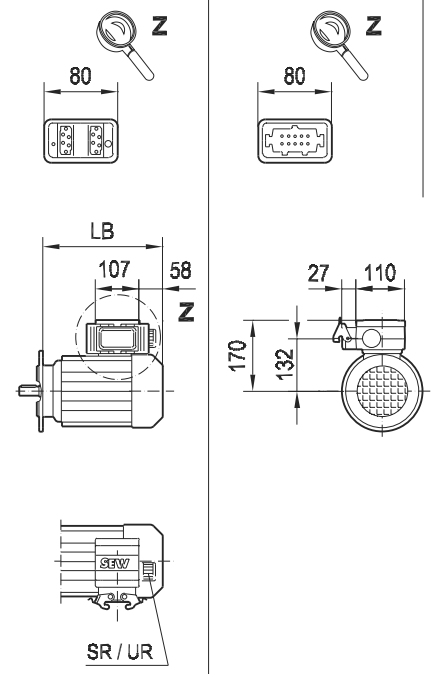

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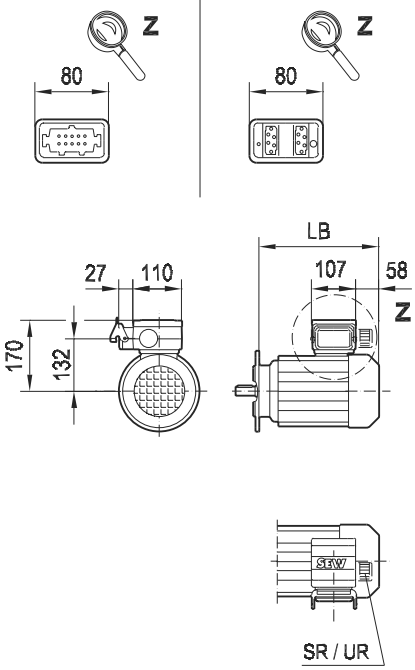

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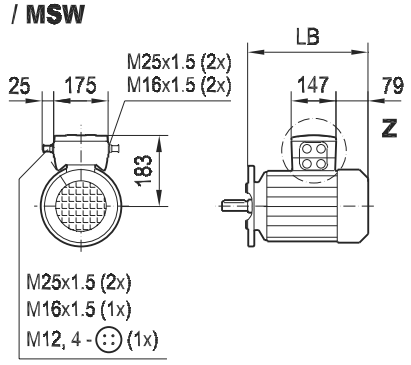
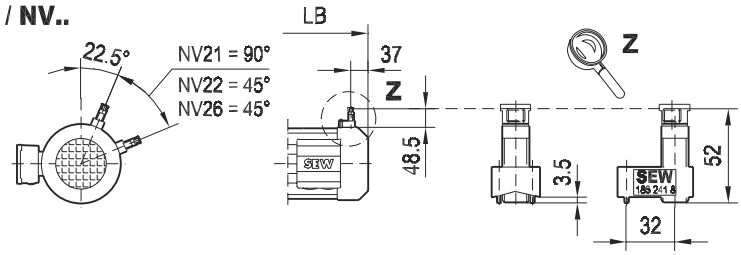
/ MSW



/ NV..



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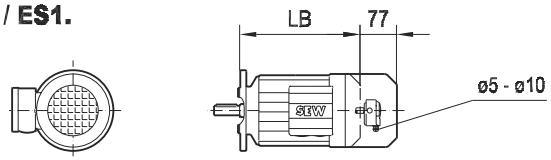

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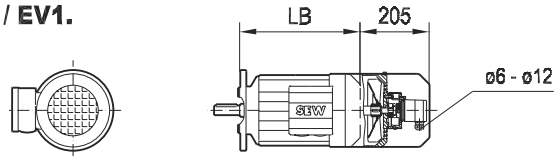

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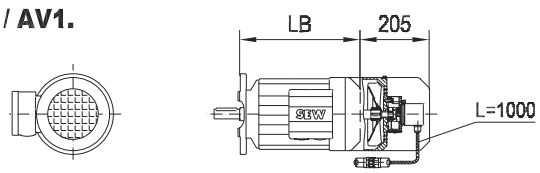
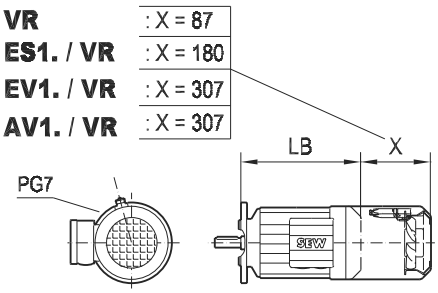


/ VR

/ ES1. / VR

/ EV1. / VR

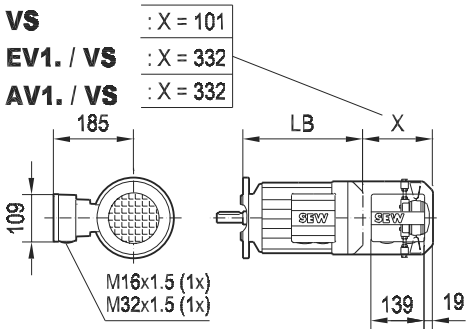
/ AV1. / VR



/ VS

/ EV1. / VS

/ AV1. / VS



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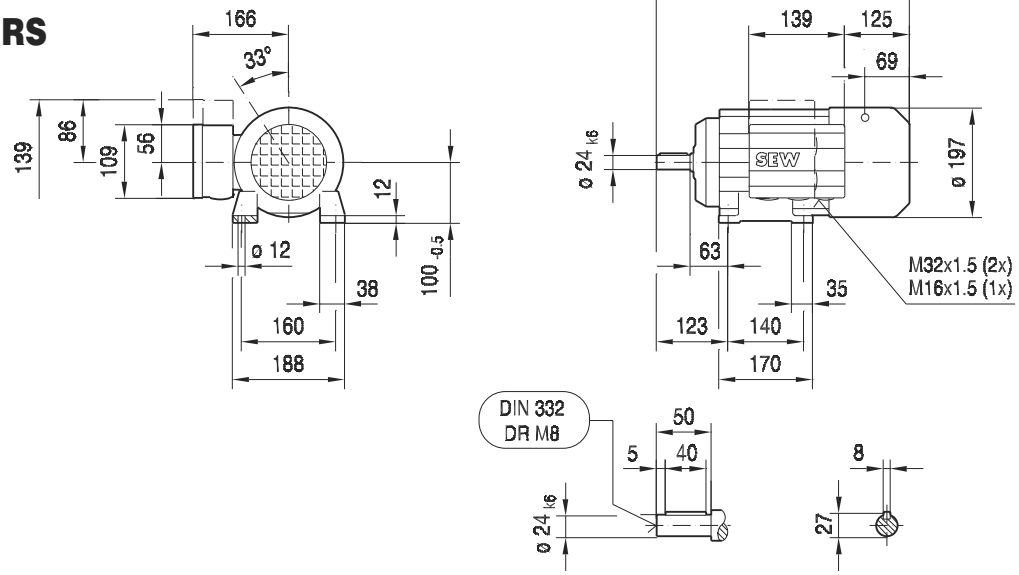
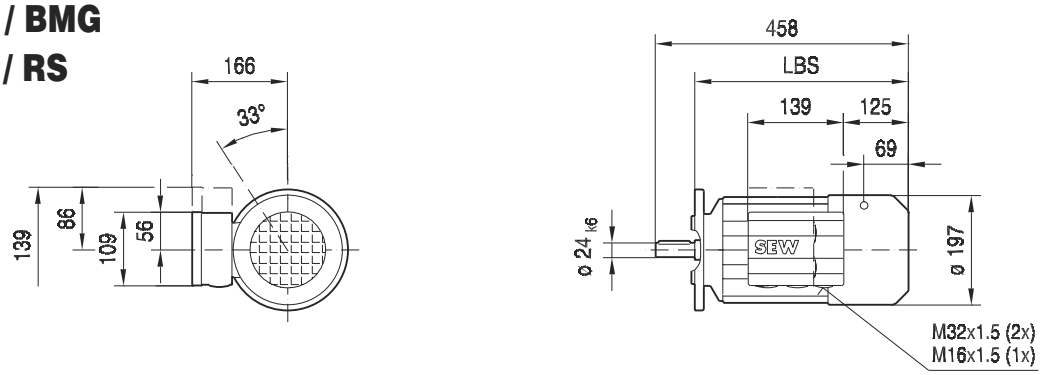
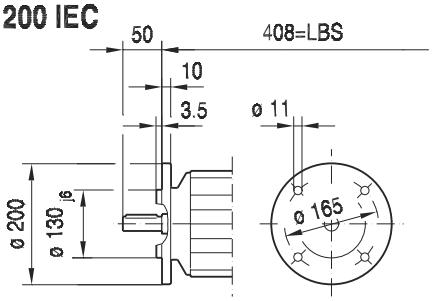
DTE90L.. / BMG
DTE90L.. / RS



DFTE90L.. / BMG
DFTE90L.. / RS



ø 200 IEC



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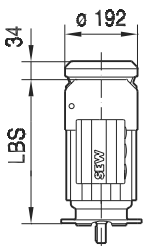
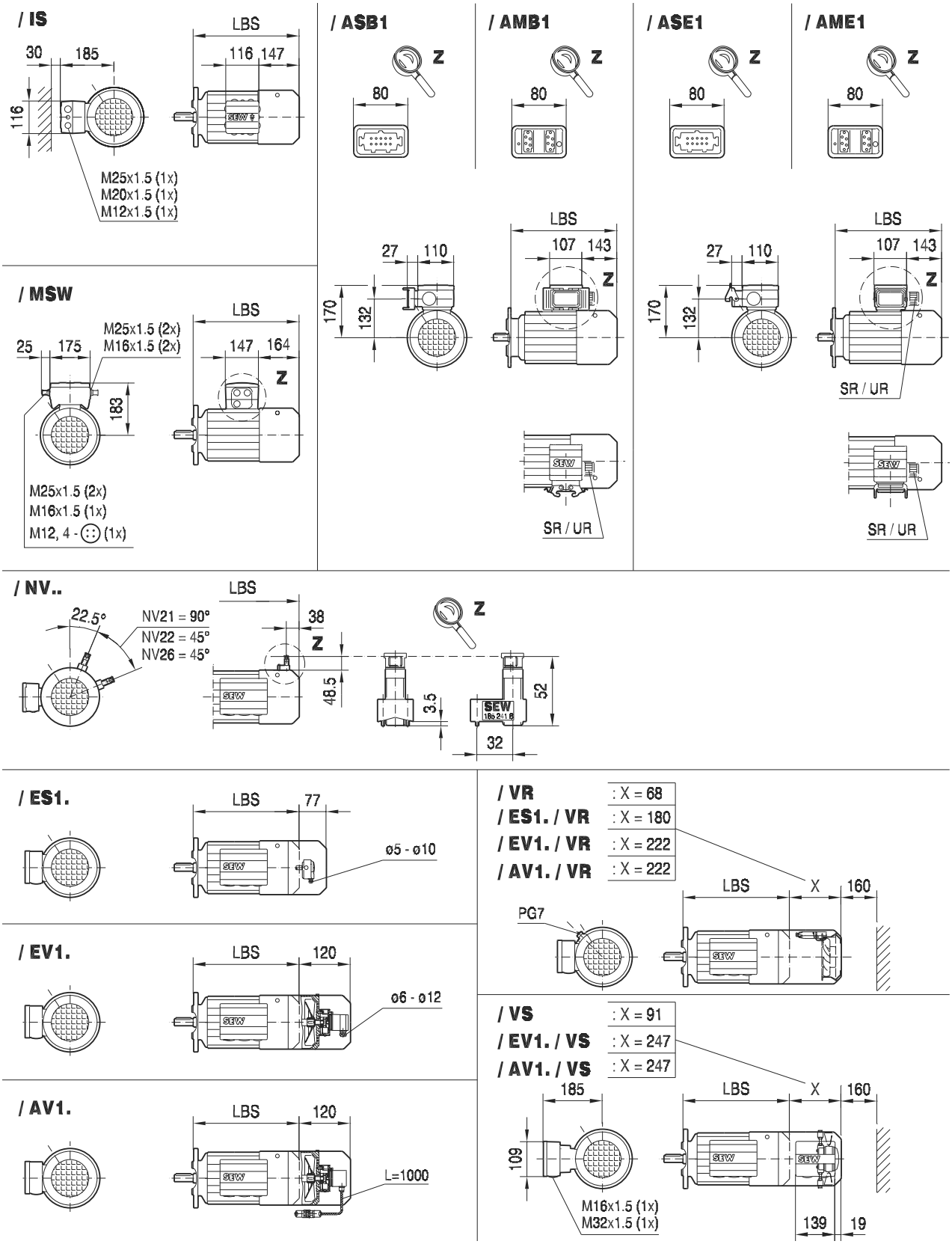


D(F)TE90L .. / BMG
D(F)TE90L.. / RS

09 071 002



SEW-EURODRIVE GmbH & Co KG · P.O. Box 3023 · D-76642 Bruchsal/Germany
Phone +49 7251 75-0 · Fax +49 7251 75-1970
http://www.sew-eurodrive.com · sew@sew-eurodrive.com

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