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Overview of production line

HEW has been producing asynchronous motors for more than 120 years. Our product line comprises the following variants:

- **Standard 3-phase motors**
- **Standard pole-changing 3-phase motors**
- **Standard pole-changing 3-phase motors , fan drives**
- **Reluctance motors**
- **Single-phase motors**
- **Brake motors**
- **Rotating field motors**
- **Submersible motors**
- **Hygiene motors**
- **Explosion protected three-phase motors for use in Zone 2**
- **Explosion protected three-phase (brake) motors for use in Zone 22**
- **Explosion protected three-phase motors (see catalogue part Model series DEx)**
- **Explosion protected three-phase brake motors (see catalogue part Model series DEx)**

Due to their high-quality insulation system, our motors are suited for inverter operation. They are always manufactured in thermal class F and can be equipped with PTC or thermostatic switch. (Other temperature monitoring elements are available on request..)

Operating three-phase motors in demanding drive systems often requires feedback elements to be fitted. On customer's request, HEW also supplies the motors with rotary encoders from various manufacturers. Tachometers, resolvers or sensor bearings are available on request. Three-phase motors or three-phase brake motors can be equipped with such encoders.

Standard motors come in protection class IP 54. Higher protection levels are available on request (see page 1/6).

Versions in compliance with other standards or guidelines (e.g. UL/CSA, VIK or GL) are available on request.

Primer/paint

HEW motors are provided with a primer as standard. The primer is a low-solvent two-component polyacrylic product. The quick-drying primer coat can be applied as an undercoat, primer or primer filler to all metallic surfaces.

On customer's request, the motors are available with a two-component polyacrylic paint (acc. to RAL table). Special paint coats for extreme environmental conditions are also available on request.



Efficiencies

Longevity, safety and environmental compatibility have always been part of our company philosophy. This is why careful and responsible handling of resources led to the development of energy-saving motors and drive solutions at an early stage.

Due to the introduction of EU directive (EC) 640 / 2009, the energy efficiency of electric motors is becoming increasingly important.

This directive specifies binding deadlines at which new motors must comply with the respective efficiency class. In Europe, the first part of this standard was put into effect on June 16 2011, which means that motors with efficiency classes falling below those stipulated by the standard may no longer be supplied. Other country-specific rules must also be heeded.

IEC 60034-30

As of August 1 2009, the IEC 60034-30 standard applies to the internationally unique classification of efficiencies of three-phase squirrel cage asynchronous motors. Please note that at present only classes IE1 to IE3 are standardised. Class IE4 is in the proposal state right now but is expected to be specified in a future issue of IEC 60034-30. According to information available today, losses are to be 15 % lower than the losses of class IE3. But this will be specified in a future issue of the standard.

The regulations will apply to three-phase 50 Hz or 50 / 60 Hz squirrel cage motors with 2, 4 or 6 poles whose

- maximum nominal voltage UN is 1000 V
- nominal power ranges from 0.75 kW to 375 kW
- design is suitable for operating mode S1 and S3 > 80 % acc. to IEC 60034-1

Exceptions acc. to IEC 60034-30 apply to:

- motors fully integrated into a machine (e.g. pumps, fans and compressors) that cannot be tested separately
- motors with cooling fluid temperatures at the product inlet of below 0 °C or above 32 °C (e.g. water cooled motors)
- motors with nominal voltages > 1000 V
- built-in motors
- motors operated at > 4000 m above sea level
- motors operated at ambient temperatures above 60 °C and below -15 °C
- multi-speed motors (pole-changing motors)

The exceptions acc. to the EuP directive also apply to:

- brake motors
- motors for use in explosive areas acc. to directive 94 / 9 / EC
- motors with operating temperatures > 400 °C (e.g. flue gas fans)

Other country-specific rules must also be heeded. This directive contains a mandatory schedule defining when each of the efficiency classes are to become effective as statutory minimum efficiency classes. Motor not complying with the applicable efficiency class at a given time must then no longer be sold. Please note that motors with the same power must be more efficient at 60 Hz and therefore require a special design.

Although not yet required for explosion protected motors, our motors comply with the efficiency requirements of IEC 60034-30 even today. The following motors are currently available:

- Size 80 – 225 in 2-pole design with a nominal voltage/frequency of 400 V / 50 Hz – IE2 version
- Size 80 – 225 in 4-pole design with a nominal voltage/frequency of 400 V / 50 Hz – IE2 version

The type designation of these motors contains the letter "H", the appropriate IE efficiency class and the efficiency, e.g. DEX 100LH/4K - IE2-85.2%.

For more information, please refer to catalogue part DEX motor on pages 18/1-2.



Standards and regulations

The motors comply with commonly applicable standards and regulations, in particular:

Title	German standard DIN	European standard CENELEC	International standard IEC
Three-phase asynchronous motors for general applications with standardised dimensions and power ratings	DIN EN 50347	EN 50347	(IEC 60072-1)
Rotating electrical machines - rating and operating behaviour	DIN EN 60034-1	EN 60034-1	IEC 60034-1
Rotating electrical machines - terminal markings and direction of rotation	DIN EN 60034-8 (VDE 0530-8)	EN 60034-8	IEC 60034-8
Rotating electrical machines - Types of construction, mounting arrangements and terminal box position (IM code)	DIN EN 60034-7	EN 60034-7	IEC 60034-7
Rotating electrical machines - Methods of cooling (IC code)	DIN EN 60034-6	EN 60034-6	IEC 60034-6
Rotating electrical machines - degrees of protection provided by integral design (IP code)	DIN EN 60034-5 (VDE 0530-5)	EN 60034-5	IEC 60034-5
Rotating electrical machines - Mechanical vibrations	DIN EN 60034-14 (VDE 0530-14)	EN 60034-14	IEC 60034-14
Rotating electrical machines - Noise level limits	DIN EN 60034-9 (VDE 0530-9)	EN 60034-9	IEC 60034-9
Rotating electrical machines - Starting performance of three-phase squirrel cage motors	DIN EN 60034-12 (VDE 0530-12)	EN 60034-12	IEC 60034-12
Rotating electrical machines - efficiency classes of three-phase motors	DIN EN 60034-30 (VDE 0530-30)	EN 60034-30	IEC 60034-30
Standard voltages	DIN EN 60038 (VDE 175-1)	EN 60038	IEC 60038:

Edition 8/2013

Mechanical design

Versions

Overview of design and IM code (international mounting) of the most frequently used versions acc. to DIN EN 60034-7.

horizontal shaft		vertical shaft		vertical shaft	
IM Code I	IM Code II	IM Code I	IM Code II	IM Code I	IM Code II
IM B3	IM 1001	IM V5	IM 1011	IM V6	IM 1031
IM B5	IM 3001	IM V1	IM 3011	IM V3	IM 3031
IM B14	IM 3601	IM V18	IM 3611	IM V19	IM 3631
IM B35	IM 2001	IM V15	IM 2011	IM V35	IM 2031
IM B34	IM 2101	IM V17	IM 2111	IM V37	IM 2131
IM B6	IM 1051				
IM B7	IM 1061				
IM B8	IM 1071				

The motors of type IM B3 can also be operated in mounting positions IM B6, IM B7 and IM B8.



Protection classes

DIN EN 60034-5 (VDE 0530-5) identifies the protection classes of rotating electrical machines with a code comprised of the code letters IP (International Protection) and two code numbers.

1st code number (0 to 6): protection levels for protection against contact and foreign objects.

2nd code number (0 to 8): protection levels for protection against water.

HEW standard motors come in protection class IP 54.

The following table lists the protection classes for electric motors.

Protection class **IP5X** against dust the the most common one. Other protection classes are available on request.

Protection class	1st code number	2nd code number
	Protection against contact and foreign objects.	Protection against water
IP 54	Protection against contact with and approaching live parts as well as contact with moving parts inside the housing. The ingress of dust is not entirely prevented but dust cannot enter in amounts that would impair the satisfactory operation of the machine.	Water being sprayed onto the machine from all directions must not have any detrimental effect.
IP 55		Water being sprayed onto the machine with a nozzle from all directions must not have any detrimental effect.
IP 56		Harmful amounts of water by heavy seas or water in a powerful jet must not enter the housing.

To prevent foreign objects from falling into the motor, the fan cowl can be equipped with a protective roof. This is particularly useful for all versions where the shaft end points down (e.g. V1 / V5 / V18).

Housing version

The housings of sizes 63 to 160 are made of an aluminium alloy. The housings of sizes 180 are made of cast iron.

Contrary to the standard range, sizes 80-160 are available in cast iron (on request).



Flange variants

Available flanges

Designation of as per DIN EN 50347	FF100	FF115	FF130	FF165	FF215	FF265	FF300
"Old" designation as per DIN 42948 (B5)	A120	A140	A160	A200	A250	A300	A350

Size 63	o	x	o				
Size 71	o	o	x				
Size 80	o	o	o	x			
Size 90			o	x	o		
Size 100			o	o	x		
Size 112			o	o	x		
Size 132					o	x	
Size 160					o	o	x
Size 180					o	o	x

Designation of as per DIN EN 50347	FT65	FT75	FT85	FT100	FT115	FT130	FT165	FT215
"Old" designation as per DIN 42948 (B14)	C80	C90	C105	C120	C140	C160	C200	C250

Size 63	o	x	o	o				
Size 71	o	o	x	o				
Size 80		o	o	x	o	o		
Size 90			o	o	x	o		
Size 100				o	o	x	o	
Size 112						x	o	
Size 132						o	x	
Size 160							o	x

x = Assignment as per standard (DIN EN 50347)

o = Special flange

Other flange variants available on request

Note

Designation of as per DIN EN 50347

FF – Flange with through holes FF corresponds to bolt circle diameter M of fastening bores

FT – Flange with threaded holes FT corresponds to bolt circle diameter M of fastening threads

Old designation as per DIN 42948

A corresponds to the outer flange diameter of flange B5

C corresponds to the outer flange diameter of flange B14

Storage

HEW motors of sizes 63 to 180 are equipped with grooved ball bearings acc. to DIN 625 at the drive side (DS) and on the non-driving side (NS). The NS bearing of size 132 to 180 motors is a fixed bearing. For protection class IP 54, 2Z bearings with C3 bearing play are used. As of protection class IP 55, 2RS bearings with C3 bearing play are used. The DS bearing is a floating bearing held in place with ball spacer washers.

Standard bearing assignment

Size	DS bearing	NS bearing
63	6202 2Z C3	6202 2Z C3
71	6202 2Z C3	6202 2Z C3
80	6204 2Z C3	6204 2Z C3
90	6205 2Z C3	6205 2Z C3
100	6206 2Z C3	6206 2Z C3
112	6306 2Z C3	6306 2Z C3
132	6308 2Z C3	6308 2Z C3 (fixed bearing)
160	6309 2Z C3	6309 2Z C3 (fixed bearing)
180	6310 2Z C3	6310 2Z C3 (fixed bearing)

Bearing lubrication

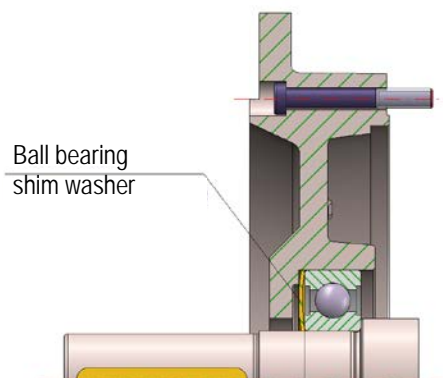
The motors are fitted with permanently lubricated bearings. When subjected to the maximum permissible load, the nominal service life of a bearing is at least 20 000 h.

Using cylindrical roller bearings

Cylindrical roller bearings can be fitted on request if the permissible radial forces are exceeded (see the following table).

Bearing design

Special version on request.

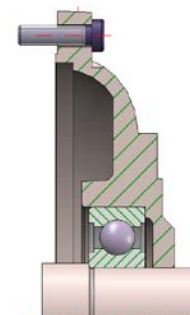


Ball bearing
shim washer

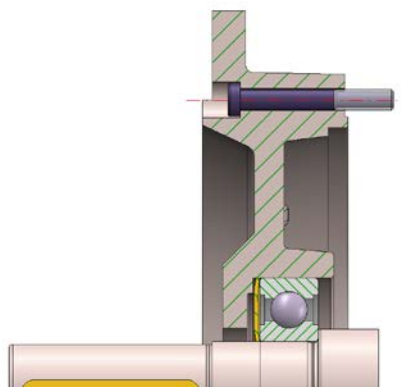
DS

Size

63-112

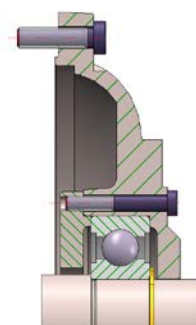


NS



Size

132-180



Fixed bearing

Shaft ends

IEC 60034-7 defines the motor sides as follows:

DS (D side) = Motor driving side

NS (N side) = Non-driving side/side opposite to DS

Designations still used in Germany:

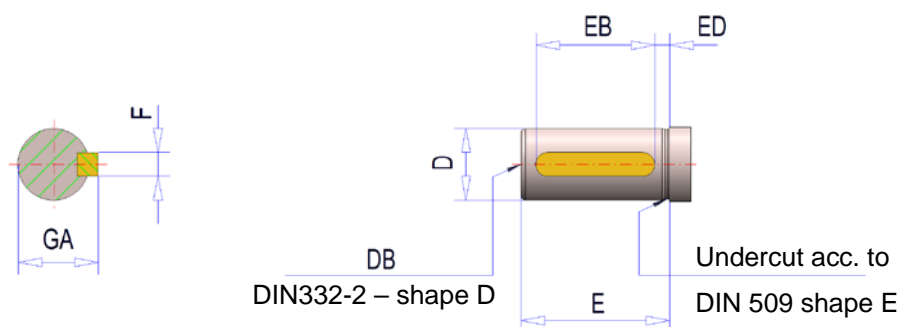
for DS = AS (A side)

for NS = BS (B side)

The shaft ends are cylindrical and their dimensions, tolerances and power assignments comply with DIN EN 50347.

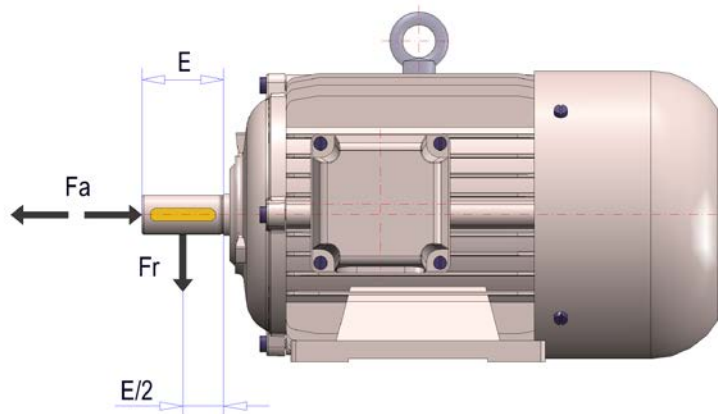
The tolerance of the shaft diameter is k6 (ISO) up to a diameter of 50 mm/m6 (ISO) for diameters exceeding 50 mm.

The DS shaft end of all standard motors has a centre bore acc. to DIN 322-2 shape D. The NS shaft end features a centre bore acc. to DIN 322-1. The motor comes with parallel keys complying with DIN 6885-1 shape A. Versions with a second free shaft end are available on customer's request.



Size	D	E	DB	EB	ED	GA	F
63	11	23	M4	18	2.5	12.5	4
71	14	30	M5	25	2.5	16	5
80	19	40	M6	32	4	21.5	6
90	24	50	M8	40	5	27	8
100	28	60	M10	50	5	31	8
112	28	60	M10	50	5	31	8
132	38	80	M12	70	5	41	10
160	42	110	M16	90	10	45	12
180	48	110	M16	100	5	51.5	14

Radial and axial forces

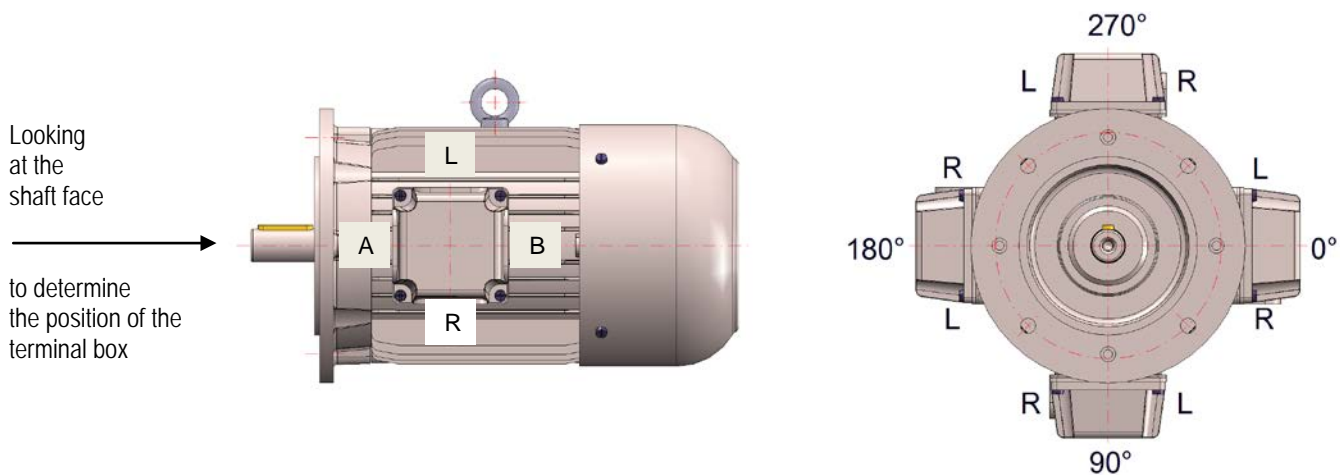


Synchronous speed rpm	3000 (2-pole)	1500 (4-pole)	1000 (6-pole)	750 (8-pole)
	Permissible radial force F_r [N]			
	Permissible axial force F_a [N]			
Size				
63	280 240	340 320	390 380	430 440
71	330 240	410 320	470 380	510 440
80	510 400	640 500	750 600	810 670
90 S + L	620 445	770 560	890 680	970 750
100 L	810 600	1010 760	1170 930	1300 1020
112 M	1070 810	1330 1090	1510 1340	1710 1490
132 S	1430 1190	1740 1610	2010 1900	2200 2160
132 M	1470 1190	1810 1610	2080 1900	2250 2160
160 M	1850 1450	2190 1940	2560 2300	2780 2630
160 L	1920 1450	2250 1940	2650 2300	2880 2630
180 M	2410 1800	2870 2300	3290 3000	3670 3500
180 L	2510 1800	2990 2300	3430 3000	3830 3500

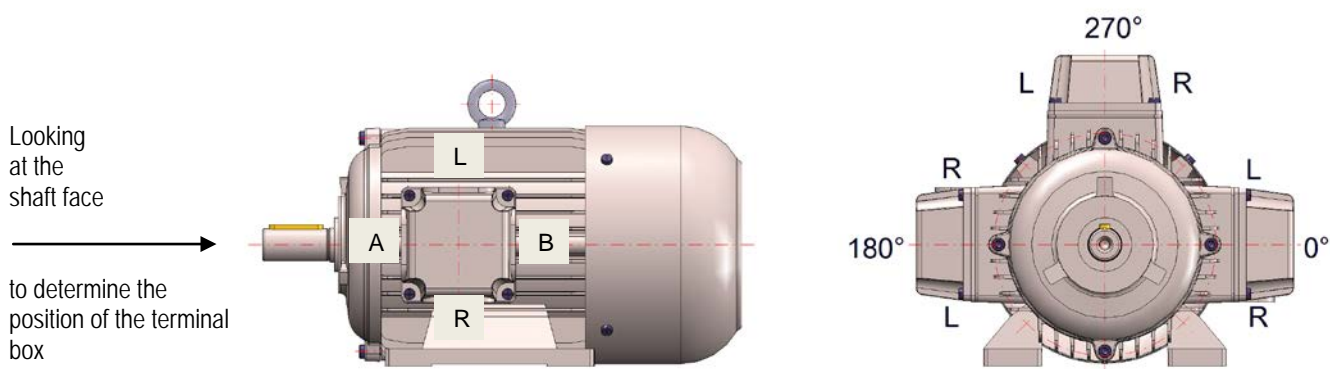
The above permissible loads are either radial or axial forces and apply to 50 Hz operation and a calculated bearing service life of 20,000 h. For 60 Hz operation, subtract approx. 10 %.

Terminal box position

The illustration below shows possible terminal box configurations and cable entry positions:



Standard terminal box configuration = 0°R



By default, the brake release lever (if present) and the terminal box of the external fan are in a line with the terminal box of the motor. Other versions have to be ordered separately.



Cable entries into the terminal box

The terminal boxes feature threads DIN EN 60423 for cable glands acc. to DIN EN 50262 but come without glands. Explosion-protected motors Zone 2 / Zone 22 come with ATEX cable glands and ATEX plug screws.

The customer is responsible for correct connection in compliance with generally applicable VDE standards. A terminal strip acc. to DIN 46294 is provided in the terminal box for this purpose.

The terminal boxes (covers) for size 63-160 are made of an aluminium alloy. Cast iron for size 180. Cast iron housings (special version on request) have terminal boxes also made of cast iron.

Size	Thread of contact screw	DIN 42925	HEW (IP 54/IP 55)	HEW (> IP 55)	Zone 2 / 22 Without brake	Zone 22 with brake
63	M4	-	2x M16x1.5 ¹⁾	2x M16x1.5	1x M16x1.5 1x M16x1.5 ²⁾	2x M16x1.5
71	M4	-	2x M16x1.5 ¹⁾	2x M16x1.5	1x M16x1.5 1x M16x1.5 ²⁾	2x M16x1.5
80	M4	-	2x M20x1.5 ¹⁾	2x M25x1.5	1x M25x1.5 1x M25x1.5 ²⁾	1x M25x1.5 1x M16x1.5
90	M4	1x M25x1.5	2x M20x1.5 ¹⁾	2x M25x1.5	1x M25x1.5 1x M25x1.5 ²⁾	1x M25x1.5 1x M16x1.5
100	M4	1x M32x1.5	2x M20x1.5 ¹⁾	2x M25x1.5	1x M25x1.5 1x M25x1.5 ²⁾	1x M25x1.5 1x M16x1.5
112	M5	2x M32x1.5	2x M20x1.5 ¹⁾	2x M25x1.5	1x M25x1.5 1x M25x1.5 ²⁾	1x M25x1.5 1x M16x1.5
132	M6	2x M32x1.5	2x M25x1.5 1x M12x1.5 ²⁾	2x M25x1.5 1x M12x1.5 ²⁾	1x M25x1.5 1x M25x1.5 ²⁾ 1x M12x1.5 ²⁾	1x M25x1.5 1x M16x1.5 1x M12x1.5 ²⁾
160	M8	2x M40x1.5	2x M32x1.5 1x M12x1.5 ²⁾	2x M32x1.5 1x M12x1.5 ²⁾	2x M32x1.5 1x M12x1.5 ²⁾	2x M32x1.5 1x M12x1.5 ²⁾
180	M8	2x M40x1.5	2x M40x1.5 1x M12x1.5 ²⁾	2x M40x1.5 1x M12x1.5 ²⁾	2x M40x1.5 1x M12x1.5 ²⁾	2x M40x1.5 1x M12x1.5 ²⁾

¹⁾ one-piece terminal box cover

²⁾ closed with screw plug

Other versions have to be ordered separately by the customer and agreed upon with HEW.

Single-phase motors with relay: see column > IP 55 / with operating capacitor only: see column IP 54 / IP 55.

Pole-changing motor > 6 Versions have to be agreed upon with HEW.

Special versions such as plugs or fitted cable set with and without terminal box are available.



Noise

All of the motors operate within the noise limits specified in DIN EN 60034-9. The A-rated average of the measuring surface sound pressure level L_{pA} at a distance of 1 m and the acoustic power level L_{WA} is specified.

The values only apply to single-revolution three-phase motors in thermal class "F" during mains operation with a nominal frequency of 50 Hz and a tolerance of +3dB(A).

Size	Sound pressure level L_{pA}							
	3000 rpm		1500 rpm		1000 rpm		750 rpm	
	L_{pA} dB (A)	L_{WA} dB (A)	L_{pA} dB (A)	L_{WA} dB (A)	L_{pA} dB (A)	L_{WA} dB (A)	L_{pA} dB (A)	L_{WA} dB (A)
63	55	64	46	55	41	50	-	-
71	58	67	49	58	43	52	38	47
80	60	69	47	56	47	56	44	53
90	64	73	52	61	49	58	47	56
100	69	78	56	65	48	57	46	55
112	71	80	56	65	49	58	49	58
132	71	81	60	70	55	65	52	62
160	72	82	62	72	59	69	54	64
180	72	83	62	73	60	71	60	71

Details for pole-changing three-phase current motors or deviating operating conditions on request.

Vibration

All armatures of the motors are dynamically balanced with half feather keys in accordance with DIN ISO 21940-32.

The vibration behaviour of the motors corresponds to the vibration severity level A in accordance with DIN EN 60034-14 (see following table).

Vibration severity level B can be supplied on request for quieter running.

The vibration speed v_{eff} [mm/s] is measured with standard motors with a speed of between 600 rpm and 3600 rpm.

Vibration limits for electric machines in accordance with DIN EN 60034-14.

Vibration severity level	Vibration severity limits dependent on size v_{eff} [mm/s]	
	Sizes 56 to 132	Sizes 160 to 280
A	1.6	2.2
B	0.7	1.1

Electrical design

Output, voltage and frequency

In the basic version, the motors are supplied for the following nominal voltages:

Voltage / circuit V	Frequency Hz	Output Factor $\square P_n$	Torque Factor $\square P_n$	Current Factor $\square P_n$
230 / 400 Δ / Y	50	1.0	1.00	1.0
254 / 440 Δ / Y	60	1.0	0.83	0.9
277 / 480 Δ / Y	60	1.2	1.00	1.0
400 / 690 Δ / Y	50	1.0	1.00	1.0
440 Δ	60	1.0	0.83	0.9
480 Δ	60	1.2	1.00	1.0

The permissible voltage-frequency fluctuations correspond to the conditions of DIN EN 60034-1.
Special voltages and frequencies and wide-range voltage versions by customer request.
For frequency inverter operation see page 1/15.

The nominal output applies to continuous operation in accordance with DIN EN 60034-1, in relation to a coolant temperature of 40° C and an installation elevation of <1000 m above sea level.

The following must be taken into consideration when selecting the best possible motor output:

- Required working machine output
- Operating mode
- Start-up, braking and reversing mode
- Torque curve of working machine
- Mains conditions
- Cooling, coolant temperature
- Installation elevation etc.

Heating and thermal classes

The choice of individual insulation system components determines the classification in the thermal classes in accordance with DIN EN 60034-1.

The limit temperature of the individual thermal classes consists of the coolant temperature of max. 40° C and the average temperature rise limit of the winding.

The following table shows the connection between the thermal classes and the limit temperatures:

Thermal class	Assigned limit temperature
B	120° C
F	145° C
H	165° C

HEW supplies the motors in thermal class F as standard.

The windings are always manufactured with phase insulation as well as high-quality enamelled wire and impregnating resin. The high degree of electrical strength that this achieves is the guarantee of problem-free use of the motors on the frequency inverter.

Capacity

According to DIN EN 60034-1, the motors can be overloaded with 1.5 times the nominal current for a period of 2 minutes or 1.6 times the nominal torque over a period of 15 seconds.



Rotation direction

Basically, the motors are suited for both directions of rotation. The winding leads U1, V1, W1 of the motors are designed such that the motor turns in clockwise direction if they are connected to the 3-phase mains to L1, L2, L3 respectively.

The motor turns counter clockwise if two outer leads are swapped (e.g. L1 with L2).

The rotation direction is indicated when looking at the shaft face (DS).

Earthing and PE connection

The motors feature a PE connection near the terminal strip. Explosion-protected motors always feature an additional external earthing terminal at the housing.

Operation on 60 Hz mains

Motors designed for 50 Hz can also be operated on 60 Hz mains. For the effect on the rated data, please refer to the table below.

Frequency Hz	Voltage factor - U_n	Power factor - P_n	Speed factor - n_n	Torque factor - M_n	Start-up torque factor - M_{An}	Breakdown torque factor - M_{Kn}
50	1.00	1.00	1.00	1.00	1.00	1.00
60	1.00	1.00	1.20	0.83	0.69	0.69
60	1.20	1.20	1.20	1.00	1.00	1.00

Operation on the frequency converter

When operated on a frequency inverter, the speed of three-phase asynchronous motors can be set or adjusted continuously via the frequency.

Careful planning is the prerequisite for optimum matching of inverter and motor.

The motor selection primarily depends on the desired speed range and the torque curve of the working machine. Then follows the selection of the winding and the cut-off frequency (break frequency).

An evaluation of the minimum and maximum speed determines whether or not the motor requires an external fan. This depends on the following factors:

- Size
- Number of poles
- Operating mode
- Ambient conditions
- Available thermal reserves



U/f = constant up to 50 Hz:
 Field weakening operation 50 Hz and above
 Winding designed for 230 / 400 V or 400 / 690 V
 Maximum inverter voltage 230 V or 400 V

			Mains		Inverter	
f Hz	U V	Circuit	P _N	M/M _n	P _N	M/M _n
5	40 ¹⁾	Δ / Y ²⁾			0.10	1.00
50	400	Δ / Y ²⁾	1.00	1.00	1.00	1.00
87	400	Δ / Y ²⁾			1.00	0.57

- 1) - Boost setting ignored
- 2) - Depends on the winding design

When operated with an inverter and U/f = constant, the flux and the torque in the motor remain constant. Inverter, winding design and specification of the cut-off frequency determine the range where such operation is possible. In field weakening operation, the voltage remains constant, only the frequency is increased. The torque drops proportional with 1/f (operation with constant power). The tables show different power and torque curves over a frequency range up to 87 Hz.

Boost setting:

To keep the flux constant, the inverter output voltage has to be increased in the lower frequency range with the static boost. This prevents excessive slippage, which would cause the motor to heat up and fail. The amount of the rise depends on the size, the number of poles and the motor design and has to be optimised in dependence on the drive.

U/f = constant up to 87 Hz:
 Winding design 230 / 400 V
 Maximum inverter output voltage 400 V

			Mains		Inverter	
f Hz	U V	Circuit	P _N	M/M _n	P _N	M/M _n
5	23 ¹⁾	Δ			0.10	1.00
50	230	Δ	1.00	1.00	1.00	1.00
87	400	Δ			1.73	1.00

- 1) - Boost setting ignored
- 2) - Depends on the winding design

Special versions on demand



Motor protection

A motor protection switch monitoring the current must be set to the nominal current indicated on the rating plate. Only a motor protection directly measuring the temperature is effective in case of frequent switching, short-term operation, coolant failure or great temperature amplitudes. To this end, there are the following options:

- **Temperature switch as NC (PTO)**
When the temperature matching the thermal class is exceeded, the temperature switch automatically opens the auxiliary circuit and switches on only when the temperature has dropped significantly.
Switching capacity: For AC: 250 V 1.6 A.
- **PTC protection:**
The integrated PTCs are operated in conjunction with a triggering device. If the nominal temperature specific for the thermal class of the motor is exceeded, the temperature sensors abruptly change their resistance, which is evaluated by the triggering device in the control circuit. The relay installed in the device has a changeover contact whose NO and NC contacts can be used for control purposes.
Advantage: Safety device monitors itself; low switching tolerance; fast switching on of the drive.
- **Measuring the winding or bearing temperature**
With PT 100 platinum temperature sensors or KTY sensors, the temperatures of the motor winding or bearing can be measured directly.

By default, the temperature monitoring connections are led out to a terminal strip in the main terminal box. If desired, a separate terminal box for the auxiliary equipment can be fitted.

Installation altitude and coolant temperature

For coolant temperatures other than 40° C
or installation altitudes above 1000 m above sea level,
power reductions are required.
In this case, the nominal power has to be corrected
with the factors given in the table below:

Installation altitude above sea level	Ambient temperature in °C			
	40	45	50	60
1000 m	1.00	0.96	0.92	0.82
1500 m	0.97	0.95	0.89	0.79
2000 m	0.94	0.9	0.86	0.77
2500 m	0.90	0.86	0.83	0.74
3000 m	0.86	0.82	0.79	0.70
3500 m	0.82	0.79	0.75	0.67
4000 m	0.77	0.74	0.71	0.63



Cooling (ventilation)

Internal ventilation (IC 411):

All standard motors are equipped with a robust and temperature-resistant plastic fan. On customer's request, a glass fibre-reinforced or metal version is also possible.

External ventilation (IC 416):

External fans are also used to increase the nominal power, in case of high switching frequencies and, if necessary, for inverter operation.

External fans are available as single-phase or three-phase variants.

Unventilated (IC 410):

used for special motors with adapted power or restricted duty cycle (on request).

Liquid cooling (IC 3S7):

used for hygiene motors (see part 14).

Standstill heating

A standstill heating can be implemented in motors whose windings are subject to condensation, e.g. motors at standstill in humid environments or motors subject to high temperature fluctuations.

This solution warms up the air inside the motor via the outside temperature, which prevents condensation inside the motor. The standstill heating must not be switched on while the motor is in operation.

Motor size	Heating power W	Supply voltage V
63	50	230 ± 10%
71	50	230 ± 10%
80	50	230 ± 10%
90	50	230 ± 10%
100	52	230 ± 10%
112	52	230 ± 10%
132	52	230 ± 10%
160	80	230 ± 10%
180	80	230 ± 10%

Standard three-phase motors

2



Three-phase motors

Number of poles: 2

Nominal data at 400V, 50 Hz

Thermal class F

Operating mode: S1

Synchronous speed: 3000 rpm

Surface cooling IC 411

Type	Nominal power	Nominal speed	Nominal current	Power factor	Nominal torque	Start-up to nominal current	Start-up to nominal torque	Breakdown to nominal torque	Moment of inertia	Weight IM B3
R	P_N kW	n_N rpm	I_N A	$\cos \varphi$	M_N Nm	I_a/I_N	M_a/M_N	M_k/M_N	J kgm ²	M appr. kg
63K/2	0.18	2780	0.55	0.72	0.62	3.5	2.4	3.4	0.00014	4.5
63L/2	0.25	2800	0.70	0.81	0.84	4.3	2.8	4.3	0.00019	5
71K/2	0.37	2810	0.95	0.78	1.3	4.6	2.2	2.7	0.00034	6
71L/2	0.55	2835	1.3	0.82	1.9	5.6	2.9	2.8	0.00042	7
80K/2	0.75	2845	1.65	0.84	2.5	5.3	3.2	3.2	0.00064	9
80L/2	1.1	2855	2.40	0.85	3.7	6.2	3.1	3.2	0.00079	10
90S/2	1.5	2890	3.40	0.80	5.0	5.9	2.5	3.2	0.00124	14
90L/2	2.2	2870	4.50	0.88	7.3	6.3	2.8	2.9	0.00155	17
100L/2	3.0	2845	6.45	0.84	10.2	6.1	3.2	3.0	0.00255	20
112M/2	4.0	2875	8.1	0.87	13.3	4.5	2.2	3.6	0.0043	29
132S/2	5.5	2900	10.5	0.90	18	5.1	2.3	3.4	0.0097	42
132S/20	7.5	2890	14.0	0.91	24.7	6.7	2.4	3.0	0.0122	48
160M/2	11.0	2930	22.5	0.89	35.4	6.6	2.1	4.0	0.0294	104
160M/20	15.0	2950	27.2	0.89	48.7	8.2	3.3	3.5	0.0394	119
160L/2	18.5	2950	34.0	0.87	59.8	9.3	4.1	4.0	0.0459	135
180M/2	22.0	2950	40.0	0.89	71	6.0	4.0	4.1	0.0615	174
180L/2	30.0	2950	53.2	0.92	97	7.2	2.5	3.7	0.0704	185

Subject to technical amendments



Three-phase motors

Number of poles: 4

Nominal data at 400V, 50 Hz

Thermal class F

Operating mode: S1

Synchronous speed: 1500 rpm

Surface cooling IC 411

Type	Nominal power	Nominal speed	Nominal current	Power factor	Nominal torque	Start-up to nominal current	Start-up to nominal torque	Breakdown to nominal torque	Moment of inertia	Weight IM B3
R	P_N kW	n_N rpm	I_N A	$\cos \varphi$	M_N Nm	I_A/I_N	M_A/M_N	M_k/M_N	J kgm ²	M appr. kg

63K/4	0.12	1350	0.45	0.68	0.85	2.95	2.1	2.5	0.00020	4.5
63L/4	0.18	1380	0.65	0.65	1.3	3.10	2.3	2.5	0.00025	5
71K/4	0.25	1415	0.70	0.76	1.7	4.4	2.5	3.1	0.00052	6.5
71L/4	0.37	1400	1.0	0.72	2.5	4.2	2.4	2.6	0.00637	7.5
80K/4	0.55	1375	1.4	0.76	3.9	4.0	2.3	2.2	0.00099	9
80L/4	0.75	1400	1.90	0.75	5.0	4.2	2.1	2.3	0.00126	10
90S/4	1.1	1420	2.7	0.75	7.4	4.5	2.2	2.6	0.00193	13.5
90L/4	1.5	1410	3.5	0.80	10.2	5.1	2.3	2.7	0.00243	15
100L/4	2.2	1420	4.9	0.81	14.9	4.6	1.8	2.3	0.00387	19
100L/40	3.0	1420	6.5	0.81	19.9	5.1	2.1	2.5	0.00498	23
112M/4	4.0	1440	8.3	0.81	26.5	6.2	2.3	3.0	0.0101	34
132S/4	5.5	1450	12	0.78	36.5	5.7	2.3	2.4	0.0210	47
132M/4	7.5	1450	15	0.84	49.5	5.9	2.2	2.8	0.0275	64
160M/4	11	1440	22.5	0.81	72	4.7	2.3	2.5	0.05122	109
160L/4	15	1460	30.2	0.80	98	5.0	2.7	3	0.0667	129
180M/4	18.5	1470	36	0.86	120	4.2	3.1	3.2	0.1135	177
180L/4	22	1460	43	0.86	144	5.5	2.6	2.7	0.1346	200

Subject to technical amendments



Three-phase motors

Number of poles: 6

Nominal data at 400V, 50 Hz

Thermal class F

Operating mode: S1

Synchronous speed: 1000 rpm

Surface cooling IC 411

Type	Nominal power	Nominal speed	Nominal current	Power factor	Nominal torque	Start-up to nominal current	Start-up to nominal torque	Breakdown to nominal torque	Moment of inertia	Weight IM B3
R	P_N kW	n_N rpm	I_N A	$\cos \varphi$	M_N Nm	I_A/I_N	M_A/M_N	M_k/M_N	J kgm ²	M appr. kg

63K/6	0.09	870	0.40	0.75	1.0	2.5	1.7	1.8	0.00029	4.5
63L/6	0.12	880	0.55	0.73	1.2	2.5	2.9	3.0	0.00042	5.0
71K/6	0.18	920	0.65	0.67	1.8	2.9	2.1	2.25	0.00081	6.5
71L/6	0.25	915	0.95	0.69	2.6	2.6	1.9	2.2	0.00101	7.5
80K/6	0.37	940	1.3	0.62	3.8	3.6	2.2	2.2	0.00191	10
80L/6	0.55	920	1.7	0.74	5.8	3.5	2.5	2.6	0.00239	11
90S/6	0.75	925	2.4	0.65	7.7	3.2	2.2	2.6	0.00303	14.5
90L/6	1.1	910	3.05	0.69	11.5	3.5	2.0	2.4	0.00416	16.5
100L/6	1.5	920	3.70	0.76	15.0	4.0	1.8	2.25	0.00857	21.5
112M/6	2.2	960	5.60	0.70	22.0	5.2	2.75	2.8	0.0158	31
132S/6	3.0	970	7.4	0.71	29.7	5.4	2.45	2.68	0.0262	46
132M/6	4.0	965	9.4	0.73	40	5.2	2.1	3.1	0.0323	52
132M/60	5.5	965	12.6	0.75	55	5.3	1.9	2.6	0.0384	55
160M/6	7.5	970	16	0.76	75.6	4.4	1.9	2.6	0.0792	112
160L/6	11.0	970	22.6	0.83	108	5.3	1.6	2.3	0.1099	135
180L/6	15.0	965	30.5	0.82	148	4.5	2.4	2.9	0.1650	200

Subject to technical amendments



Three-phase motors

Number of poles: 8

Nominal data at 400V, 50 Hz

Thermal class F

Operating mode: S1

Synchronous speed: 750 rpm

Surface cooling IC 411

Type	Nominal power	Nominal speed	Nominal current	Power factor	Nominal torque	Start-up to nominal current	Start-up to nominal torque	Breakdown to nominal torque	Moment of inertia	Weight IM B3
R	P_N kW	n_N rpm	I_N A	$\cos \varphi$	M_N Nm	I_A/I_N	M_A/M_N	M_k/M_N	J kgm ²	M appr. kg

63K/8	0.06	665	0.45	0.60	0.85	1.6	1.95	2.1	0.00029	4.5
63L/8	0.09	630	0.50	0.67	1.3	1.7	2.2	2.2	0.00042	5.0
71K/8	0.12	680	0.65	0.69	1.7	1.95	2.2	2.2	0.00081	6.0
71L/8	0.18	665	0.80	0.63	2.6	2.1	1.7	1.8	0.00101	7.0
80K/8	0.25	690	1.10	0.59	3.5	2.4	1.9	2.25	0.00191	9.0
80L/8	0.37	680	1.5	0.64	5.2	2.2	1.9	1.9	0.00239	10
90L/8	0.55	700	2.0	0.59	7.6	3.0	1.85	2.5	0.00416	14.5
100L/8	0.75	680	2.35	0.72	10	2.4	1.45	1.8	0.00657	19
100L/80	1.10	690	3.45	0.66	15.3	3.1	1.8	2.25	0.00857	21.5
112M/8	1.5	705	5.00	0.57	21	3.6	2.5	3.2	0.0158	31
132S/8	2.2	690	5.7	0.80	32	2.8	1.3	1.65	0.0261	42
132M/8	3.0	700	7.5	0.74	41	4.2	2.0	2.2	0.0345	49
160M/8	4.00	715	9.2	0.77	53	4.7	1.8	2.25	0.0688	101
160M/80	5.50	720	12.25	0.75	73	4.95	1.9	2.5	0.0874	116
160L/8	7.50	730	17.5	0.80	100	3.65	2.7	2.7	0.1182	136
180L/8	11.0	730	22	0.86	145	3.8	2.0	2.8	0.2031	200

Subject to technical amendments



Three-phase motors

Number of poles: 12

Nominal data at 400V, 50 Hz

Thermal class F

Operating mode: S1

Synchronous speed: 500 rpm

Surface cooling IC 411

Type	Nominal power	Nominal speed	Nominal current	Power factor	Nominal torque	Start-up to nominal current	Start-up to nominal torque	Breakdown to nominal torque	Moment of inertia	Weight IM B3
R	P_N kW	n_N rpm	I_N A	$\cos \varphi$	M_N Nm	I_A/I_N	M_A/M_N	M_k/M_N	J kgm ²	M appr. kg

71K/12	0.06	430	0.55	0.58	1.35	1.4	1.5	1.75	0.00081	6.5
71L/12	0.08	415	0.60	0.62	1.85	1.55	1.5	1.9	0.00101	7.5
80K/12	0.12	425	0.85	0.57	2.7	1.35	1.3	2.9	0.00191	10
80L/12	0.18	120	1.15	0.58	4.10	1.75	1.85	2.2	0.00239	11
90L/12	0.25	400	1.7	0.52	6.0	1.25	1.55	1.7	0.00416	16.5
100L/12	0.37	460	2.0	0.48	8	2.3	1.7	1.85	0.00657	21.5
100L/120	0.55	405	2.65	0.62	12.5	2.3	1.2	1.4	0.00857	24
112M/12	0.75	470	3.7	0.49	15	2.25	2.1	2.75	0.0158	31
132S/12	1.10	485	4.7	0.55	22	2.1	1.5	2.15	0.0262	46
132M/12	1.50	480	5.5	0.66	30	2.2	1.55	2.2	0.0323	52
132M/120	2.00	450	8.0	0.62	36	2.5	1.5	2.0	0.0384	55
160M/12	3.00	480	11.8	0.65	62	3.4	1.75	2.7	0.0792	112
160L/12	3.70	480	14.0	0.65	75	2.7	1.8	2.8	0.1099	135
180L/12	7.00	480	23.0	0.67	139	3.15	2.0	2.7	0.1645	200

Subject to technical amendments

Standard three-phase motors, efficiency class IE2



Three-phase motors

Efficiency IE2 – DIN EN 60034-30

Number of poles: 2

Nominal data at 400V, 50 Hz

Thermal class F

Operating mode: S1

Synchronous speed: 3000 rpm

Surface cooling IC 411

Type R	Nominal power P_N kW	Nominal speed n_N rpm	Nominal current I_N A	Power factor $\cos \varphi$	Nominal torque M_N Nm	Efficiency			Start-up to nominal current I_A/I_N	Start-up to nominal torque M_A/M_N	Breakdown to nominal torque M_k/M_N	Moment of inertia J kgm ²	Weight IM B3 M appr. kg
						η							
						$4/4 \times P_N$ %	$3/4 \times P_N$ %	$1/2 \times P_N$ %					

80K/2	0.75	2850	1.65	0.81	2.5	81.3	81	77.6	6.2	3.9	3.6	0.00064	9
80L/2	1.1	2860	2.4	0.80	3.7	82.9	82.6	79.8	6.65	4.1	3.9	0.00079	10
90S/2	1.5	2860	3.2	0.83	5	81.9	81.8	79.3	5.75	2.8	3.0	0.00124	14
90L/2	2.2	2880	4.5	0.83	7.3	85.6	85.5	83.3	7.0	3.8	3.65	0.00155	17
100L/20	3	2890	6.25	0.82	9.9	84.7	84.5	82.0	7.6	3.9	3.6	0.00295	22
112M/2	4	2920	8.10	0.83	13.1	86.1	85.8	83.7	8.25	3.95	3.6	0.0043	29
132S/20	5.5	2945	10.25	0.89	17.8	87.5	86.6	83.8	9.0	3.6	4.2	0.0122	48
132S/200	7.5	2950	14.0	0.87	24	88.6	87.9	85.3	9.6	3.8	4.45	0.0147	54
160M/20	11	2965	20.0	0.89	35.4	89.5	88.3	85.4	10.8	4.5	4.75	0.0394	119
160L/2	15	2960	26.75	0.9	48.3	90.3	89.6	87.4	10.3	4.0	4.45	0.0459	135
160L/20	18.5	2965	34.0	0.86	59.7	91.0	90.3	88.0	11.35	5.3	5.1	0.0564	141
180M/2	22	2960	39.80	0.87	71	91.9	91.5	89.9	10.1	3.65	4.05	0.0615	174
180L/20	30	2955	53.0	0.88	97	93.0	92.9	91.7	10.3	3.5	4.2	0.0791	180

Subject to technical amendments



Three-phase motors

Efficiency IE2 – DIN EN 60034-30

Number of poles: 4

Nominal data at 400V, 50 Hz

Thermal class F

Operating mode: S1

Synchronous speed: 1500 rpm

Surface cooling IC 411

Type	Nominal power P_N kW	Nominal speed n_N rpm	Nominal current I_N A	Power factor $\cos \varphi$	Nominal torque M_N Nm	Efficiency			Start-up to nominal current I_A/I_N	Start-up to nominal torque M_A/M_N	Breakdown to nominal torque M_k/M_N	Moment of inertia J kgm ²	Weight IM B3 M appr. kg
						η							
						4/4xP _N %	3/4xP _N %	1/2xP _N %					

80L/4	0.75	1410	1.90	0.71	5.0	80.4	80.6	78.2	4.6	2.6	2.65	0.00126	10
90S/40	1.1	1425	2.60	0.75	7.35	81.8	81.7	79.1	5.0	2.6	2.8	0.00216	14
90L/4	1.50	1420	3.50	0.74	10.0	83.4	83.4	80.8	5.25	2.3	3.0	0.00243	15
100L/40	2.2	1450	4.75	0.78	14.5	86.3	86.3	84.4	6.45	2.6	3.0	0.00498	23
100L/400	3.0	1435	6.35	0.80	20.0	85.5	85.5	83.3	5.9	2.35	2.9	0.00559	25
112M/4	4.0	1450	8.35	0.80	26.5	86.6	86.7	84.7	6.3	2.6	3.2	0.0101	34
132S/40	5.5	1460	11.6	0.78	36.5	87.7	87.6	85.4	7.2	3.4	3.5	0.0231	50
132M/40	7.5	1460	14.9	0.81	49.0	89.3	89.4	88.0	7.1	3.1	3.2	0.0316	70
160L/4S	11	1475	23.9	0.74	71.2	90.0	89.4	87.2	7.9	3.95	3.7	0.0702	133
160L/40	15	1470	28.6	0.83	97.2	90.9	91.0	90.0	6.4	2.15	2.95	0.0804	142
180L/4	18.5	1475	35.0	0.83	119.5	92.0	92.0	91.0				0.1227	204
180L/40	22	1475	42.4	0.81	141.8	92.1	92.1	91.0	8.1	3.25	3.7	0.1663	225

Subject to technical amendments



Three-phase motors

Efficiency IE2 – DIN EN 60034-30

Number of poles: 6

Nominal data at 400V, 50 Hz

Thermal class F

Operating mode: S1

Synchronous speed: 1000 rpm

Surface cooling IC 411

Type R	Nominal power P_N kW	Nominal speed n_N rpm	Nominal current I_N A	Power factor $\cos \varphi$	Nominal torque M_N Nm	Efficiency			Start-up to nominal current I_A/I_N	Start-up to nominal torque M_A/M_N	Breakdown to nominal torque M_k/M_N	Moment of inertia J kgm ²	Weight IM B3 M appr. kg
						η							
						4/4xP _N %	3/4xP _N %	1/2xP _N %					

90L/6	0.75	940	2.00	0.69	7.6	78.1	77.6	74.0	4.1	2.2	2.4	0.00416	16.5
90L/60	1.1	930	2.95	0.68	11.2	78.6	78.6	75.7	4.0	2.3	2.3	0.00419	18
100L/6	1.50	950	3.70	0.71	15.0	82.6	82.5	79.9	4.9	2.4	2.6	0.00857	21.5
112M/6	2.2	950	5.50	0.71	21.8	83.3	83.3	80.9	5.15	2.75	2.8	0.0158	31
132S/6	3	960	7.25	0.69	29.5	85.3	85.4	83.4	5.2	2.4	2.9	0.0262	46
132M/6	4	960	9.75	0.70	39.5	85.1	85.2	83.3	5.15	2.5	2.75	0.0323	52
132M/600	5.5	965	12.5	0.73	54.4	87.0	87.6	86.8	6.9	2.75	2.85	0.0424	64
160M/6	7.5	975	15.5	0.79	73.5	88.8	88.5	86.7	7.0	2.4	3.6	0.0792	112
160L/6	11	975	23.3	0.79	108	89.6	89.6	88.3	7.0	2.3	3.5	0.1099	135
180L/6	15	975	30.5	0.79	147	89.7	89.6	88.1	6.7	2.2	3.4	0.1650	200

Subject to technical amendments

Standard three-phase motors, efficiency class IE3



Three-phase motors

Efficiency IE3 – DIN EN 60034-30

Number of poles: 2

Nominal data at 400V, 50 Hz

Thermal class F

Operating mode: S1

Synchronous speed: 3000 rpm

Surface cooling IC 411

Type	Nominal power	Nominal speed	Nominal current	Power factor	Nominal torque	Efficiency			Start-up to nominal current	Start-up to nominal torque	Breakdown to nominal torque	Moment of inertia	Weight IM B3
						η							
R	P_N	n_N	I_N	$\cos \varphi$	M_N				I_A/I_N	M_A/M_N	M_k/M_N	J	M
	kW	rpm	A		Nm	4/4x P_N	3/4x P_N	1/2x P_N				kgm ²	appr. kg

Tech. data in preparation



Three-phase motors

Efficiency IE3 – DIN EN 60034-30

Number of poles: 4

Nominal data at 400V, 50 Hz

Thermal class F

Operating mode: S1

Synchronous speed: 1500 rpm

Surface cooling IC 411

Type	Nominal power	Nominal speed	Nominal current	Power factor	Nominal torque	Efficiency			Start-up to nominal current	Start-up to nominal torque	Breakdown to nominal torque	Moment of inertia	Weight IM B3
						η							
R	P_N	n_N	I_N	$\cos \varphi$	M_N	$4/4 \times P_N$	$3/4 \times P_N$	$1/2 \times P_N$	I_A/I_N	M_A/M_N	M_k/M_N	J	M
	kW	rpm	A		Nm	%	%	%				kgm ²	appr. kg

Tech. data in preparation



Three-phase motors

Efficiency IE3 – DIN EN 60034-30

Number of poles: 6

Nominal data at 400V, 50 Hz

Thermal class F

Operating mode: S1

Synchronous speed: 1000 rpm

Surface cooling IC 411

Type	Nominal power	Nominal speed	Nominal current	Power factor	Nominal torque	Efficiency			Start-up to nominal current	Start-up to nominal torque	Breakdown to nominal torque	Moment of inertia	Weight IM B3
						η							
R	P_N	n_N	I_N	$\cos \varphi$	M_N	$4/4xP_N$	$3/4xP_N$	$1/2xP_N$	I_A/I_N	M_A/M_N	M_K/M_N	J	M
	kW	rpm	A		Nm	%	%	%				kgm ²	appr. kg

Tech. data in preparation

Standard pole-changing motors



Three-phase motors

Number of poles: 4-2

Nominal data at 400V, 50 Hz Δ/YY

Thermal class F

Operating mode: S1

Synchronous speed: 1500-3000 rpm

Surface cooling IC 411

Type	Nominal power	Nominal speed	Nominal current	Power factor	Nominal torque	Start-up to nominal current	Start-up to nominal torque	Breakdown to nominal torque	Moment of inertia	Weight IM B3
R	P _N kW	n _N rpm	I _N A	cos φ	M _N Nm	I _A /I _N	M _A /M _N	M _K /M _N	J kgm ²	M appr. kg

71K/4-2	0.22	1410	0.80	0.80	1.5	3.0	1.9	2.4	0.00052	6.5
	0.30	2830	1.00	0.80	1.0	3.4	1.9	2.5		
71L/4-2	0.30	1410	1.00	0.80	2.0	3.3	2.0	2.4	0.00064	7
	0.45	2820	1.30	0.80	1.5	3.9	1.9	2.4		
80K/4-2	0.50	1410	1.40	0.78	3.4	3.8	1.9	3.2	0.00099	9
	0.60	2800	2.20	0.78	2.0	3.5	1.9	2.8		
80L/4-2	0.75	1400	2.00	0.82	5.1	3.8	2.0	2.7	0.00126	10
	1.10	2800	2.80	0.90	3.8	3.7	2.0	2.9		
90S/4-2	1.00	1410	2.90	0.71	6.8	4.4	2.0	3.2	0.00193	13.5
	1.40	2800	4.20	0.80	4.8	4.3	2.0	2.9		
90L/4-2	1.30	1430	3.00	0.85	8.7	5.1	2.3	2.9	0.00243	15
	1.80	2820	4.30	0.88	6.1	5.1	2.0	2.9		
100L/4-2	1.80	1430	4.10	0.87	12	5.0	1.9	2.8	0.00384	19
	2.30	2830	5.60	0.86	7.8	5.2	1.9	2.9		
100L/4-20	2.40	1420	5.10	0.88	16	5.0	1.9	2.5	0.00498	22.5
	3.10	2840	6.70	0.93	10	5.0	2.0	3.2		
112M/4-2	3.60	1440	7.80	0.84	24	5.0	2.8	3.2	0.0101	32
	4.40	2890	9.70	0.86	15	6.0	3.0	4.0		
132S/4-2	4.80	1450	10.5	0.84	32	5.3	2.6	3.3	0.0210	47
	6.00	2900	14.0	0.84	20	5.4	2.5	3.2		
132M/4-2	6.60	1470	14.5	0.83	43	5.6	3.0	3.4	0.0275	64
	8.00	2920	20.0	0.80	26	6.2	3.3	3.4		
160M/4-2	9.00	1470	19.0	0.86	58	5.0	2.8	3.6	0.0512	109
	11.0	2910	25.0	0.90	36	6.0	2.9	3.9		
160L/4-2	12.0	1470	22.0	0.88	78	5.0	2.7	3.0	0.0667	129
	15.0	2920	31.0	0.81	49	6.1	2.9	3.9		
180M/4-2	16.0	1470	29.0	0.89	104	5.0	2.6	2.9	0.1135	177
	18.5	2900	36.0	0.95	61	5.5	2.8	3.7		
180L/4-2	18.5	1480	36.0	0.87	119	5.1	2.5	3.0	0.1346	200
	22.0	2930	45.0	0.90	72	6.3	3.8	4.0		

Subject to technical amendments



Three-phase motors

Poles: 6-2

Nominal data at 400V, 50 Hz Y/Y

Thermal class F

Operating mode: S1

Synchronous speed: 1000-3000 rpm

Surface cooling IC 411

Type	Nominal power	Nominal speed	Nominal current	Power factor	Nominal torque	Start-up to nominal current	Start-up to nominal torque	Breakdown to nominal torque	Moment of inertia	Weight IM B3
R	P_N kW	n_N rpm	I_N A	$\cos \varphi$	M_N Nm	I_A/I_N	M_A/M_N	M_k/M_N	J kgm ²	M appr. kg

71L/6-2	0.12 0.37	930 2840	0.70 1.20	0.62 0.78	1.2 1.2	3.0 4.0	1.9 1.9	3.0 3.2	0.00637	7.5
80L/6-2	0.18 0.55	950 2900	1.00 1.60	0.62 0.75	1.9 1.9	3.0 4.9	2.1 2.1	2.7 3.1	0.00126	10
90S/6-2	0.25 0.75	950 2860	1.20 1.90	0.75 0.90	2.5 2.5	3.2 4.9	1.9 1.9	3.5 5.2	0.00193	14.5
90L/6-2	0.37 1.10	960 2880	1.85 3.00	0.65 0.83	3.7 3.6	3.4 5.7	2.7 2.7	4.1 3.1	0.00243	16.5
100L/6-2	0.50 1.50	960 2880	2.20 3.70	0.62 0.85	5.0 5.0	3.6 5.5	2.4 2.3	3.7 3.9	0.00387	20
100L/6-20	0.75 2.20	950 2880	2.90 4.80	0.70 0.88	7.5 7.3	3.6 5.8	2.0 1.8	3.6 4.4	0.00498	23
112M/6-2	0.95 2.60	960 2920	4.20 6.40	0.65 0.90	9.4 8.5	3.5 5.6	2.2 2.0	3.6 4.0	0.0101	32
132S/6-2	1.10 3.00	970 2920	3.80 8.00	0.65 0.78	11 9.8	4.3 7.1	2.6 2.9	3.5 4.4	0.0210	47
132M/6-2	1.50 4.50	970 2920	5.80 12.0	0.60 0.80	15 15	4.1 7.2	2.5 2.9	3.5 4.2	0.0275	64
160M/6-2	2.20 6.60	970 2920	7.00 17.0	0.62 0.82	22 22	4.9 6.5	3.6 2.8	4.7 3.9	0.0512	109
160L/6-2	3.00 9.00	970 2920	11.0 22.0	0.60 0.84	30 29	4.7 7.5	3.8 3.6	4.3 5.9	0.0668	129
180M/6-2	4.00 11.0	970 2920	14.0 31.0	0.60 0.81	39 36	4.9 6.7	4.1 3.2	4.4 5.2	0.1135	177
180L/6-2	5.50 15.0	970 2920	19.0 39.0	0.61 0.82	54 49	4.9 7.0	4.1 3.6	4.4 5.3	0.1346	200

Subject to technical amendments



Three-phase motors

Number of poles: 8-2

Nominal data at 400V, 50 Hz Y/Y

Thermal class F

Operating mode: S1

Synchronous speed: 750-3000 rpm

Surface cooling IC 411

Type	Nominal power	Nominal speed	Nominal current	Power factor	Nominal torque	Start-up to nominal current	Start-up to nominal torque	Breakdown to nominal torque	Moment of inertia	Weight IM B3
R	P_N kW	n_N rpm	I_N A	$\cos \varphi$	M_N Nm	I_A/I_N	M_A/M_N	M_k/M_N	J kgm ²	M appr. kg

71L/8-2	0.07 0.30	700 2800	0.80 1.30	0.60 0.76	1.0 1.0	1.9 3.5	2.2 2.2	2.8 3.0	0.00637	7.5
80L/8-2	0.12 0.37	720 2820	1.00 1.30	0.63 0.76	1.6 1.3	2.1 4.1	1.9 2.0	2.8 3.0	0.00126	10
90S/8-2	0.18 0.55	710 2860	1.30 2.10	0.65 0.70	2.4 1.8	1.9 4.2	1.9 2.6	3.6 3.8	0.00193	14.5
90L/8-2	0.25 1.00	720 2840	1.40 2.70	0.65 0.85	3.3 3.4	2.6 5.2	2.3 1.9	3.8 2.3	0.00243	16.5
100L/8-20	0.37 1.50	720 2910	1.70 3.80	0.70 0.80	4.9 4.9	2.4 6.4	1.5 2.5	3.3 5.3	0.00498	20
100L/8-200	0.55 2.20	720 2920	2.50 5.40	0.70 0.82	7.3 7.2	2.6 5.5	1.4 1.9	2.6 3.5	0.00498	23
112M/8-2	0.65 2.40	720 2940	3.00 5.70	0.60 0.85	8.6 7.8	2.9 6.7	2.7 2.0	3.3 3.7	0.0101	32
132S/8-2	0.75 2.80	720 2950	3.10 9.00	0.60 0.71	9.9 9.1	2.7 7.1	2.4 2.6	3.1 3.3	0.0210	47
132M/8-2	1.00 4.00	730 2950	4.00 11.0	0.70 0.75	13 13	2.8 7.8	2.0 3.9	2.6 4.9	0.0275	64
160M/8-2	1.50 6.00	730 2940	6.00 16.0	0.60 0.82	20 19	2.0 4.3	2.1 3.3	2.7 5.5	0.0512	109
160L/8-2	2.20 9.00	730 2940	8.00 22.0	0.60 0.83	29 29	3.2 8.2	2.1 4.2	2.9 5.3	0.0667	129
180M/8-2	2.50 10.0	730 2950	9.00 23.0	0.68 0.81	33 32	2.9 7.0	1.8 2.7	2.9 4.3	0.1135	177
180L/8-2	3.00 12.0	730 2950	9.00 25.0	0.72 0.80	39 39	3.0 7.2	1.6 2.6	1.9 4.4	0.1346	200

Subject to technical amendments



Three-phase motors

Number of poles: 12-2

Nominal data at 400V, 50 Hz Y/Y

Thermal class F

Operating mode: S1

Synchronous speed: 500-3000 rpm

Surface cooling IC 411

Type	Nominal power	Nominal speed	Nominal current	Power factor	Nominal torque	Start-up to nominal current	Start-up to nominal torque	Breakdown to nominal torque	Moment of inertia	Weight IM B3
R	P_N kW	n_N rpm	I_N A	$\cos \varphi$	M_N Nm	I_A/I_N	M_A/M_N	M_k/M_N	J kgm ²	M appr. kg
90S/12-2	0.09	400	0.90	0.80	2.1	1.4	1.7	2.5	0.00193	14.5
	0.75	2800	1.70	0.85	2.6	5.8	2.0	2.7		
90L/12-2	0.12	420	1.10	0.73	2.7	1.4	2.5	3.5	0.00243	16.5
	0.90	2860	2.60	0.82	3.0	6.0	2.1	2.8		
100L/12-2	0.18	420	1.30	0.74	4.1	1.5	1.4	2.8	0.00387	20
	1.10	2880	2.80	0.85	3.6	5.9	1.9	3.5		
100L/12-20	0.25	460	1.80	0.70	5.2	1.7	1.2	2.5	0.00198	23
	1.50	2900	4.20	0.85	4.9	6.4	1.8	3.8		
112M/12-2	0.37	460	2.50	0.60	7.7	1.6	1.5	2.4	0.0101	32
	2.20	2920	6.10	0.80	7.2	7.1	2.6	4.0		
132S/12-2	0.50	480	3.20	0.51	10	1.8	2.0	2.6	0.0210	47
	3.00	2920	8.30	0.76	9.8	6.7	2.3	4.9		
132M/12-2	0.65	470	4.00	0.50	13	1.7	1.6	2.7	0.2753	64
	4.00	2950	10.0	0.86	13	7.1	2.2	4.9		

Subject to technical amendments



Three-phase motors

Number of poles: 6-4

Nominal data at 400V, 50 Hz Y/Y

Thermal class F

Operating mode: S1

Synchronous speed: 1000-1500 rpm

Surface cooling IC 411

Type	Nominal power	Nominal speed	Nominal current	Power factor	Nominal torque	Start-up to nominal current	Start-up to nominal torque	Breakdown to nominal torque	Moment of inertia	Weight IM B3
R	P _N kW	n _N rpm	I _N A	cos φ	M _N Nm	I _A /I _N	M _A /M _N	M _k /M _N	J kgm ²	M appr. kg

71L/6-4	0.12 0.18	930 1430	0.70 0.80	0.71 0.79	1.3 1.2	2.0 3.0	1.6 1.4	2.0 1.9	0.00064	6.5
80K/6-4	0.25 0.30	930 1420	1.10 1.20	0.75 0.77	2.6 2.0	3.0 3.3	1.5 1.9	2.6 3.7	0.00191	10
80L/6-4	0.30 0.45	920 1420	1.20 2.00	0.74 0.70	3.1 3.0	3.1 3.3	1.6 2.2	3.4 3.8	0.00239	11
90S/6-4	0.40 0.60	930 1450	1.40 2.1	0.74 0.70	4.2 4.1	3.0 4.2	1.4 1.5	2.0 2.3	0.00193	13.5
90L/6-4	0.60 0.90	940 1440	1.90 2.60	0.78 0.80	6.1 6.0	3.5 4.3	1.7 1.6	2.6 3.0	0.00243	16.5
100L/6-4	0.80 1.20	950 1450	2.70 3.10	0.72 0.79	8.0 7.9	3.3 4.3	1.6 1.5	3.5 3.5	0.00387	19
100L/6-40	1.20 1.70	940 1450	3.60 4.60	0.71 0.76	12 11	3.4 4.5	2.2 2.8	2.5 3.4	0.00498	22.5
112M/6-4	1.70 2.50	960 1470	4.60 6.30	0.75 0.77	17 16	4.2 5.5	2.2 2.0	2.9 3.9	0.0101	32
132S/6-4	2.20 3.30	970 1470	7.20 8.00	0.70 0.80	22 21	4.1 5.2	2.9 1.8	3.7 3.4	0.0210	47
132M/6-4	3.00 4.40	960 1450	10.0 11.0	0.65 0.80	30 29	3.5 4.7	2.7 1.9	3.3 3.1	0.0279	64
160M/6-4	4.50 6.00	970 1470	13.0 14.0	0.70 0.83	44 39	3.6 4.8	2.9 2.1	3.2 3.0	0.0512	112
160L/6-4	6.00 8.00	970 1470	16.0 17.0	0.70 0.84	59 52	4.3 5.2	2.7 2.2	3.0 3.2	0.0667	129
180M/6-4	8.00 12.0	970 1470	19.0 25.0	0.74 0.85	80 80	3.8 4.5	1.8 1.8	1.8 2.0	0.1135	177
180L/6-4	9.50 14.0	960 1470	24.0 28.0	0.74 0.87	94 91	3.9 4.9	2.6 2.5	2.6 2.9	0.1346	200

Subject to technical amendments



Three-phase motors

Poles: 8-4

Nominal data at 400V, 50 Hz Δ/YY

Thermal class F

Operating mode: S1

Synchronous speed: 750-1500 rpm

Surface cooling IC 411

Type	Nominal power	Nominal speed	Nominal current	Power factor	Nominal torque	Start-up to nominal current	Start-up to nominal torque	Breakdown to nominal torque	Moment of inertia	Weight IM B3
R	P _N kW	n _N rpm	I _N A	cos φ	M _N Nm	I _A /I _N	M _A /M _N	M _k /M _N	J kgm ²	M appr. kg

71K/8-4	0.09	690	0.65	0.73	1.25	2.0	1.6	2.0	0.00081	6.5
	0.12	1400	0.40	0.85	0.82	4.0	1.6	2.5		
71L/8-4	0.12	700	0.85	0.80	1.6	2.2	1.9	2.1	0.00101	7.5
	0.18	1410	0.60	0.70	1.25	3.7	2.0	2.6		
80K/8-4	0.25	690	1.30	0.60	3.5	2.5	2.1	2.5	0.00191	10
	0.37	1390	1.10	0.76	2.5	3.9	2.1	2.7		
80L/8-4	0.33	690	1.50	0.62	4.6	2.3	2.0	2.0	0.00239	11
	0.55	1380	1.50	0.85	3.8	3.4	1.8	2.6		
90S/8-4	0.40	700	2.10	0.65	5.5	2.1	1.7	2.3	0.00303	14.5
	0.70	1390	2.00	0.87	4.8	3.0	1.6	2.3		
90L/8-4	0.60	690	2.30	0.70	8.3	2.5	1.9	2.2	0.00416	16.5
	0.90	1400	2.30	0.88	6.1	3.5	1.9	2.3		
100L/8-4	0.75	710	3.20	0.67	10	2.6	1.8	2.2	0.00657	20
	1.30	1400	3.40	0.87	8.9	3.6	1.8	2.4		
100L/8-40	1.00	710	3.60	0.70	13	2.8	1.9	2.3	0.00857	23
	1.60	1410	4.00	0.89	11	3.5	1.8	2.6		
112M/8-4	1.50	710	4.50	0.70	20	3.7	1.9	2.4	0.0158	32
	2.50	1410	5.20	0.90	17	4.4	1.8	2.4		
132S/8-4	2.40	720	7.40	0.70	32	3.3	2.0	3.3	0.0262	47
	3.50	1450	7.60	0.88	23	4.8	2.0	2.9		
132M/8-4	2.70	720	7.50	0.73	36	3.1	1.8	2.5	0.0323	52
	4.00	1440	8.00	0.90	27	4.7	2.1	2.5		
132M/8-40	3.20	720	10.0	0.70	42	3.6	2.5	3.2	0.0384	64
	5.10	1460	11.0	0.88	33	5.3	2.3	3.0		
160M/8-4	4.00	720	10.0	0.76	53	5.0	1.8	2.7	0.0792	112
	5.50	1450	12.0	0.92	36	6.5	1.9	3.3		
160M/8-40	5.00	720	12.0	0.80	66	3.5	1.8	2.5	0.0792	119
	7.50	1440	16.0	0.93	50	4.3	1.8	2.8		
160L/8-4	7.00	720	17.0	0.76	93	3.9	1.7	2.3	0.1089	135
	10.0	1450	21.0	0.89	66	5.4	1.5	2.8		
180L/8-4	10.0	720	22.0	0.80	133	5.0	2.4	3.2	0.16450	200
	15.0	1450	30.0	0.90	99	5.9	2.7	3.2		

Subject to technical amendments



Three-phase motors

Poles:8-6

Nominal data at 400V, 50 Hz Y/Y

Thermal class F

Operating mode: S1

Synchronous speed: 750-1000 rpm

Surface cooling IC 411

Type	Nominal power	Nominal speed	Nominal current	Power factor	Nominal torque	Start-up to nominal current	Start-up to nominal torque	Breakdown to nominal torque	Moment of inertia	Weight IM B3
R	P_N kW	n_N rpm	I_N A	$\cos \varphi$	M_N Nm	I_A/I_N	M_A/M_N	M_k/M_N	J kgm ²	M appr. kg

90S/8-6	0.30	670	1.20	0.81	4.3	2.2	1.3	2.7	0.00303	14.5
	0.50	930	1.50	0.76	5.1	2.8	1.5	2.9		
90L/8-6	0.40	690	1.70	0.62	5.5	2.3	1.5	1.8	0.00416	16
	0.60	930	2.10	0.80	6.2	3.0	1.5	1.8		
100L/8-6	0.60	700	2.00	0.83	8.2	2.5	1.5	3.0	0.00657	20
	0.80	940	2.50	0.78	8.1	3.5	1.7	3.2		
100L/8-60	0.70	700	2.20	0.87	9.6	2.7	1.6	3.0	0.00857	23
	1.00	940	2.80	0.77	10	4.1	1.7	3.3		
112M/8-6	0.90	700	3.00	0.70	12	2.9	2.0	2.9	0.0158	32
	1.30	960	3.40	0.73	13	4.6	2.5	3.2		
132S/8-6	1.50	720	4.80	0.70	20	3.1	1.4	2.6	0.0262	47
	2.20	950	5.50	0.75	22	3.3	1.7	2.7		
132M/8-6	2.20	720	6.90	0.70	29	3.5	1.7	3.2	0.0384	55
	3.00	950	7.60	0.76	30	4.5	1.9	2.4		
160M/8-6	3.50	730	9.0	0.70	46	5.6	2.0	3.2	0.0792	112
	5.50	970	12.0	0.83	54	5.5	1.5	2.5		
160L/8-6	5.00	720	14.0	0.72	66	3.9	1.8	3.0	0.1089	135
	7.00	950	16.0	0.80	70	5.3	2.3	3.1		
180L/8-6	7.00	720	17.0	0.75	93	4.3	1.8	2.9	0.2059	200
	9.50	960	22.0	0.82	95	5.7	2.6	3.0		

Subject to technical amendments



Three-phase motors

Poles:12-6

Nominal data at 400V, 50 Hz Δ /YY

Thermal class F

Operating mode: S1

Synchronous speed: 500-1000 rpm

Surface cooling IC 411

Type	Nominal power	Nominal speed	Nominal current	Power factor	Nominal torque	Start-up to nominal current	Start-up to nominal torque	Breakdown to nominal torque	Moment of inertia	Weight IM B3
R	P _N kW	n _N rpm	I _N A	cos φ	M _N Nm	I _A /I _N	M _A /M _N	M _K /M _N	J kgm ²	M appr. kg

90S/12-6	0.15	440	1.00	0.60	3.3	1.6	1.4	1.4	0.00303	15
	0.30	920	0.90	0.83	3.1	2.7	1.4	1.5		
90L/12-6	0.20	430	1.40	0.63	4.4	1.5	1.4	1.7	0.00416	16.5
	0.40	930	1.10	0.83	4.1	3.5	1.5	2.3		
100L/12-6	0.30	430	1.80	0.61	6.7	1.9	1.4	1.9	0.00657	20
	0.60	920	1.80	0.81	6.2	3.4	1.4	2.3		
100L/12-60	0.45	440	2.40	0.60	9.8	2.3	1.8	2.1	0.00857	23
	0.90	920	2.20	0.82	9.3	3.6	1.6	2.4		
112M/12-6	0.70	450	3.60	0.60	15	2.5	1.6	1.8	0.01580	32
	1.40	940	3.60	0.80	14	4.3	1.9	2.1		
132S/12-6	1.00	460	5.00	0.60	21	2.6	1.6	1.9	0.0262	47
	2.00	940	5.00	0.78	20	4.6	1.6	2.6		
132M/12-6	1.50	470	7.30	0.50	30	2.6	2.2	2.3	0.0384	64
	3.00	945	7.20	0.80	30	4.0	1.8	2.5		
160M/12-6	2.20	470	8.50	0.55	45	2.3	1.9	2.4	0.0792	109
	4.50	940	11.0	0.82	46	4.2	1.8	2.5		
160L/12-6	3.70	480	14.0	0.58	74	2.8	2.0	2.5	0.1089	129
	7.50	960	16.5	0.85	75	4.9	1.9	2.4		
180L/12-6	5.00	480	17.0	0.60	99	3.0	2.1	2.5	0.1649	200
	11.0	960	22.0	0.90	109	5.0	2.0	2.6		

Subject to technical amendments

**Standard pole-changing motors,
fan drives**



Three-phase motors

Number of poles: 4-2L

Nominal data at 400V, 50 Hz Y/YY

Thermal class F

Operating mode: S1

Synchronous speed: 1500-3000 rpm

Surface cooling IC 411

Type	Nominal power	Nominal speed	Nominal current	Power factor	Nominal torque	Start-up to nominal current	Start-up to nominal torque	Breakdown to nominal torque	Moment of inertia	Weight IM B3
R	P_N kW	n_N rpm	I_N A	$\cos \varphi$	M_N Nm	I_A/I_N	M_A/M_N	M_k/M_N	J kgm ²	M appr. kg

71K/4-2L	0.08 0.37	1410 2860	0.30 1.06	0.80 0.78	0.54 1.24	3.8 4.7	2.2 2.4	2.7 3.3	0.00035	6
71L/4-2L	0.10 0.50	1410 2860	0.37 1.60	0.81 0.79	0.68 1.67	3.9 4.8	2.4 2.4	2.9 3.3	0.00045	7
80K/4-2L	0.18 0.75	1410 2860	0.55 1.80	0.82 0.82	1.2 2.5	4.0 4.5	2.0 1.8	2.5 2.7	0.00064	9
80L/4-2L	0.22 1.10	1410 2830	0.61 2.65	0.82 0.82	1.5 3.7	4.0 4.5	2.0 1.7	2.5 2.6	0.00079	10
90S/4-2L	0.37 1.40	1400 2850	0.95 3.50	0.83 0.82	2.5 4.7	4.8 4.9	2.0 1.9	2.5 2.8	0.00193	13.5
90L/4-2L	0.50 2.00	1420 2860	1.25 5.10	0.83 0.82	3.4 6.7	5.2 5.3	2.4 1.7	2.9 2.6	0.00243	17
100L/4-2L	0.60 2.40	1410 2850	1.40 5.80	0.86 0.84	4.1 8.0	4.4 4.5	1.7 2.0	2.2 2.9	0.00387	19.5
100L/4-20L	0.80 3.00	1440 2885	1.80 8.10	0.86 0.84	5.3 10	6.0 5.9	2.1 2.1	2.6 3.0	0.00498	24
112M/4-2L	1.10 4.10	1420 2895	2.30 8.50	0.86 0.86	7.4 14	5.2 6.5	1.8 2.0	2.3 2.9	0.0101	29
132S/4-2L	1.50 6.00	1450 2925	3.30 12.6	0.87 0.88	10 20	6.5 7.5	1.9 2.2	2.4 3.1	0.0122	42
132M/4-2L	2.20 9.00	1450 2915	4.50 18.6	0.87 0.89	14 29	6.5 7.2	2.0 2.1	2.5 3.0	0.0190	48
160M/4-2L	3.00 12.0	1460 2915	6.20 24.4	0.88 0.90	20 39	5.3 6.1	2.1 2.2	2.6 3.1	0.0630	119
160L/4-2L	4.00 16.0	1465 2930	8.90 32.5	0.88 0.91	26 52	6.7 7.0	2.8 2.9	3.3 3.8	0.0750	135
180M/4-2L	5.50 20.0	1470 2950	11.0 40.0	0.89 0.91	36 65	5.8 6.8	2.4 2.4	2.9 3.3	0.1100	174

Subject to technical amendments



Three-phase motors

Number of poles: 6-4L

Nominal data at 400V, 50 Hz Y/Y

Thermal class F

Operating mode: S1

Synchronous speed: 1000-1500 rpm

Surface cooling IC 411

Type	Nominal power	Nominal speed	Nominal current	Power factor	Nominal torque	Start-up to nominal current	Start-up to nominal torque	Breakdown to nominal torque	Moment of inertia	Weight IM B3
R	P_N kW	n_N rpm	I_N A	$\cos \varphi$	M_N Nm	I_a/I_N	M_a/M_N	M_k/M_N	J kgm ²	M appr. kg

80K/6-4L	0.12 0.37	935 1440	0.80 1.40	0.70 0.77	1.2 2.5	2.2 3.2	1.3 1.4	4.0 3.4	0.00099	10
80L/6-4L	0.18 0.55	910 1440	0.90 1.90	0.80 0.75	1.9 3.6	2.1 3.4	1.3 2.1	4.8 3.3	0.00126	11
90S/6-4L	0.25 0.75	910 1450	1.00 2.10	0.85 0.77	2.6 4.9	2.4 4.6	1.3 2.2	3.7 3.3	0.00193	13.5
90L/6-4L	0.40 1.20	930 1450	1.50 3.80	0.80 0.75	4.1 7.9	3.0 4.1	1.4 2.5	2.6 3.6	0.00243	16.5
100L/6-4L	0.55 1.50	920 1450	2.00 4.40	0.79 0.72	5.7 9.9	2.8 3.9	1.5 1.9	2.7 2.9	0.00378	19
100L/6-40L	0.75 2.20	960 1450	2.60 6.10	0.75 0.72	7.5 14	3.2 4.3	1.9 2.2	3.3 3.3	0.00498	22.5
112M/6-4L	1.00 3.00	950 1450	3.00 7.30	0.72 0.78	10 20	3.5 5.5	1.5 2.2	2.8 3.7	0.0101	32
132S/6-4L	1.50 4.20	970 1470	4.50 10.0	0.73 0.77	15 27	3.5 5.2	2.0 2.4	2.9 3.2	0.0210	47
132M/6-4L	2.00 6.00	970 1470	5.80 13.5	0.75 0.80	20 39	3.9 5.1	2.0 2.3	2.8 3.3	0.0275	57
160M/6-4L	3.00 8.50	970 1470	8.00 18.0	0.73 0.82	30 55	4.2 4.6	2.4 2.1	2.9 3.0	0.0512	112
160L/6-4L	3.80 11.0	970 1470	12.0 24.0	0.66 0.85	37 71	4.5 5.0	2.9 2.8	3.6 3.2	0.0667	129
180M/6-4L	4.80 14.0	970 1470	13.0 31.0	0.76 0.87	47 91	4.1 4.3	2.5 2.3	2.6 2.5	0.1135	169
180L/6-4L	5.50 16.0	980 1470	18.0 35.0	0.70 0.85	54 104	5.0 5.5	2.9 2.8	3.4 3.3	0.1346	191

Subject to technical amendments



Three-phase motors

Poles: 8-4L

Nominal data at 400V, 50 Hz Y/YY

Thermal class F

Operating mode: S1

Synchronous speed: 750-1500 rpm

Surface cooling IC 411

Type	Nominal power	Nominal speed	Nominal current	Power factor	Nominal torque	Start-up to nominal current	Start-up to nominal torque	Breakdown to nominal torque	Moment of inertia	Weight IM B3
R	P_N kW	n_N rpm	I_N A	$\cos \varphi$	M_N Nm	I_A/I_N	M_A/M_N	M_k/M_N	J kgm ²	M appr. kg

80K/8-4L	0.125	690	0.65	0.70	1.7	2.1	1.6	2.7	0.00191	10
	0.50	1380	2.00	0.72	3.5	2.8	1.7	2.8		
80L/8-4L	0.18	690	0.80	0.69	2.5	2.7	1.6	2.3	0.00239	11
	0.70	1410	2.70	0.75	4.7	3.5	1.7	2.9		
90S/8-4L	0.25	700	1.30	0.70	3.4	2.0	1.5	2.7	0.00193	14.5
	1.00	1430	3.00	0.78	6.7	3.9	1.6	3.0		
90L/8-4L	0.35	680	1.30	0.70	4.9	2.4	1.6	1.9	0.00243	16.5
	1.40	1400	3.40	0.87	9.6	4.1	1.9	2.7		
100L/8-4L	0.48	690	1.80	0.67	6.6	2.3	1.6	2.0	0.00387	20
	1.90	1430	4.50	0.85	13	4.2	1.9	3.1		
100L/8-40L	0.60	700	2.40	0.70	8.2	2.5	1.6	2.2	0.00498	23
	2.50	1420	6.00	0.85	17	3.9	1.7	2.5		
112M/8-4L	0.80	710	2.80	0.70	11	3.0	2.0	2.4	0.0101	32
	3.20	1450	7.20	0.80	21	5.3	2.2	3.5		
132S/8-4L	1.30	710	4.20	0.65	17	2.6	1.6	2.3	0.0210	47
	5.00	1440	11.0	0.82	33	4.4	1.8	2.7		
132M/8-4L	1.70	710	5.50	0.65	23	2.6	2.0	2.2	0.0275	64
	6.50	1450	14.0	0.85	43	4.9	2.4	3.2		
160M/8-4L	3.00	710	8.40	0.74	40	2.3	1.4	1.6	0.0512	112
	10.0	1460	20.0	0.88	65	4.3	1.9	2.5		
160L/8-4L	3.50	720	10.0	0.72	46	2.3	1.5	1.5	0.0668	135
	13.0	1460	26.0	0.90	85	4.0	1.7	2.2		
180M/8-4L	4.00	720	12.0	0.70	53	2.7	1.8	2.0	0.1135	177
	16.0	1460	33.0	0.85	105	4.4	2.5	2.8		
180L/8-4L	5.50	720	16.0	0.70	73	2.8	1.9	1.9	0.1346	200
	20.0	1460	40.0	0.87	131	5.0	2.7	3.0		

Subject to technical amendments



Three-phase motors

Poles: 8-6L

Nominal data at 400V, 50 Hz Y/Y

Thermal class F

Operating mode: S1

Synchronous speed: 750-1000 rpm

Surface cooling IC 411

Type	Nominal power	Nominal speed	Nominal current	Power factor	Nominal torque	Start-up to nominal current	Start-up to nominal torque	Breakdown to nominal torque	Moment of inertia	Weight IM B3
R	P_N	n_N	I_N	$\cos \varphi$	M_N	I_A/I_N	M_A/M_N	M_k/M_N	J	M
	kW	rpm	A		Nm				kgm ²	appr. kg

80K/8-6L	0.11	710	0.80	0.70	1.5	2.0	1.5	3.2	0.00191	10
	0.22	950	1.00	0.70	2.2	3.0	1.8	3.0		
80L/8-6L	0.15	710	1.10	0.73	2.0	1.9	1.5	3.5	0.00239	11
	0.30	930	1.40	0.70	3.1	3.1	1.5	2.9		
90S/8-6L	0.22	710	1.10	0.78	3.0	1.9	1.5	3.7	0.00303	13.5
	0.44	930	1.40	0.80	4.5	2.7	1.5	3.1		
90L/8-6L	0.33	700	1.40	0.74	4.5	2.5	1.5	2.5	0.00416	16.5
	0.66	930	2.00	0.70	6.8	3.1	1.5	3.2		
100L/8-6L	0.40	700	1.70	0.73	5.5	2.6	1.5	2.3	0.00657	19
	0.80	920	2.80	0.74	8.3	3.3	1.5	3.2		
100L/8-60L	0.55	710	2.10	0.75	7.4	2.8	1.5	2.9	0.00857	22.5
	1.10	940	3.10	0.75	11	3.8	1.8	3.3		
112M/8-6L	0.80	720	3.00	0.71	11	3.3	1.7	2.6	0.0158	32
	1.60	955	4.40	0.74	16	4.4	2.4	3.2		
132S/8-6L	1.10	720	3.50	0.70	15	3.2	1.4	3.3	0.0262	47
	2.20	960	5.50	0.76	22	3.8	1.9	3.1		
132M/8-6L	1.75	720	6.00	0.70	23	2.4	1.9	2.1	0.0384	57
	3.50	950	9.50	0.72	35	3.1	2.1	2.3		
160M/8-6L	2.20	730	7.50	0.62	29	5.5	3.0	4.2	0.0894	112
	4.80	970	14.0	0.82	47	4.6	2.0	3.2		
160L/8-6L	3.30	730	13.0	0.60	43	4.8	2.9	4.1	0.1203	129
	7.00	970	19.5	0.70	69	5.0	2.2	3.5		
180L/8-6L	4.70	730	14.0	0.63	61	4.9	2.3	3.7	0.2059	191
	9.50	970	22.0	0.80	94	6.0	2.3	2.7		

Subject to technical amendments



Three-phase motors

Poles: 12-6L

Nominal data at 400V, 50 Hz Y/YY

Thermal class F

Operating mode: S1

Synchronous speed: 500-1000 rpm

Surface cooling IC 411

Type	Nominal power	Nominal speed	Nominal current	Power factor	Nominal torque	Start-up to nominal current	Start-up to nominal torque	Breakdown to nominal torque	Moment of inertia	Weight IM B3
R	P_N	n_N	I_N	$\cos \varphi$	M_N	I_A/I_N	M_A/M_N	M_k/M_N	J	M
	kW	rpm	A		Nm				kgm ²	appr. kg

80K/12-6L	0.04	455	0.40	0.60	0.84	2.0	1.6	2.0	0.00191	10
	0.25	940	0.90	0.78	2.5	3.2	1.7	2.5		
80L/12-6L	0.05	460	0.50	0.60	1.0	2.0	1.7	2.2	0.00239	11
	0.32	940	1.20	0.79	3.2	3.2	1.6	2.5		
90S/12-6L	0.10	450	0.68	0.61	2.1	2.0	1.6	2.1	0.00303	14.5
	0.55	940	2.00	0.80	5.6	3.2	1.7	2.6		
90L/12-6L	0.15	465	1.40	0.62	3.1	2.0	1.8	2.3	0.00416	16.5
	0.80	955	3.30	0.81	8.0	3.2	1.8	2.7		
100L/12-6L	0.22	465	2.00	0.64	4.5	2.0	1.7	1.9	0.00657	20
	0.90	955	2.60	0.80	9.0	4.5	1.9	2.8		
100L/12-60L	0.30	475	2.80	0.66	6.0	2.0	1.7	2.0	0.00857	23
	1.20	960	3.30	0.81	12	4.6	2.0	2.9		
112M/12-6L	0.35	460	1.50	0.54	7.5	2.5	1.6	2.1	0.1580	32
	2.20	940	5.10	0.82	20	4.5	1.7	2.9		
132S/12-6L	0.70	480	2.80	0.61	14	2.8	1.5	2.1	0.0262	47
	3.20	955	8.30	0.71	33	3.5	1.7	2.9		
132M/12-6L	1.00	460	4.20	0.59	22	2.8	1.4	1.8	0.0384	64
	4.40	960	11.3	0.59	44	4.8	1.4	2.3		
160M/12-6L	1.30	465	3.80	0.70	27	2.7	1.5	1.9	0.0792	112
	6.20	965	14.0	0.85	61	5.6	1.9	2.8		
160L/12-6L	1.80	470	5.00	0.72	37	3.5	1.5	1.9	0.1088	135
	8.40	965	18.0	0.87	83	6.4	2.0	2.9		
180L/12-60L	3.00	475	11.0	0.55	60	3.8	1.5	1.9	0.2058	200
	12.5	970	28.0	0.74	123	6.2	1.7	2.6		

Subject to technical amendments

Reluctance motors

Reluctance motors

The reluctance motor combines the characteristics of asynchronous and synchronous motors. The special feature is a rotor with distinguished poles and damper cage. This makes the reluctance motor start in the asynchronous and then switch to the synchronous mode. It runs at the synchronous speed until the reactive torque (synchronous breakdown torque or pull-out torque) is exceeded.

With these properties, the reluctance motor suits many applications where more complex servo technology or asynchronous motors with encoder systems had to be used until now. This applies primarily to plants requiring several drives to run at synchronous speeds or constant speeds at varying loads. Another benefit is the robust and maintenance-free design.

Mechanical design

The reluctance motor uses the standard stator of the asynchronous motor. For this reason, it is generally possible to implement all mechanical variants as described in the planning section for asynchronous motors. If desired, the motors can also be equipped with a mechanical spring-loaded brake. We recommend a brake in noise-reduced version (see Brake motors / Part 10).

Electrical design

By default, HEW manufactures the insulation system in thermal class F using high-quality enamelled wire and windings with phase insulation. This warrants a high electrical strength against loads caused by switching and commutating voltages and frequency inverter operation. The motors can be equipped with a PTC or thermostatic switch as motor protection. The reluctance motors are available with 2, 4 and 6 poles. Special windings for custom drive solutions are available on request.

Reluctance motor with frequency inverter

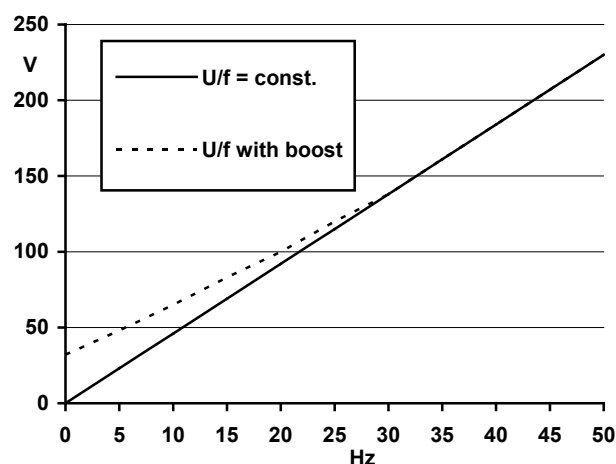
The motor is selected according to the required load torque and the minimum/maximum frequency.

The acceleration torque has to be heeded for highly dynamic drives.

Depending on the frequency/speed limits, an internal or external fan variant has to be chosen.

Internally ventilated reluctance motors are dimensioned such that they are capable of outputting the nominal torques specified in the Technical Data from approx. 20 Hz to the cut-off frequency permanently. To operate the motor at the nominal torque and below 20 Hz, only a reduced duty cycle is allowed, or an external fan is needed.

The voltage has to be raised via static boost because in the lower frequency range at $U/f = \text{constant}$, the flux and thus the torque do not remain constant. The amount of the rise depends on the size, the number of poles and the motor design and has to be optimised in dependence on the drive.



The illustration shows the U/f curves with and without boost in principle. The frequency inverter make determines the possible boost settings. The maximum torque of the reluctance motor is proportional to the square of the voltage. As the ratio of pull-out torque to nominal torque is approximately 1.6, operation in the field weakening range ($U = \text{constant}$) is not feasible or possible with restrictions only.



Reluctance motors

Number of poles: 2

Nominal data at 400 V, 50 Hz

Thermal class F

Operating mode: S1

Synchronous speed: 3000 rpm

Surface cooling IC 411

Type	Nominal power	Nominal speed	Nominal current	Power factor	Nominal torque	Start-up to nominal current	Start-up to nominal torque	Breakdown to nominal torque	Moment of inertia	Weight IM B3
RR	P_N kW	n_N rpm	I_N A	$\cos \varphi$	M_N Nm	I_A/I_N	M_A/M_N	M_k/M_N	J kgm ²	M appr. kg

63K/2	0.09	3000	0.60	0.45	0.29	5.4	4.0	1.5	0.00014	4.5
63L/2	0.12	3000	0.80	0.45	0.38	5.5	4.1	1.5	0.00019	5
71K/2	0.18	3000	1.20	0.50	0.57	6.0	4.1	1.6	0.00034	6
71L/2	0.25	3000	1.40	0.45	0.80	6.0	4.0	1.6	0.00035	7
80K/2	0.37	3000	1.90	0.45	1.18	6.4	4.0	1.6	0.00064	9
80L/2	0.55	3000	2.70	0.45	1.75	6.5	4.2	1.6	0.00079	10
90S/2	0.75	3000	3.50	0.53	2.4	7.0	4.1	1.6	0.00124	14
90L/2	1.1	3000	5.20	0.50	3.5	7.5	4.1	1.6	0.00155	17
100L/2	1.50	3000	7.00	0.50	4.8	8.5	4.2	1.6	0.00255	20
112M/2	2.20	3000	9.00	0.50	7.0	9.0	4.2	1.6	0.00430	29

Subject to technical amendments



Reluctance motors

Number of poles: 4

Nominal data at 400 V, 50 Hz

Thermal class F

Operating mode: S1

Synchronous speed: 1500 rpm

Surface cooling IC 411

Type	Nominal power	Nominal speed	Nominal current	Power factor	Nominal torque	Start-up to nominal current	Start-up to nominal torque	Breakdown to nominal torque	Moment of inertia	Weight IM B3
RR	P_N kW	n_N rpm	I_N A	$\cos \varphi$	M_N Nm	I_A/I_N	M_A/M_N	M_k/M_N	J kgm ²	M appr. kg

63K/4	0.06	1500	0.50	0.45	0.38	3.5	4.0	1.6	0.00020	4.5
63L/4	0.09	1500	0.70	0.45	0.57	3.6	4.0	1.6	0.00025	5
71K/4	0.12	1500	0.75	0.50	0.76	3.8	3.8	1.7	0.00052	6.5
71L/4	0.18	1500	1.15	0.50	1.1	4.0	3.9	1.7	0.00637	7.5
80K/4	0.25	1500	1.60	0.50	1.6	4.0	4.4	1.7	0.00099	9
80L/4	0.37	1500	2.10	0.50	2.4	4.2	4.5	1.7	0.00126	10
90S/4	0.55	1500	2.80	0.50	3.5	5.5	4.5	1.6	0.00193	13.5
90L/4	0.75	1500	3.70	0.50	4.8	5.8	4.5	1.6	0.00243	15
100L/4	1.10	1500	5.20	0.50	7.0	6.5	4.5	1.6	0.00387	19
100L/4	1.50	1500	6.50	0.50	9.6	6.0	3.5	1.6	0.00498	23
112M/4	2.30	1500	9.80	0.50	14.5	7.0	4.0	1.6	0.01012	34

Subject to technical amendments



Reluctance motors

Number of poles: 6

Nominal data at 400 V, 50 Hz

Thermal class F

Operating mode: S1

Synchronous speed: 1000 rpm

Surface cooling IC 411

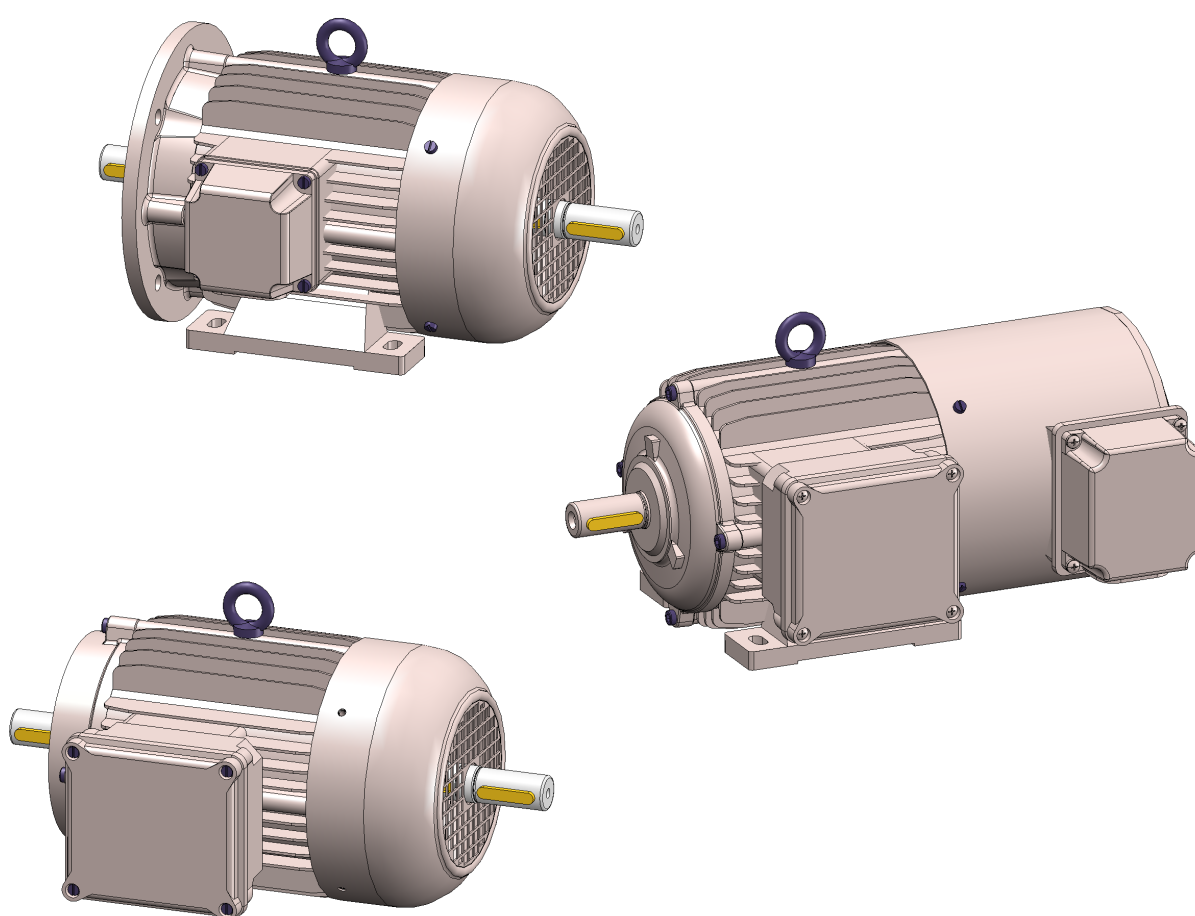
Type	Nominal power	Nominal speed	Nominal current	Power factor	Nominal torque	Start-up to nominal current	Start-up to nominal torque	Breakdown to nominal torque	Moment of inertia	Weight IM B3
RR	P_N kW	n_N rpm	I_N A	$\cos \varphi$	M_N Nm	I_a/I_N	M_a/M_N	M_k/M_N	J kgm ²	M appr. kg

71K/6	0.09	1000		on request					0.00081	6
71L/6	0.12	1000		on request					0.00101	7
80K/6	0.18	1000	1.30	0.45	1.7	4.3	4.2	1.6	0.00191	10
80L/6	0.25	1000	1.30	0.50	2.4	4.5	4.2	1.6	0.00239	11
90S/6	0.37	1000	2.40	0.42	3.5	4.8	4.0	1.6	0.00303	14.5
90L/6	0.55	1000	3.40	0.42	5.3	4.8	4.0	1.6	0.00416	16.5
100L/6	0.75	1000	4.20	0.40	7.2	5.2	4.0	1.7	0.00857	21.5
112M/6	1.10	1000	6.00	0.45	10.5	5.5	4.0	1.7	0.01580	31

Subject to technical amendments

THREE-PHASE ASYNCHRONOUS MOTORS

Dimensional sheets for 2 / 3 / 4 / 5 / 6 / 7





Fits and tolerances

Excerpt of major fits and tolerances

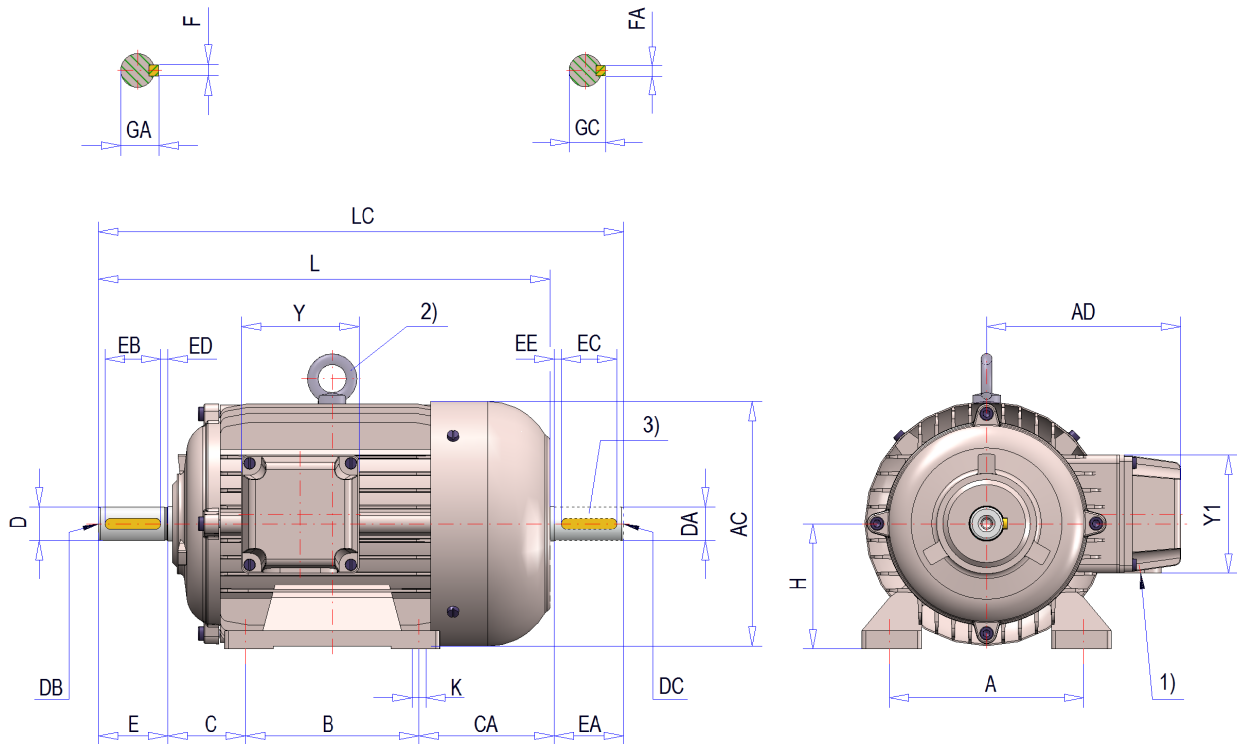
Designation of dimension	Designation of as per DIN EN 50347	Fits or tolerances
N	Diameter of flange centring	\varnothing 50 - 250 j6 \varnothing 250 - 300 h6
D	Diameter of DS shaft end	\varnothing 9-48 k6
DA	Diameter of NS shaft end	\varnothing 9-48 k6
M	Bolt circle diameter of fastening bores	\varnothing 90 - 120 +/- 0.3 \varnothing 140 - 350 +/- 0.5
H	Distance between shaft centre line and underside of feet (basic dimension)	- 0.5
E	Length of shaft end starting at the shoulder on the drive side	- 0.5
EA	Length of shaft end starting at the shoulder on the drive side	- 0.5
S	Diameter of fastening bores in the flange, or nominal thread diameter	+/- 0.2
GA	Distance between upper side of parallel key and opposite surface of DS shaft end	\varnothing 9 - 11 - 0.1 / -0.13 \varnothing 14 - 48 - 0.2 / -0.25
GC	Distance between upper side of parallel key and opposite surface of NS shaft end	\varnothing 9 - 11 - 0.1 / -0.13 \varnothing 14 - 48 - 0.2 / -0.25
F	Width of parallel key groove or parallel key of DS shaft end	N9 or h9
FA	Width of parallel key groove or parallel key of NS shaft end	N9 or h9

Three-phase motors- surface cooling, cooling type IC411 (internal ventilation)

Types R 63 K – 180 L

Protection class IP54 - IP55

Design B3 *



1) See planning section page 1/12

2) With lifting eye from size 112 onward

3) 2nd shaft end optional (standard shown – different dimensions possible)

Fits and tolerances see page 8/2

Subject to technical amendments

Type	B	A	K	H	C	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LC	CA
													GC	FA	EC	EE			
R 63 K/L	80	100	7	63	40	11	23	M4	123	99	70	70	12.5	4	18	2.5	211	239	73
R 71 K/L	90	112	7	71	45	14	30	M5	138	109	70	70	16	5	25	2.5	243	278	83
R 80 K/L	100	125	9.5	80	50	19	40	M6	156	127	85	85	21.5	6	32	4	274	319	89
R 90 S	100	140	10	90	56	24	50	M8	176	140	85	85	27	8	40	5	301	356	100
R 90 L	125	140	10	90	56	24	50	M8	176	140	85	85	27	8	40	5	326	381	100
R 100 L	140	160	11.2	100	63	28	60	M10	194	149	85	85	31	8	50	5	366	431	108
R 112 M	140	190	11.2	112	70	28	60	M10	218	161	85	85	31	8	50	5	383	448	118
R 132 S	140	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	449	534	145
R 132 M	178	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	487	572	145
R 160 M	210	254	14.5	160	108	42	110	M16	310	244	186	186	45	12	90	10	588	703	165
R 160 L	254	254	14.5	160	108	42	110	M16	310	244	186	186	45	12	90	10	632	747	165
R 180 M	241	279	13	180	121	48	110	M16	348	254	175	190	51.5	14	100	5	653	768	186
R 180 L	279	279	13	180	121	48	110	M16	348	254	175	190	51.5	14	100	5	691	806	186

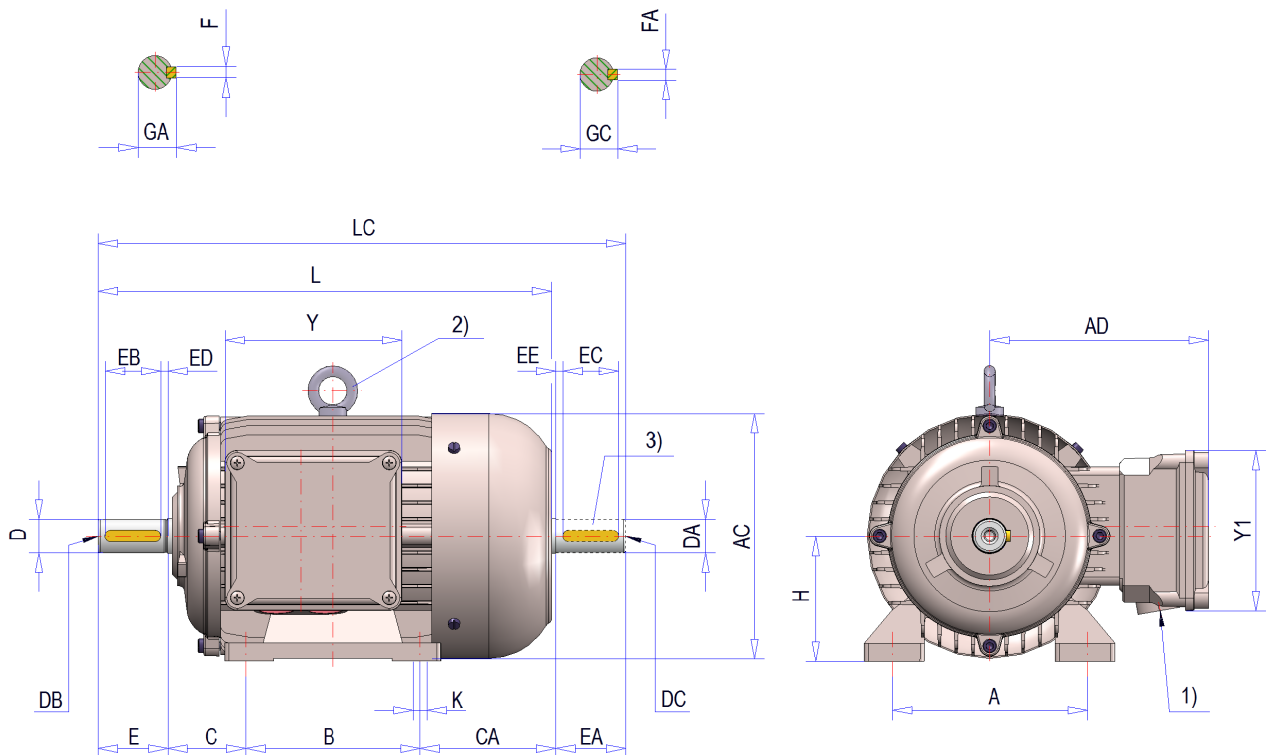
* Design IM B3 / IM 1001, IM B6 / IM 1051, IM B7 / IM 1061, IM B8 / IM 1071, IM V5 / IM 1011, IM V6 / IM 1031 (see page 1/5)

Three-phase motors- surface cooling, cooling type IC411 (internal ventilation)

Types R 63 K – 180 L

Protection class \geq IP56

Design B3 *



1) See planning section page 1/12

2) With lifting eye from size 112 onward

3) 2nd shaft end optional (standard shown – different dimensions possible)

Fits and tolerances see page 8/2

Subject to technical amendments

Type	B	A	K	H	C	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LC	CA
													GC	FA	EC				
R 63 K/L	80	100	7	63	40	11	23	M4	123	121	117	103	12.5	4	18	2.5	211	239	73
R 71 K/L	90	112	7	71	45	14	30	M5	138	130	117	103	16	5	25	2.5	243	278	83
R 80 K/L	100	125	9.5	80	50	19	40	M6	156	144	127	115	21.5	6	32	4	274	319	89
R 90 S	100	140	10	90	56	24	50	M8	176	157	127	115	27	8	40	5	301	356	100
R 90 L	125	140	10	90	56	24	50	M8	176	157	127	115	27	8	40	5	326	381	100
R 100 L	140	160	11.2	100	63	28	60	M10	194	166	127	115	31	8	50	5	366	431	108
R 112 M	140	190	11.2	112	70	28	60	M10	218	178	127	115	31	8	50	5	383	448	118
R 132 S	140	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	449	534	145
R 132 M	178	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	487	572	145
R 160 M	210	254	14.5	160	108	42	110	M16	310	244	186	186	45	12	90	10	588	703	165
R 160 L	254	254	14.5	160	108	42	110	M16	310	244	186	186	45	12	90	10	632	747	165
R 180 M	241	279	13	180	121	48	110	M16	348	254	175	190	51.5	14	100	5	653	768	186
R 180 L	279	279	13	180	121	48	110	M16	348	254	175	190	51.5	14	100	5	691	806	186

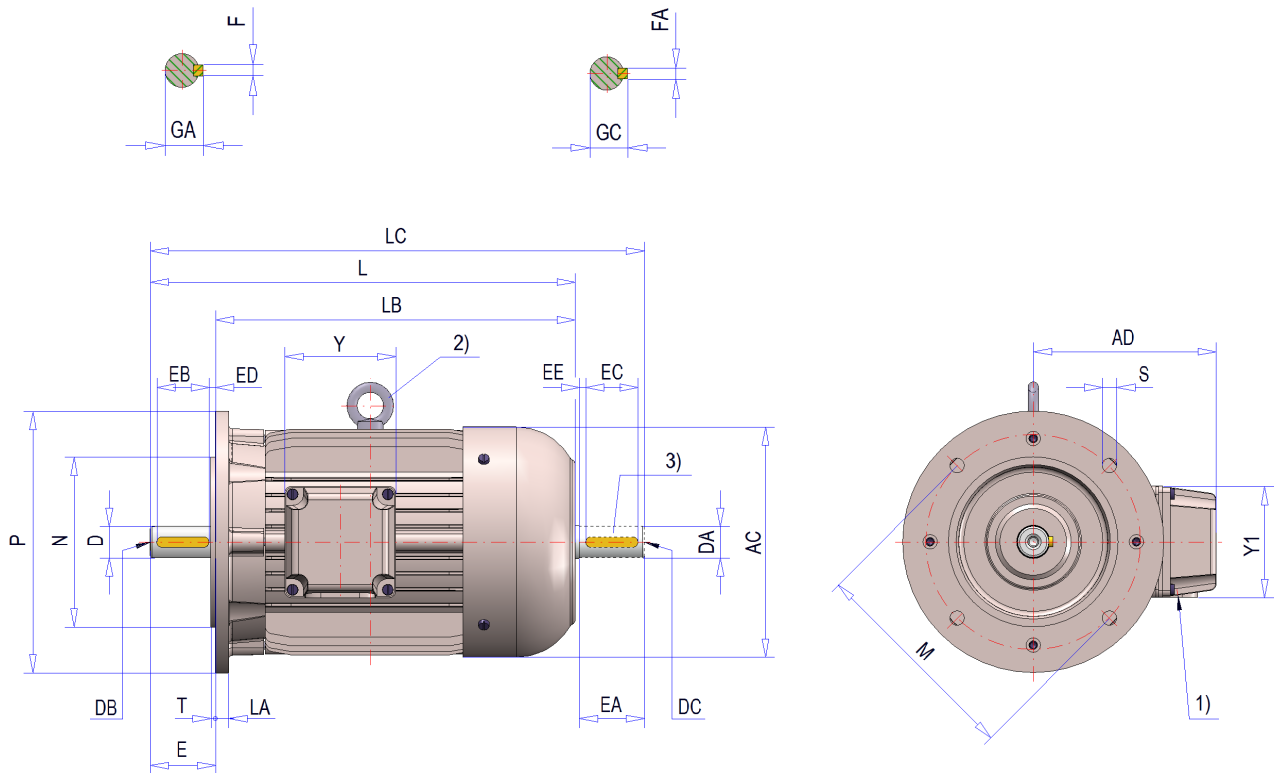
* Design IM B3 / IM 1001, IM B6 / IM 1051, IM B7 / IM 1061, IM B8 / IM 1071, IM V5 / IM 1011, IM V6 / IM 1031 (see page 1/5)

Three-phase motors- surface cooling, cooling type IC411 (internal ventilation)

Types RF 63 K – 180 L

Protection class IP54 - IP55

Design B5 *



1) See planning section page 1/12

2) With lifting eye from size 112 onward

3) 2nd shaft end optional (standard shown – different dimensions possible)

Fits and tolerances see page 8/2

Subject to technical amendments

Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	LC	S	M	N	P	T	LA
	DA	EA	DC					GC	FA	EC	EE									
RF 63 K/L	11	23	M4	123	104	70	70	12.5	4	18	2.5	211	188	239	9	115	95	140	3	10
RF 71 K/L	14	30	M5	138	114	70	70	16	5	25	2.5	243	213	278	9.5	130	110	160	3.5	9.5
RF 80 K/L	19	40	M6	156	134	85	85	21.5	6	32	4	274	234	319	11.5	165	130	200	3.5	11
RF 90 S	24	50	M8	176	137	85	85	27	8	40	5	301	251	356	11.5	165	130	200	3.5	10.5
RF 90 L	24	50	M8	176	137	85	85	27	8	40	5	326	276	381	11.5	165	130	200	3.5	10.5
RF 100 L	28	60	M10	194	148	85	85	31	8	50	5	366	306	431	14	215	180	250	4	15.5
RF 112 M	28	60	M10	218	158	85	85	31	8	50	5	383	323	448	14	215	180	250	4	11
RF 132 S	38	80	M12	258	197	145	130	41	10	70	5	449	369	534	14	265	230	300	4	12
RF 132 M	38	80	M12	258	197	145	130	41	10	70	5	487	407	572	14	265	230	300	4	12
RF 160 M	42	110	M16	310	244	186	186	45	12	90	10	588	478	703	18	300	250	350	5	14
RF 160 L	42	110	M16	310	244	186	186	45	12	90	10	632	522	747	18	300	250	350	5	14
RF 180 M	48	110	M16	348	254	175	190	51.5	14	100	5	653	543	768	18	300	250	350	5	14
RF 180 L	48	110	M16	348	254	175	190	51.5	14	100	5	691	581	806	18	300	250	350	5	14

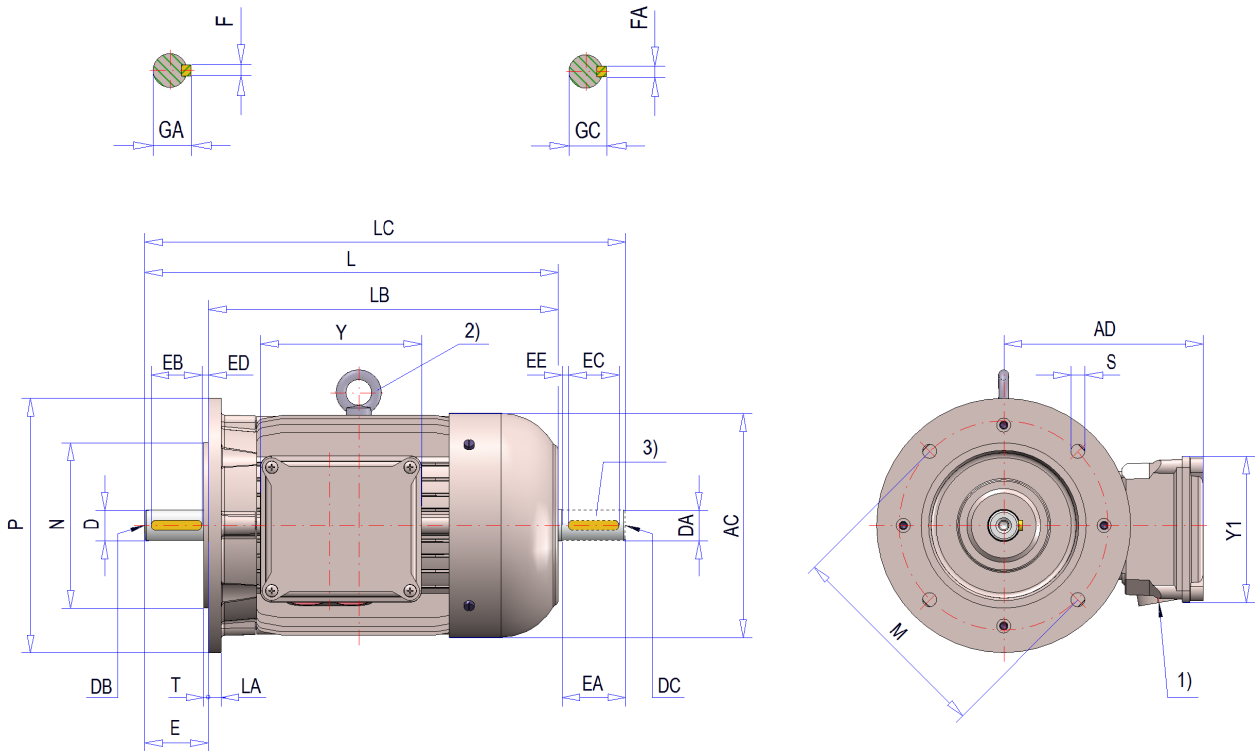
* Design IM B5 / IM 3001, IM V1 / IM 3011, IM V3 / IM 3031 (see page 1/5)

Three-phase motors- surface cooling, cooling type IC411 (internal ventilation)

Types RF 63 K – 180 L

Protection class \geq IP56

Design B5 *



1) See planning section page 1/12

2) With lifting eye from size 112 onward

3) 2nd shaft end optional (standard shown – different dimensions possible)

Fits and tolerances see page 8/2

Subject to technical amendments

Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	LC	S	M	N	P	T	LA
	DA	EA	DC					GC	FA	EC	EE									
RF 63 K/L	11	23	M4	123	126	117	103	12.5	4	18	2.5	211	188	239	9	115	95	140	3	10
RF 71 K/L	14	30	M5	138	136	117	103	16	5	25	2.5	243	213	278	9.5	130	110	160	3.5	9.5
RF 80 K/L	19	40	M6	156	150	127	115	21.5	6	32	4	274	234	319	11.5	165	130	200	3.5	11
RF 90 S	24	50	M8	176	154	127	115	27	8	40	5	301	251	356	11.5	165	130	200	3.5	10.5
RF 90 L	24	50	M8	176	154	127	115	27	8	40	5	326	276	381	11.5	165	130	200	3.5	10.5
RF 100 L	28	60	M10	194	165	127	115	31	8	50	5	366	306	431	14	215	180	250	4	15.5
RF 112 M	28	60	M10	218	175	127	115	31	8	50	5	383	323	448	14	215	180	250	4	11
RF 132 S	38	80	M12	258	197	145	130	41	10	70	5	449	369	534	14	265	230	300	4	12
RF 132 M	38	80	M12	258	197	145	130	41	10	70	5	487	407	572	14	265	230	300	4	12
RF 160 M	42	110	M16	310	244	186	186	45	12	90	10	588	478	703	18	300	250	350	5	14
RF 160 L	42	110	M16	310	244	186	186	45	12	90	10	632	522	747	18	300	250	350	5	14
RF 180 M	48	110	M16	348	254	175	190	51.5	14	100	5	653	543	768	18	300	250	350	5	14
RF 180 L	48	110	M16	348	254	175	190	51.5	14	100	5	691	581	806	18	300	250	350	5	14

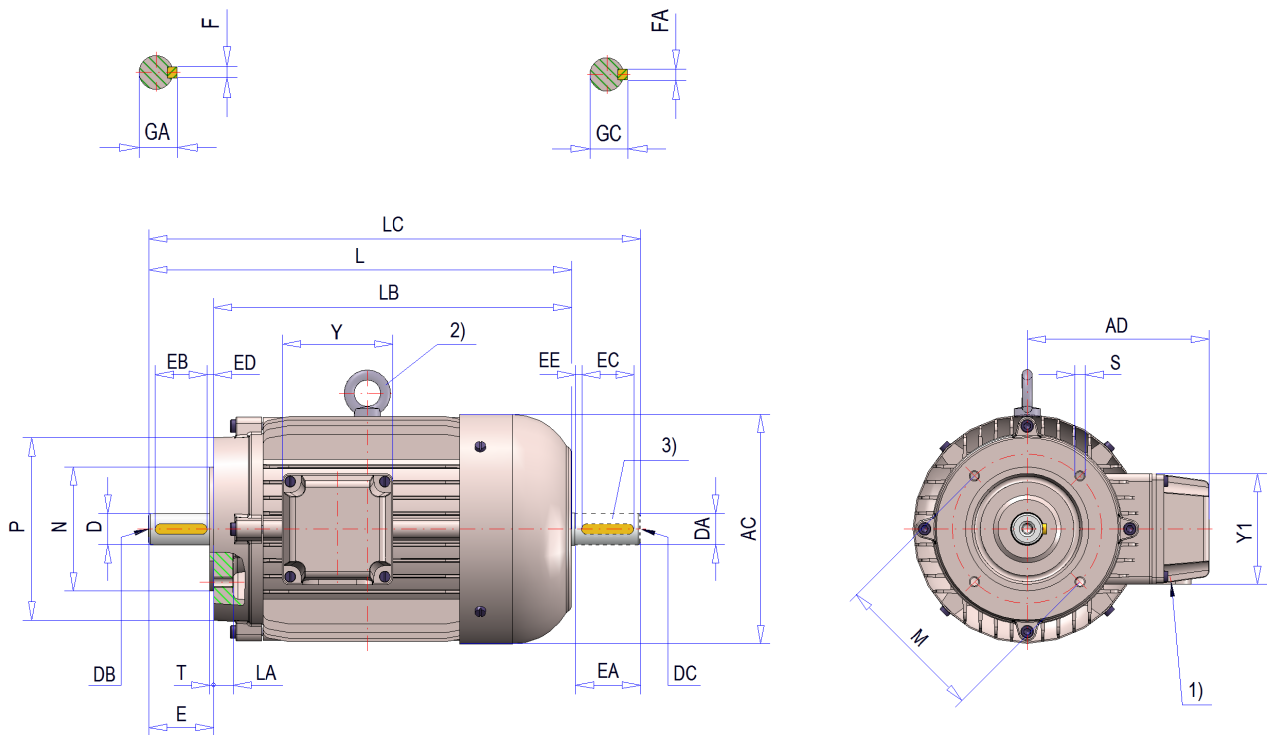
* Design IM B5 / IM 3001, IM V1 / IM 3011, IM V3 / IM 3031 (see page 1/5)

Three-phase motors- surface cooling, cooling type IC411 (internal ventilation)

Types RF 63 K – 180 L

Protection class IP54 - IP55

Design B14 *



1) See planning section page 1/12

2) With lifting eye from size 112 onward

3) 2nd shaft end optional (standard shown – different dimensions possible)

Fits and tolerances see page 8/2

Subject to technical amendments

Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	LC	S	M	N	P	T	LA
	DA	EA	DC					GC	FA	EC	EE									
RF 63 K/L	11	23	M4	123	104	70	70	12.5	4	18	2.5	211	188	239	M5	75	60	90	2.5	8
RF 71 K/L	14	30	M5	138	114	70	70	16	5	25	2.5	243	213	278	M6	85	70	105	2.5	10
RF 80 K/L	19	40	M6	156	134	85	85	21.5	6	32	4	274	234	319	M6	100	80	120	3	9.5
RF 90 S	24	50	M8	176	137	85	85	27	8	40	5	301	251	356	M8	115	95	140	3	15
RF 90 L	24	50	M8	176	137	85	85	27	8	40	5	326	276	381	M8	115	95	140	3	15
RF 100 L	28	60	M10	194	148	85	85	31	8	50	5	366	306	431	M8	130	110	160	3.5	17
RF 112 M	28	60	M10	218	158	85	85	31	8	50	5	383	323	448	M8	130	110	160	3.5	16
RF 132 S	38	80	M12	258	197	145	130	41	10	70	5	449	369	534	M10	165	130	200	3.5	15
RF 132 M	38	80	M12	258	197	145	130	41	10	70	5	487	407	572	M10	165	130	200	3.5	15
RF 160 M	42	110	M16	310	244	186	186	45	12	90	10	615	505	731	M12	215	180	250	4	14
RF 160 L	42	110	M16	310	244	186	186	45	12	90	10	659	549	775	M12	215	180	250	4	14
RF 180 M	48	110	M16	348	254	175	190	51.5	14	100	5	687	577	802	M12	215	180	250	4	15
RF 180 L	48	110	M16	348	254	175	190	51.5	14	100	5	725	615	840	M12	215	180	250	4	15

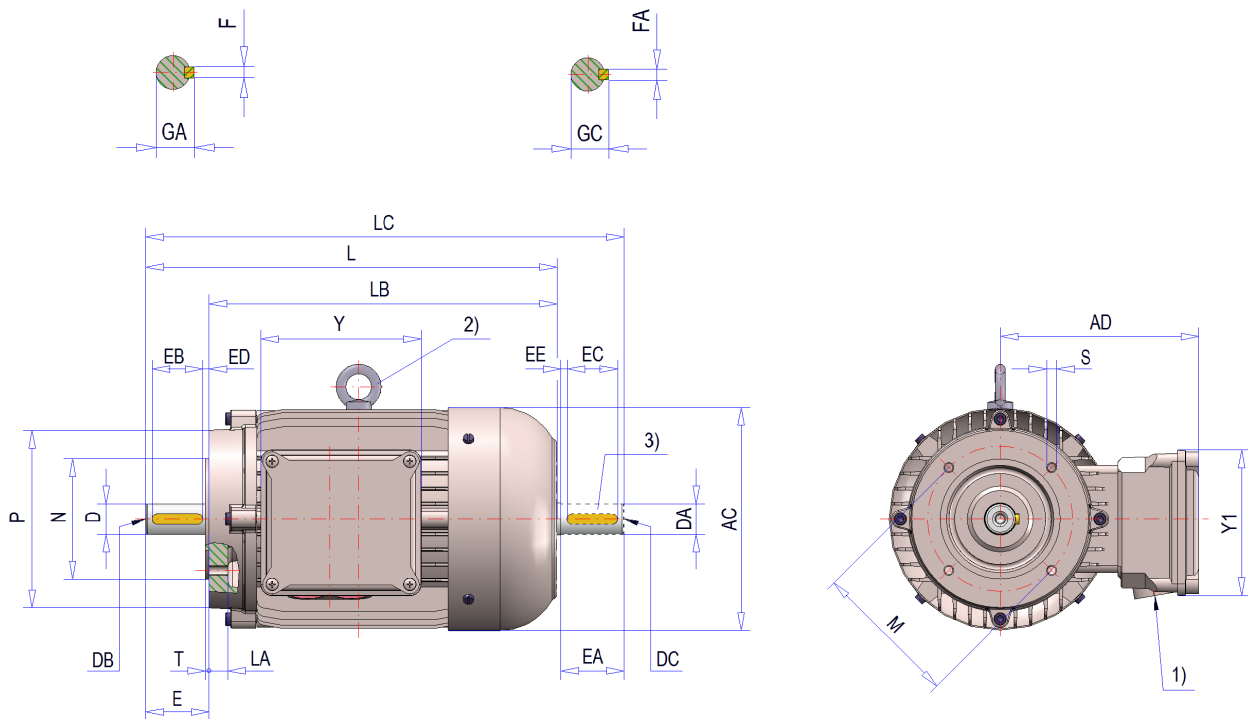
* Design IM B14 / IM 3601, IM V18 / IM 3611, IM V19 / IM 3631 (see page 1/5)

Three-phase motors- surface cooling, cooling type IC411 (internal ventilation)

Types RF 63 K – 180 L

Protection class \geq IP56

Design B14 *



1) See planning section page 1/12

2) With lifting eye from size 112 onward

3) 2nd shaft end optional (standard shown – different dimensions possible)

Fits and tolerances see page 8/2

Subject to technical amendments

Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	LC	S	M	N	P	T	LA
	DA	EA	DC					GC	FA	EC	EE									
RF 63 K/L	11	23	M4	123	126	117	103	12.5	4	18	2.5	211	188	239	M5	75	60	90	2.5	8
RF 71 K/L	14	30	M5	138	136	117	103	16	5	25	2.5	243	213	278	M6	85	70	105	2.5	10
RF 80 K/L	19	40	M6	156	150	127	115	21.5	6	32	4	274	234	319	M6	100	80	120	3	9.5
RF 90 S	24	50	M8	176	154	127	115	27	8	40	5	301	251	356	M8	115	95	140	3	15
RF 90 L	24	50	M8	176	154	127	115	27	8	40	5	326	276	381	M8	115	95	140	3	15
RF 100 L	28	60	M10	194	165	127	115	31	8	50	5	366	306	431	M8	130	110	160	3.5	17
RF 112 M	28	60	M10	218	175	127	115	31	8	50	5	383	323	448	M8	130	110	160	3.5	16
RF 132 S	38	80	M12	258	197	145	130	41	10	70	5	449	369	534	M10	165	130	200	3.5	15
RF 132 M	38	80	M12	258	197	145	130	41	10	70	5	487	407	572	M10	165	130	200	3.5	15
RF 160 M	42	110	M16	310	244	186	186	45	12	90	10	615	505	731	M12	215	180	250	4	14
RF 160 L	42	110	M16	310	244	186	186	45	12	90	10	659	6549	775	M12	215	180	250	4	14
RF 180 M	48	110	M16	348	254	175	190	51.5	14	100	5	687	577	802	M12	215	180	250	4	15
RF 180 L	48	110	M16	348	254	175	190	51.5	14	100	5	725	615	840	M12	215	180	250	4	15

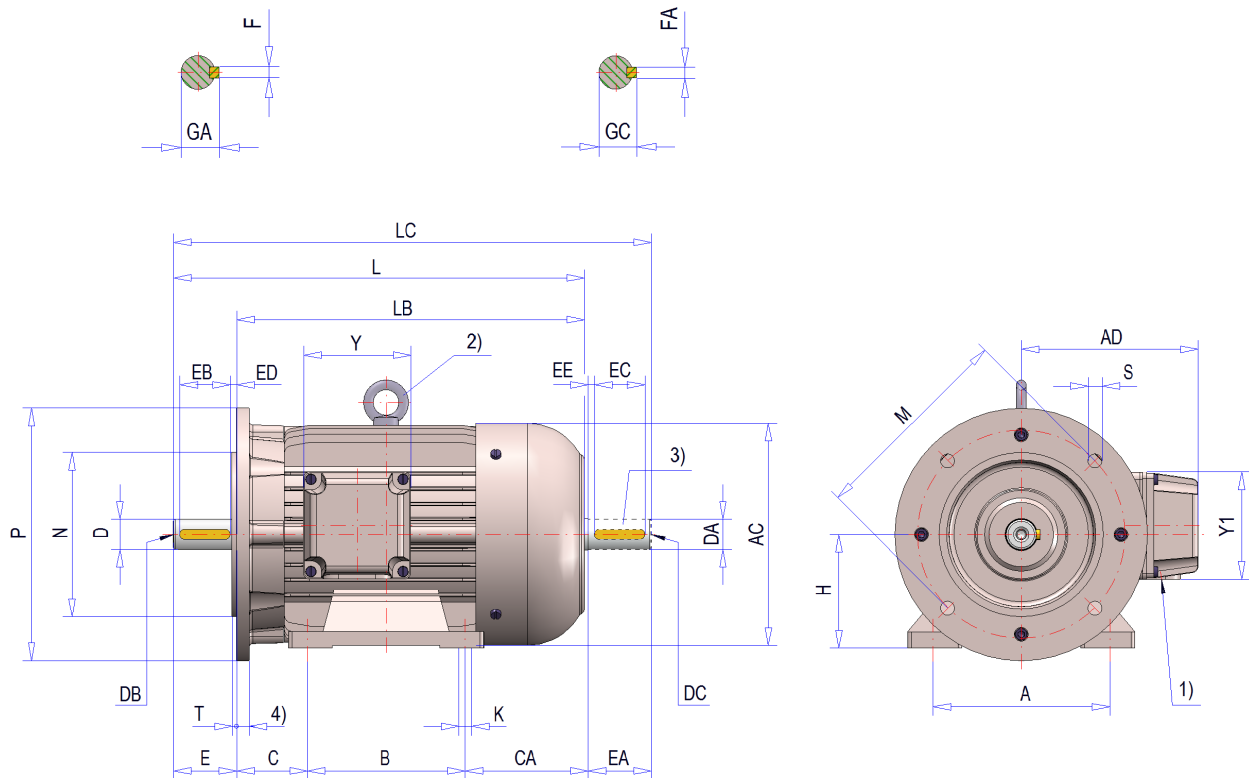
* Design IM B14 / IM 3601, IM V18 / IM 3611, IM V19 / IM 3631 (see page 1/5)

Three-phase motors- surface cooling, cooling type IC411 (internal ventilation)

Types R+F 63 K – 180 L

Protection class IP54 - IP55

Design B35 *



- 1) See planning section page 1/12
- 2) With lifting eye from size 112 onward
- 3) 2nd shaft end optional (standard shown – different dimensions possible)
- 4) Dimensions LA see page 8/5

Fits and tolerances see page 8/2
Subject to technical amendments

Type	B	A	K	H	C	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	LC	S	M	N	P	T	CA
						DA	EA	DC					GC	FA	EC	EE									
R+F 63 K/L	80	100	7	63	40	11	23	M4	123	99	70	70	12.5	4	18	2.5	211	188	239	9	115	95	140	3	73
R+F 71 K/L	90	112	7	71	45	14	30	M5	138	109	70	70	16	5	25	2.5	243	213	278	9.5	130	110	160	3.5	83
R+F 80 K/L	100	125	9.5	80	50	19	40	M6	156	127	85	85	21.5	6	32	4	274	234	319	11.5	165	130	200	3.5	89
R+F 90 S	100	140	10	90	56	24	50	M8	176	140	85	85	27	8	40	5	301	251	356	11.5	165	130	200	3.5	100
R+F 90 L	125	140	10	90	56	24	50	M8	176	140	85	85	27	8	40	5	326	276	381	11.5	165	130	200	3.5	100
R+F 100 L	140	160	11.2	100	63	28	60	M10	194	149	85	85	31	8	50	5	366	306	431	14	215	180	250	4	108
R+F 112 M	140	190	11.2	112	70	28	60	M10	218	161	85	85	31	8	50	5	383	323	448	14	215	180	250	4	118
R+F 132 S	140	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	449	369	534	14	265	230	300	4	145
R+F 132 M	178	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	487	407	572	14	265	230	300	4	145
R+F 160 M	210	254	14.5	160	108	42	110	M16	310	244	186	186	45	12	90	10	588	478	703	18	300	250	350	5	165
R+F 160 L	254	254	14.5	160	108	42	110	M16	310	244	186	186	45	12	90	10	632	522	747	18	300	250	350	5	165
R+F 180 M	241	279	13	180	121	48	110	M16	348	254	175	190	51.5	14	100	5	653	543	768	18	300	250	350	5	186
R+F 180 L	279	279	13	180	121	48	110	M16	348	254	175	190	51.5	14	100	5	691	581	806	18	300	250	350	5	186

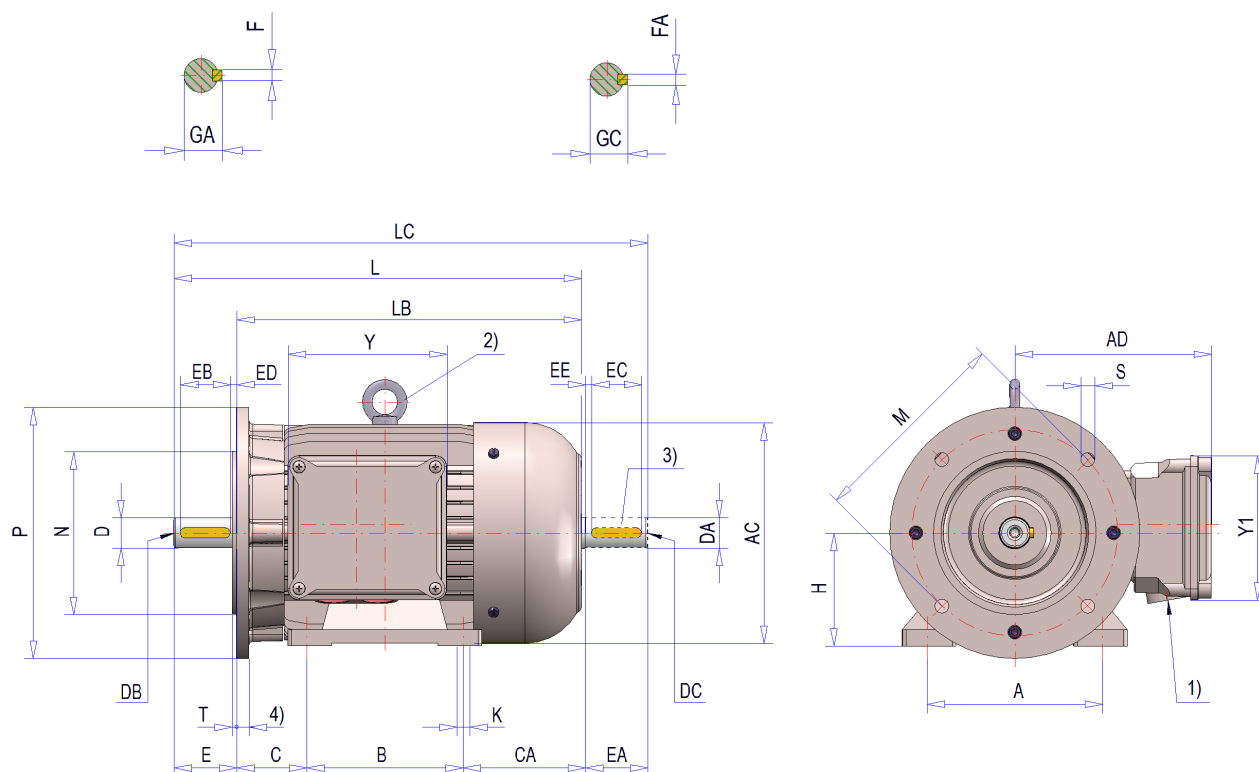
* Design IM B35 / IM 2001, IM V15 / IM 2011, IM V35 / IM 2031 (see page 1/5)

Three-phase motors- surface cooling, cooling type IC411 (internal ventilation)

Types R+F 63 K – 180 L

Protection class \geq IP56

Design B35 *



- 1) See planning section page 1/12
- 2) With lifting eye from size 112 onward
- 3) 2nd shaft end optional (standard shown – different dimensions possible)
- 4) Dimensions LA see page 8/6

Fits and tolerances see page 8/2
Subject to technical amendments

Type	B	A	K	H	C	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	LC	S	M	N	P	T	CA
						DA	EA	DC					GC	FA	EC	EE									
R+F 63 K/L	80	100	7	63	40	11	23	M4	123	121	117	103	12.5	4	18	2.5	211	188	239	9	115	95	140	3	73
R+F 71 K/L	90	112	7	71	45	14	30	M5	138	130	117	103	16	5	25	2.5	243	213	278	9.5	130	110	160	3.5	83
R+F 80 K/L	100	125	9.5	80	50	19	40	M6	156	144	127	115	21.5	6	32	4	274	234	319	11.5	165	130	200	3.5	89
R+F 90 S	100	140	10	90	56	24	50	M8	176	157	127	115	27	8	40	5	301	251	356	11.5	165	130	200	3.5	100
R+F 90 L	125	140	10	90	56	24	50	M8	176	157	127	115	27	8	40	5	326	276	381	11.5	165	130	200	3.5	100
R+F 100 L	140	160	11.2	100	63	28	60	M10	194	166	127	115	31	8	50	5	366	306	431	14	215	180	250	4	108
R+F 112 M	140	190	11.2	112	70	28	60	M10	218	178	127	115	31	8	50	5	383	323	448	14	215	180	250	4	118
R+F 132 S	140	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	449	369	534	14	265	230	300	4	145
R+F 132 M	178	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	487	407	572	14	265	230	300	4	145
R+F 160 M	210	254	14.5	160	108	42	110	M16	310	244	186	186	45	12	90	10	588	478	703	18	300	250	350	5	165
R+F 160 L	254	254	14.5	160	108	42	110	M16	310	244	186	186	45	12	90	10	632	522	747	18	300	250	350	5	165
R+F 180 M	241	279	13	180	121	48	110	M16	348	254	175	190	51.5	14	100	5	653	543	768	18	300	250	350	5	186
R+F 180 L	279	279	13	180	121	48	110	M16	348	254	175	190	51.5	14	100	5	691	581	806	18	300	250	350	5	186

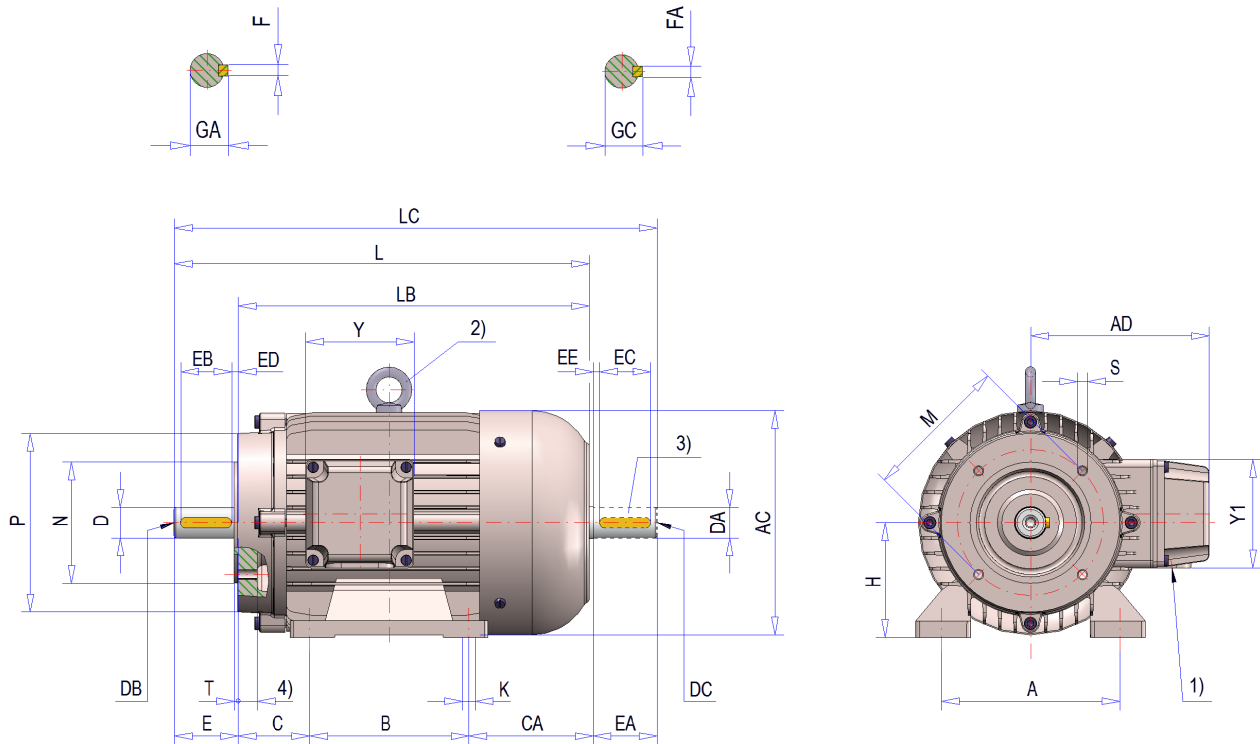
* Design IM B35 / IM 2001, IM V15 / IM 2011, IM V35 / IM2031 (see page 1/5)

Three-phase motors- surface cooling, cooling type IC411 (internal ventilation)

Types R+F 63 K – 180 L

Protection class IP54 - IP55

Design B34 *



- 1) See planning section page 1/12
- 2) With lifting eye from size 112 onward
- 3) 2nd shaft end optional (standard shown – different dimensions possible)
- 4) Dimensions LA see page 8/7

Fits and tolerances see page 8/2
Subject to technical amendments

Type	B	A	K	H	C	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	LC	S	M	N	P	T	CA
						DA	EA	DC					GC	FA	EC	EE									
R+F 63 K/L	80	100	7	63	40	11	23	M4	123	99	70	70	12.5	4	18	2.5	211	188	239	M5	75	60	90	2.5	73
R+F 71 K/L	90	112	7	71	45	14	30	M5	138	109	70	70	16	5	25	2.5	243	213	278	M6	85	70	105	2.5	83
R+F 80 K/L	100	125	9.5	80	50	19	40	M6	156	127	85	85	21.5	6	32	4	274	234	319	M6	100	80	120	3	89
R+F 90 S	100	140	10	90	56	24	50	M8	176	140	85	85	27	8	40	5	301	251	356	M8	115	95	140	3	100
R+F 90 L	125	140	10	90	56	24	50	M8	176	140	85	85	27	8	40	5	326	276	381	M8	115	95	140	3	100
R+F 100 L	140	160	11.2	100	63	28	60	M10	194	149	85	85	31	8	50	5	366	306	431	M8	130	110	160	3.5	108
R+F 112 M	140	190	11.2	112	70	28	60	M10	218	161	85	85	31	8	50	5	383	323	448	M8	130	110	160	3.5	118
R+F 132 S	140	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	449	369	534	M10	165	130	200	3.5	145
R+F 132 M	178	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	487	407	572	M10	165	130	200	3.5	145
R+F 160 M	210	254	14.5	160	108	42	110	M16	310	244	186	186	45	12	90	10	615	505	731	M12	215	180	250	4	165
R+F 160 L	254	254	14.5	160	108	42	110	M16	310	244	186	186	45	12	90	10	659	549	775	M12	215	180	250	4	165
R+F 180 M	241	279	13	180	121	48	110	M16	348	254	175	190	51.5	14	100	5	687	577	802	M12	215	180	250	4	186
R+F 180 L	279	279	13	180	121	48	110	M16	348	254	175	190	51.5	14	100	5	725	615	840	M12	215	180	250	4	186

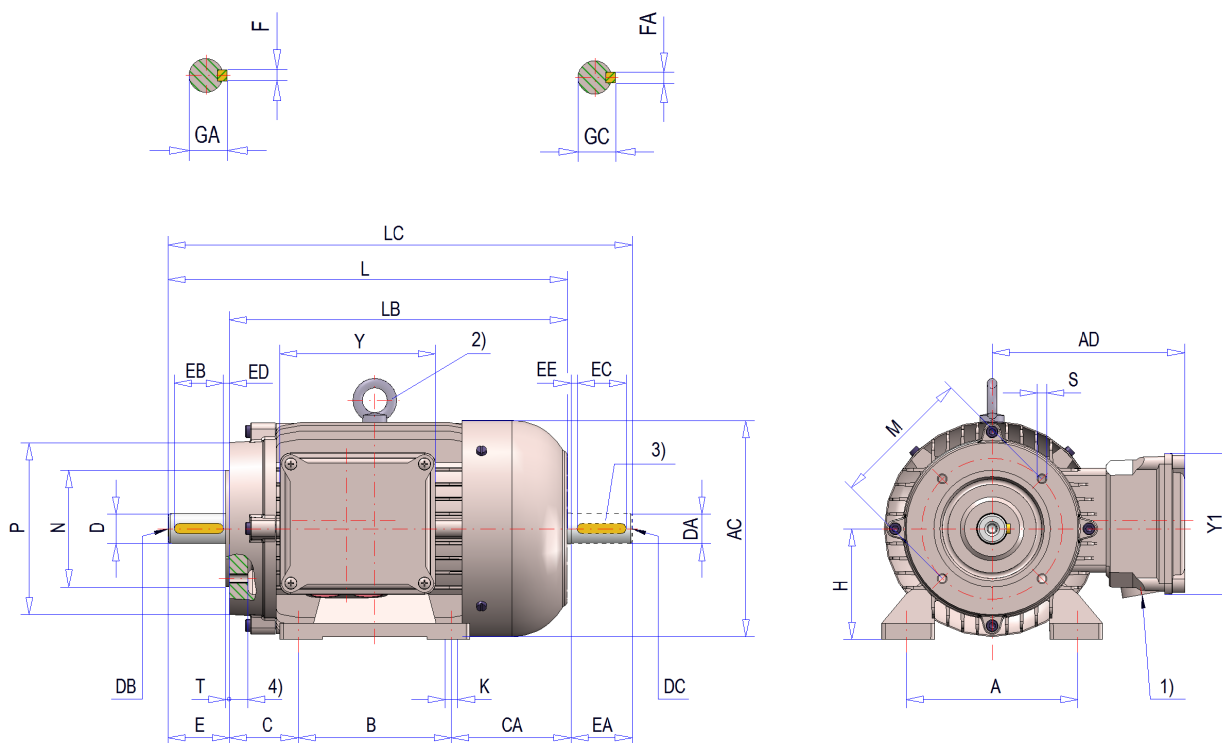
* Design IM B34 / IM 2101, IM V17 / IM 2111, IM V37 / IM 2131 (see page 1/5)

Three-phase motors- surface cooling, cooling type IC411 (internal ventilation)

Types R+F 63 K – 180 L

Protection class \geq IP56

Design B34 *



- 1) See planning section page 1/12
- 2) With lifting eye from size 112 onward
- 3) 2nd shaft end optional (standard shown – different dimensions possible)
- 4) Dimensions LA see page 8/8

Fits and tolerances see page 8/2
Subject to technical amendments

Type	B	A	K	H	C	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	LC	S	M	N	P	T	CA
						DA	EA	DC					GC	FA	EC	EE									
R+F 63 K/L	80	100	7	63	40	11	23	M4	123	121	117	103	12.5	4	18	2.5	211	188	239	M5	75	60	90	2.5	73
R+F 71 K/L	90	112	7	71	45	14	30	M5	138	130	117	103	16	5	25	2.5	243	213	278	M6	85	70	105	2.5	83
R+F 80 K/L	100	125	9.5	80	50	19	40	M6	156	144	127	115	21.5	6	32	4	274	234	319	M6	100	80	120	3	89
R+F 90 S	100	140	10	90	56	24	50	M8	176	157	127	115	27	8	40	5	301	251	356	M8	115	95	140	3	100
R+F 90 L	125	140	10	90	56	24	50	M8	176	157	127	115	27	8	40	5	326	276	381	M8	115	95	140	3	100
R+F 100 L	140	160	11.2	100	63	28	60	M10	194	166	127	115	31	8	50	5	366	306	431	M8	130	110	160	3.5	108
R+F 112 M	140	190	11.2	112	70	28	60	M10	218	178	127	115	31	8	50	5	383	323	448	M8	130	110	160	3.5	118
R+F 132 S	140	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	449	369	534	M10	165	130	200	3.5	145
R+F 132 M	178	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	487	407	572	M10	165	130	200	3.5	145
R+F 160 M	210	254	14.5	160	108	42	110	M16	310	244	186	186	45	12	90	10	615	505	731	M12	215	180	250	4	165
R+F 160 L	254	254	14.5	160	108	42	110	M16	310	244	186	186	45	12	90	10	659	549	775	M12	215	180	250	4	165
R+F 180 M	241	279	13	180	121	48	110	M16	348	254	175	190	51.5	14	100	5	687	577	802	M12	215	180	250	4	186
R+F 180 L	279	279	13	180	121	48	110	M16	348	254	175	190	51.5	14	100	5	725	615	840	M12	215	180	250	4	186

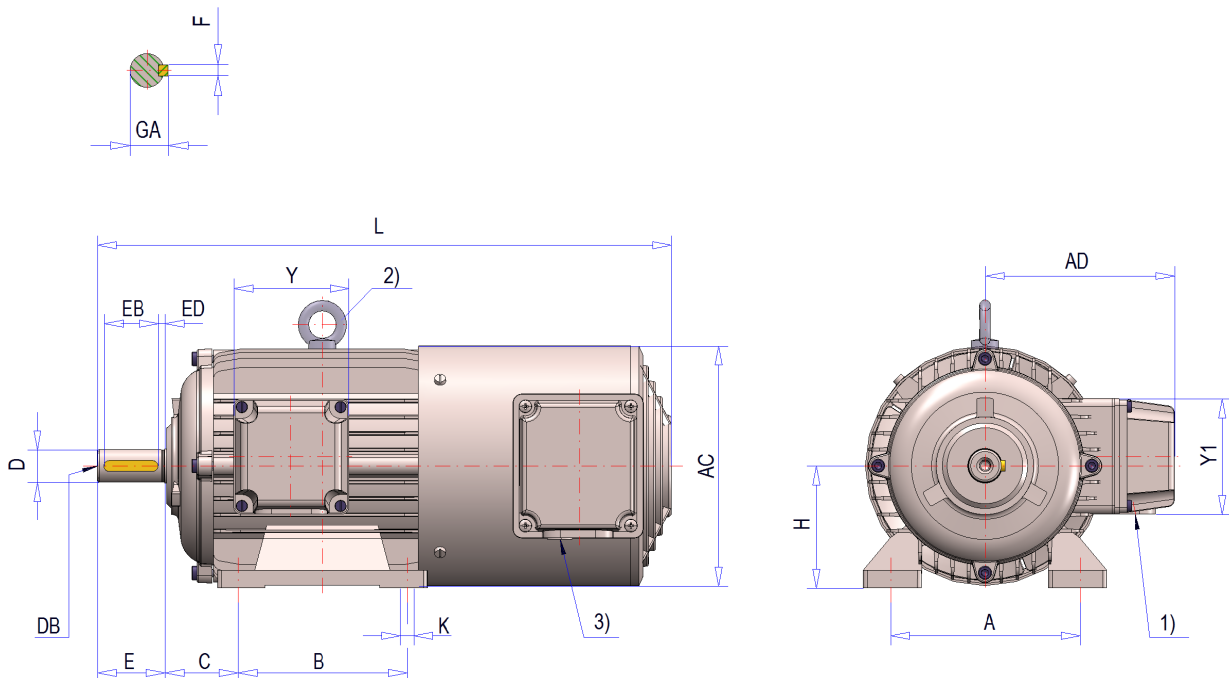
* Design IM B34 / IM 2101, IM V17 / IM 2111, IM V37 / IM 2131 (see page 1/5)

Three-phase motors- surface cooling, cooling type IC416 (external ventilation)

Types R 63 K – 180 L

Protection class IP54 - IP55

Design B3 *



1) See planning section page 1/12

2) With lifting eye from size 112 onward

3) 1x M16x1.5

Fits and tolerances see page 8/2

Subject to technical amendments

Type	B	A	K	H	C	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L
R 63 K/L	80	100	7	63	40	11	23	M4	124	99	70	70	12.5	4	18	2.5	309
R 71 K/L	90	112	7	71	45	14	30	M5	139	109	70	70	16	5	25	2.5	337
R 80 K/L	100	125	9.5	80	50	19	40	M6	157	127	85	85	21.5	6	32	4	367
R 90 S	100	140	10	90	56	24	50	M8	177	140	85	85	27	8	40	5	402
R 90 L	125	140	10	90	56	24	50	M8	177	140	85	85	27	8	40	5	427
R 100 L	140	160	11.2	100	63	28	60	M10	195	149	85	85	31	8	50	5	465
R 112 M	140	190	11.2	112	70	28	60	M10	218	161	85	85	31	8	50	5	483
R 132 S	140	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	578
R 132 M	178	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	616
R 160 M	210	254	14.5	160	108	42	110	M16	311	244	186	186	45	12	90	10	737
R 160 L	254	254	14.5	160	108	42	110	M16	311	244	186	186	45	12	90	10	781
R 180 M	241	279	13	180	121	48	110	M16	348	254	175	190	51.5	14	100	5	800
R 180 L	279	279	13	180	121	48	110	M16	348	254	175	190	51.5	14	100	5	838

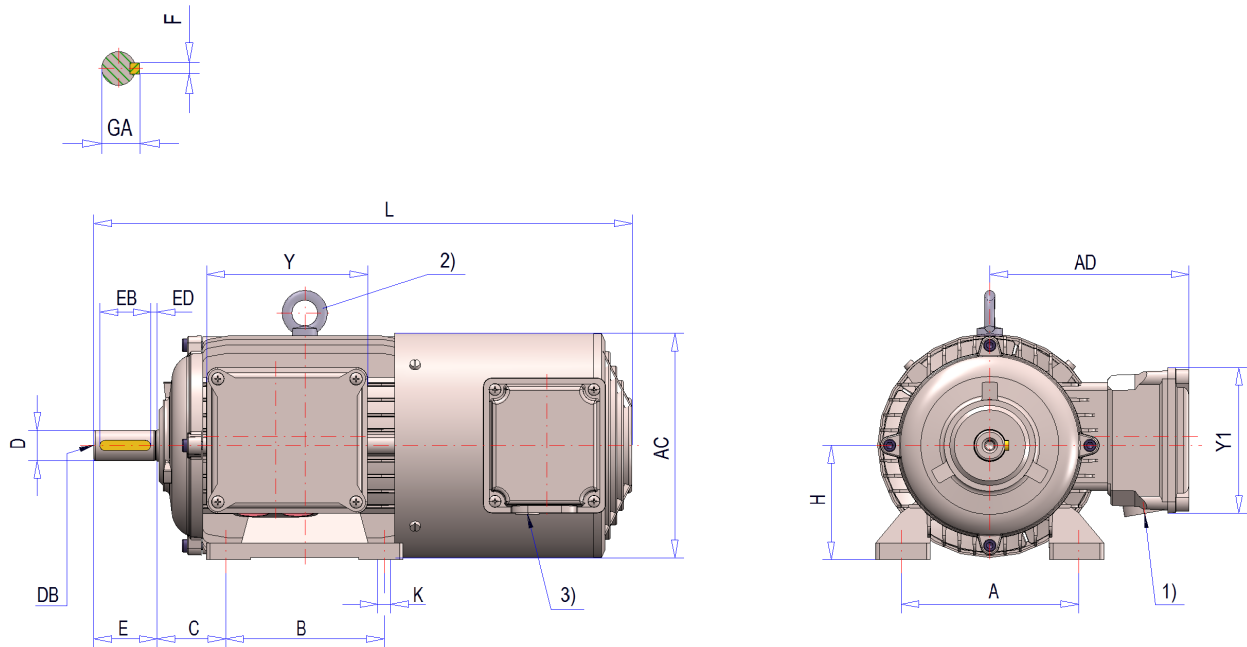
* Design IM B3 / IM 1001, IM B6 / IM 1051, IM B7 / IM 1061, IM B8 / IM 1071, IM V5 / IM 1011, IM V6 / IM 1031 (see page 1/5)

Three-phase motors- surface cooling, cooling type IC416 (external ventilation)

Types R 63 K – 180 L

Protection class \geq IP56

Design B3 *



1) See planning section page 1/12

2) With lifting eye from size 112 onward

3) 1x M16x1.5

Fits and tolerances see page 8/2

Subject to technical amendments

Type	B	A	K	H	C	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L
R 63 K/L	80	100	7	63	40	11	23	M4	124	121	117	103	12.5	4	18	2.5	309
R 71 K/L	90	112	7	71	45	14	30	M5	139	130	117	103	16	5	25	2.5	337
R 80 K/L	100	125	9.5	80	50	19	40	M6	157	144	127	115	21.5	6	32	4	367
R 90 S	100	140	10	90	56	24	50	M8	177	157	127	115	27	8	40	5	402
R 90 L	125	140	10	90	56	24	50	M8	177	157	127	115	27	8	40	5	427
R 100 L	140	160	11.2	100	63	28	60	M10	195	166	127	115	31	8	50	5	465
R 112 M	140	190	11.2	112	70	28	60	M10	218	178	127	115	31	8	50	5	483
R 132 S	140	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	578
R 132 M	178	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	616
R 160 M	210	254	14.5	160	108	42	110	M16	311	244	186	186	45	12	90	10	737
R 160 L	254	254	14.5	160	108	42	110	M16	311	244	186	186	45	12	90	10	781
R 180 M	241	279	13	180	121	48	110	M16	348	254	175	190	51.5	14	100	5	800
R 180 L	279	279	13	180	121	48	110	M16	348	254	175	190	51.5	14	100	5	838

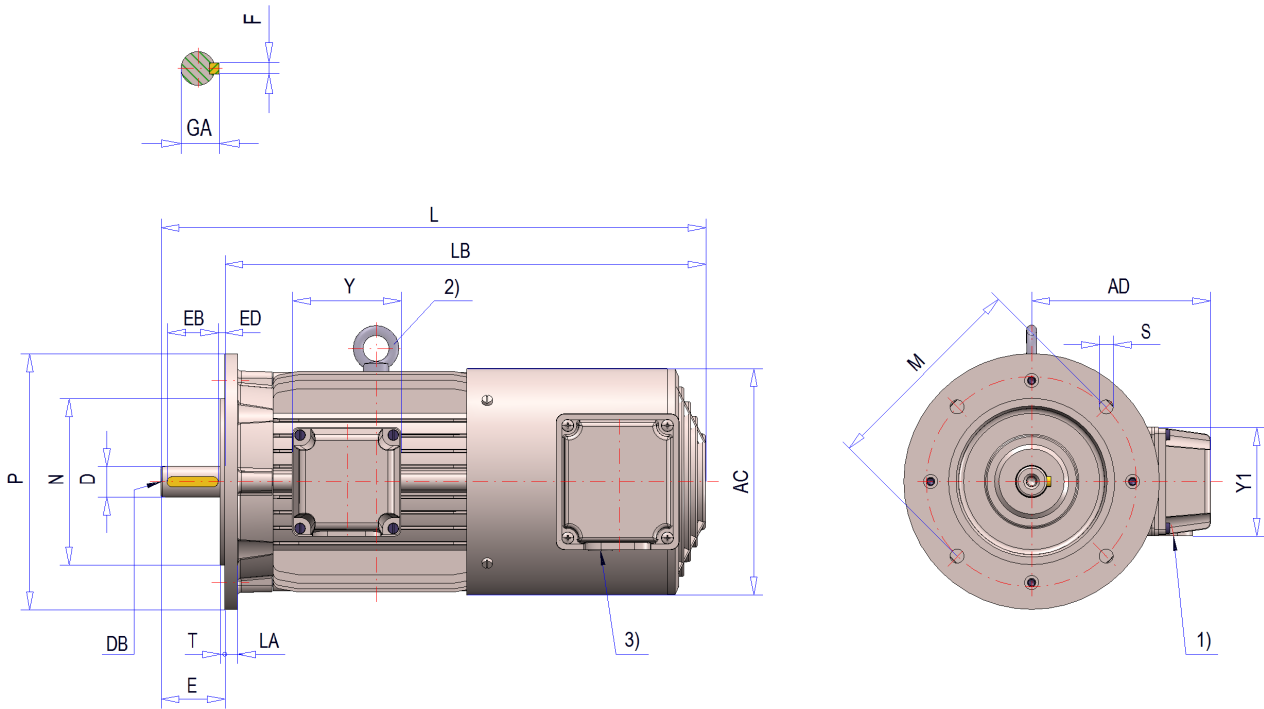
* Design IM B3 / IM 1001, IM B6 / IM 1051, IM B7 / IM 1061, IM B8 / IM 1071, IM V5 / IM 1011, IM V6 / IM 1031 (see page 1/5)

Three-phase motors- surface cooling, cooling type IC416 (external ventilation)

Types RF 63 K – 180 L

Protection class IP54 - IP55

Design B5 *



1) See planning section page 1/12

2) With lifting eye from size 112 onward

3) 1x M16x1.5

Fits and tolerances see page 8/2

Subject to technical amendments

Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
RF 63 K/L	11	23	M4	124	104	70	70	12.5	4	18	2.5	309	286	9	115	95	140	3	10
RF 71 K/L	14	30	M5	139	114	70	70	16	5	25	2.5	337	307	9.5	130	110	160	3.5	9.5
RF 80 K/L	19	40	M6	157	134	85	85	21.5	6	32	4	367	327	11.5	165	130	200	3.5	11
RF 90 S	24	50	M8	177	137	85	85	27	8	40	5	402	352	11.5	165	130	200	3.5	10.5
RF 90 L	24	50	M8	177	137	85	85	27	8	40	5	427	377	11.5	165	130	200	3.5	10.5
RF 100 L	28	60	M10	195	148	85	85	31	8	50	5	465	405	14	215	180	250	4	15.5
RF 112 M	28	60	M10	218	158	85	85	31	8	50	5	483	423	14	215	180	250	4	11
RF 132 S	38	80	M12	258	197	145	130	41	10	70	5	578	498	14	265	230	300	4	12
RF 132 M	38	80	M12	258	197	145	130	41	10	70	5	616	536	14	265	230	300	4	12
RF 160 M	42	110	M16	311	244	186	186	45	12	90	10	737	627	18	300	250	350	5	14
RF 160 L	42	110	M16	311	244	186	186	45	12	90	10	781	671	18	300	250	350	5	14
RF 180 M	48	110	M16	348	254	175	190	51.5	14	100	5	800	690	18	300	250	350	5	14
RF 180 L	48	110	M16	348	254	175	190	51.5	14	100	5	838	728	18	300	250	350	5	14

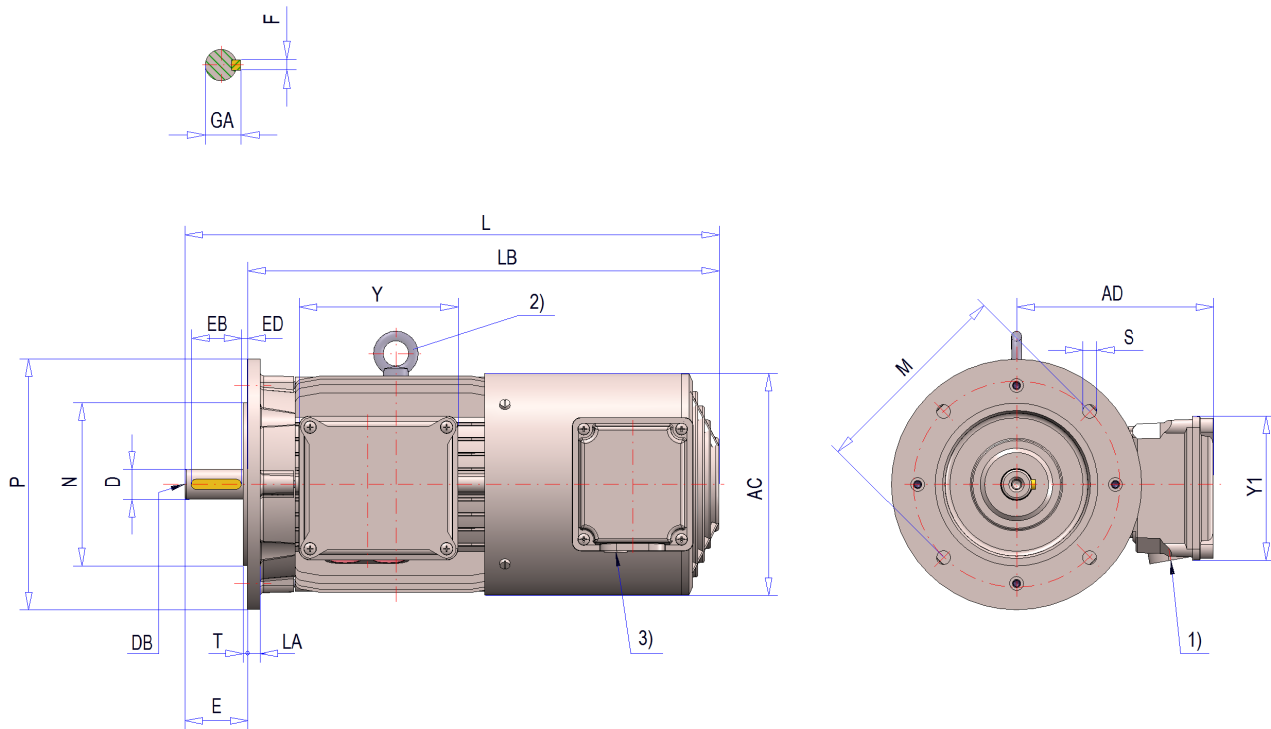
* Design IM B5 / IM 3001, IM V1 / IM 3011, IM V3 / IM 3031 (see page 1/5)

Three-phase motors- surface cooling, cooling type IC416 (external ventilation)

Types RF 63 K – 180 L

Protection class \geq IP56

Design B5 *



1) See planning section page 1/12

2) With lifting eye from size 112 onward

3) 1x M16x1.5

Fits and tolerances see page 8/2

Subject to technical amendments

Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
RF 63 K/L	11	23	M4	124	126	117	103	12.5	4	18	2.5	309	286	9	115	95	140	3	10
RF 71 K/L	14	30	M5	139	136	117	103	16	5	25	2.5	337	307	9.5	130	110	160	3.5	9.5
RF 80 K/L	19	40	M6	157	150	127	115	21.5	6	32	4	367	327	11.5	165	130	200	3.5	11
RF 90 S	24	50	M8	177	154	127	115	27	8	40	5	402	352	11.5	165	130	200	3.5	10.5
RF 90 L	24	50	M8	177	154	127	115	27	8	40	5	427	377	11.5	165	130	200	3.5	10.5
RF 100 L	28	60	M10	195	165	127	115	31	8	50	5	465	405	14	215	180	250	4	15
RF 112 M	28	60	M10	218	175	127	115	31	8	50	5	483	423	14	215	180	250	4	11
RF 132 S	38	80	M12	258	197	145	130	41	10	70	5	578	498	14	265	230	300	4	12
RF 132 M	38	80	M12	258	197	145	130	41	10	70	5	616	536	14	265	230	300	4	12
RF 160 M	42	110	M16	311	244	186	186	45	12	90	10	737	627	18	300	250	350	5	14
RF 160 L	42	110	M16	311	244	186	186	45	12	90	10	781	671	18	300	250	350	5	14
RF 180 M	48	110	M16	348	254	175	190	51.5	14	100	5	800	690	18	300	250	350	5	14
RF 180 L	48	110	M16	348	254	175	190	51.5	14	100	5	838	728	18	300	250	350	5	14

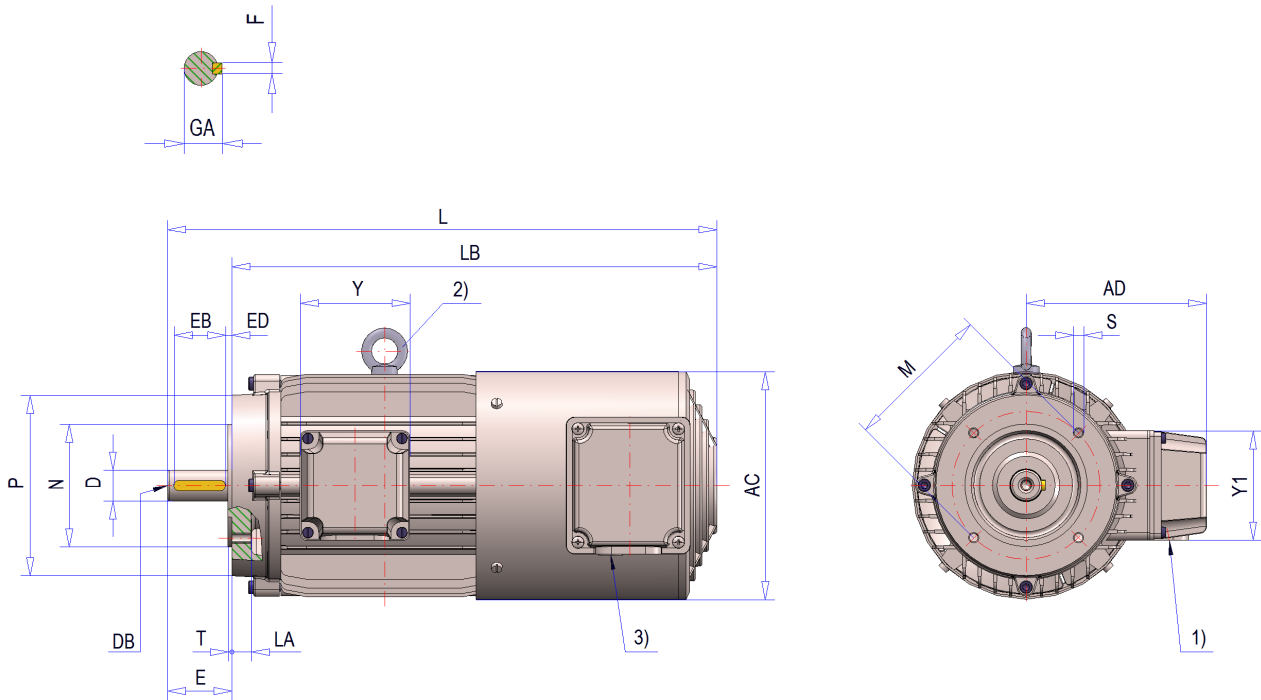
* Design IM B5 / IM 3001, IM V1 / IM 3011, IM V3 / IM 3031 (see page 1/5)

Three-phase motors- surface cooling, cooling type IC416 (external ventilation)

Types RF 63 K – 180 L

Protection class IP54 - IP55

Design B14 *



1) See planning section page 1/12

2) With lifting eye from size 112 onward

3) 1x M16x1.5

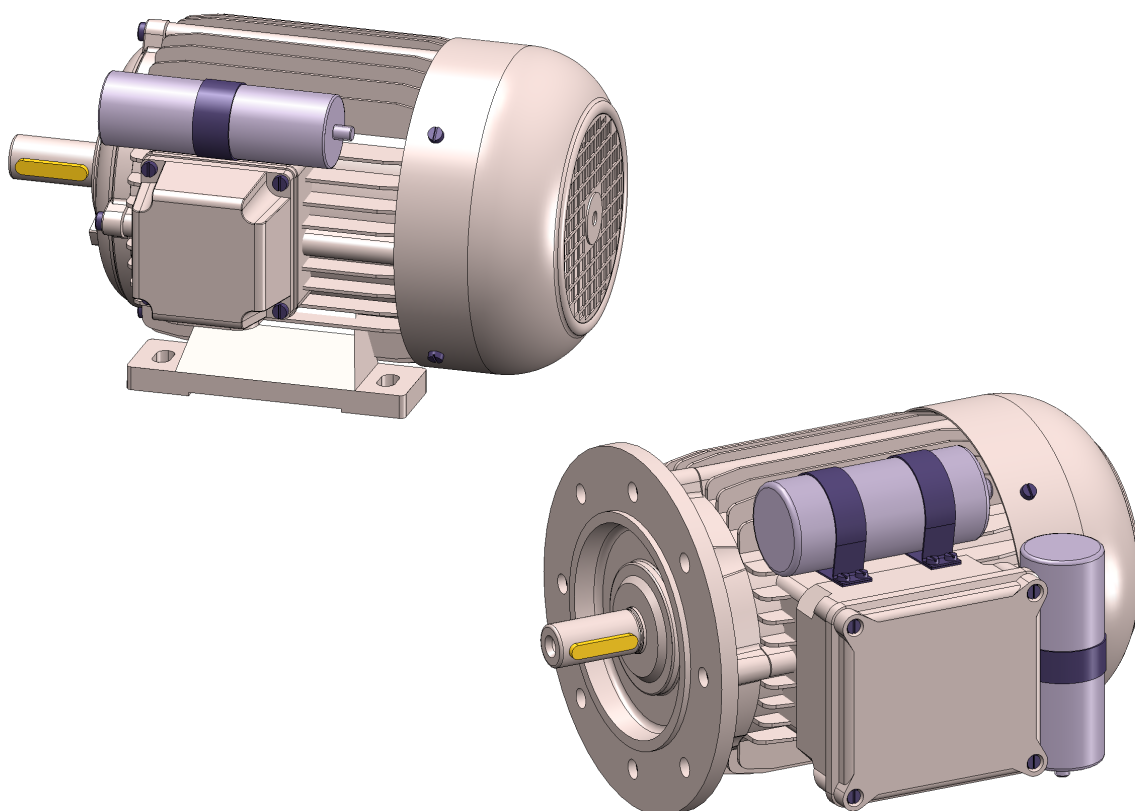
Fits and tolerances see page 8/2

Subject to technical amendments

Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
RF 63 K/L	11	23	M4	124	104	70	70	12.5	4	18	2.5	309	286	M5	75	60	90	2.5	9.5
RF 71 K/L	14	30	M5	139	114	70	70	16	5	25	2.5	337	307	M6	85	70	105	2.5	10
RF 80 K/L	19	40	M6	157	134	85	85	21.5	6	32	4	367	327	M6	100	80	120	3	12.5
RF 90 S	24	50	M8	177	137	85	85	27	8	40	5	402	352	M8	115	95	140	3	15
RF 90 L	24	50	M8	177	137	85	85	27	8	40	5	427	377	M8	115	95	140	3	15
RF 100 L	28	60	M10	195	148	85	85	31	8	50	5	465	405	M8	130	110	160	3.5	12.5
RF 112 M	28	60	M10	218	158	85	85	31	8	50	5	483	423	M8	130	110	160	3.5	16
RF 132 S	38	80	M12	258	197	145	130	41	10	70	5	578	498	M10	165	130	200	3.5	15
RF 132 M	38	80	M12	258	197	145	130	41	10	70	5	616	536	M10	165	130	200	3.5	15
RF 160 M	42	110	M16	311	244	186	186	45	12	90	10	764	654	M12	215	180	250	4	14
RF 160 L	42	110	M16	311	244	186	186	45	12	90	10	808	698	M12	215	180	250	4	14
RF 180 M	48	110	M16	348	254	175	190	51.5	14	100	5	834	724	M12	215	180	250	4	15
RF 180 L	48	110	M16	348	254	175	190	51.5	14	100	5	872	762	M12	215	180	250	4	15

* Design IM B14 / IM 3601, IM V18 / IM 3611, IM V19 / IM 3631 (see page 1/5)

SINGLE-PHASE MOTORS



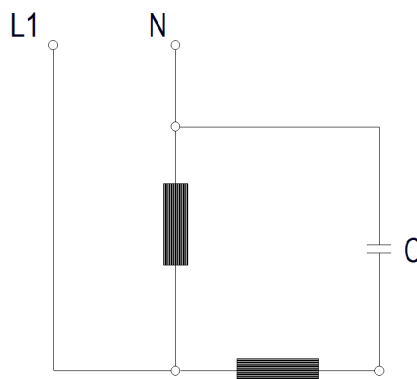
For dimensional sheets see page 9/5.

Single-phase motors

Single-phase motors can be operated on single-phase 230 V mains. Depending on the required start-up torque, you can choose one of the following versions

Single-phase motors with operating capacitors, type REBK

These motors - given the same size and number of poles - feature the same power as 3-phase motors but a relatively low start-up torque (see Technical Data, page 9/3). For this reason, they are particularly suited for drives for which a low start-up torque is required or which start up without load. The capacitor remains permanently switched on. The motors cannot be used for prolonged idling because this could exceed the permissible limit temperatures.



Voltage and frequency

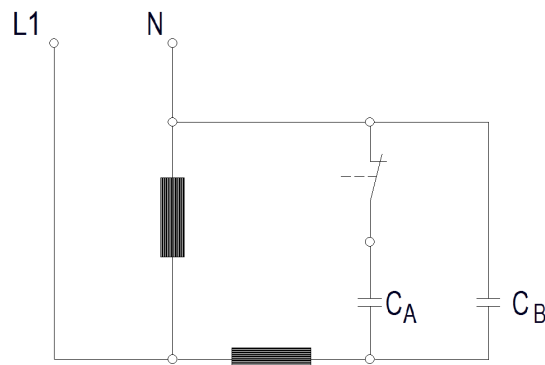
The motors are designed for 230 V, 50 Hz. Other voltages and frequencies on request.

Direction of rotation

When looking at the drive side shaft end, the motors turn in clockwise direction, i.e. to the right. The direction of rotation can be changed by swapping the jumpers on the terminal strip according to the wiring diagrams.

Single-phase motors with start-up and operating capacitors, type REBK ... AR

This version combines the high power of the REBK type and a high start-up torque (see Technical Data, page 9/4). Once the motor has reached the nominal speed, the start-up capacitor is switched off with a start-up relay or centrifugal switch.



Capacitors

The motors come with start-up and operating capacitors fitted by default. The capacitors are also available separately. Operation capacitors are low-loss metallised paper (MP) power capacitors with self-healing effect acc. to VDE 0560 Part 1 and 8.

The start-up capacitors are electrolytic capacitors and comply with VDE 0560 Part 1 and 8. Other motor data may result in changed capacitor sizes.

Special versions on demand



Single-phase motor with operational capacitor

Types: REBK 71 K – 90 L

Surface cooling IC 411

Thermal class F

Operating mode: S1

50 Hz, synchronous speed: 3000 rpm (2-pole)

Type	Nominal power P_N kW	Nominal speed n_N rpm	Nominal current at 230 V I_N A	Power factor $\cos \varphi$	Nominal torque M_N Nm	Start-up to nominal current I_A/I_N Nm	Start-up to nominal torque M_A/M_N	Capacitor C_B ¹⁾ μF	Capacitor C_A ¹⁾ μF	Moment of inertia J kgm ²	Weight IM B3 M appr. kg
REBK 71K/2	0.37	2830	2.90	0.99	1.3	3.0	0.40	12	-	0.00034	6.5
REBK 71L/2	0.55	2850	3.80	0.95	1.9	3.0	0.60	16	-	0.00042	7.5
REBK 80K/2	0.75	2860	5.20	0.99	2.5	3.2	0.40	25	-	0.00064	9.5
REBK 80L/2	1.10	2870	7.00	0.95	3.7	3.2	0.50	30	-	0.00079	10.5
REBK 90S/2	1.50	2870	10.5	0.95	5.0	3.7	0.50	40	-	0.00124	14.5
REBK 90L/2	2.20	2870	14.1	0.99	7.35	3.0	0.45	70	-	0.00155	17.5

¹⁾ Capacitor voltage strength: operation 400 V

Subject to technical amendments

50 Hz, synchronous speed: 1500 rpm (4-pole)

Type	Nominal power P_N kW	Nominal speed n_N rpm	Nominal current at 230 V I_N A	Power factor $\cos \varphi$	Nominal torque M_N Nm	Start-up to nominal current I_A/I_N Nm	Start-up to nominal torque M_A/M_N	Capacitor C_B ¹⁾ μF	Capacitor C_A ¹⁾ μF	Moment of inertia J kgm ²	Weight IM B3 M appr. kg
REBK 71K/4	0.25	1390	2.2	0.99	1.7	2.5	0.40	10	-	0.00052	6.5
REBK 71L/4	0.37	1400	3.0	0.97	2.5	2.5	0.40	12	-	0.00064	7.5
REBK 80K/4	0.55	1410	4.50	0.97	3.7	3.0	0.50	20	-	0.00099	8.5
REBK 80L/4	0.75	1410	5.50	0.96	5.1	3.0	0.45	25	-	0.00126	11.0
REBK 90S/4	1.10	1410	7.50	0.98	7.5	3.2	0.50	30	-	0.00205	14.5
REBK 90L/4	1.50	1420	9.50	0.96	10.0	3.3	0.50	40	-	0.00243	16.0

¹⁾ Capacitor voltage strength: operation 400 V

Subject to technical amendments



Single-phase motors with start-up and operating capacitors

Types: REBK 71 K...AR – 90 L...AR

Surface cooling IC 411

Thermal class F

Operating mode: S1

50 Hz, synchronous speed: 3000 rpm (2-pole)

Type	Nominal power P_N kW	Nominal speed n_N rpm	Nominal current at 230 V I_N A	Power factor $\cos \varphi$	Nominal torque M_N Nm	Start-up to nominal current I_A/I_N Nm	Start-up to nominal torque M_A/M_N	Capacitor C_B ¹⁾ μF	Capacitor C_A ¹⁾ μF	Moment of inertia J kgm ²	Weight IM B3 M appr. kg
REBK 71K/2 AR	0.37	2830	2.90	0.99	1.3	4.0	1.6	12	40	0.00034	7.5
REBK 71L/2 AR	0.55	2850	3.80	0.95	1.9	4.3	1.7	16	50	0.00042	8.5
REBK 80K/2 AR	0.75	2860	5.20	0.99	2.5	4.3	1.8	25	70	0.00064	10.5
REBK 80L/2 AR	1.10	2870	7.00	0.95	3.7	4.6	1.8	30	100	0.00079	11.5
REBK 90S/2 AR	1.50	2870	10.5	0.95	5.0	4.0	1.8	40	100	0.00124	15.5
REBK 90L/2 AR	2.20	2870	14.0	0.97	7.5	4.5	1.8	50	200	0.00155	18.5

¹⁾ Capacitor voltage: start 320 V, operation 400 V

Subject to technical amendments

50 Hz, synchronous speed: 1500 rpm (4-pole)

Type	Nominal power P_N kW	Nominal speed n_N rpm	Nominal current at 230 V I_N A	Power factor $\cos \varphi$	Nominal torque M_N Nm	Start-up to nominal current I_A/I_N Nm	Start-up to nominal torque M_A/M_N	Capacitor C_B ¹⁾ μF	Capacitor C_A ¹⁾ μF	Moment of inertia J kgm ²	Weight IM B3 M appr. kg
REBK 71K/4AR	0.25	1390	2.20	0.99	1.7	3.5	1.7	10	20	0.00052	7.5
REBK 71L/4AR	0.37	1400	3.00	0.93	2.5	3.3	1.8	12	30	0.00064	8.5
REBK 80K/4AR	0.55	1410	4.50	0.97	3.7	3.5	1.7	20	50	0.00099	9.5
REBK 80L/4AR	0.75	1410	5.50	0.92	5.1	3.5	1.8	25	70	0.00126	12.0
REBK 90S/4AR	1.10	1410	7.50	0.98	7.5	4.0	1.8	30	70	0.00205	15.5
REBK 90L/4AR	1.50	1420	9.50	0.94	10.0	4.0	1.7	40	100	0.00243	17.0

¹⁾ Capacitor voltage: start 320 V, operation 400 V

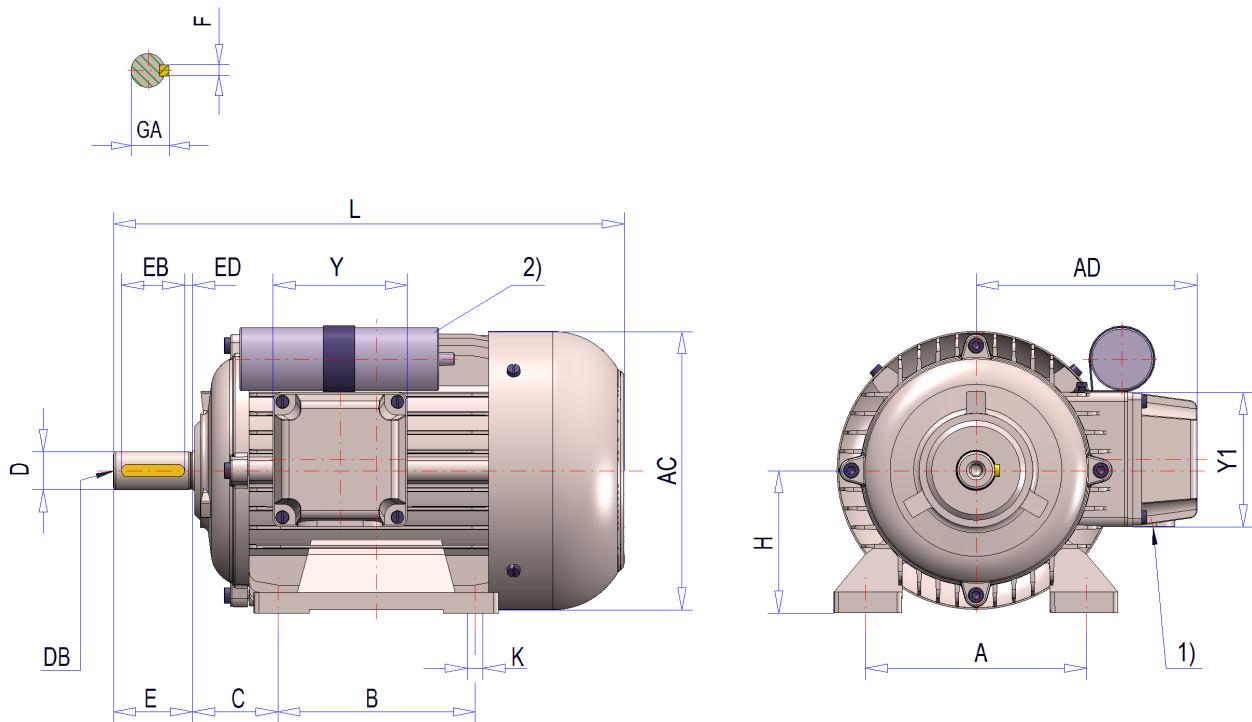
Subject to technical amendments

Single-phase motors with operating capacitor – surface cooling, cooling type IC410 (internal ventilation)

Types REBK 71 K – 90 L

Protection class IP54 - IP55

Design B3 *



1) See Planning section, page 1/12

2) Capacitor size acc. to winding configuration

Fits and tolerances see page 8/2

Subject to technical amendments

Type	B	A	K	H	C	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L
REBK 71 K/L	90	112	7	71	45	14	30	M5	138	109	70	70	16	5	25	2.5	243
REBK 80 K/L	100	125	9.5	80	50	19	40	M6	156	127	85	85	21.5	6	32	4	274
REBK 90 S	100	140	10	90	56	24	50	M8	176	140	85	85	27	8	40	5	301
REBK 90 L	125	140	10	90	56	24	50	M8	176	140	85	85	27	8	40	5	326

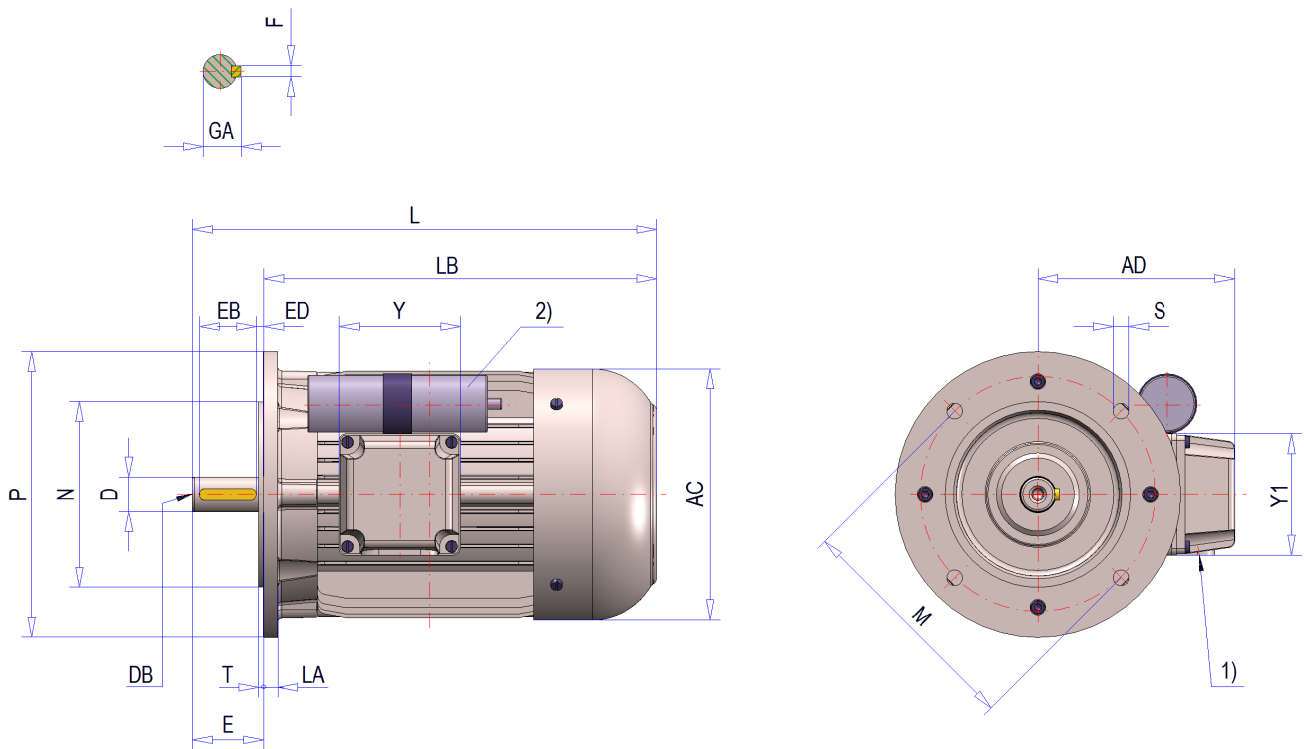
* Design IM B3 / IM 1001, IM B6 / IM 1051, IM B7 / IM 1061; IM B8 / IM 1071, IM V5 / IM 1011, IM V6 / IM 1031 (see page 1/5)

Single-phase motors with operating capacitor – surface cooling, cooling type IC410 (internal ventilation)

Types REBKF 71 K – 90 L

Protection class IP54 - IP55

Design B5 *



1) See Planning section, page 1/12

2) Capacitor size acc. to winding configuration

Fits and tolerances see page 8/2

Subject to technical amendments

Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
REBKF 71 K/L	14	30	M5	138	114	70	70	16	5	25	2.5	243	213	9.5	130	110	160	3.5	9.5
REBKF 80 K/L	19	40	M6	156	134	85	85	21.5	6	32	4	274	234	11.5	165	130	200	3.5	11
REBKF 90 S	24	50	M8	176	137	85	85	27	8	40	5	301	251	11.5	165	130	200	3.5	10.5
REBKF 90 L	24	50	M8	176	137	85	85	27	8	40	5	326	276	11.5	165	130	200	3.5	10.5

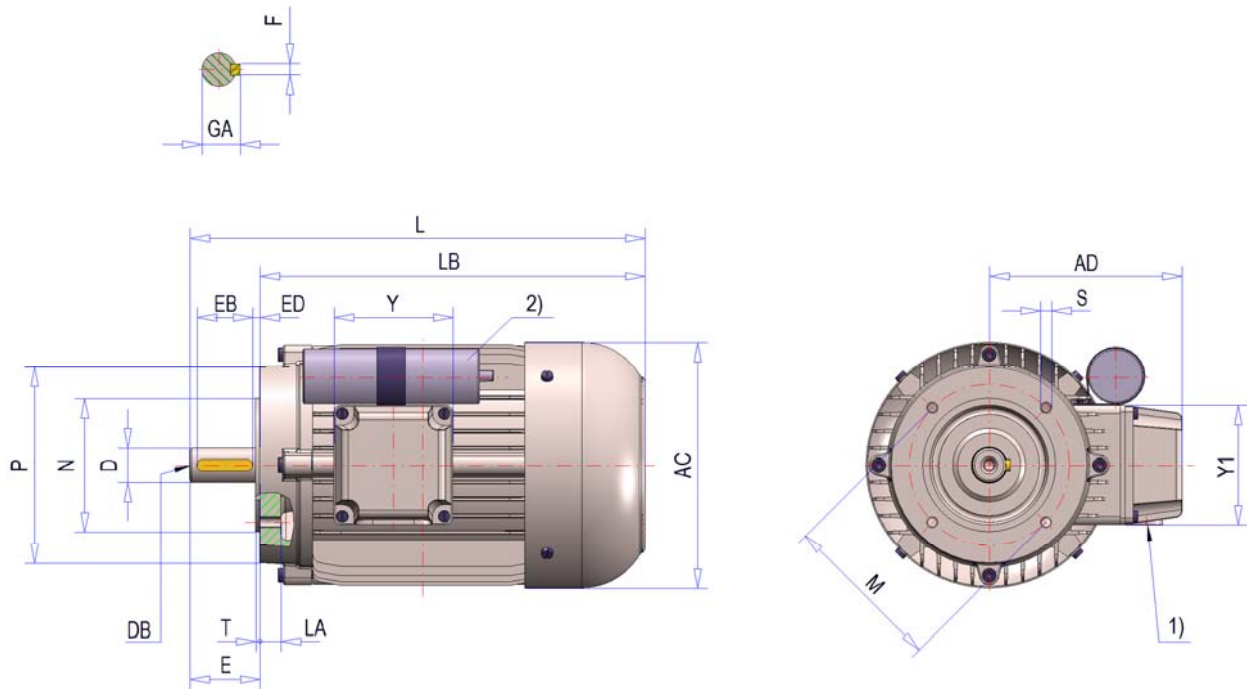
* Design IM B5 / IM 3001, IM V1 / IM 3011, IM V3 / IM 3031 (see page 1/5)

Single-phase motors with operating capacitor – surface cooling, cooling type IC410 (internal ventilation)

Types REBKF 71 K – 90 L

Protection class IP54 - IP55

Design B14 *



1) See Planning section, page 1/12

2) Capacitor size acc. to winding configuration

Fits and tolerances see page 8/2

Subject to technical amendments

Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
REBKF 71 K/L	14	30	M5	138	114	70	70	16	5	25	2.5	243	213	M6	85	70	105	2.5	10
REBKF 80 K/L	19	40	M6	156	134	85	85	21.5	6	32	4	274	234	M6	100	80	120	3	9.5
REBKF 90 S	24	50	M8	176	137	85	85	27	8	40	5	301	251	M8	115	95	140	3	15
REBKF 90 L	24	50	M8	176	137	85	85	27	8	40	5	326	276	M8	115	95	140	3	15

* Design IM B14 / IM 3601, IM V18 / IM 3611, IM V19 / IM 3631 (see page 1/5)

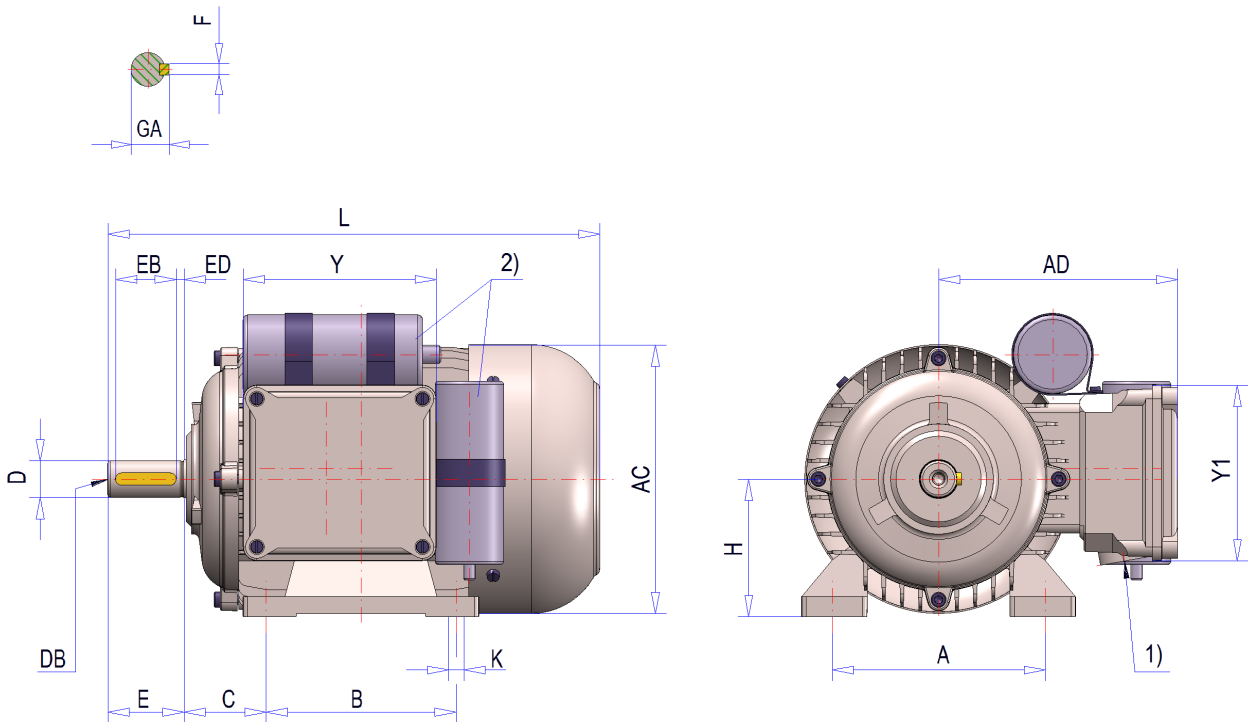
Single-phase motors with start-up and operating capacitors – surface cooling, cooling type IC411

Internal ventilation

Types REBK 71 K...AR – 90 L...AR

Protection class IP54 - IP55

Design B3 *



1) See Planning section, page 1/12

2) Capacitor size acc. to winding configuration

Fits and tolerances see page 8/2

Subject to technical amendments

Type	B	A	K	H	C	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L
REBK 71 K/L	90	112	7	71	45	14	30	M5	138	130	117	103	16	5	25	2.5	243
REBK 80 K/L	100	125	9.5	80	50	19	40	M6	156	144	127	115	21.5	6	32	4	274
REBK 90 S	100	140	10	90	56	24	50	M8	176	157	127	115	27	8	40	5	301
REBK 90 L	125	140	10	90	56	24	50	M8	176	157	127	115	27	8	40	5	326

* Design IM B3 / IM 1001, IM B6 / IM 1051, IM B7 / IM 1061; IM B8 / IM 1071, IM V5 / IM 1011, IM V6 / IM 1031 (see page 1/5)

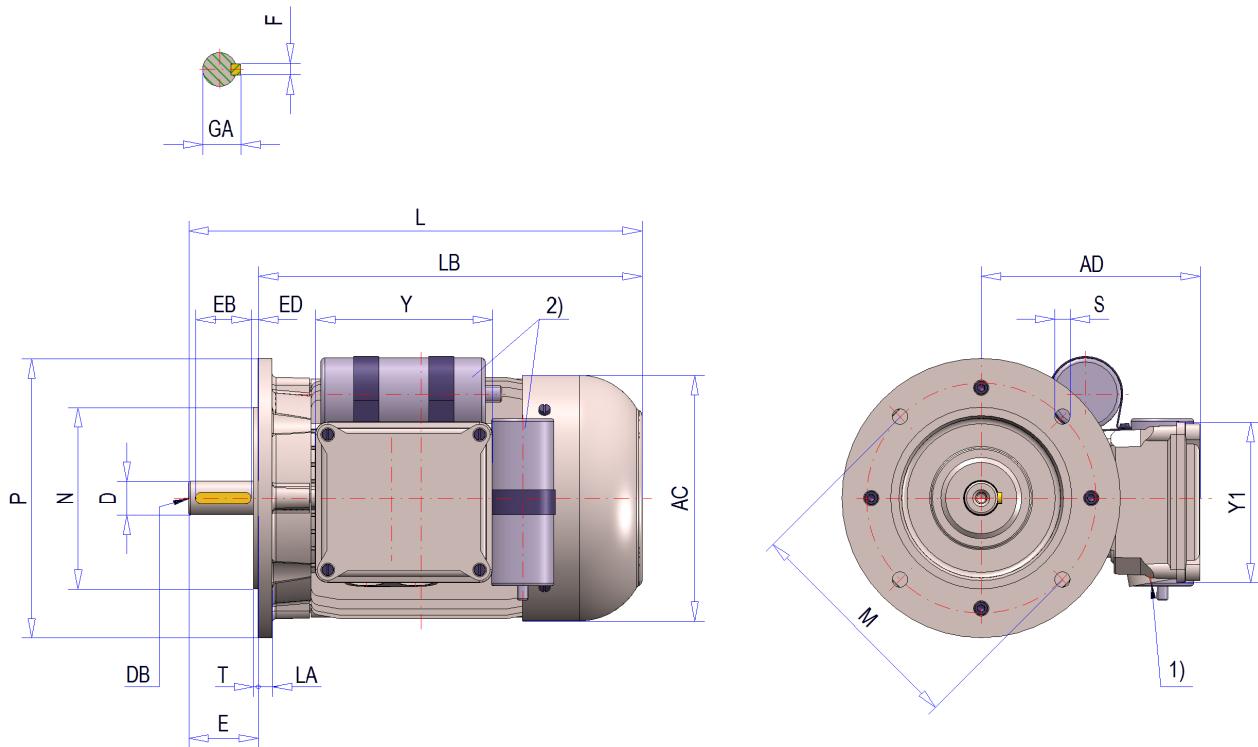
Single-phase motors with start-up and operating capacitors – surface cooling, cooling type IC411

Internal ventilation

Types REBKF 71 K...AR – 90 L...AR

Protection class IP54 - IP55

Design B5 *



1) See Planning section, page 1/12

2) Capacitor size acc. to winding configuration

Fits and tolerances see page 8/2

Subject to technical amendments

Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
REBKF 71 K/L	14	30	M5	138	136	117	103	16	5	25	2.5	243	213	9	130	110	160	3.5	9.5
REBKF 80 K/L	19	40	M6	156	150	127	115	21.5	6	32	4	274	234	9	165	130	200	3.5	11
REBKF 90 S	24	50	M8	176	154	127	115	27	8	40	5	301	251	9	165	130	200	3.5	10.5
REBKF 90 L	24	50	M8	176	154	127	115	27	8	40	5	326	276	9	165	130	200	3.5	10.5

* Design IM B5 / IM 3001, IM V1 / IM 3011, IM V3 / IM 3031 (see page 1/5)

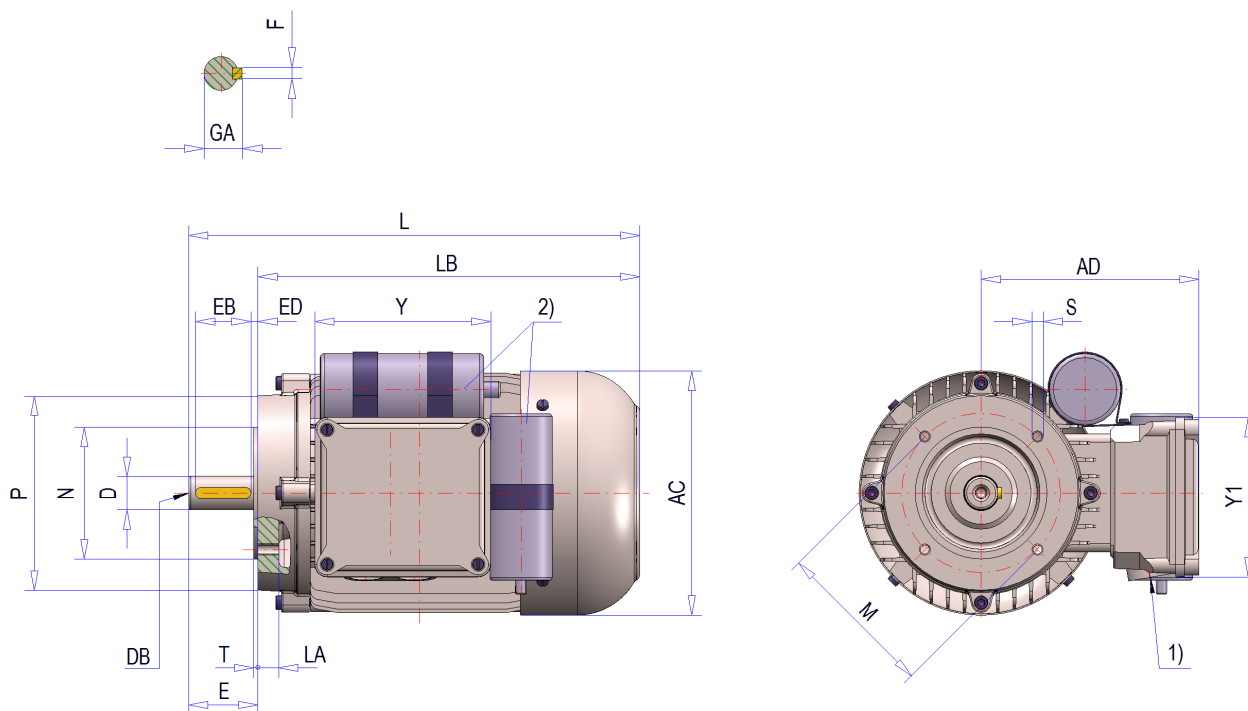
Single-phase motors with start-up and operating capacitors – surface cooling, cooling type IC411

Internal ventilation

Types REBKf 71 K...AR – 90 L...AR

Protection class IP54 - IP55

Design B14 *



1) See Planning section, page 1/12

2) Capacitor size acc. to winding configuration

Fits and tolerances see page 8/2
Subject to technical amendments

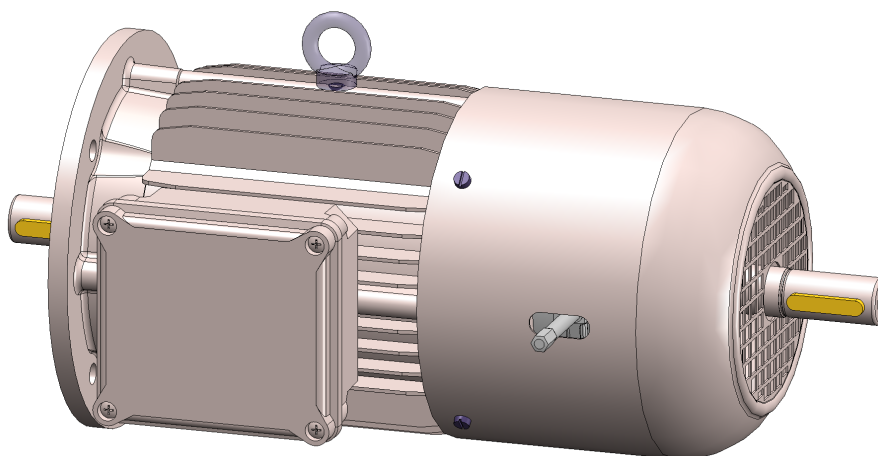
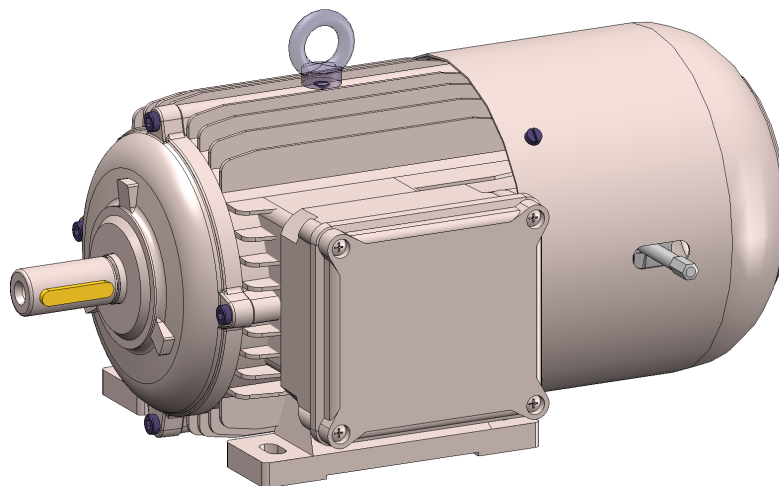
Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
REBKf 71 K/L	14	30	M5	138	136	117	103	16	5	25	2.5	243	213	M6	85	70	105	2.5	10
REBKf 80 K/L	19	40	M6	156	150	127	115	21.5	6	32	4	274	234	M6	100	80	120	3	9.5
REBKf 90 S	24	50	M8	176	154	127	115	27	8	40	5	301	251	M8	115	95	140	3	15
REBKf 90 L	24	50	M8	176	154	127	115	27	8	40	5	326	276	M8	115	95	140	3	15

* Design IM B14 / IM 3601, IM V18 / IM 3611, IM V19 / IM 3631 (see page 1/5)

Brake motors

10

THREE-PHASE BRAKE MOTORS



For dimensional sheets see page 10/11.

Brake motors

Brake motors are single-phase or 3-phase asynchronous motors with squirrel cage rotor equipped with a mechanical brake. Braking does not subject the motor winding to a thermal load.

Brake motors are used where moving masses have to be decelerated in a short period of time or where masses have to be held in a defined state. For example in lifting and travelling drives, machine tools, packaging machines, transport and conveyor technology, servo drives and many more.

Brake motors are characterised by:

- shortening of ancillary times by reduced motor coast-down times
- locking brake in case of power failure
- exact approaching of a certain position
- increased motor switching frequency
- matching of braking torque to work conditions
- high operational safety due to robust design
- long service life

The brake motors are available with the following brake types:

- Electromagnetically released spring-loaded brake type B
- Electromagnetically operated brake type EB

The brakes comply with VDE 0580. They are exclusively intended for dry operation.

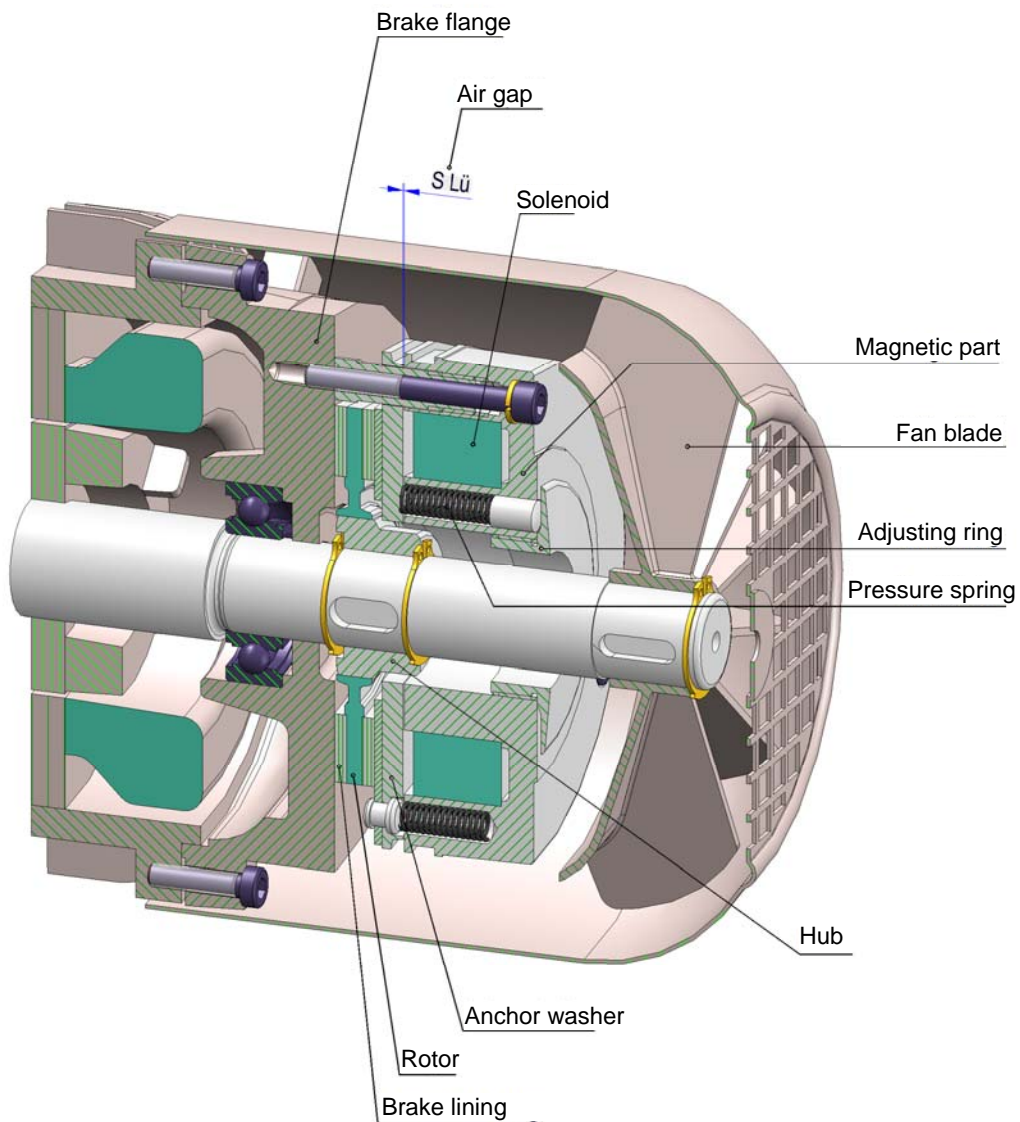
Electromagnetically released spring-loaded brake type B

This brake is a single-disc brake with two friction surfaces. In the deenergised state, several pressure springs generate the braking torque by friction locking. The brake is released electromagnetically.

Generating the braking torque

During braking, the pressure springs push the rotor axially sliding on the hub or shaft via the armature disc against the counter friction surface. When the brake is applied, there is an air gap $S_{Lü}$ between armature disc and magnet part.

To release the brake, a direct current excites the solenoid of the magnet part. The resulting magnetic force pulls the armature disc against the spring force to the magnet part. The rotor is no longer subjected to the spring force and can turn freely. The customer can adjust the spring force of the standard brake type B with the adjusting ring.



Voltage and circuit type

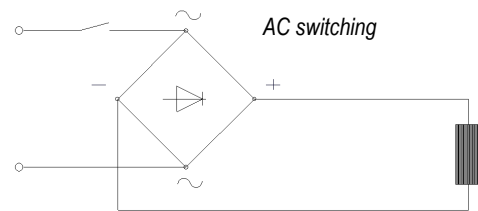
The brakes also available for voltages other than the standard voltages 24 V, 103 V, 180 V, and 205 V [DC]. According to DIN VDE 0580, the permissible voltage change is +/- 10 % of the nominal voltage.

A rectifier is used to connect the brakes to an AC supply. These rectifiers, specially developed for supplying DM solenoids, are protected with a varistor circuit against voltage peaks that occur in connection with switching, contact chatter, excessively long cables or poor mains conditions. The brake motors can be equipped with one-way or bridge rectifiers located in the terminal box.

The brake motors come in two basic circuit variants:

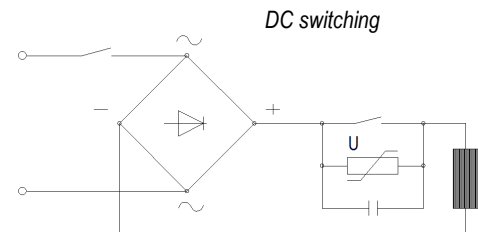
AC switching

By default, the AC side of the rectifier is connected to the motor terminals, and the DC side to the brake solenoid. This results in a smooth, delayed brake engagement.



DC switching

The AC side of the rectifier is connected to the motor terminals. During switch-off, the DC circuit between rectifier and brake solenoid is interrupted with an auxiliary contact of the motor protection switch. The magnetic field of the brake breaks down very quickly, which makes the brake torque available faster.

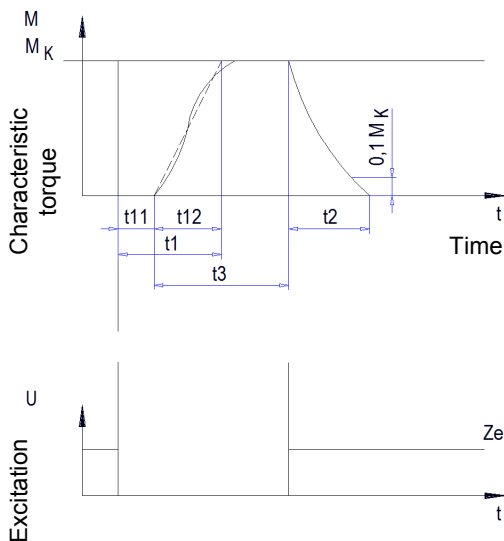


Switching times

The transition from a state free of braking torque to a state of steady braking torque is not free of delay. The switching times of the brake depend on the circuit variants mentioned. The engagement time controls the application of the brake, the release time the releasing of the brake. DC switching results in a significantly shorter engagement time t_1 . The release time t_2 can be reduced with devices that use quick or over-excitation.

The switching times given in the table on page 10/5 apply to DC switching at nominal release travel S_{Re} and warm brake solenoid. The engagement times are approx. 10 times longer in case of AC switching.

Several factors such as temperature, release travel between armature and solenoid carrier (depending on the state of brake wear), a potentially reduced brake torque, the rectifier type, etc. affect the switching times.



- t_{11} = Response delay during engagement
- t_{12} = Rise time of braking torque
- t_1 = Engagement time
- t_2 = Release time
- t_3 = Slippage time



Technical data (for standard brake type B)

Type	Braking torque	Nominal input power	max. speed *	Release travel	Permissible release travel	Switching times DC switch-off		Moment of inertia	Weight magnetic part
	M _k	[P _{20°C}]	n _{max.}	S _{Re}	S _{Re max.}	t ₁	t ₂	J	
	[Nm]	[W]	rpm	[mm]	[mm]	[ms]	[ms]	[kgm ² · 10 ⁻⁴]	[kg]
B4	4	20	6000	0.2	0.5	28	45	0.15	0.8
B8	8	25	5000	0.2	0.5	31	57	0.61	1.2
B16	16	30	4000	0.2	0.5	47	76	2.0	2.1
B32	32	40	3600	0.3	0.75	53	115	4.5	3.5
B60	60	50	3600	0.3	0.75	42	210	6.3	5.2
B80	80	55	3600	0.3	0.75	57	220	15	7.9
B150	150	85	3600	0.4	1.0	78	270	29	12.0
B260	260	100	3600	0.4	1.0	165	340	73	19.3
B400	400	110	3000	0.5	1.25	230	390	200	29.1

* Only 66-74% of the nominal braking torque is reached at maximum speed

Subject to technical amendments

Brake motor power data

Brake size and motor size usually correspond in such a manner that the switching frequency to be obtained with the brake motor is not restricted by the brake but by the motor temperature. The permissible switching frequency calculated from the moment of inertia, counter torque and load factors can in most cases be assumed to also be the permissible brake switching frequency for the spring-loaded brake. This value must be higher than the required number of start-ups or brake procedures per hour.

Brake type B	B4	B8	B16	B32	B60	B80	B150	B260	B400
Braking torque [Nm]	4	8	16	32	60	80	150	260	400

Size 63	x								
Size 71	x	o	o						
Size 80	o	x	o						
Size 90	o	o	x	o					
Size 100		o	o	x	o				
Size 112			o	o	x	o			
Size 132			o	o	o	x	o		
Size 160					o	o	x	o	
Size 180							o	x	o

x = standard assignment

o = possible assignment

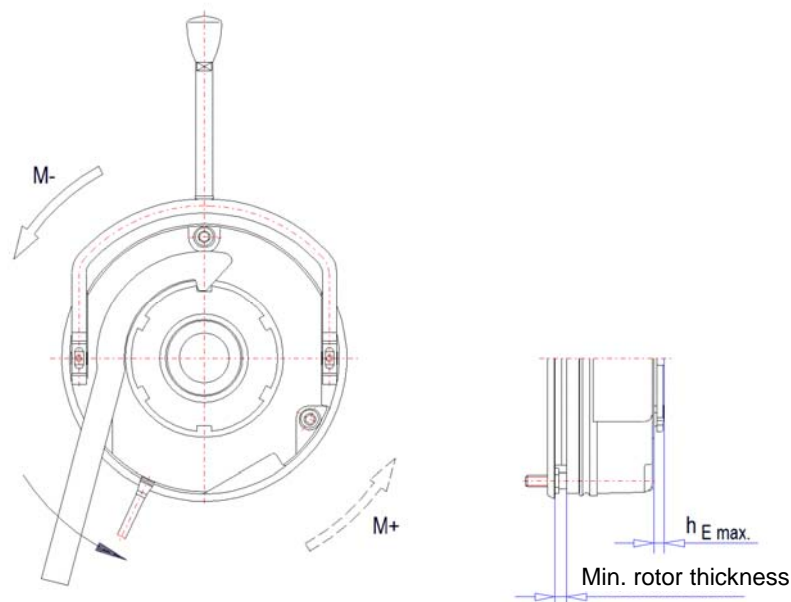
Brake torque reduction

On the standard brake type B, the brake torque M_K can be reduced with the adjusting ring in the magnet section (using a hook wrench acc. to DIN 1810, shape A). Each notch of the adjusting ring changes the brake torque as specified in the table. The adjusting ring may be screwed out only to the maximum dimension $h_{E_{max}}$ (see table). Please note that engagement and release times change. The torque reduction is independent of the used nominal torque.

Brake torque M_K	4 [Nm]	8 [Nm]	16 [Nm]	32 [Nm]	60 [Nm]	80 [Nm]	150 [Nm]	260 [Nm]	400 [Nm]
Torque reduction per notch [Nm]	0.2	0.35	0.8	1.3	1.7	1.6	3.6	5.6	6.2
Adjusting ring projection $h_{E_{max}}$ [mm]	4.5	4.5	7.5	9.5	11	10	15	17	19.5
Min. rotor thickness [mm]	4.5	5.5	7.5	8.0	7.5	8.0	10	12	15.5

Table only applies to brake Type B with adjusting ring

Subject to technical amendments



Protection class

The magnet section of the brake has protection class IP 66. If the spring-loaded brake is installed in the fan cowl, the protection class is at least IP 55, depending on the design measures taken.

Higher protection levels by using other brake types are possible on request.

The ambient temperature is -20°C to $+40^{\circ}\text{C}$. If high humidity and low temperatures prevail, measures to protect the rotor disc and the rotor against freezing up have to be taken.

Maintenance

The brakes are next to maintenance-free. We recommend checking the release travel S_{Re} at fixed intervals. The wear depends on the work of friction that has to be performed each time the brake is applied. If the maximum release travel $S_{Re_{max}}$ (see page 10/5) has been reached, the brake has to be set to S_{Re} again. The brake can be adjusted at least 5 times, but only as many times as the minimum rotor thickness (see table above) has not been reached.



Controlling drives for frequent switching

The drive shall be controlled such that the motor does not start if the brake is applied.

The response times of motor and brake of large brake motors in particular differ greatly. Starting with the brake applied frequently will result in premature wear of the brake lining and, due to the continuously repeated high start-up current, will cause the winding to heat up and the motor to fail.

With the following options, the response times of motor and brake can be matched:

- A micro switch installed inside the brake can control the motor control voltage. The motor switches on as soon as the brake releases.
- The response times of motor and brake can be compensated for with a timer relay. (timer relay adjusting range 0.05 ... 1s).
- Fast switching with a fast acting rectifier can be performed; this will trigger the brake coil with a higher voltage while the motor starts. The voltage drops to the nominal value as soon as the brake has been released.

Special designs

- Brake motors with fast excitation for high switching frequencies
- Brakes with manual release (TÜV-approved)
 - As an option, the brake is also available with manual release. When the manual release is actuated while the brake is deenergised, the brake releases mechanically, and the shaft can be moved easily. The manual release lever is located close to the fan cowl.
 - A lockable manual release lever is available on request.
- Brakes for frequency operation and single-phase motors
 - The design reduces vibrations, noise and points of resonance that can occur in this mode.
- Protection class IP 65 brakes
- ATEX brakes
 - Brakes suited for operation in explosive areas of Zone II
- Corrosion-protected brakes
- Brakes with micro-switch
 - Micro switches to monitor the release travel and the wear or to monitor the manual release function
- Brakes suited for encoder mounting
- Brake motors with additional flywheel mass. The additional flywheel mass installed in the fan cowl enables jerk-free starting and stopping of the motor.
- Brake motors with external cooling. Brake motors can be equipped with external ventilation to obtain high switching frequencies.
- Brake motors with second shaft end (shaft end on request)
- Double brakes for stage machinery/theatre version (see Part 11)



Three-phase motors

Number of poles: 2

Nominal data at 400V, 50 Hz

Thermal class F

Operating mode: S1

Synchronous speed: 3000 rpm

Surface cooling IC 411

Type	Nominal power	Nominal speed	Nominal current	Power factor	Nominal torque	Start-up to nominal current	Start-up to nominal torque	Breakdown to nominal torque	Braking torque	Moment of inertia	Weight IM B3
R	P _N kW	n _N rpm	I _N A	cos φ	M _N Nm	I _A /I _N	M _A /M _N	M _k /M _N	M _{Bmax} Nm	J kgm ²	M appr. kg
63K/2-B4	0.18	2780	0.55	0.72	0.62	3.5	2.4	3.4	4	0.00016	5.5
63L/2-B4	0.25	2800	0.70	0.81	0.84	4.3	2.8	4.3	4	0.00021	6.0
71K/2-B4	0.37	2810	0.95	0.78	1.3	4.6	2.2	2.7	4	0.00036	7.0
71L/2-B4	0.55	2835	1.3	0.82	1.9	5.6	2.9	2.8	4	0.00043	8.0
80K/2-B8	0.75	2845	1.65	0.84	2.5	5.3	3.2	3.2	8	0.00070	10.5
80L/2-B8	1.1	2855	2.40	0.85	3.7	6.2	3.1	3.2	8	0.00085	11.5
90S/2-B16	1.5	2890	3.40	0.80	5.0	5.9	2.5	3.2	16	0.00144	16
90L/2-B16	2.2	2870	4.50	0.88	7.3	6.3	2.8	2.9	16	0.00175	19
100L/2-B32	3.0	2845	6.45	0.84	10.2	6.1	3.2	3.0	32	0.00290	23.5
112M/2-B60	4.0	2875	8.1	0.87	13.3	4.5	2.2	3.6	60	0.0049	34.5
132S/2-B80	5.5	2900	10.5	0.90	18	5.1	2.3	3.4	80	0.0105	50
132S/20-B80	7.5	2890	14.0	0.91	24.7	6.7	2.4	3.0	80	0.0130	56
160M/2-B150	11.0	2930	22.5	0.89	35.4	6.6	2.1	4.0	150	0.0306	116
160M/20-B150	15.0	2950	27.2	0.89	48.7	8.2	3.3	3.5	150	0.0406	131
160L/2-B150	18.5	2950	34.0	0.87	59.8	9.3	4.1	4.0	150	0.0471	147
180M/2-B260	22.0	2950	40.0	0.89	71	6.0	4.0	4.1	260	0.0724	193
180L/2-B260	30.0	2950	53.2	0.92	97	7.2	2.5	3.7	260	0.0810	204

Subject to technical amendments



Three-phase motors

Number of poles: 4

Nominal data at 400V, 50 Hz

Thermal class F

Operating mode: S1

Synchronous speed: 1500 rpm

Surface cooling IC 411

Type	Nominal power	Nominal speed	Nominal current	Power factor	Nominal torque	Start-up to nominal current	Start-up to nominal torque	Breakdown to nominal torque	Braking torque	Moment of inertia	Weight IM B3
R	P _N kW	n _N rpm	I _N A	cos φ	M _N Nm	I _A /I _N	M _A /M _N	M _k /M _N	M _{Bmax} Nm	J kgm ²	M appr. kg
63K/4-B4	0.12	1350	0.45	0.68	0.85	2.95	2.1	2.5	4	0.00022	5.5
63L/4-B4	0.18	1380	0.65	0.65	1.3	3.10	2.3	2.5	4	0.00027	6.0
71K/4-B4	0.25	1415	0.70	0.76	1.7	4.4	2.5	3.1	4	0.00053	7.5
71L/4-B4	0.37	1400	1.0	0.72	2.5	4.2	2.4	2.6	4	0.00065	8.5
80K/4-B8	0.55	1375	1.4	0.76	3.9	4.0	2.3	2.2	8	0.00105	10.5
80L/4-B8	0.75	1400	1.90	0.75	5.0	4.2	2.1	2.3	8	0.00132	11.5
90S/4-B16	1.1	1420	2.70	0.75	7.4	4.5	2.2	2.6	16	0.00213	16.0
90L/4-B16	1.5	1410	3.5	0.80	10.2	5.1	2.3	2.7	16	0.00263	17.5
100L/4-B32	2.2	1420	4.9	0.81	14.9	4.6	1.8	2.3	32	0.00422	23
100L/40-B32	3.0	1420	6.5	0.81	19.9	5.1	2.1	2.5	60	0.00533	27
112M/4-B60	4.0	1440	8.3	0.81	26.5	6.2	2.3	3.0	80	0.0108	39.5
132S/4-B80	5.5	1450	12	0.78	36.5	5.7	2.3	2.4	80	0.0218	55
132M/4-B80	7.5	1450	15	0.84	49.5	5.9	2.2	2.8	150	0.0283	72
160M/4-B150	11	1440	22.5	0.81	72	4.7	2.3	2.5	150	0.0524	121
160L/4-B150	15	1460	30.2	0.80	98	5.0	2.7	3	150	0.0679	141
180M/4-B260	18.5	1470	36	0.86	120	4.2	3.1	3.2	260	0.1154	197
180L/4-B260	22	1460	43	0.86	144	5.5	2.6	2.7	260	0.1246	220

Subject to technical amendments



Three-phase motors

Number of poles: 6

Nominal data at 400V, 50 Hz

Thermal class F

Operating mode: S1

Synchronous speed: 1000 rpm

Surface cooling IC 411

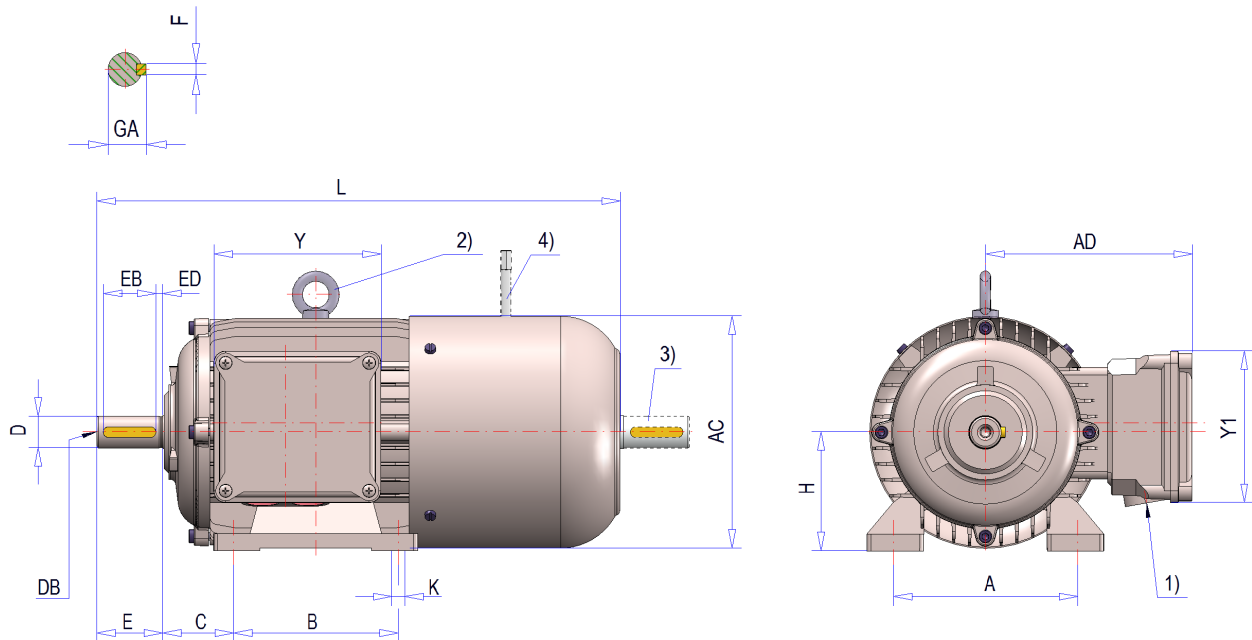
Type	Nominal power	Nominal speed	Nominal current	Power factor	Nominal torque	Start-up to nominal current	Start-up to nominal torque	Breakdown to nominal torque	Braking torque	Moment of inertia	Weight IM B3
R	P_N kW	n_N rpm	I_N A	$\cos \varphi$	M_N Nm	I_A/I_N	M_A/M_N	M_k/M_N	M_{Bmax} Nm	J kgm ²	M appr. kg

63K/6-B4	0.09	870	0.40	0.75	1.0	2.5	1.7	1.8	4	0.00031	5.5
63L/6-B4	0.12	880	0.55	0.73	1.2	2.5	2.9	3.0	4	0.00044	6
71K/6-B4	0.18	920	0.65	0.67	1.8	2.9	2.1	2.25	4	0.00083	7.5
71L/6-B4	0.25	915	0.95	0.69	2.6	2.6	1.9	2.2	4	0.00103	8.5
80K/6-B8	0.37	940	1.3	0.62	3.8	3.6	2.2	2.2	8	0.00197	11.5
80L/6-B8	0.55	920	1.7	0.74	5.8	3.5	2.5	2.6	8	0.00245	12.5
90S/6-B16	0.75	925	2.4	0.65	7.7	3.2	2.2	2.6	16	0.00323	17
90L/6-B16	1.1	910	3.05	0.69	11.5	3.5	2.0	2.4	16	0.00436	20
100L/6-B32	1.5	920	3.7	0.76	15.0	4.0	1.8	2.25	32	0.00892	25
112M/6-B60	2.2	960	5.6	0.70	22.0	5.2	2.75	2.8	60	0.0164	36.5
132S/6-B80	3.0	970	7.4	0.71	29.7	5.4	2.45	2.68	80	0.0270	54
132M/6-B80	4.0	965	9.4	0.73	40	5.2	2.1	3.1	80	0.0324	60
132M/60-B80	5.5	965	12.6	0.75	55	5.3	1.9	2.6	150	0.0392	63
160M/6-B150	7.5	970	16	0.76	75.6	4.4	1.9	2.6	150	0.0804	124
160L/6-B150	11.0	970	22.6	0.83	108	5.3	1.6	2.3	150	0.1100	147
180L/6-B260	15.0	965	30.5	0.82	148	4.5	2.4	2.9	260	0.1669	220

Subject to technical amendments

Three-phase brake motors – surface cooling, cooling type IC411 (internal ventilation)

Types R 63 K – 180 L
 Protection class IP54-IP55 **
 Design B3 *



- 1) See planning section page 1/12
- 2) With lifting eye from size 112 onward
- 3) 2nmd shaft end (dimension on request)
- 4) Manual release as option (can be ordered in positions 0°/90°/180°/270° see page 1/11)

Fits and tolerances see page 8/2
 Subject to technical amendments

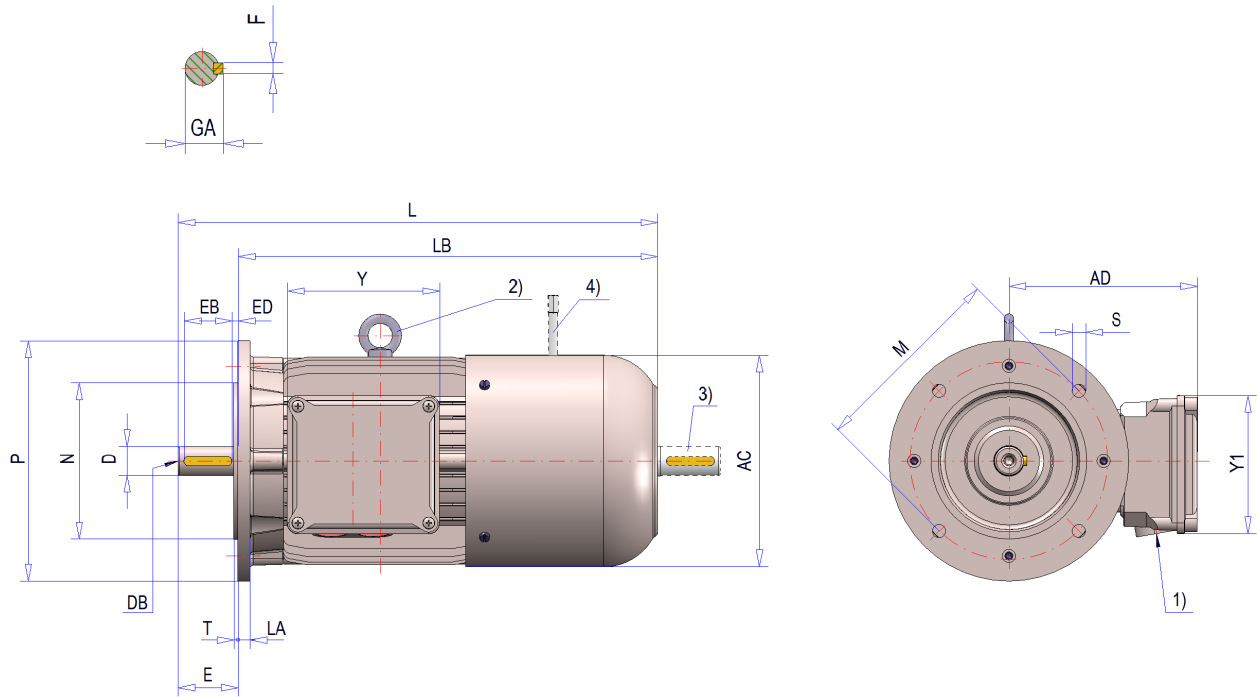
Type	B	A	K	H	C	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L
R 63 K/L ...B4	80	100	7	63	40	11	23	M4	123	121	117	103	12.5	4	18	2.5	260
R 71 K/L ...B4	90	112	7	71	45	14	30	M5	138	130	117	103	16	5	25	2.5	298
R 80 K/L ...B8	100	125	9.5	80	50	19	40	M6	156	144	127	115	21.5	6	32	4	331
R 90 S ...B16	100	140	10	90	56	24	50	M8	176	157	127	115	27	8	40	5	369
R 90 L ...B16	125	140	10	90	56	24	50	M8	176	157	127	115	27	8	40	5	394
R 100 L ...B32	140	160	11.2	100	63	28	60	M10	194	166	127	115	31	8	50	5	444
R 112 M ...B60	140	190	11.2	112	70	28	60	M10	218	178	127	115	31	8	50	5	464
R 132 S ...B80	140	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	537
R 132 M ...B80	178	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	575
R 160 M ...B150	210	254	14.5	160	108	42	110	M16	310	244	186	186	45	12	90	10	682
R 160 L ...B150	254	254	14.5	160	108	42	110	M16	310	244	186	186	45	12	90	10	726
R 180 M ...B260	241	279	13	180	121	48	110	M16	348	254	175	190	51.5	14	100	5	768
R 180 L ...B260	279	279	13	180	121	48	110	M16	348	254	175	190	51.5	14	100	5	806

* Design IM B3 / IM 1001, IM B6 / IM 1051, IM B7 / IM 1061, IM B8 / IM 1071, IM V5 / IM 1011, IM V6 / IM 1031 (see page 1/5)

** The overall length "L" can differ with protection class \geq IP56 or with different brake assignment. (dimensions on request)

Three-phase brake motors – surface cooling, cooling type IC411 (internal ventilation)

Types RF 63 K – 180 L
 Protection class IP54-IP55 **
 Design B5 *



- 1) See planning section page 1/12
- 2) With lifting eye from size 112 onward
- 3) 2nmd shaft end (dimension on request)
- 4) Manual release as option (can be ordered in positions 0°/90°/180°/270° see page 1/11)

Fits and tolerances see page 8/2
 Subject to technical amendments

Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
RF 63 K/L ...B4	11	23	M4	123	121	117	103	12.5	4	18	2.5	260	237	9	115	95	140	3	10
RF 71 K/L ...B4	14	30	M5	138	130	117	103	16	5	25	2.5	298	268	9.5	130	110	160	3.5	9.5
RF 80 K/L ...B8	19	40	M6	156	144	127	115	21.5	6	32	4	331	291	11.5	165	130	200	3.5	11
RF 90 S ...B16	24	50	M8	176	157	127	115	27	8	40	5	369	319	11.5	165	130	200	3.5	10.5
RF 90 L ...B16	24	50	M8	176	157	127	115	27	8	40	5	394	344	11.5	165	130	200	3.5	10.5
RF 100 L ...B32	28	60	M10	194	166	127	115	31	8	50	5	444	384	14	215	180	250	4	15.5
RF 112 M ...B60	28	60	M10	218	178	127	115	31	8	50	5	464	404	14	215	180	250	4	11
RF 132 S ...B80	38	80	M12	258	197	145	130	41	10	70	5	537	457	14	265	230	300	4	12
RF 132 M ...B80	38	80	M12	258	197	145	130	41	10	70	5	575	495	14	265	230	300	4	12
RF 160 M ...B150	42	110	M16	310	244	186	186	45	12	90	10	682	572	18	300	250	350	5	14
RF 160 L ...B150	42	110	M16	310	244	186	186	45	12	90	10	726	616	18	300	250	350	5	14
RF 180 M ...B260	48	110	M16	348	254	175	190	51.5	14	100	5	768	658	18	300	250	350	5	14
RF 180 L ...B260	48	110	M16	348	254	175	190	51.5	14	100	5	806	696	18	300	250	350	5	14

* Design IM B5 / IM 3001, IM V1 / IM 3011, IM V3 / IM 3031 (see page 1/5)

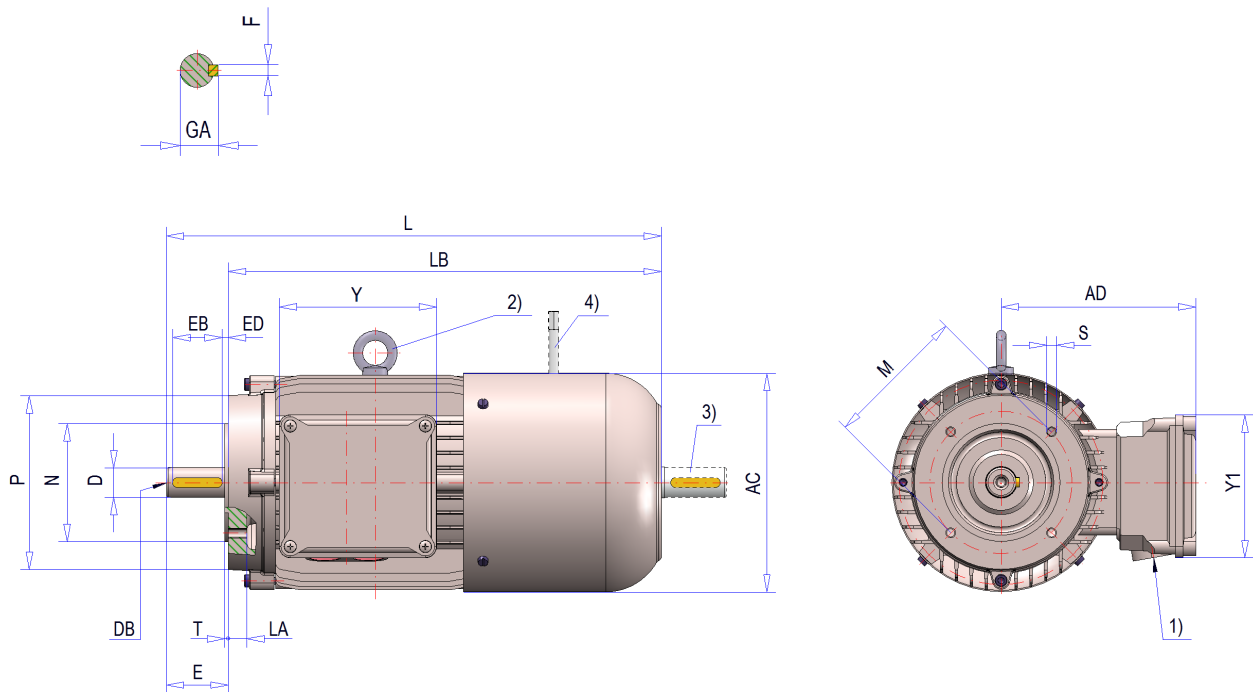
** Lengths "L" and "LB" can differ with protection class ≥ IP56 or with different brake assignment. (dimensions on request)

Three-phase brake motors – surface cooling, cooling type IC411 (internal ventilation)

Types RF 63 K – 180 L

Protection class IP54-IP55 **

Design B14 *



1) See planning section page 1/12

2) With lifting eye from size 112 onward

3) 2nd shaft end (dimension on request)

4) Manual release as option (can be ordered in positions 0°/90°/180°/270° see page 1/11)

Fits and tolerances see page 8/2

Subject to technical amendments

Type		D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
RF 63 K/L	...B4	11	23	M4	123	121	117	103	12.5	4	18	2.5	260	237	M5	75	60	90	2.5	8
RF 71 K/L	...B4	14	30	M5	138	130	117	103	16	5	25	2.5	298	268	M6	85	70	105	2.5	10
RF 80 K/L	...B8	19	40	M6	156	144	127	115	21.5	6	32	4	331	291	M6	100	80	120	3	9.5
RF 90 S	...B16	24	50	M8	176	157	127	115	27	8	40	5	369	319	M8	115	95	140	3	15
RF 90 L	...B16	24	50	M8	176	157	127	115	27	8	40	5	394	344	M8	115	95	140	3	15
RF 100 L	...B32	28	60	M10	194	166	127	115	31	8	50	5	444	384	M8	130	110	160	3.5	17
RF 112 M	...B60	28	60	M10	218	178	127	115	31	8	50	5	464	404	M8	130	110	160	3.5	16
RF 132 S	...B80	38	80	M12	258	197	145	130	41	10	70	5	537	457	M10	165	130	200	3.5	15
RF 132 M	...B80	38	80	M12	258	197	145	130	41	10	70	5	575	495	M10	165	130	200	3.5	15
RF 160 M	...B150	42	110	M16	310	244	186	186	45	12	90	10	682	572	M12	215	180	250	4	14
RF 160 L	...B150	42	110	M16	310	244	186	186	45	12	90	10	726	616	M12	215	180	250	4	14
RF 180 M	...B260	48	110	M16	348	254	175	190	51.5	14	100	5	768	658	M12	215	180	250	4	15
RF 180 L	...B260	48	110	M16	348	254	175	190	51.5	14	100	5	806	696	M12	215	180	250	4	15

* Design IM B14 / IM 3601, IM V18 / IM 3611, IM V19 / IM 3631 (see page 1/5)

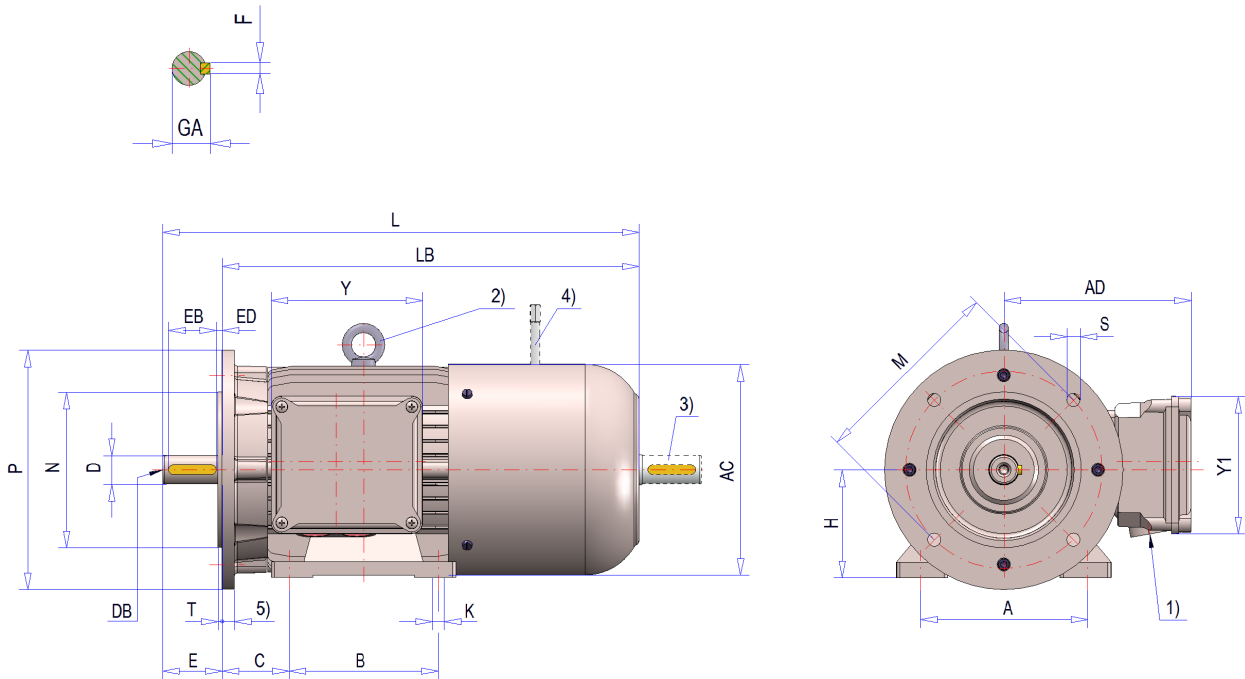
** Lengths "L" and "LB" can differ with protection class ≥ IP56 or with different brake assignment. (dimensions on request)

Three-phase brake motors – surface cooling, cooling type IC411 (internal ventilation)

Types R+F 63 K – 180 L

Protection class IP54-IP55 **

Design B35 *



- 1) See planning section page 1/12
- 2) With lifting eye from size 112 onward
- 3) 2nd shaft end (dimension on request)
- 4) Manual release as option (can be ordered in positions 0°/90°/180°/270° see page 1/11)
- 5) Dimensions LA see page 10/12

Fits and tolerances see page 8/2
Subject to technical amendments

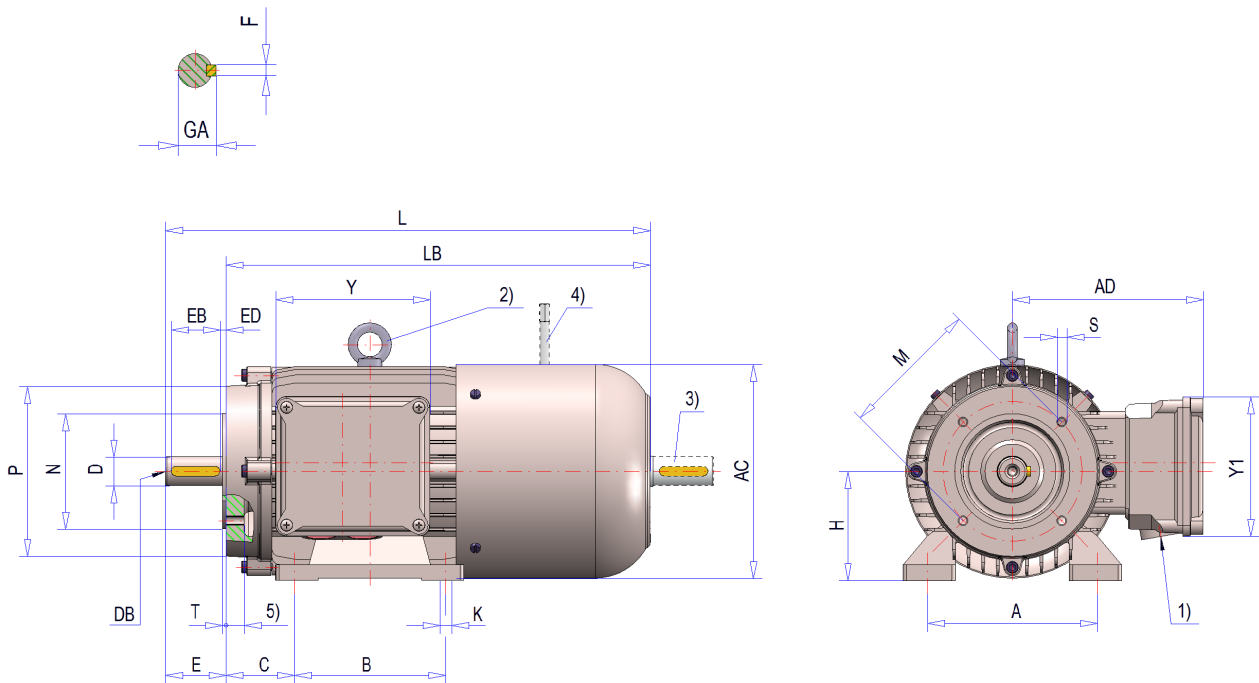
Type	B	A	K	H	C	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T
R+F 63 K/L ...B4	80	100	7	63	40	11	23	M4	123	121	117	103	12.5	4	18	2.5	260	237	9	115	95	140	3
R+F 71 K/L ...B4	90	112	7	71	45	14	30	M5	138	130	117	103	16	5	25	2.5	298	268	9.5	130	110	160	3.5
R+F 80 K/L ...B8	100	125	9.5	80	50	19	40	M6	156	144	127	115	21.5	6	32	4	331	291	11.5	165	130	200	3.5
R+F 90 S ...B16	100	140	10	90	56	24	50	M8	176	157	127	115	27	8	40	5	369	319	11.5	165	130	200	3.5
R+F 90 L ...B16	125	140	10	90	56	24	50	M8	176	157	127	115	27	8	40	5	394	344	11.5	165	130	200	3.5
R+F 100 L ...B32	140	160	11.2	100	63	28	60	M10	194	166	127	115	31	8	50	5	444	384	14	215	180	250	4
R+F 112 M ...B60	140	190	11.2	112	70	28	60	M10	218	178	127	115	31	8	50	5	464	404	14	215	180	250	4
R+F 132 S ...B80	140	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	537	457	14	265	230	300	4
R+F 132 M ...B80	178	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	575	495	14	265	230	300	4
R+F 160 M ...B150	210	254	14.5	160	108	42	110	M16	310	244	186	186	45	12	90	10	682	572	18	300	250	350	5
R+F 160 L ...B150	254	254	14.5	160	108	42	110	M16	310	244	186	186	45	12	90	10	726	616	18	300	250	350	5
R+F 180 M ...B260	241	279	13	180	121	48	110	M16	348	254	175	190	51.5	14	100	5	768	658	18	300	250	350	5
R+F 180 L ...B260	279	279	13	180	121	48	110	M16	348	254	175	190	51.5	14	100	5	806	696	18	300	250	350	5

* Design IM B35 / IM 2001, IM V15 / IM 2011, IM V35 / IM 2031 (see page 1/5)

** Lengths "L" and "LB" can differ with protection class \geq IP56 or with different brake assignment. (dimensions on request)

Three-phase brake motors – surface cooling, cooling type IC411 (internal ventilation)

Types R+F 63 K – 180 L
 Protection class IP54-IP55 **
 Design B34 *



- 1) See planning section page 1/12
- 2) With lifting eye from size 112 onward
- 3) 2nd shaft end (dimension on request)
- 4) Manual release as option (can be ordered in positions 0°/90°/180°/270° see page 1/11)
- 5) Dimensions LA see page 10/13

Fits and tolerances see page 8/2
 Subject to technical amendments

Type	B	A	K	H	C	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T
R+F 63 K/L ...B4	80	100	7	63	40	11	23	M4	123	121	117	103	12.5	4	18	2.5	260	237	M5	75	60	90	2.5
R+F 71 K/L ...B4	90	112	7	71	45	14	30	M5	138	130	117	103	16	5	25	2.5	298	268	M6	85	70	105	2.5
R+F 80 K/L ...B8	100	125	9.5	80	50	19	40	M6	156	144	127	115	21.5	6	32	4	331	291	M6	100	80	120	3
R+F 90 S ...B16	100	140	10	90	56	24	50	M8	176	157	127	115	27	8	40	5	369	319	M8	115	95	140	3
R+F 90 L ...B16	125	140	10	90	56	24	50	M8	176	157	127	115	27	8	40	5	394	344	M8	115	95	140	3
R+F 100 L ...B32	140	160	11.2	100	63	28	60	M10	194	166	127	115	31	8	50	5	444	384	M8	130	110	160	3.5
R+F 112 M ...B60	140	190	11.2	112	70	28	60	M10	218	178	127	115	31	8	50	5	464	404	M8	130	110	160	3.5
R+F 132 S ...B80	140	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	537	457	M10	165	130	200	3.5
R+F 132 M ...B80	178	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	575	495	M10	165	130	200	3.5
R+F 160 M ...B150	210	254	14.5	160	135	42	110	M16	310	244	186	186	45	12	90	10	709	599	M12	215	180	250	4
R+F 160 L ...B150	254	254	14.5	160	135	42	110	M16	310	244	186	186	45	12	90	10	753	643	M12	215	180	250	4
R+F 180 M ...B260	241	279	13	180	154	48	110	M16	348	254	175	190	51.5	14	100	5	802	692	M12	215	180	250	4
R+F 180 L ...B260	279	279	13	180	154	48	110	M16	348	254	175	190	51.5	14	100	5	840	730	M12	215	180	250	4

* Design IM B34 / IM 2101, IM V17 / IM 2111, IM V37 / IM 2131 (see page 1/5)

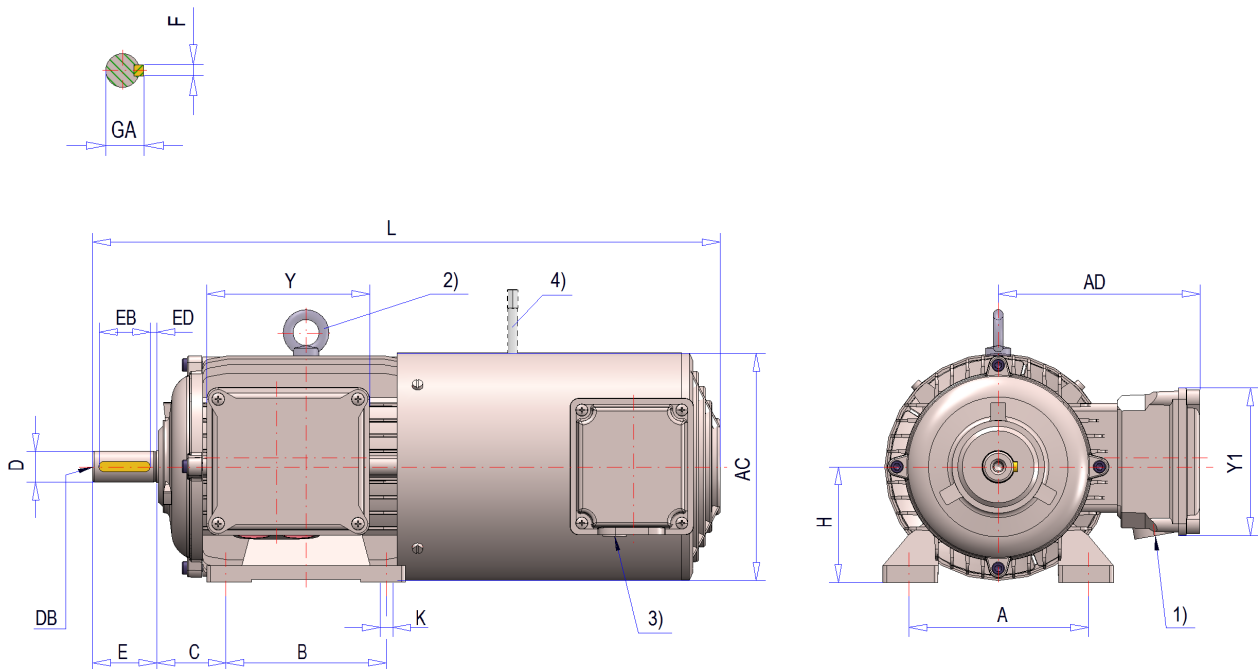
** Lengths "L" and "LB" can differ with protection class ≥ IP56 or with different brake assignment. (dimensions on request)

Three-phase brake motors – surface cooling, cooling type IC416 (external ventilation)

Types R 63 K – 180L

Protection class \geq IP54

Design B3 *



1) See planning section page 1/12

2) With lifting eye from size 112 onward

3) 1x M16x1.5

4) Manual release as option (can be ordered in positions 0°/90°/180°/270° see page 1/11)

Fits and tolerances see page 8/2

Subject to technical amendments

Type	B	A	K	H	C	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L
R 63 K/L ...B4	80	100	7	63	40	11	23	M4	124	121	117	103	12.5	4	18	2.5	324
R 71 K/L ...B4	90	112	7	71	45	14	30	M5	139	130	117	103	16	5	25	2.5	367
R 80 K/L ...B8	100	125	9.5	80	50	19	40	M6	157	144	127	115	21.5	6	32	4	402
R 90 S ...B16	100	140	10	90	56	24	50	M8	177	157	127	115	27	8	40	5	437
R 90 L ...B16	125	140	10	90	56	24	50	M8	177	157	127	115	27	8	40	5	462
R 100 L ...B32	140	160	11.2	100	63	28	60	M10	195	166	127	115	31	8	50	5	510
R 112 M ...B60	140	190	11.2	112	70	28	60	M10	219	178	127	115	31	8	50	5	533
R 132 S ...B80	140	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	652
R 132 M ...B80	178	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	690
R 160 M ...B150	210	254	14.5	160	108	42	110	M16	311	244	186	186	45	12	90	10	792
R 160 L ...B150	254	254	14.5	160	108	42	110	M16	311	244	186	186	45	12	90	10	836
R 180 M ...B260	241	279	13	180	121	48	110	M16	348	254	175	190	51.5	14	100	5	925
R 180 L ...B260	279	279	13	180	121	48	110	M16	348	254	175	190	51.5	14	100	5	963

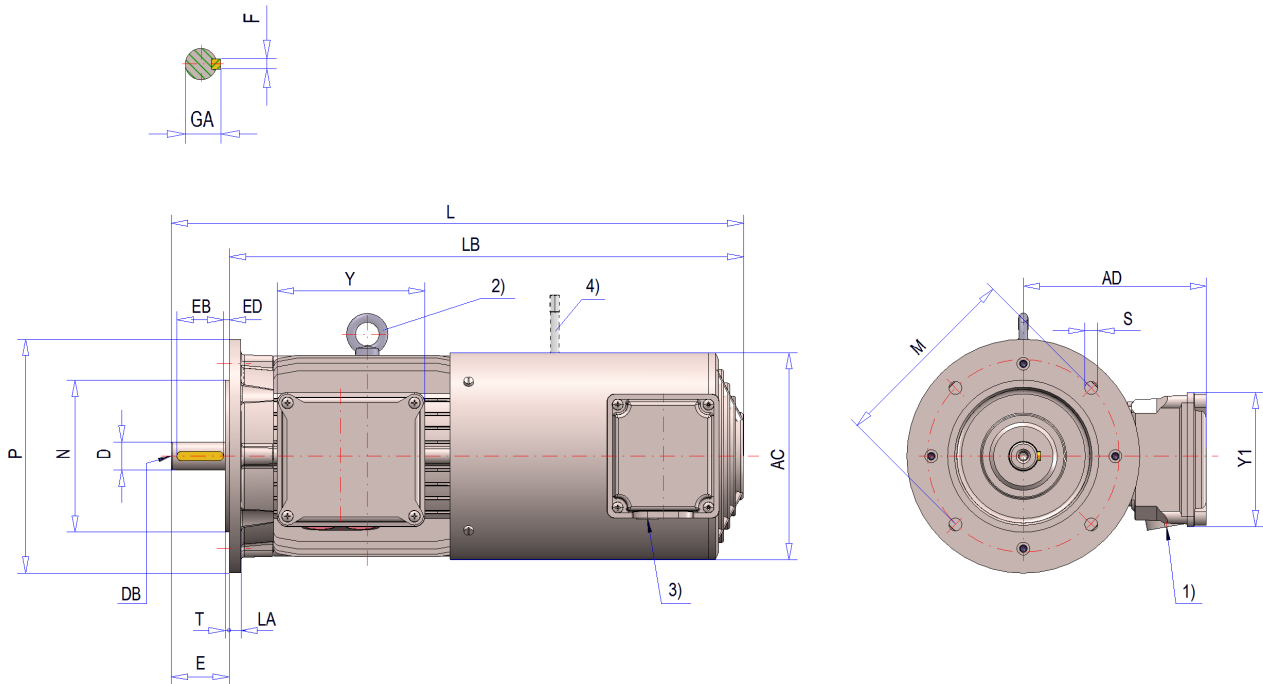
* Design IM B3 / IM 1001, IM B6 / IM 1051, IM B7 / IM 1061, IM B8 / IM 1071, IM V5 / IM 1011, IM V6 / IM 1031 (see page 1/5)

Three-phase brake motors – surface cooling, cooling type IC416 (external ventilation)

Types RF 63 K – 180L

Protection class \geq IP54

Design B5 *



1) See planning section page 1/12

2) With lifting eye from size 112 onward

3) 1x M16x1.5

4) Manual release as option (can be ordered in positions 0°/90°/180°/270° see page 1/11)

Fits and tolerances see page 8/2
Subject to technical amendments

Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
RF 63 K/L ...B4	11	23	M4	124	121	117	103	12.5	4	18	2.5	324	301	9	115	95	140	3	10
RF 71 K/L ...B4	14	30	M5	139	130	117	103	16	5	25	2.5	367	337	9.5	130	110	160	3.5	9.5
RF 80 K/L ...B8	19	40	M6	157	144	127	115	21.5	6	32	4	402	362	11.5	165	130	200	3.5	11
RF 90 S ...B16	24	50	M8	177	157	127	115	27	8	40	5	437	387	11.5	165	130	200	3.5	10.5
RF 90 L ...B16	24	50	M8	177	157	127	115	27	8	40	5	462	412	11.5	165	130	200	3.5	10.5
RF 100 L ...B32	28	60	M10	195	166	127	115	31	8	50	5	510	450	14	215	180	250	4	15.5
RF 112 M ...B60	28	60	M10	219	178	127	115	31	8	50	5	533	473	14	215	180	250	4	11
RF 132 S ...B80	38	80	M12	258	197	145	130	41	10	70	5	652	572	14	265	230	300	4	12
RF 132 M ...B80	38	80	M12	258	197	145	130	41	10	70	5	690	610	14	265	230	300	4	12
RF 160 M ...B150	42	110	M16	311	244	186	186	45	12	90	10	792	682	18	300	250	350	5	14
RF 160 L ...B150	42	110	M16	311	244	186	186	45	12	90	10	836	726	18	300	250	350	5	14
RF 180 M ...B260	48	110	M16	348	254	175	190	51.5	14	100	5	925	815	18	300	250	350	5	14
RF 180 L ...B260	48	110	M16	348	254	175	190	51.5	14	100	5	963	853	18	300	250	350	5	14

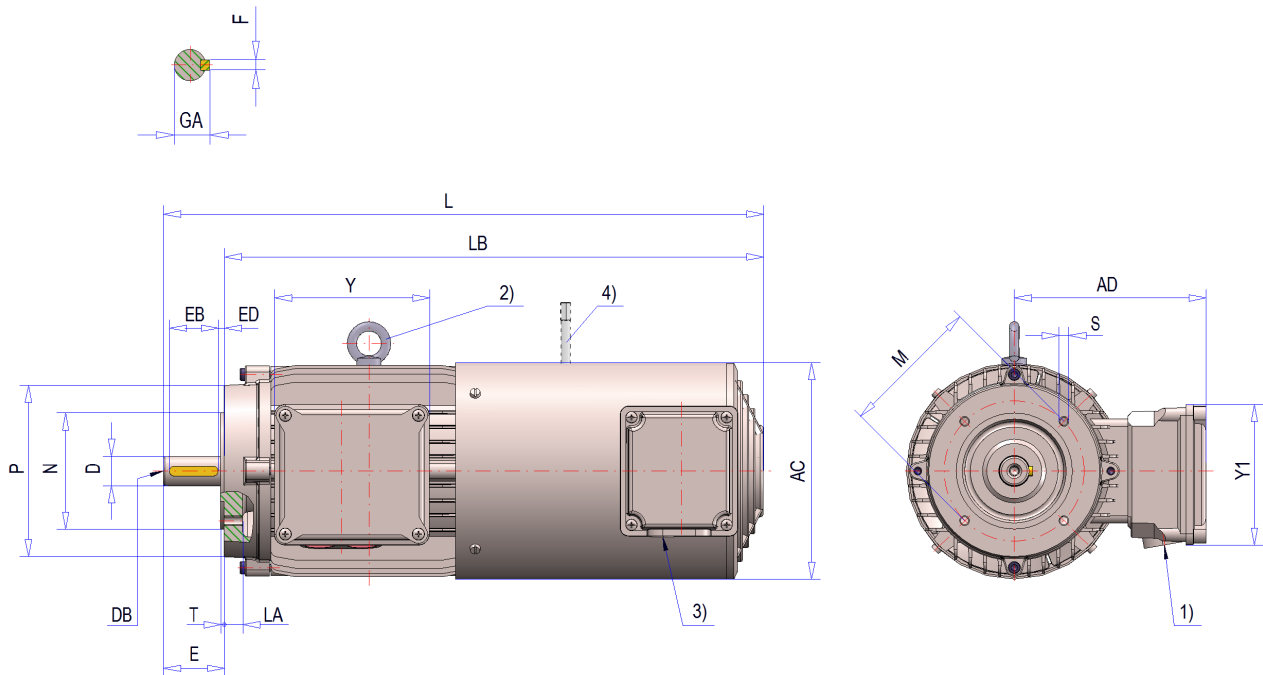
* Design IM B5 / IM 3001, IM V1 / IM 3011, IM V3 / IM 3031 (see page 1/5)

Three-phase brake motors – surface cooling, cooling type IC416 (external ventilation)

Types RF 63 K – 180L

Protection class \geq IP54

Design B14 *



1) See planning section page 1/12

2) With lifting eye from size 112 onward

3) 1x M16x1.5

4) Manual release as option (can be ordered in positions 0°/90°/180°/270° see page 1/11)

Fits and tolerances see page 8/2

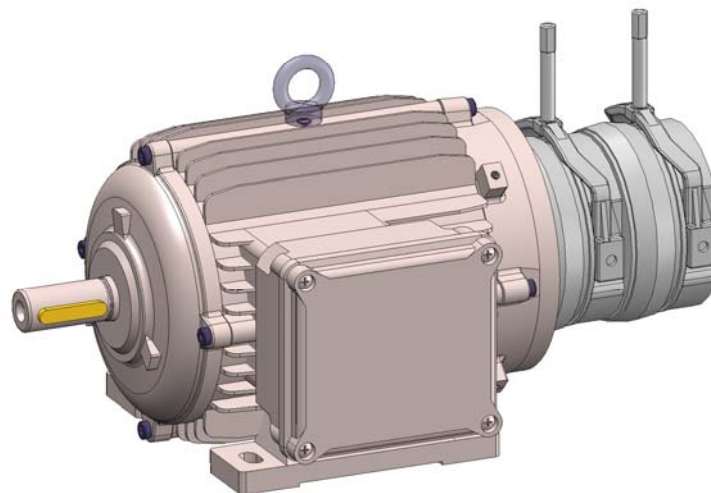
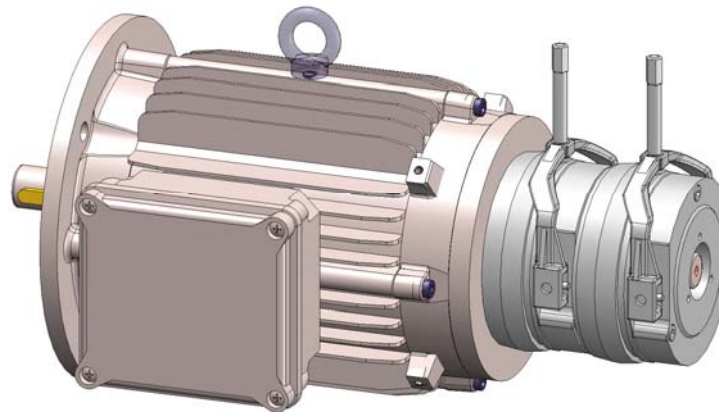
Subject to technical amendments

Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
RF 63 K/L ...B4	11	23	M4	124	121	117	103	12.5	4	18	2.5	324	301	M5	75	60	90	2.5	8
RF 71 K/L ...B4	14	30	M5	139	130	117	103	16	5	25	2.5	367	337	M6	85	70	105	2.5	10
RF 80 K/L ...B8	19	40	M6	157	144	127	115	21.5	6	32	4	402	362	M6	100	80	120	3	9.5
RF 90 S ...B16	24	50	M8	177	157	127	115	27	8	40	5	437	387	M8	115	95	140	3	15
RF 90 L ...B16	24	50	M8	177	157	127	115	27	8	40	5	462	412	M8	115	95	140	3	15
RF 100 L ...B32	28	60	M10	195	166	127	115	31	8	50	5	510	450	M8	130	110	160	3.5	17
RF 112 M ...B60	28	60	M10	219	178	127	115	31	8	50	5	533	473	M8	130	110	160	3.5	16
RF 132 S ...B80	38	80	M12	258	197	145	130	41	10	70	5	652	572	M10	165	130	200	3.5	15
RF 132 M ...B80	38	80	M12	258	197	145	130	41	10	70	5	690	610	M10	165	130	200	3.5	15
RF 160 M ...B150	42	110	M16	311	244	186	186	45	12	90	10	819	709	M12	215	180	250	4	14
RF 160 L ...B150	42	110	M16	311	244	186	186	45	12	90	10	863	753	M12	215	180	250	4	14
RF 180 M ...B260	48	110	M16	348	254	175	190	51.5	14	100	5	959	849	M12	215	180	250	4	15
RF 180 L ...B260	48	110	M16	348	254	175	190	51.5	14	100	5	997	887	M12	215	180	250	4	15

* Design IM B34 / IM 2101, IM V17 / IM 2111, IM V37 / IM 2131 (see page 1/5)

Brake motors with double brake for stage machinery

THREE-PHASE BRAKE MOTORS WITH DOUBLE BRAKE (FOR STAGE MACHINERY)



For dimensional sheets see page 11/3.



Brake motors for stage machinery

The HEW series of stage machinery motors was specially developed for stage machinery use in theatres and opera houses. Our motors move curtains, podiums, rotating, lifting or sliding stages as well as stage sets, unnoticed of the audience and without exposing actors and stage staff.

To meet the specific requirements of stage machinery, HEW brake motors in the range of 0.37 – 30.0 kW in 4-pole design (also in 6-pole design as option) which can be used in the above-stage or below-stage machinery of theatres. The motors comply with the high demands of DIN 56950 and BGV C1. This ensures the highest possible working safety for people standing in the vicinity of the drive units. All motors are equipped with double brakes, as work goes on continuously under suspended loads such as parts of the stage set or lighting equipment. The standard design features brakes with manual release. When the manual release is actuated while the brake is deenergised, the brake releases mechanically, and the shaft can be moved easily.

The noise levels of the drives is also exceptionally low. The windings are always manufactured with phase insulation, which makes the drives suitable for operation with frequency inverters. In this way, the drive solutions can also be controlled very flexibly, either individually or in groups.

As option, the drives can be equipped with thermistors (PTC) or thermostatic switches (bi-metal).

As encoder or feedback system, incremental encoders (TTL / HTL / sin-cos), absolute encoders (single-turn or multi-turn, combined encoders), sensor bearings or inductive sensors can be mounted.

The standard motor housing is made of aluminium, from size 80 onward, the motors can also be ordered with cast iron housings.

The following objects were equipped with HEW stage machinery motors:

Semperoper Dresden	Germany
Stadttheater Paderborn	Germany
Anhaltinisches Theater Dessau	Germany
Stadttheater Saarbrücken	Germany
Kulturhaus Kornwestheim	Germany
Royal Opera House Muscat	Oman
Opera and Ballet Theatre Novosibirsk	Russia
het Nationale Toneel Den Haag	Niederlande



Three-phase motors

Poles: 4

Nominal data at 400V, 50 Hz

Thermal class F

Operating mode: S3-40%

Synchronous speed: 1500 rpm

Surface cooling, unventilated

Size Type	Nominal power	Nominal speed	Nominal current	Power factor	Nominal torque	Start-up to nominal current	Start-up to nominal torque	Breakdown to nominal torque	Braking torque	Moment of inertia	Weight IM B3
RU	P_N kW	n_N rpm	I_N A	$\cos \varphi$	M_N Nm	I_A/I_N	M_A/M_N	M_k/M_N	NM	J kgm ²	M appr. kg

71L/4-PrDB7H	0.37	1400	1.0	0.72	2.5	4.2	2.4	2.6	2 x 4	0.00068	9.5
80K/4- PrDB7H	0.55	1375	1.4	0.76	3.9	4.0	2.3	2.2	2 x 7	0.00108	13
80L/4-PrDB7H	0.75	1400	1.90	0.75	5.0	4.2	2.1	2.3	2 x 7	0.00135	14
90S/4-PrDB14H	1.1	1420	2.65	0.75	7.4	4.5	2.2	2.6	2 x 14	0.00228	19.5
90L/4-PrDB17,5H	1.5	1410	3.25	0.80	10.2	5.1	2.3	2.7	2 x 17.5	0.00278	21
100L/4-PrDB28H	2.2	1420	4.9	0.81	14.9	4.6	1.8	2.3	2x 28	0.00477	29
100L/40-PrDB35H	3.0	1420	6.5	0.81	19.9	5.1	2.1	2.5	2 x 35	0.00588	33
112M/4-PrDB42H	4.0	1440	8.30	0.81	26.5	6.2	2.3	3.0	2 x 42	0.0119	47
132S/4-PrDB70H	5.5	1450	12	0.75	36.5	5.7	2.3	2.4	2 x 70	0.0235	67
132M/40-PrDB89H	7.5	1450	14.5	0.85	49.5	5.9	2.2	2.8	2 x 89	0.0300	84
132M/40-PrDB89H	9.2	1450	18.3	0.81	60	7.5	3.3	3.8	2 x 89	0.034	90
160M/4-PrDB107H	11	1440	22.5	0.81	72	4.7	2.3	2.5	2 x 107	0.0569	139
160L/4-PrDB187H	15	1460	30.2	0.80	98	5.0	2.7	3	2 x 187	0.0724	159
160L/40-PrDB187H	17	1470	32.5	0.86	110	5.6	1.9	2.7	2 x 187	0.0861	172
180M/4-PrDB225H	18.5	1470	36	0.86	120	4.2	3.1	3.2	2 x 225	0.1268	221
180L/4-PrDB225H	22	1460	43	0.86	144	5.5	2.6	2.7	2 x 225	0.1360	244
180L/40-PrDB300H	30	1470	59	0.81	194	4.6	1.8	2.6	2 x 300	0.1796	270

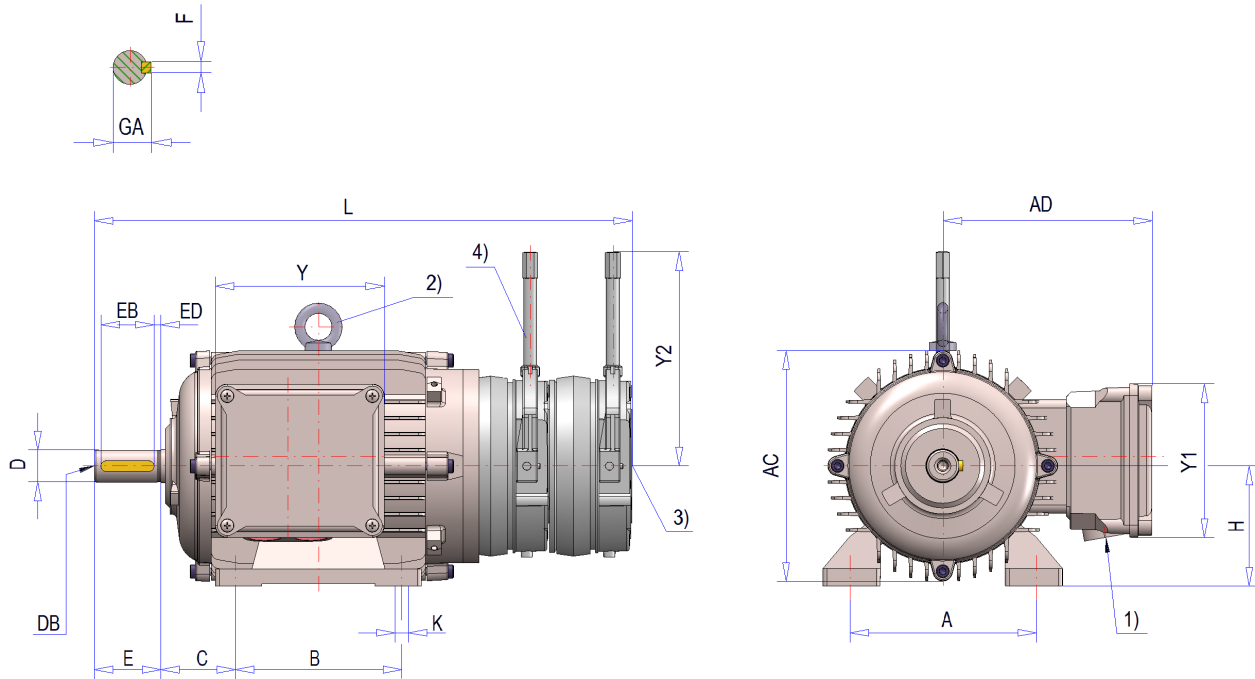
Subject to technical amendments

Three-phase brake motors with double brake for stage machinery – surface cooling, cooling type IC410, unventilated

Types RU 71 L – 180 L

Protection class IP54 - IP55 **

Design B3*



1) See planning section page 1/12

2) With lifting eye from size 112 onward

3) 2nd shaft end as option (for mounting of encoders, hand wheels, etc.) Dimension on request

4) Manual release as option (can be ordered in positions 0°/90°/180°/270° see page 1/11)

Fits and tolerances see page 8/2

Subject to technical amendments

Type	B	A	K	H	C	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	Y2
RU 71 LPrDB7	90	112	7	71	45	14	30	M5	138	130	117	103	16	5	25	2.5	297	110
RU 80 K/L ... PrDB7	100	125	9.5	80	50	19	40	M6	156	144	127	115	21.5	6	32	4	348	120
RU 90 SPrDB14	100	140	10	90	56	24	50	M8	176	157	127	115	27	8	40	5	381	160
RU 90 LPrDB17,5	125	140	10	90	56	24	50	M8	176	157	127	115	27	8	40	5	406	160
RU 100 LPrDB28	140	160	11.2	100	63	28	60	M10	194	166	127	115	31	8	50	5	458	200
RU 100 LPrDB35	140	160	11.2	100	63	28	60	M10	194	166	127	115	31	8	50	5	458	200
RU 112 MPrDB42	140	190	11.2	112	70	28	60	M10	218	178	127	115	31	8	50	5	494	220
RU 132 SPrDB70	140	216	11	132	89	38	80	M12	260	197	145	130	41	10	70	5	573	220
RU 132 MPrDB89	178	216	11	132	89	38	80	M12	260	197	145	130	41	10	70	5	611	220
RU 160 MPrDB107	210	254	14.5	160	108	42	110	M16	305	244	186	186	45	12	90	10	724	250
RU 160 LPrDB187	254	254	14.5	160	108	42	110	M16	305	244	186	186	45	12	90	10	768	250
RU 180 MPrDB225	241	279	13	180	121	48	110	M16	346	254	175	190	51.5	14	100	5	804	330
RU 180 LPrDB300	279	279	13	180	121	48	110	M16	346	254	175	190	51.5	14	100	5	841	330

* Design IM B3 / IM 1001, IM B6 / IM 1051, IM B7 / IM 1061, IM B8 / IM 1071, IM V5 / IM 1011, IM V6 / IM 1031 (see page 1/5)

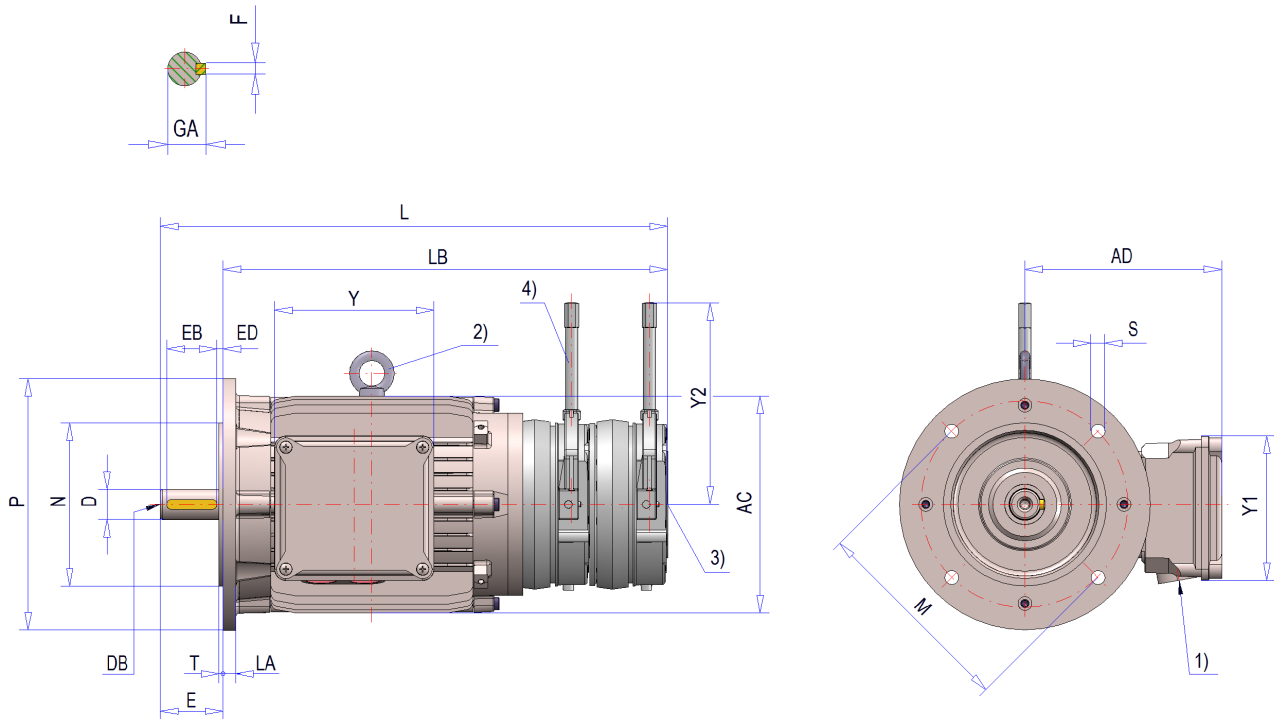
** The overall length "L" can differ with protection class \geq IP56 or with different brake assignment. (dimensions on request)

Three-phase brake motors with double brake for stage machinery – surface cooling, cooling type IC410, unventilated

Types RUF 71 L – 180 L

Protection class IP54 - IP55 **

Design B5*



1) See planning section page 1/12

2) With lifting eye from size 112 onward

3) 2nd shaft end as option (for mounting of encoders, hand wheels, etc.) Dimension on request

4) Manual release as option (can be ordered in positions 0°/90°/180°/270° see page 1/11)

Fits and tolerances see page 8/2

Subject to technical amendments

Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA	Y2
RUF 71 LPrDB7	14	30	M5	138	130	117	103	16	5	25	2.5	297	267	9	130	110	160	3.5	10	110
RUF 80 K/L ... PrDB7	19	40	M6	156	144	127	115	21.5	6	32	4	348	308	9	165	130	200	3.5	10	120
RUF 90 SPrDB14	24	50	M8	176	157	127	115	27	8	40	5	381	331	9	165	130	200	3.5	10	160
RUF 90 LPrDB17,5	24	50	M8	176	157	127	115	27	8	40	5	406	356	9	165	130	200	3.5	10	160
RUF 100 LPrDB28	28	60	M10	194	166	127	115	31	8	50	5	458	398	9	215	180	250	4	14	200
RUF 100 LPrDB35	28	60	M10	194	166	127	115	31	8	50	5	458	398	9	215	180	250	4	14	200
RUF 112 MPrDB42	28	60	M10	218	178	127	115	31	8	50	5	494	434	11	215	180	250	4	13	220
RUF 132 SPrDB70	38	80	M12	260	197	145	130	41	10	70	5	573	493	14	265	230	300	4	11.5	220
RUF 132 MPrDB89	38	80	M12	260	197	145	130	41	10	70	5	611	531	14	265	230	300	4	11.5	220
RUF 160 MPrDB107	42	110	M16	305	244	186	186	45	12	90	10	725	615	18	300	250	350	5	13.5	250
RUF 160 LPrDB187	42	110	M16	305	244	186	186	45	12	90	10	769	659	18	300	250	350	5	13.5	250
RUF 180 MPrDB225	48	110	M16	346	254	175	190	51.5	14	100	5	804	694	18	300	250	350	5	14	330
RUF 180 LPrDB300	48	110	M16	346	254	175	190	51.5	14	100	5	842	732	18	300	250	350	5	14	330

* Design IM B5 / IM 3001, IM V1 / IM 3011, IM V3 / IM 3031 (see page 1/5)

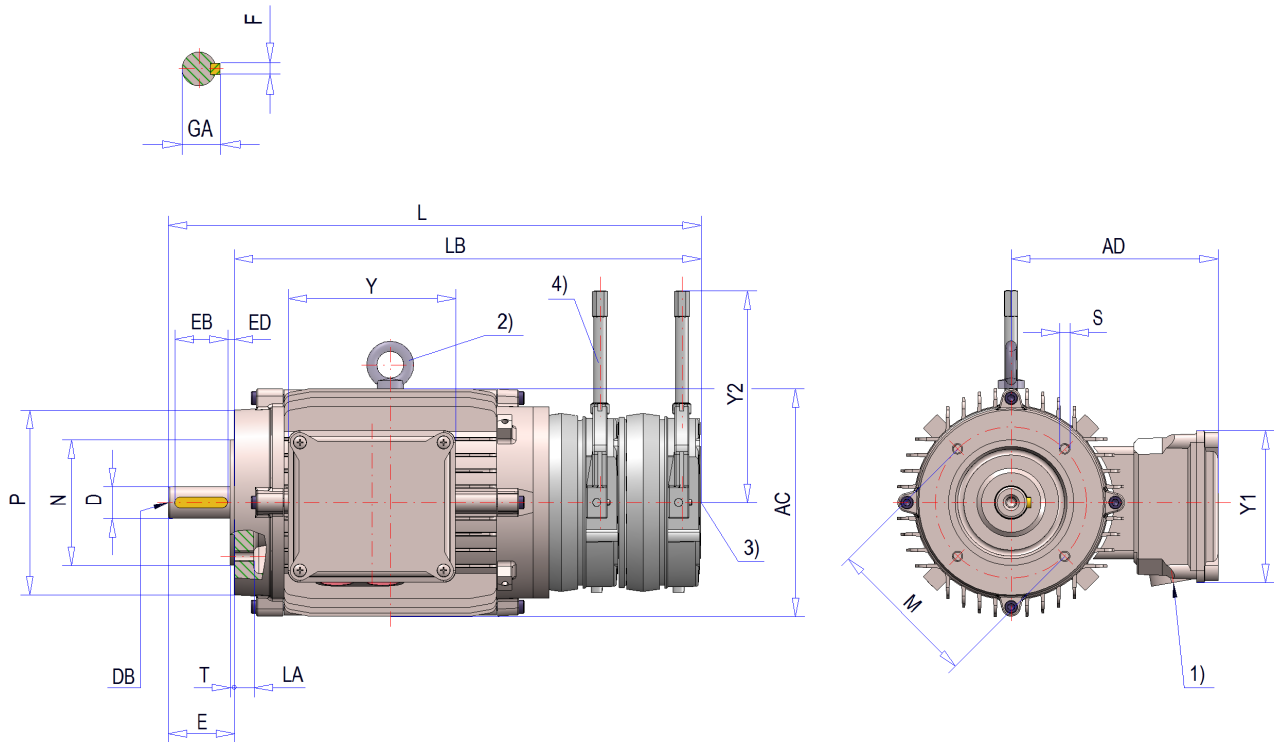
** Lengths "L" and "LB" can differ with protection class ≥ IP56 or with different brake assignment. (dimensions on request)

Three-phase brake motors with double brake for stage machinery – surface cooling, cooling type IC410, unventilated

Types RUF 71 L – 180 L

Protection class IP54 - IP55 **

Design B14*



1) See planning section page 1/12

2) With lifting eye from size 112 onward

3) 2nd shaft end as option (for mounting of encoders, hand wheels, etc.) Dimension on request

4) Manual release as option (can be ordered in positions 0°/90°/180°/270° see page 1/11)

Fits and tolerances see page 8/2

Subject to technical amendments

Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA	Y2
RUF 71 LPrDB7	14	30	M5	138	130	117	103	16	5	25	2.5	297	267	M6	85	70	105	2.5	10	110
RUF 80 K/L ... PrDB7	19	40	M6	156	144	127	115	21.5	6	32	4	348	308	M6	100	80	120	3	12.5	120
RUF 90 SPrDB14	24	50	M8	176	157	127	115	27	8	40	5	381	331	M8	115	95	140	3	15	160
RUF 90 LPrDB17,5	24	50	M8	176	157	127	115	27	8	40	5	406	356	M8	115	95	140	3	15	160
RUF 100 LPrDB28	28	60	M10	194	166	127	115	31	8	50	5	458	398	M8	130	110	160	3.5	12.5	200
RUF 100 LPrDB35	28	60	M10	194	166	127	115	31	8	50	5	458	398	M8	130	110	160	3.5	12.5	200
RUF 112 MPrDB42	28	60	M10	218	178	127	115	31	8	50	5	494	434	M8	130	110	160	3.5	16	220
RUF 132 SPrDB70	38	80	M12	260	197	145	130	41	10	70	5	573	493	M10	165	130	200	3.5	15	220
RUF 132 MPrDB89	38	80	M12	260	197	145	130	41	10	70	5	611	531	M10	165	130	200	3.5	15	220
RUF 160 MPrDB107	42	110	M16	305	244	186	186	45	12	90	10	725	615	M12	215	180	250	4	14	250
RUF 160 LPrDB187	42	110	M16	305	244	186	186	45	12	90	10	769	659	M12	215	180	250	4	14	250
RUF 180 MPrDB225	48	110	M16	346	254	175	190	51.5	14	100	5	804	694	M12	215	180	250	4	15	330
RUF 180 LPrDB300	48	110	M16	346	254	175	190	51.5	14	100	5	842	732	M12	215	180	250	4	15	330

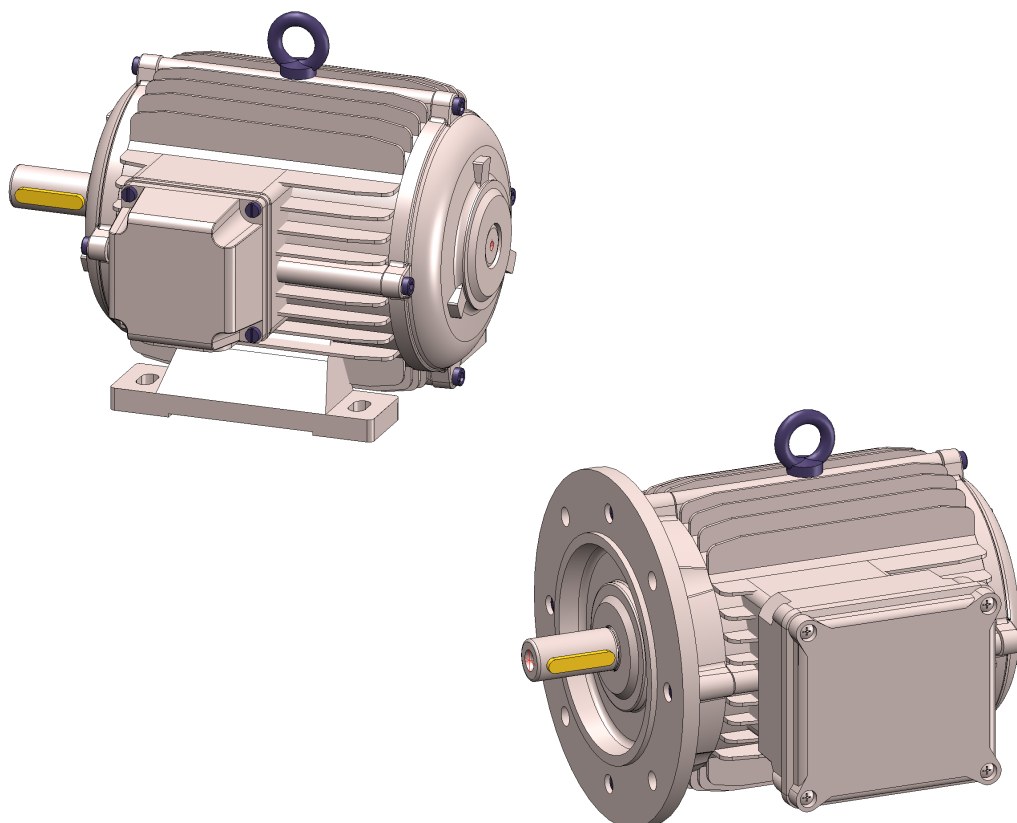
* Design IM B14 / IM 3601, IM V18 / IM 3611, IM V19 / IM 3631 (see page 1/5)

** Lengths "L" and "LB" can differ with protection class ≥ IP56 or with different brake assignment. (dimensions on request)

Rotating field motors

12

ROTATING FIELD MOTORS



For dimensional sheets see page 12/4.



Rotating field motors

Rotating field motors are three-phase asynchronous motors with special squirrel cage rotor characteristics. Their electrical design is such that they develop their highest torque (standstill torque) when the nominal voltage is applied at standstill.

Two variants are available:

- IC 410 (unventilated variant)
- IC 416 (externally ventilated variant)

The motors are suitable for continuous operation at standstill torque (S1 operation) or three times the standstill torque in intermittent operation (S3 - 25%).

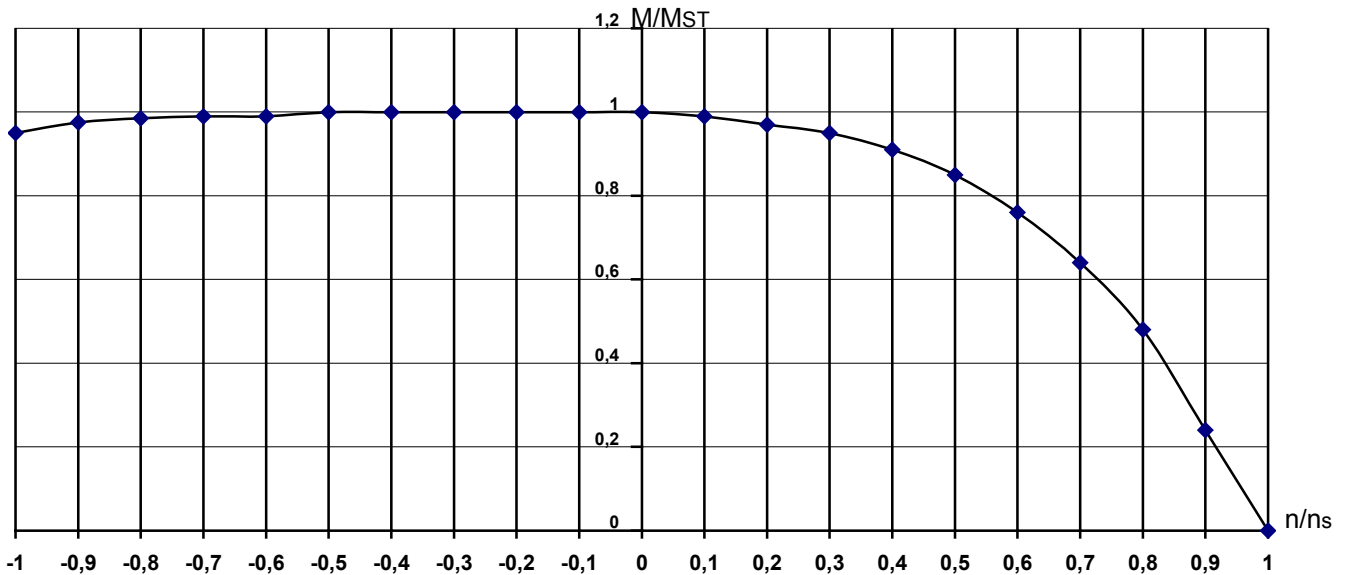
The chart shows the speed/torque curve of rotating field motors.

The obtained speed depends on the counter torque.

Continuous operation between 0 n/ns and 1 n/ns in the intended operating mode is permitted.

If operation between -1 n/ns and 1 n/ns is required, ensure that the limit temperature of the thermal class is not exceeded. In this case, we recommend using full thermal motor protection (see Section 1/18 Motor protection).

Chart: MST = Standstill torque ns = Synchronous speed



Circuit

For S1 operation, the motors are wired in a star configuration. By switching to a delta configuration, the standstill torque changes to three times the value. In this case, only intermittent operation S3 - 25% is permitted (see Technical Data, page 12/3).

It is impossible to obtain the standstill torques for intermittent operation S3 - 40% mentioned on page 12/3 by simple switching over; instead, a modified winding is necessary.

Torque change

The specified standstill torques are the maximum torques, related to the nominal voltage.

The torque can be reduced by reducing the voltage (M proportional U²).

Using a three-phase AC controller, the standstill torque of the motors can thus be regulated continuously between maximum and zero.

Special version

As special version, rotating field motors are also available for single-phase operation.

Other size/torque assignments are available on request.



Rotating field motors

Types: RDM 63L-132M
Torque tolerance +/-10%

Cooling type IC 410 (unventilated) and IC 416 (external ventilation)

Resistance rotor/thermal class: F

50 Hz, 750 rpm (8-pole)

Type	Standstill torque M _{ST} (Nm)						I _k @ 400V (A)						J _M kgm ²	Weight	
	IC 410			IC 416			IC 410			IC 416				IC410	IC416
	S1	S3	S3	S1	S3	S3	S1	S3	S3	S1	S3	S3		approx. kg	
		40%	25%		40%	25%		40%	25%		40%	25%			
RDM 63L/8	0.55	0.83	1.65	1.7	2.7	5.1	0.2	0.35	0.65	0.6	1.0	1.8	0.00033	5	7
RDM 71L/8	1.0	1.5	3.0	2.8	4.2	8.4	0.3	0.5	1.0	0.8	1.3	2.6	0.00094	7	9.5
RDM 80L/8	1.5	2.4	4.5	6.0	8.5	18	0.4	0.7	1.4	1.5	2.5	5.5	0.0024	10	12.5
RDM 90L/8	2.2	3.6	6.6	9.0	14	27	0.7	1.2	2.1	2.4	4.5	10	0.0042	15	18
RDM 100L/80	3.0	4.8	8.5	11	17	33	0.8	1.4	2.3	3.2	5.8	11.5	0.0083	22	25
RDM 112M/8	3.8	6.0	11	14	21	50	1.0	1.8	2.7	4.2	7.5	14.5	0.0159	31	34
RDM 132M/8	on request														

Subject to technical amendments

50 Hz, 500 rpm (12-pole)

Type	Standstill torque M _{ST} (Nm)						I _k @ 400V (A)						J _M kgm ²	Weight	
	IC 410			IC 416			IC 410			IC 416				IC410	IC416
	S1	S3	S3	S1	S3	S3	S1	S3	S3	S1	S3	S3		approx. kg	
		40%	25%		40%	25%		40%	25%		40%	25%			
RDM 63L/12	0.6	1.0	1.8	2.0	3.2	6.0	0.2	0.3	0.6	0.6	1.0	1.8	0.00033	5	7
RDM 71K/12	0.85	1.35	2.5	2.4	3.5	7.2	0.25	0.4	0.8	0.6	1.5	3	0.00080	6	8.5
RDM 71L/12	1.2	2.0	3.6	4.0	6.5	12	0.3	0.5	1.0	0.95	1.9	4.7	0.00094	7	9.5
RDM 80K/12	1.5	2.8	4.5	6.0	10	18	0.4	0.6	1.2	1.25	2.1	5.5	0.0019	9	11.5
RDM 80L/12	2.0	3.2	6.0	8.0	13	24	0.40	0.75	1.4	1.6	3.0	7.2	0.0024	10	12.5
RDM 90L/12	2.5	4.0	7.5	10	17	30	0.45	0.9	1.9	2.0	4.1	8.5	0.0042	15	18
RDM 100L/12	3.2	5.2	10	12	19	36	0.50	1.2	2.2	1.9	4.8	9.5	0.0083	22	25
RDM 112M/12	3.8	6.8	13	15	23	50	0.90	1.7	3.3	3.2	6.0	12.5	0.0159	31	34
RDM 132M/12	6.0	on request		18	on request		1.6	on request		4.7	on request		0.0375	52	57

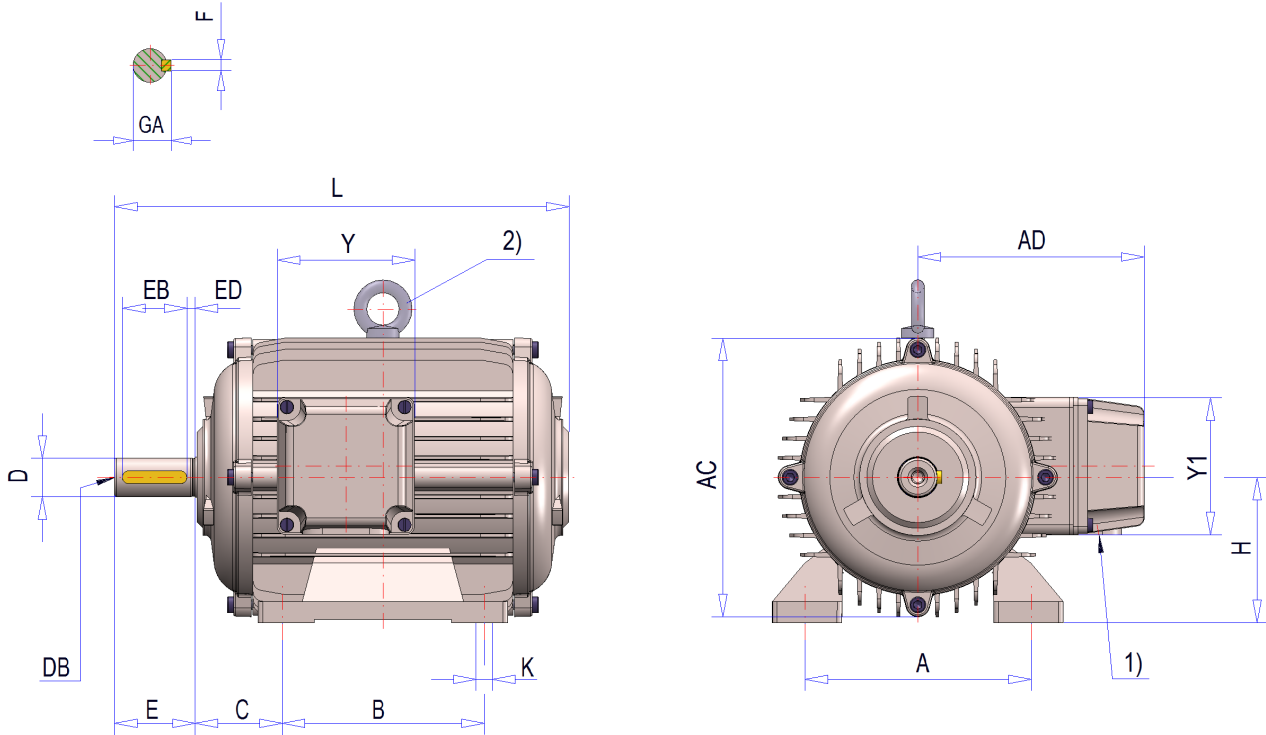
Subject to technical amendments

Rotating field motors – surface cooling, cooling type IC410, (unventilated)

Types RDM 63 L – 132 M

Protection class IP54 - IP55

Design B3 *



- 1) See Planning section, page 1/12
- 2) With lifting eye from size 112 onward

Fits and tolerances see page 8/2
Subject to technical amendments

Type	B	A	K	H	C	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L
RDM 63 L	80	100	7	63	40	11	23	M4	121	99	70	70	12.5	4	18	2.5	181
RDM 71 K/L	90	112	7	71	45	14	30	M5	138	109	70	70	16	5	25	2.5	207
RDM 80 K/L	100	125	9.5	80	50	19	40	M6	156	127	85	85	21.5	6	32	4	237
RDM 90 S	100	140	10	90	56	24	50	M8	176	140	85	85	27	8	40	5	259
RDM 90 L	125	140	10	90	56	24	50	M8	176	140	85	85	27	8	40	5	284
RDM 100 L	140	160	11.2	100	63	28	60	M10	194	148	85	85	31	8	50	5	323
RDM 112 M	140	190	11.2	112	70	28	60	M10	218	161	85	85	31	8	50	5	336
RDM 132 S	140	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	395
RDM 132 M	178	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	432

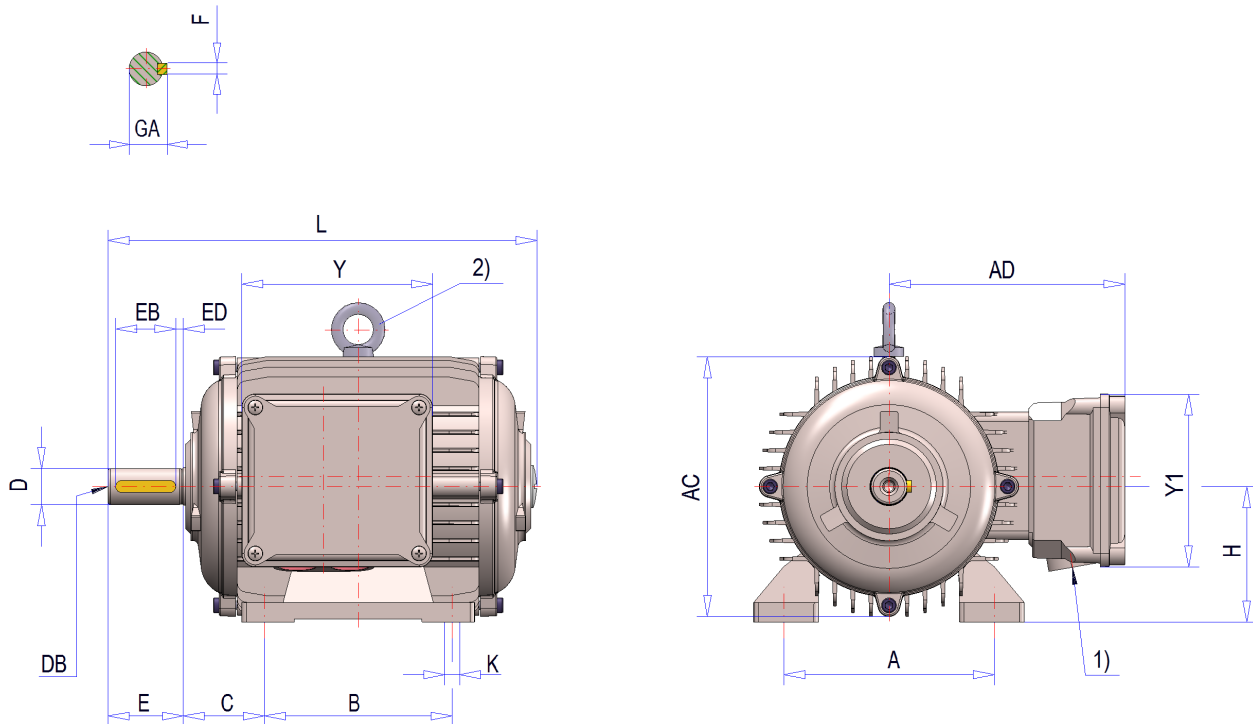
* Design IM B3 / IM 1001, IM B6 / IM 1051, IM B7 / IM 1061, IM B8 / IM 1071, IM V5 / IM 1011, IM V6 / IM 1031 (see page 1/5)

Rotating field motors – surface cooling, cooling type IC410, (unventilated)

Types RDM 63 L – 132 M

Protection class \geq IP56

Design B3 *



- 1) See Planning section, page 1/12
- 2) With lifting eye from size 112 onward

Fits and tolerances see page 8/2
Subject to technical amendments

Type	B	A	K	H	C	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L
RDM 63 L	80	100	7	63	40	11	23	M4	121	121	117	103	12.5	4	18	2.5	185
RDM 71 K/L	90	112	7	71	45	14	30	M5	138	130	117	103	16	5	25	2.5	211
RDM 80 K/L	100	125	9.5	80	50	19	40	M6	156	144	127	115	21.5	6	32	4	241
RDM 90 S	100	140	10	90	56	24	50	M8	176	157	127	115	27	8	40	5	263
RDM 90 L	125	140	10	90	56	24	50	M8	176	157	127	115	27	8	40	5	288
RDM 100 L	140	160	11.2	100	63	28	60	M10	194	166	127	115	31	8	50	5	327
RDM 112 M	140	190	11.2	112	70	28	60	M10	218	178	127	115	31	8	50	5	340
RDM 132 S	140	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	399
RDM 132 M	178	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	436

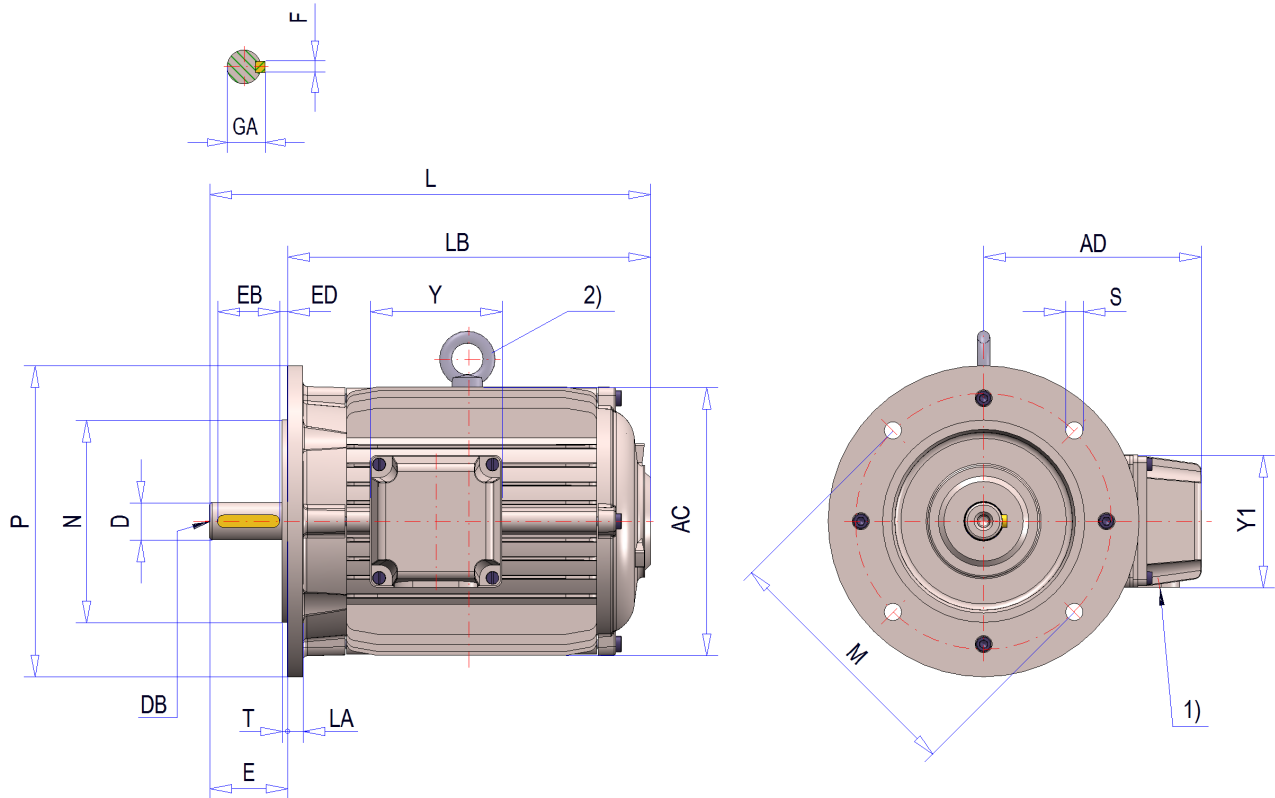
* Design IM B3 / IM 1001, IM B6 / IM 1051, IM B7 / IM 1061, IM B8 / IM 1071, IM V5 / IM 1011, IM V6 / IM 1031 (see page 1/5)

Rotating field motors – surface cooling, cooling type IC410, (unventilated)

Types RDMF 63 L – 132 M

Protection class IP54 - IP55

Design B5 *



1) See Planning section, page 1/12

2) With lifting eye from size 112 onward

Fits and tolerances see page 8/2

Subject to technical amendments

Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
RDMF 63 L	11	23	M4	117	104	70	70	12.5	4	18	2.5	181	156	9	115	95	140	3	10
RDMF 71 K/L	14	30	M5	134	114	70	70	16	5	25	2.5	207	177	9	130	110	160	3.5	10
RDMF 80 K/L	19	40	M6	151	134	85	85	21.5	6	32	4	237	197	9	165	130	200	3.5	10
RDMF 90 S	24	50	M8	169	137	85	85	27	8	40	5	259	209	9	165	130	200	3.5	10
RDMF 90 L	24	50	M8	169	137	85	85	27	8	40	5	284	234	9	165	130	200	3.5	10
RDMF 100 L	28	60	M10	187	148	85	85	31	8	50	5	323	263	9	215	180	250	4	14
RDMF 112 M	28	60	M10	208	158	85	85	31	8	50	5	336	276	11	215	180	250	4	13
RDMF 132 S	38	80	M12	258	197	145	130	41	10	70	5	395	315	14	265	230	300	4	11.5
RDMF 132 M	38	80	M12	258	197	145	130	41	10	70	5	432	352	14	265	230	300	4	11.5

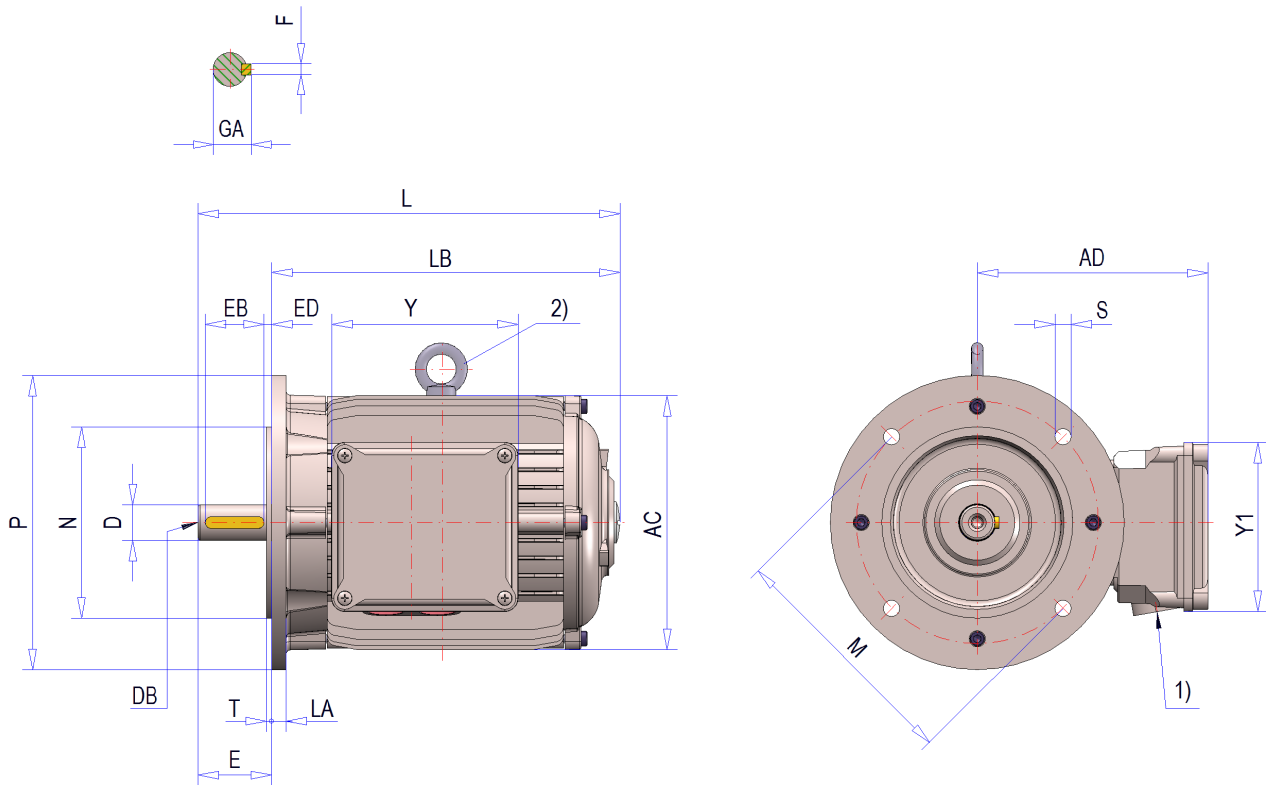
* Design IM B5 / IM 3001, IM V1 / IM 3011, IM V3 / IM 3031 (see page 1/5)

Rotating field motors – surface cooling, cooling type IC410, (unventilated)

Types RDMF 63 L – 112 M

Protection class \geq IP56

Design B5 *



- 1) See Planning section, page 1/12
- 2) With lifting eye from size 112 onward

Fits and tolerances see page 8/2
Subject to technical amendments

Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
RDMF 63 L	11	23	M4	117	126	117	103	12.5	4	18	2.5	185	160	9	115	95	140	3	10
RDMF 71 K/L	14	30	M5	134	136	117	103	16	5	25	2.5	211	181	9	130	110	160	3.5	10
RDMF 80 K/L	19	40	M6	151	150	127	115	21.5	6	32	4	241	201	9	165	130	200	3.5	10
RDMF 90 S	24	50	M8	169	154	127	115	27	8	40	5	263	213	9	165	130	200	3.5	10
RDMF 90 L	24	50	M8	169	154	127	115	27	8	40	5	288	238	9	165	130	200	3.5	10
RDMF 100 L	28	60	M10	187	165	127	115	31	8	50	5	327	267	9	215	180	250	4	14
RDMF 112 M	28	60	M10	208	175	127	115	31	8	50	5	340	280	11	215	180	250	4	13
RDMF 132 S	38	80	M12	258	197	145	130	41	10	70	5	399	319	14	265	230	300	4	11.5
RDMF 132 M	38	80	M12	258	197	145	130	41	10	70	5	436	356	14	265	230	300	4	11.5

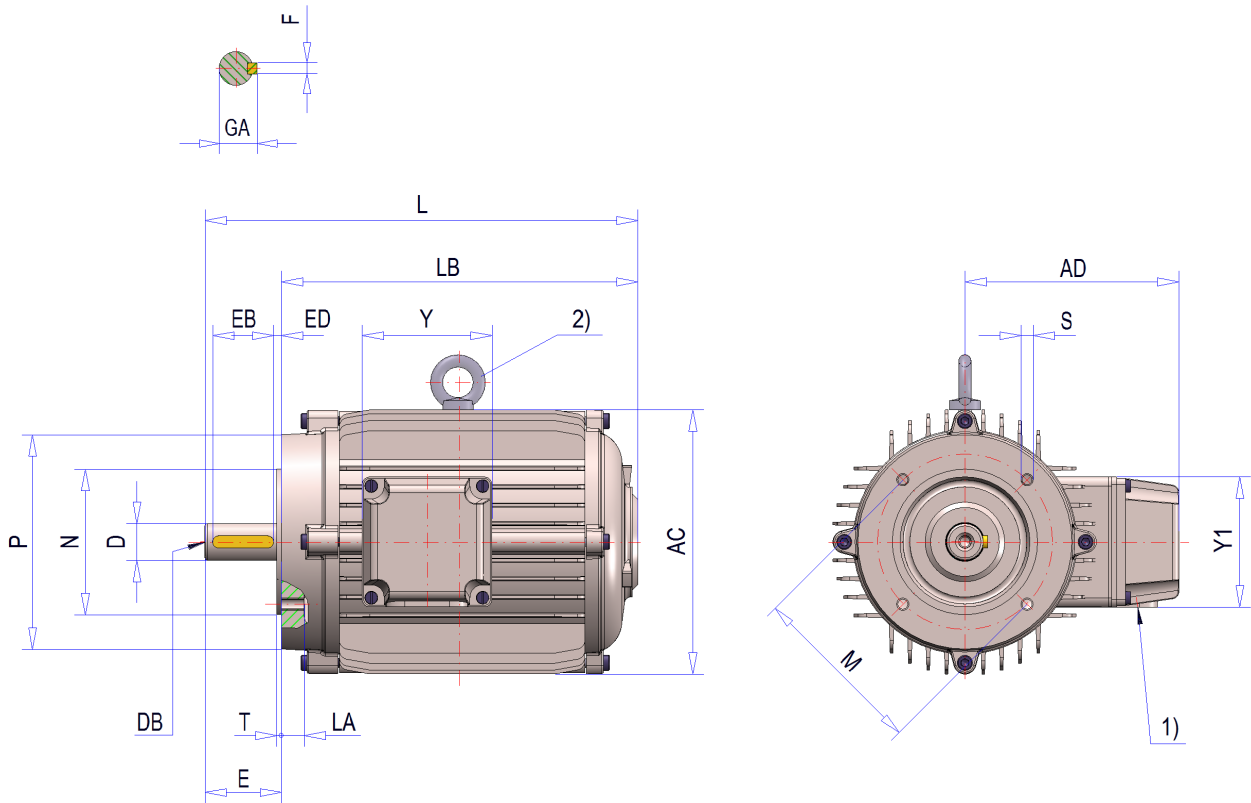
* Design IM B5 / IM 3001, IM V1 / IM 3011, IM V3 / IM 3031 (see page 1/5)

Rotating field motors – surface cooling, cooling type IC410, (unventilated)

Types RDMF 63 L – 132 M

Protection class IP54 - IP55

Design B14 *



- 1) See Planning section, page 1/12
- 2) With lifting eye from size 112 onward

Fits and tolerances see page 8/2
Subject to technical amendments

Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
RDMF 63 L	11	23	M4	117	104	70	70	12.5	4	18	2.5	181	156	M5	75	60	90	2.5	9.5
RDMF 71 K/L	14	30	M5	134	114	70	70	16	5	25	2.5	207	177	M6	85	70	105	2.5	10
RDMF 80 K/L	19	40	M6	151	134	85	85	21.5	6	32	4	237	197	M6	100	80	120	3	12.5
RDMF 90 S	24	50	M8	169	137	85	85	27	8	40	5	259	209	M8	115	95	140	3	15
RDMF 90 L	24	50	M8	169	137	85	85	27	8	40	5	284	234	M8	115	95	140	3	15
RDMF 100 L	28	60	M10	187	148	85	85	31	8	50	5	323	263	M8	130	110	160	3.5	12.5
RDMF 112 M	28	60	M10	208	158	85	85	31	8	50	5	336	276	M8	130	110	160	3.5	16
RDMF 132 S	38	80	M12	258	197	145	130	41	10	70	5	395	315	M10	165	130	200	3.5	15
RDMF 132 M	38	80	M12	258	197	145	130	41	10	70	5	432	352	M10	165	130	200	3.5	15

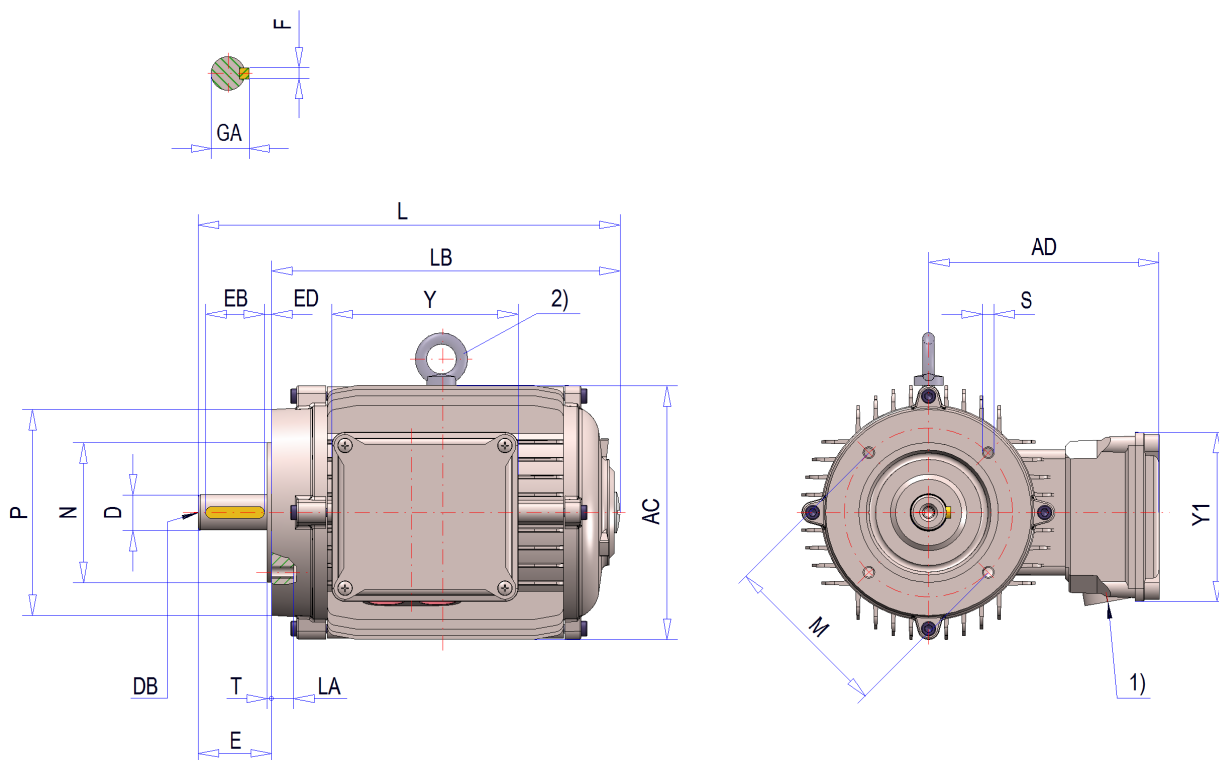
* Design IM B14 / IM 3601, IM V18 / IM 3611, IM V19 / IM 3631 (see page 1/5)

Rotating field motors – surface cooling, cooling type IC410, (unventilated)

Types RDMF 63 L – 132 M

Protection class \geq IP56

Design B14 *



- 1) See Planning section, page 1/12
- 2) With lifting eye from size 112 onward

Fits and tolerances see page 8/2
Subject to technical amendments

Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
RDMF 63 L	11	23	M4	117	126	117	103	12.5	4	18	2.5	185	160	M5	75	60	90	2.5	9.5
RDMF 71 K/L	14	30	M5	134	136	117	103	16	5	25	2.5	211	181	M6	85	70	105	2.5	10
RDMF 80 K/L	19	40	M6	151	150	127	115	21.5	6	32	4	241	201	M6	100	80	120	3	12.5
RDMF 90 S	24	50	M8	169	154	127	115	27	8	40	5	263	213	M8	115	95	140	3	15
RDMF 90 L	24	50	M8	169	154	127	115	27	8	40	5	288	238	M8	115	95	140	3	15
RDMF 100 L	28	60	M10	187	165	127	115	31	8	50	5	327	267	M8	130	110	160	3.5	12.5
RDMF 112 M	28	60	M10	208	175	127	115	31	8	50	5	340	280	M8	130	110	160	3.5	16
RDMF 132 S	38	80	M12	258	197	145	130	41	10	70	5	399	319	M10	165	130	200	3.5	15
RDMF 132 M	38	80	M12	258	197	145	130	41	10	70	5	436	356	M10	165	130	200	3.5	15

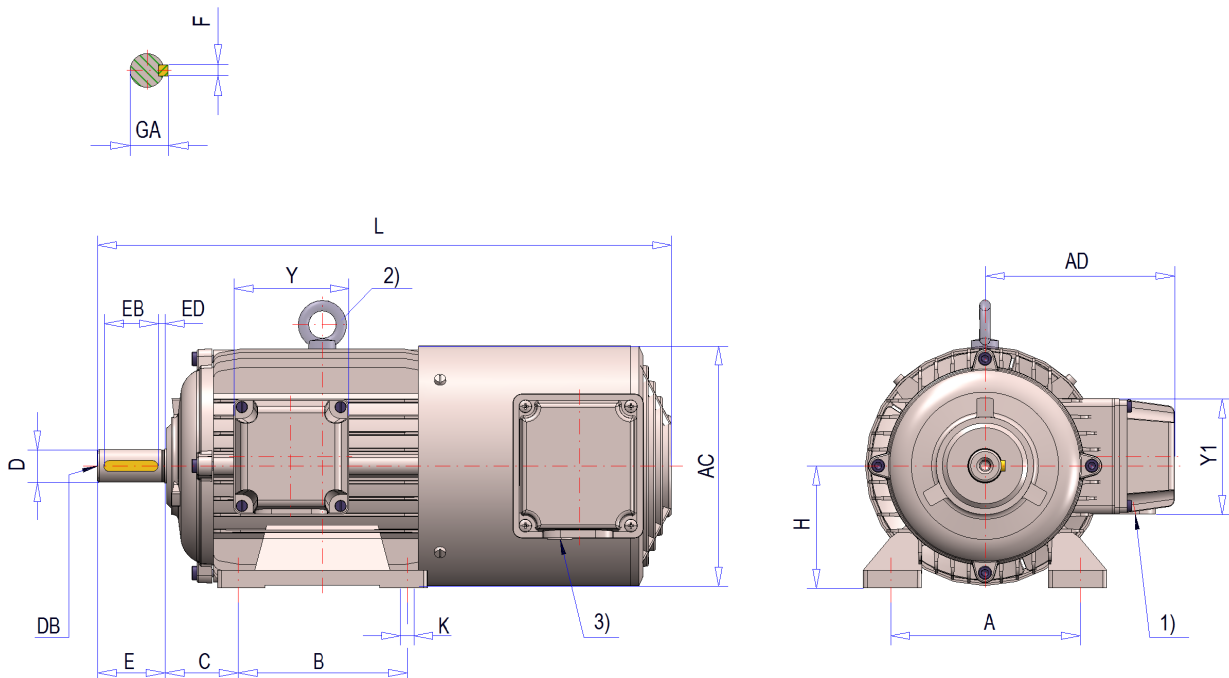
* Design IM B14 / IM 3601, IM V18 / IM 3611, IM V19 / IM 3631 (see page 1/5)

Rotating field motors - surface cooling, cooling type IC416 (external ventilation)

Types RDM 63 L – 132 M

Protection class IP54 - IP55

Design B3 *



1) See planning section page 1/12

2) With lifting eye from size 112 onward

3) 1x M16x1.5

Fits and tolerances see page 8/2

Subject to technical amendments

Type	B	A	K	H	C	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L
RDM 63 L	80	100	7	63	40	11	23	M4	124	99	70	70	12.5	4	18	2.5	309
RDM 71 K/L	90	112	7	71	45	14	30	M5	139	109	70	70	16	5	25	2.5	337
RDM 80 K/L	100	125	9.5	80	50	19	40	M6	157	127	85	85	21.5	6	32	4	367
RDM 90 S	100	140	10	90	56	24	50	M8	177	140	85	85	27	8	40	5	402
RDM 90 L	125	140	10	90	56	24	50	M8	177	140	85	85	27	8	40	5	427
RDM 100 L	140	160	11.2	100	63	28	60	M10	195	149	85	85	31	8	50	5	465
RDM 112 M	140	190	11.2	112	70	28	60	M10	218	161	85	85	31	8	50	5	483
RDM 132 S	140	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	578
RDM 132 M	178	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	616

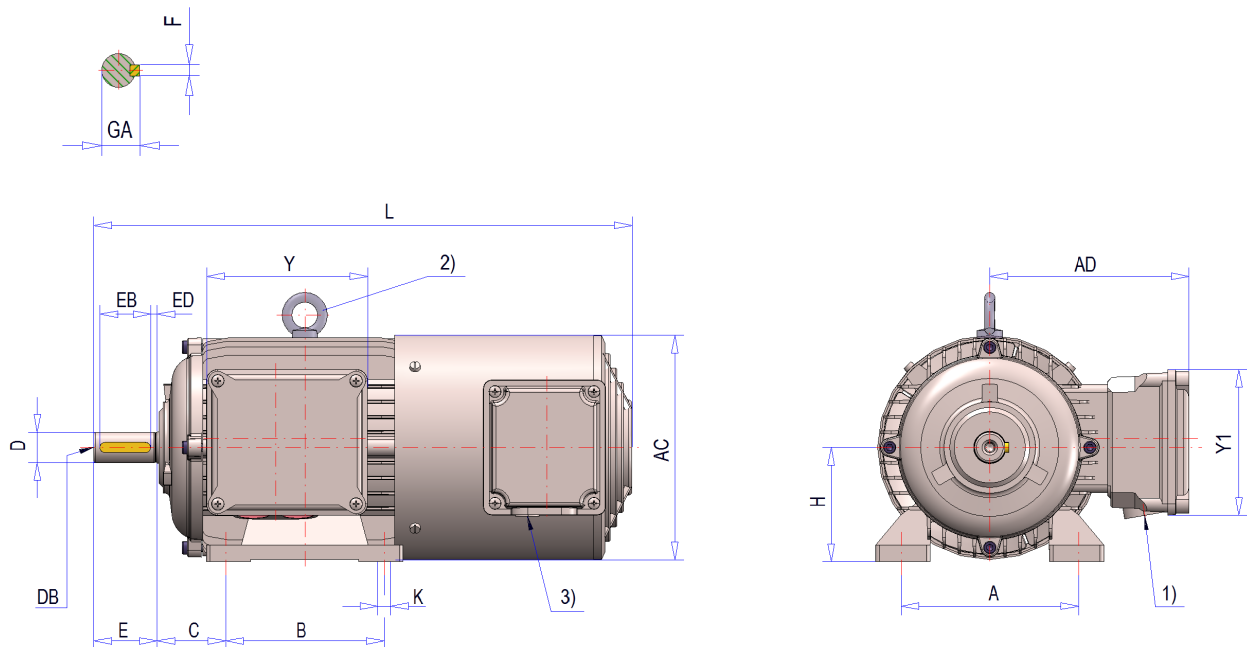
* Design IM B3 / IM 1001, IM B6 / IM 1051, IM B7 / IM 1061, IM B8 / IM 1071, IM V5 / IM 1011, IM V6 / IM 1031 (see page 1/5)

Rotating field motors - surface cooling, cooling type IC416 (external ventilation)

Types RDM 63 L – 132 M

Protection class \geq IP56

Design B3 *



1) See planning section page 1/12

2) With lifting eye from size 112 onward

3) 1x M16x1.5

Fits and tolerances see page 8/2
Subject to technical amendments

Type	B	A	K	H	C	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L
RDM 63 L	80	100	7	63	40	11	23	M4	124	121	117	103	12.5	4	18	2.5	309
RDM 71 K/L	90	112	7	71	45	14	30	M5	139	130	117	103	16	5	25	2.5	337
RDM 80 K/L	100	125	9.5	80	50	19	40	M6	157	144	127	115	21.5	6	32	4	367
RDM 90 S	100	140	10	90	56	24	50	M8	177	157	127	115	27	8	40	5	402
RDM 90 L	125	140	10	90	56	24	50	M8	177	157	127	115	27	8	40	5	427
RDM 100 L	140	160	11.2	100	63	28	60	M10	195	166	127	115	31	8	50	5	465
RDM 112 M	140	190	11.2	112	70	28	60	M10	218	178	127	115	31	8	50	5	483
RDM 132 S	140	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	578
RDM 132 M	178	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	616

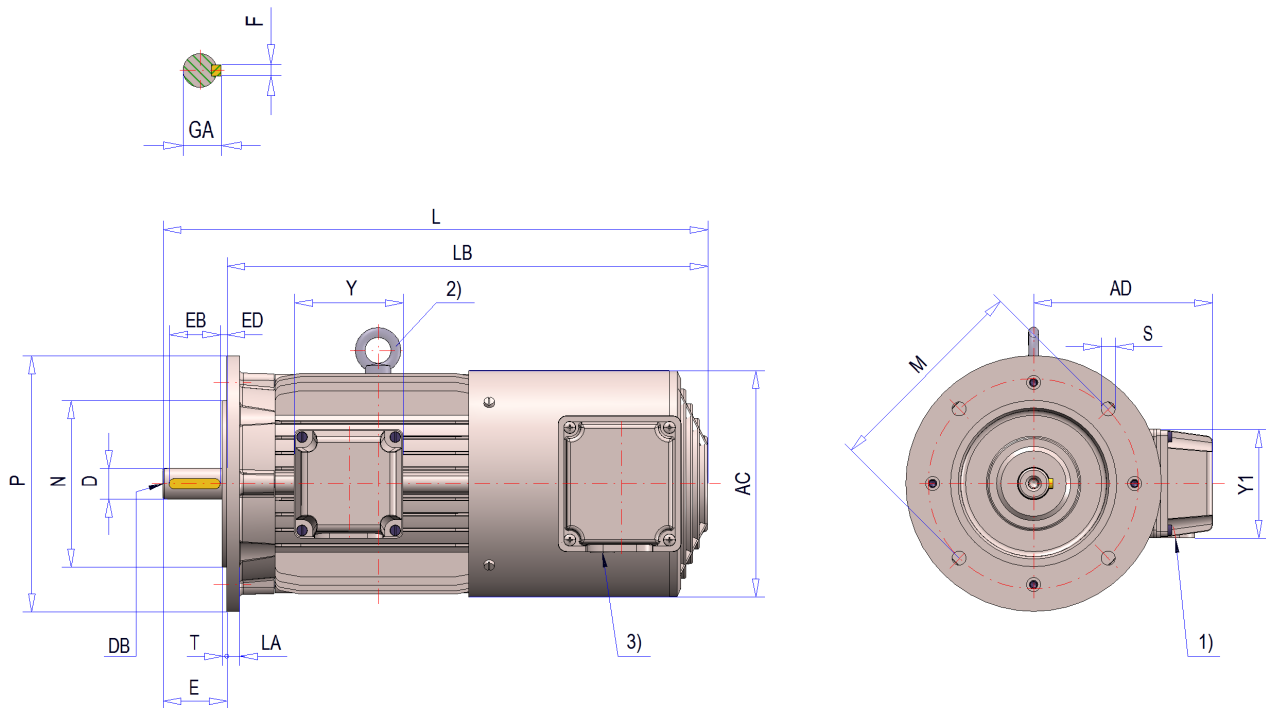
* Design IM B3 / IM 1001, IM B6 / IM 1051, IM B7 / IM 1061, IM B8 / IM 1071, IM V5 / IM 1011, IM V6 / IM 1031 (see page 1/5)

Rotating field motors - surface cooling, cooling type IC416 (external ventilation)

Types RDMF 63 L – 132 M

Protection class IP54 - IP55

Design B5 *



1) See planning section page 1/12

2) With lifting eye from size 112 onward

3) 1x M16x1.5

Fits and tolerances see page 8/2
Subject to technical amendments

Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
RDMF 63 L	11	23	M4	124	104	70	70	12.5	4	18	2.5	309	286	9	115	95	140	3	10
RDMF 71 K/L	14	30	M5	139	114	70	70	16	5	25	2.5	337	307	9.5	130	110	160	3.5	9.5
RDMF 80 K/L	19	40	M6	157	134	85	85	21.5	6	32	4	367	327	11.5	165	130	200	3.5	11
RDMF 90 S	24	50	M8	177	137	85	85	27	8	40	5	402	352	11.5	165	130	200	3.5	10.5
RDMF 90 L	24	50	M8	177	137	85	85	27	8	40	5	427	377	11.5	165	130	200	3.5	10.5
RDMF 100 L	28	60	M10	195	148	85	85	31	8	50	5	465	405	14	215	180	250	4	15.5
RDMF 112 M	28	60	M10	218	158	85	85	31	8	50	5	483	423	14	215	180	250	4	11
RDMF 132 S	38	80	M12	258	197	145	130	41	10	70	5	578	498	14	265	230	300	4	12
RDMF 132 M	38	80	M12	258	197	145	130	41	10	70	5	616	536	14	265	230	300	4	12

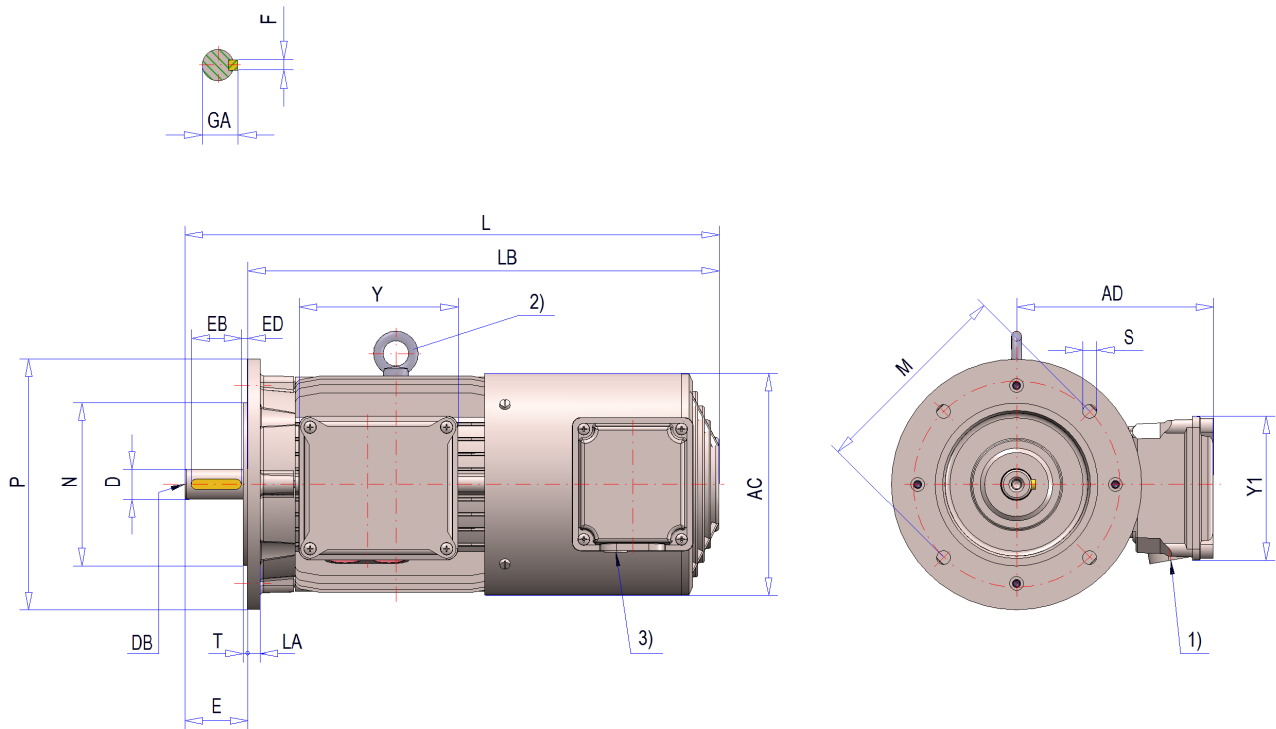
* Design IM B5 / IM 3001, IM V1 / IM 3011, IM V3 / IM 3031 (see page 1/5)

Rotating field motors - surface cooling, cooling type IC416 (external ventilation)

Types RDMF 63 L – 132 M

Protection class \geq IP56

Design B5 *



1) See planning section page 1/12

2) With lifting eye from size 112 onward

3) 1x M16x1.5

Fits and tolerances see page 8/2
Subject to technical amendments

Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
RDMF 63 L	11	23	M4	124	126	117	103	12.5	4	18	2.5	309	286	9	115	95	140	3	10
RDMF 71 K/L	14	30	M5	139	136	117	103	16	5	25	2.5	337	307	9.5	130	110	160	3.5	9.5
RDMF 80 K/L	19	40	M6	157	150	127	115	21.5	6	32	4	367	327	11.5	165	130	200	3.5	11
RDMF 90 S	24	50	M8	177	154	127	115	27	8	40	5	402	352	11.5	165	130	200	3.5	10.5
RDMF 90 L	24	50	M8	177	154	127	115	27	8	40	5	427	377	11.5	165	130	200	3.5	10.5
RDMF 100 L	28	60	M10	195	165	127	115	31	8	50	5	465	405	14	215	180	250	4	15
RDMF 112 M	28	60	M10	218	175	127	115	31	8	50	5	483	423	14	215	180	250	4	11
RDMF 132 S	38	80	M12	258	197	145	130	41	10	70	5	578	498	14	265	230	300	4	12
RDMF 132 M	38	80	M12	258	197	145	130	41	10	70	5	616	536	14	265	230	300	4	12

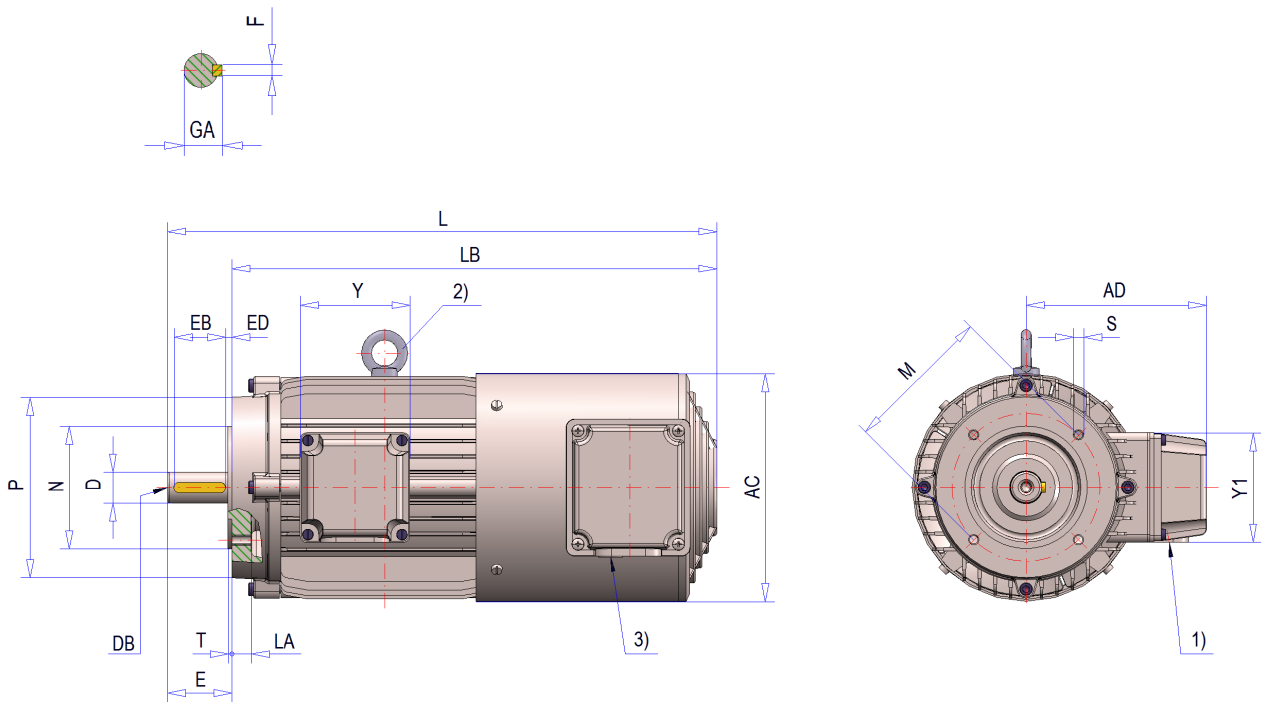
* Design IM B5 / IM 3001, IM V1 / IM 3011, IM V3 / IM 3031 (see page 1/5)

Rotating field motors - surface cooling, cooling type IC416 (external ventilation)

Types RDMF 63 L – 132 M

Protection class IP54 - IP55

Design B14 *



1) See planning section page 1/12

2) With lifting eye from size 112 onward

3) 1x M16x1.5

Fits and tolerances see page 8/2
Subject to technical amendments

Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
RDMF 63 L	11	23	M4	124	104	70	70	12.5	4	18	2.5	309	286	M5	75	60	90	2.5	9.5
RDMF 71 K/L	14	30	M5	139	114	70	70	16	5	25	2.5	337	307	M6	85	70	105	2.5	10
RDMF 80 K/L	19	40	M6	157	134	85	85	21.5	6	32	4	367	327	M6	100	80	120	3	12.5
RDMF 90 S	24	50	M8	177	137	85	85	27	8	40	5	402	352	M8	115	95	140	3	15
RDMF 90 L	24	50	M8	177	137	85	85	27	8	40	5	427	377	M8	115	95	140	3	15
RDMF 100 L	28	60	M10	195	148	85	85	31	8	50	5	465	405	M8	130	110	160	3.5	12.5
RDMF 112 M	28	60	M10	218	158	85	85	31	8	50	5	483	423	M8	130	110	160	3.5	16
RDMF 132 S	38	80	M12	258	197	145	130	41	10	70	5	578	498	M10	165	130	200	3.5	15
RDMF 132 M	38	80	M12	258	197	145	130	41	10	70	5	616	536	M10	165	130	200	3.5	15

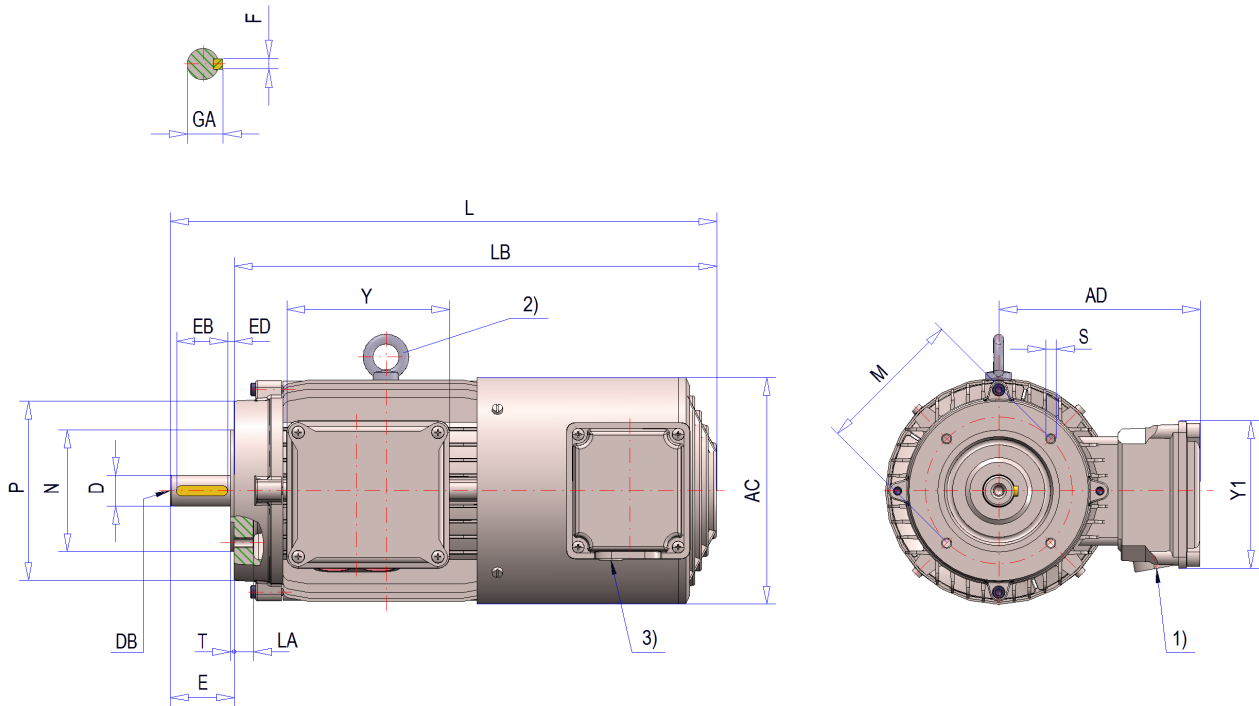
* Design IM B14 / IM 3601, IM V18 / IM 3611, IM V19 / IM 3631 (see page 1/5)

Rotating field motors - surface cooling, cooling type IC416 (external ventilation)

Types RDMF 63 L – 132 M

Protection class \geq IP56

Design B14 *



1) See planning section page 1/12

2) With lifting eye from size 112 onward

3) 1x M16x1.5

Fits and tolerances see page 8/2
Subject to technical amendments

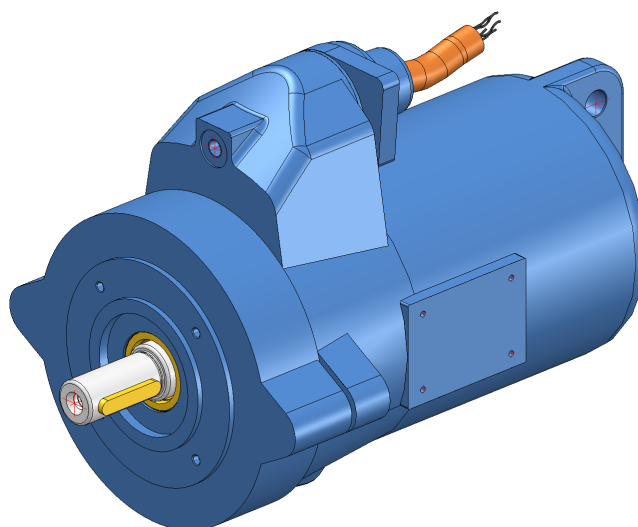
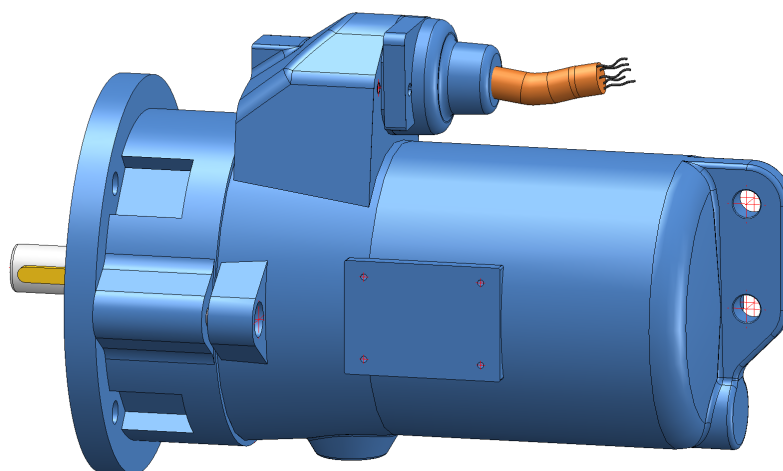
Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
RDMF 63 L	11	23	M4	124	126	117	103	12.5	4	18	2.5	309	286	M5	75	60	90	2.5	9.5
RDMF 71 K/L	14	30	M5	139	136	117	103	16	5	25	2.5	337	307	M6	85	70	105	2.5	10
RDMF 80 K/L	19	40	M6	157	150	127	115	21.5	6	32	4	367	327	M6	100	80	120	3	12.5
RDMF 90 S	24	50	M8	177	154	127	115	27	8	40	5	402	352	M8	115	95	140	3	15
RDMF 90 L	24	50	M8	177	154	127	115	27	8	40	5	427	377	M8	115	95	140	3	15
RDMF 100 L	28	60	M10	195	165	127	115	31	8	50	5	465	405	M8	130	110	160	3.5	12.5
RDMF 112 M	28	60	M10	218	175	127	115	31	8	50	5	483	423	M8	130	110	160	3.5	16
RDMF 132 S	38	80	M12	258	197	145	130	41	10	70	5	578	498	M10	165	130	200	3.5	15
RDMF 132 M	38	80	M12	258	197	145	130	41	10	70	5	616	536	M10	165	130	200	3.5	15

* Design IM B14 / IM 3601, IM V18 / IM 3611, IM V19 / IM 3631 (see page 1/5)

Submersible motors

13

SUBMERSIBLE MOTORS



For dimensional sheets see page 13/5.



Submersible motors

HEW submersible motors are specially designed for operation under water. Submersible three-phase motors are used to pump drain water, waste water, river and rain water as well as all kinds of muddy waters and for mixer and homogeniser agitators. The housing is an optimised cast iron motor barrel casing with less corners and edges. Due to its robust design, the drive has a very long service life. A pre-assembled power cable is encapsulated at the motor and allows for easy installation on site. The submersible motors come in protection class IP 68 and are mainly used under water at a maximum immersion depth of 10 m. The motors are designed for direct fastening to the drive (e.g. gear, agitator or pump).

The windings are always manufactured with phase insulation, which makes the drives suitable for operation with frequency inverters. These drives are available in the power range of 1.1 kW to 5.5 kW. Motors up to a power of 30.0 kW are available on request. Standard motors are made as 4-pole variants. Other pole numbers or pole-changing motors are also available on request. As special design, the motors are also available with closed brake system or standstill heater. Further special versions are available on request.

Standards and regulations

The motors meet the commonly applicable standards and rules (see Part 1, page 1 / 4)

Housing version

Flanges and housing parts are made of cast iron, all connection elements such as screws and fastening elements are made of corrosion-proof and acid-proof materials.

Shaft end

The standard shaft ends are cylindrical and their dimensions, tolerances and power assignments comply with DIN EN 50347. The tolerance of the shaft diameter is k6 (ISO) up to a diameter of 50 mm/m6 (ISO) for diameters exceeding 50 mm. The DS shaft end of all submersible motors has a centre bore acc. to DIN 322-2 shape D. The motor comes with parallel keys complying with DIN 6885-1 shape A.

Standard motors come with a shaft end made of 1.4021 (corrosion-proof and acid-proof). Other materials can be used on customer's request. Motors with special shafts (e.g. for direct mounting to the gear) are also available as an option.

Vibration

All armatures of the motors are dynamically balanced with half feather keys in accordance with DIN ISO 21940-32. The vibration behaviour of the motors corresponds to the vibration severity level A in accordance with DIN EN 60034-14 (see the table in Part 1, page 1/13). Vibration severity level B can be supplied on request for quieter running.

Storage

The motors are equipped with generously dimensioned roller bearings. The DS bearing is a fixed bearing. The NS bearing is a floating bearing held in place with springs.

Shaft seal

The motor inside is sealed with a radial seal ring at the shaft. This seal complies with the "oil tight" protection class IP 67.

Leakage monitor

To monitor the seal, a leakage monitoring unit can be fitted on customer's request. The measuring line leading to the electrodes is integrated in the motor power cable. Evaluation by way of resistance measuring occurs with appropriate electronic components. The evaluation device is not included in the scope of delivery.



Electrical design

The power values given in the list refer to fully immersed units with a maximum coolant temperature of 40 °C at operating mode S1 (continuous operation).

Rated voltage and frequency

The submersible motors are available for the following rated voltages:

3AC, 50 Hz – 400 V, 500 V, 690 V

3AC, 60 Hz – 400 V, 440 V, 460 V

Voltage tolerance $\pm 10\%$, acc. to EN 60 034 Part 1 – Section B

Other rated voltages are available on customer's request.

Thermal class

The standard design of motors is thermal class F. As an option, motors can also be thermal class H. An improved moisture protection is also available as an option.

Motor connection

The motors are connected with watertight, moisture-proof rubber cables. The standard power cable length is fifteen metres.

Motor protection

A motor protection switch monitoring the current must be set to the nominal current indicated on the rating plate. Only a motor protection directly measuring the temperature is effective in case of frequent switching, short-term operation, coolant failure (dry running) or great temperature amplitudes. To this end, there are the following options:

- Temperature switch as NC (PTO)

When the temperature matching the thermal class is exceeded, the temperature switch opens the contact and closes it only when the temperature has dropped significantly.

Switching capacity: For AC: 250 V 1.6 A.

By default, the temperature monitoring connections are integrated in the power cable.

As an option, the motors can also be equipped with PTCs; in this case, a shielded motor cable is mandatory.

Standstill heating

A standstill heating can be implemented in motors whose windings are subject to condensation, e.g. caused by high temperature fluctuations.

This solution warms up the air inside the motor via the outside temperature, which prevents condensation inside the motor. The standstill heating must not be switched on while the motor is in operation.



Submersible three-phase motors

Number of poles: 4

Nominal data at 400V, 50 Hz

Thermal class F

Operating mode: S1

Synchronous speed: 1500 rpm

Surface cooling IC 410

Max. coolant temperature 40°C

Fully immersed

Size Type	Nominal power	Nominal speed	Nominal current	Power factor	Nominal torque	Start-up to nominal current	Start-up to nominal torque	Breakdown to nominal torque	Moment of inertia	Weight IM B5 incl. motor cable
GGUF	P_N kW	n_N rpm	I_N A	$\cos \varphi$	M_N Nm	I_A/I_N	M_A/M_N	M_k/M_N	J kgm ²	M appr. kg
90L/4	1.1	1440	2.45	0.78	7.3	5.8	2.6	2.9	0.0024	25
90L/4	1.5	1430	3.35	0.78	10	5.1	2.3	2.6	0.0024	25
90L/4	2.2	1420	5.37	0.73	14.8	4.9	2.2	2.5	0.0024	25
112M/4	3.0	1450	5.9	0.84	19.7	6.0	2.25	2.8	0.0101	52
112M/4	3.3	1450	6.65	0.84	21.8	5.5	2.2	2.6	0.0101	52
112M/4	4.0	1450	8.35	0.79	26.3	6.2	2.3	2.9	0.0101	52
112M/4	4.4	1445	9.0	0.81	29	5.6	2.1	2.7	0.0101	52
112M/4	5.5	1440	11.9	0.77	36.5	5.5	2.0	2.6	0.0101	52

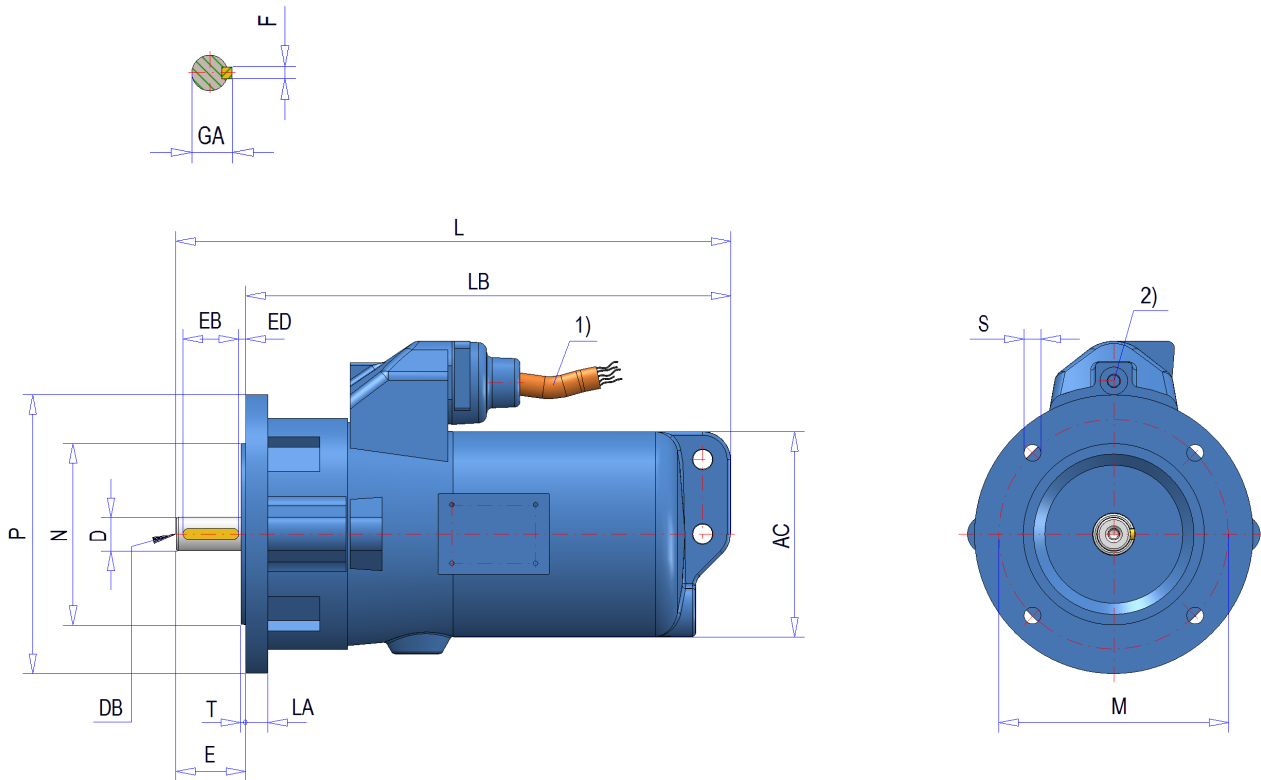
Subject to technical amendments

Submersible motors – surface cooling, cooling type IC410, unventilated

Types GGUF 90 L – 112 L

Protection class IP68

Design B5*



1) Cable length GGUF 90 L = 15 m / GGUF 112 M = 20 m (other lengths on request)

2) optional R1/8" thread for leakage monitoring

Fits and tolerances see page 8/2

Subject to technical amendments

Type	D	E	DB	AC	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
GGUF 90 L	24	50	M8	147	27	8	40	5	398	348	12	165	130	200	3.5	16
GGUF 90 L	28	60	M10	147	31	8	50	5	378	318	14	215	180	250	4	16
GGUF 112 M	28	60	M10	184	31	8	60	5	431	371	14	215	180	250	4	14
GGUF 112 M	38	80	M12	184	41	10	70	5	451	371	14	265	230	300	4	14

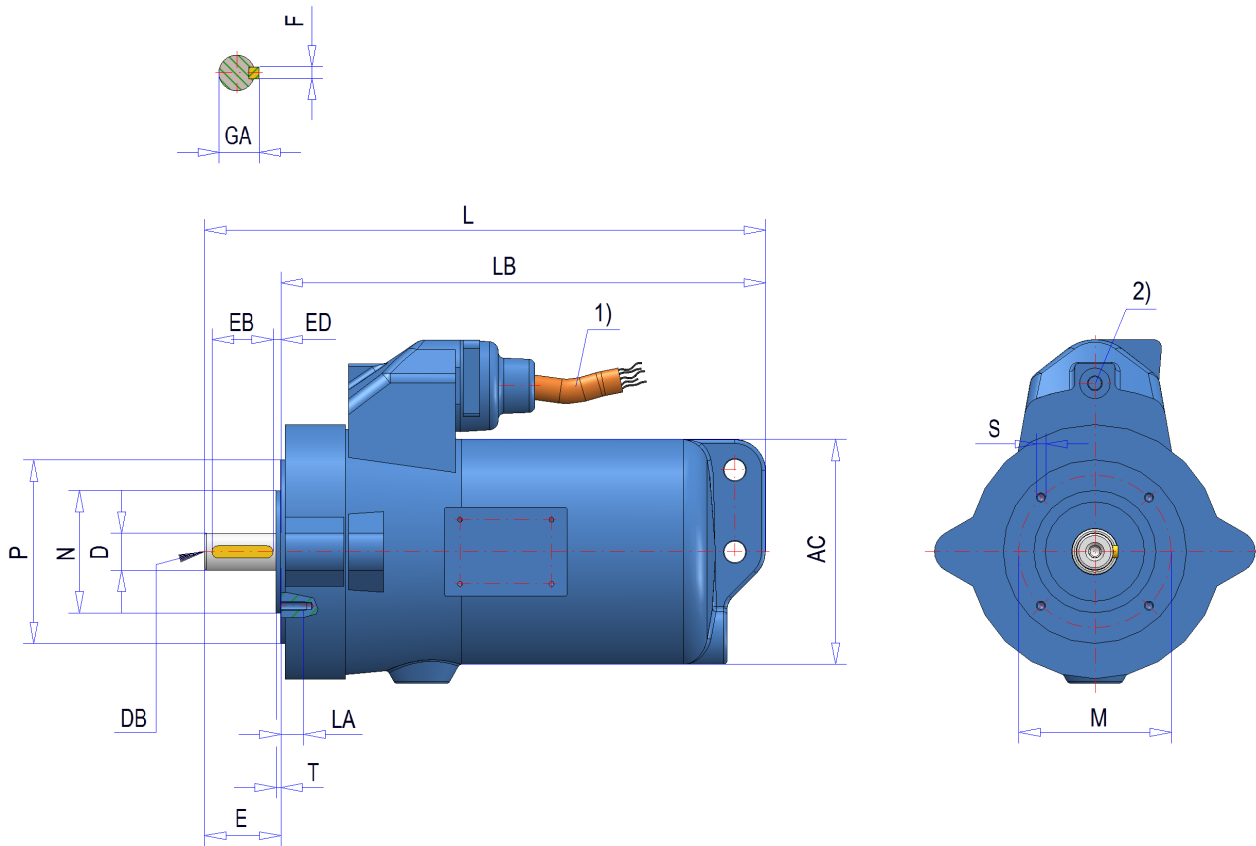
* Design IM B5 / IM 3001, IM V1 / IM 3011, IM V3 / IM 3031 (see page 1/5)

Submersible motors – surface cooling, cooling type IC410, unventilated

Types GGUF 90 L – 112 L

Protection class IP68

Design B14 *



1) Cable length GGUF 90 L = 15 m / GGUF 112 M = 20 m (other lengths on request)

2) optional R1/8" thread for leakage monitoring

Fits and tolerances see page 8/2

Subject to technical amendments

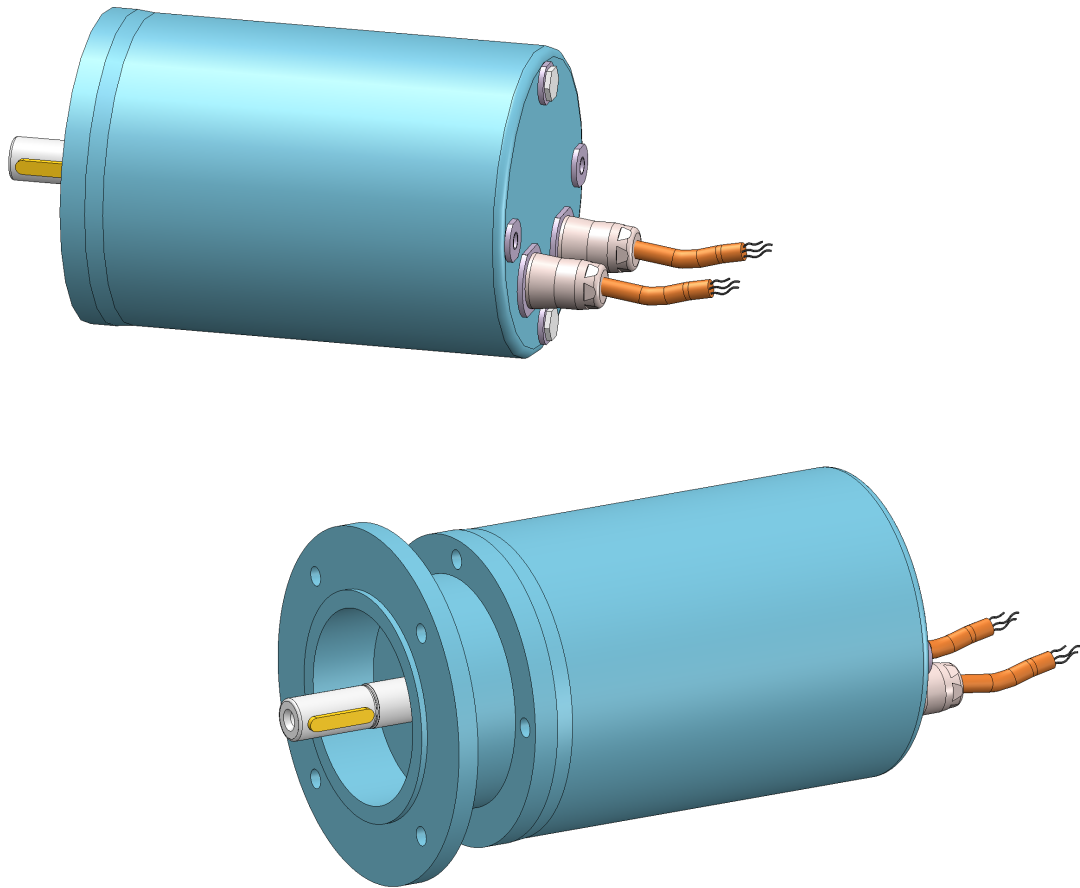
Type	D	E	DB	AC	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
GGUF 90 L	24	50	M8	147	27	8	40	5	368	318	M8	115	95	140	3	16
GGUF 90 L	28	60	M10	147	31	8	50	5	378	318	M8	130	110	160	3	16
GGUF 112 M	28	60	M10	184	31	8	50	5	490	430	M8	130	110	160	3	16
GGUF 112 M	38	80	M12	184	41	10	70	5	510	430	M10	165	130	200	3	16

* Design IM B14 / IM 3601, IM V18 / IM 3611, IM V19 / IM 3631 (see page 1/5)

Hygiene motors

14

HYGIENE MOTORS



For dimensional sheets see page 14/4.



Hygiene motor

Especially in the sensitive production areas of foodstuffs technologies, i.e. in the production and processing of foods and beverages, the highest demands are placed on hygienic conditions. This also applies to production in the chemical and pharmaceutical industries. Here, even sterile production environments are often required.

The construction of conventional motors often caused problems for the designers of such production facilities, as these motors are usually equipped with cooling fins and fans, in which dirt can accumulate. Cleaning is hindered because of poor accessibility. As a result, there is a risk of germ formation. As well as this, cleaning of the production facilities was often made difficult by these features in the past.

HEW hygiene motors now solve these problems. With these new special motors from HEW, the housing is designed as a completely smooth, closed surface, which has no edges, depressions or grooves. They are therefore very easy to clean and reduce the growth of pathogens and bacteria on their surfaces. The motors are optionally available in V2A stainless steel or aluminium versions. The stainless steel motors are available in a non-ventilated version (IC410 TENV Totally Enclosed Non Ventilated) and in a liquid-cooled version (IC 3S7 TELC Totally Enclosed Liquid Cooled). The electrical connections and the supply and return connections for liquid cooling are located opposite the drive side. For additional information regarding the used coolant, please refer to the respective maintenance and operating instructions.

Technical specification:

- Smooth surface
- Low surface temperature with liquid cooling < 60°C
- No fan, purely convection or liquid cooling
- Available in stainless steel or aluminium housing versions
- Motor outputs from 0.18 kW - 2.2 kW
- Motor protection class IP 66
- Motor protection optionally with PTC or thermostatic switch
- Low friction PTFE rotary shaft seal in hygienic design
- Optional rotary encoder for inverter operation
- Connection optionally via motor cable or IP66 plug connector
- Shaft end made of stainless steel; other materials on request
- Motors with specially dimensioned motor shafts (direct gear mounting) are available on request

The HEW hygiene motors offer optimum protection against:

- Moisture
- Cleaning agents
- Oils
- Soiling
- Chemicals
- Bacteria
- Temperature fluctuations
- Water jets

Electrical data and dimension sheets of hygiene motors in aluminium version are available on request.



Hygiene motors

Number of poles: 4

Nominal data at 400V, 50 Hz

Thermal class F

Operating mode: S1

Synchronous speed: 1500 rpm

Housing material: Stainless steel

Ventilation: unventilated IC410 TENV Totally Enclosed Non Ventilated)

Size Type	Nominal power	Nominal speed	Nominal current	Power factor	Nominal torque	Start-up to nominal current	Start-up to nominal torque	Breakdown to nominal torque	Moment of inertia	Weight IM B3
GUF	P _N kW	n _N rpm	I _N A	cos φ	M _N Nm	I _A /I _N	M _A /M _N	M _k /M _N	J kgm ²	M appr. kg
71L/4	0.12			on request						
90S/4	0.18	1440	0.45	0.77	1.2	6.0	2.9	3.5	0.00205	19.4
90S/4	0.25	1460	0.80	0.62	1.7	7.2	4.7	7.3	0.00243	20.3
90S/4	0.37	1450	0.90	0.72	2.45	6.8	3.5	3.9	0.00243	20.3
90L/4	0.55	1400	1.3	0.85	3.8	4.35	1.9	2.9	0.00243	20.3

Ventilation: liquid cooled IC 3S7 TELC Totally Enclosed Liquid Cooled

Size Type	Nominal power	Nominal speed	Nominal current	Power factor	Nominal torque	Start-up to nominal current	Start-up to nominal torque	Breakdown to nominal torque	Moment of inertia	Weight IM B3
GUF	P _N kW	n _N rpm	I _N A	cos φ	M _N Nm	I _A /I _N	M _A /M _N	M _k /M _N	J kgm ²	M appr. kg
71K/4	0.12			on request						
71K/4	0.18			on request						
71K/4	0.25			on request						
71L/4	0.37			on request						
71L/4	0.55			on request						
90S/4	0.75	1390	1.9	0.75	5.15	4.2	2.1	2.6	0.00205	21.3
90L/4	1.1			on request						
90L/4	1.5	1430	3.5	0.74	10.0	5.4	2.9	2.9	0.0026	23
90L/4	2.2	1390	4.85	0.81	15.0	5.0	2.5	2.5	0.0030	29.5

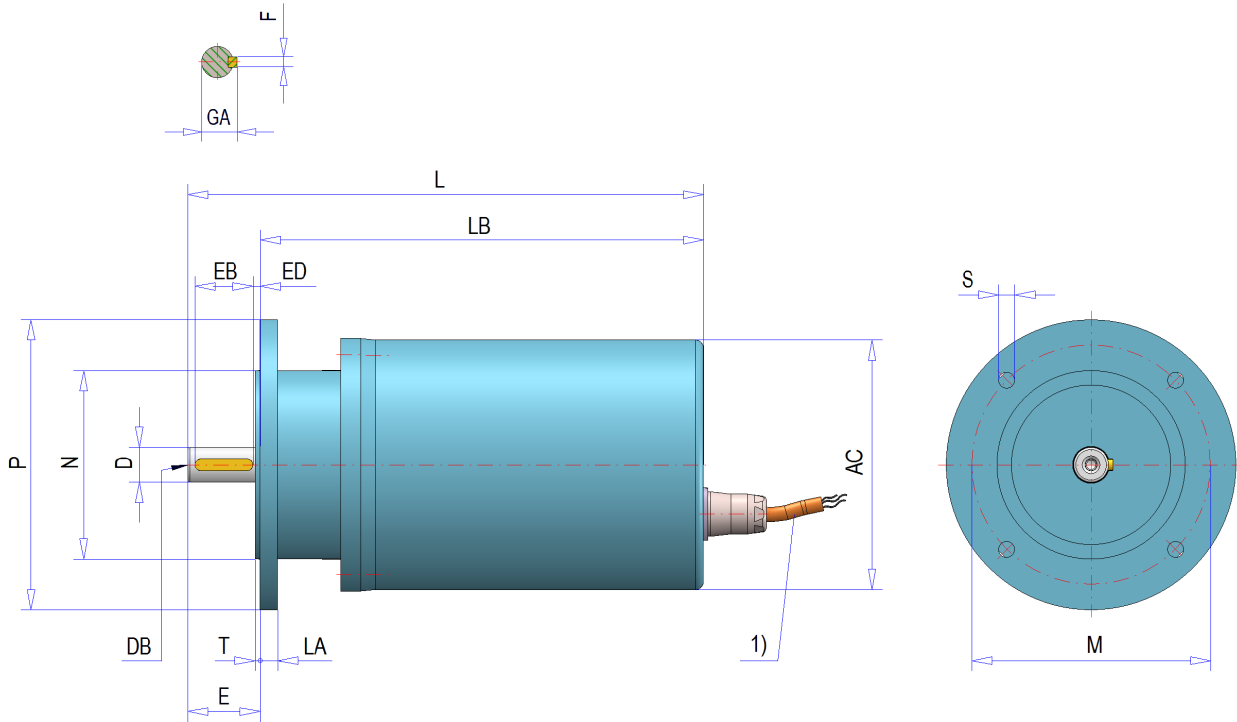
Subject to technical amendments

Hygiene motors (stainless steel housing) – surface cooling, cooling type IC410, (unventilated)

Types GUF 71 K - 90 L

Protection class IP66 – IP68

Design B5 *



1) Standard: 2 m cable (other lengths on request)
For motor protection (PTC/thermal switch) a 2nd cable of same length

Fits and tolerances see page 8/2
Subject to technical amendments

Type	D	E	DB	AC	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
GUF 71K/L	11	23	M4	143	12.5	4	18	2.5	287	264	9	115	95	140	3.5	14
GUF 71K/L	14	30	M5	143	16	5	25	2.5	294	264	9	130	110	160	3.5	14
GUF 71K/L	19	40	M6	143	21.5	6	32	4	304	264	11	165	130	200	3.5	14
GUF 90S/L	11	23	M4	172	12.5	4	18	2.5	329	308	9	115	95	140	3.5	12
GUF 90S/L	14	30	M5	172	16	5	25	2.5	336	308	9	130	110	160	3.5	12
GUF 90S/L	19	40	M6	172	21.5	6	32	4	346	308	11	165	130	200	3.5	12
GUF 90S/L	24	50	M8	172	27	8	40	5	356	306	11	165	130	200	3.5	12
GUF 90S/L	28	60	M10	172	31	8	50	5	366	306	14	215	180	250	3.5	12

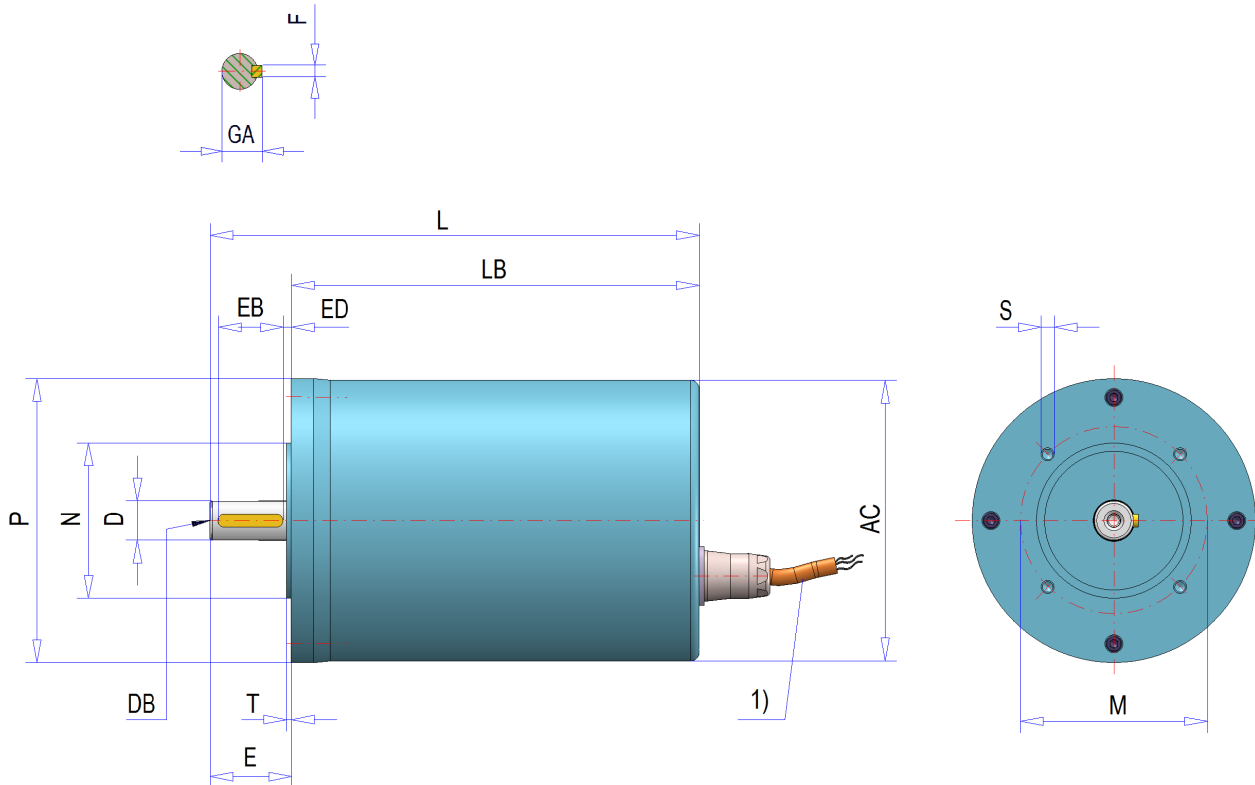
* Design IM B5 / IM 3001, IM V1 / IM 3011, IM V3 / IM 3031 (see page 1/5)

Hygiene motors (stainless steel housing) – surface cooling, cooling type IC410, (unventilated)

Types GUF 71 K - 90 L

Protection class IP66 – IP68

Design B14 *



1) Standard: 2 m cable (other lengths on request)

For motor protection (PTC/thermal switch) a 2nd cable of same length

2) Outer diameter of flange P contrary to allocation as per EN 50347; bolt circle of fastening bores M

Fits and tolerances see page 8/2

Subject to technical amendments

Type	D	E	DB	AC	GA	F	EB	ED	L	LB	S	M	N	P ²⁾	T	LA
GUF 71 K/L	11	23	M4	143	12.5	4	18	2.5	229	206	M5	75	60	145	3	15
GUF 71 K/L	14	30	M5	143	16	5	25	2.5	236	206	M6	85	70	145	3	15
GUF 71 K/L	19	40	M6	143	21.5	6	32	4	246	206	M6	100	80	145	3	15
GUF 90 S/L	11	23	M4	172	12.5	4	18	2.5	294	271	M5	75	60	174	2.5	15
GUF 90 S/L	14	30	M5	172	16	5	25	2.5	301	271	M6	85	70	174	2.5	15
GUF 90 S/L	19	40	M6	172	21.5	6	32	4	291	251	M6	100	80	174	3	12
GUF 90 S/L	24	50	M8	172	27	8	40	5	301	251	M8	115	95	174	3	15
GUF 90 S/L	28	60	M10	172	31	8	50	5	311	251	M8	130	110	174	3.5	14

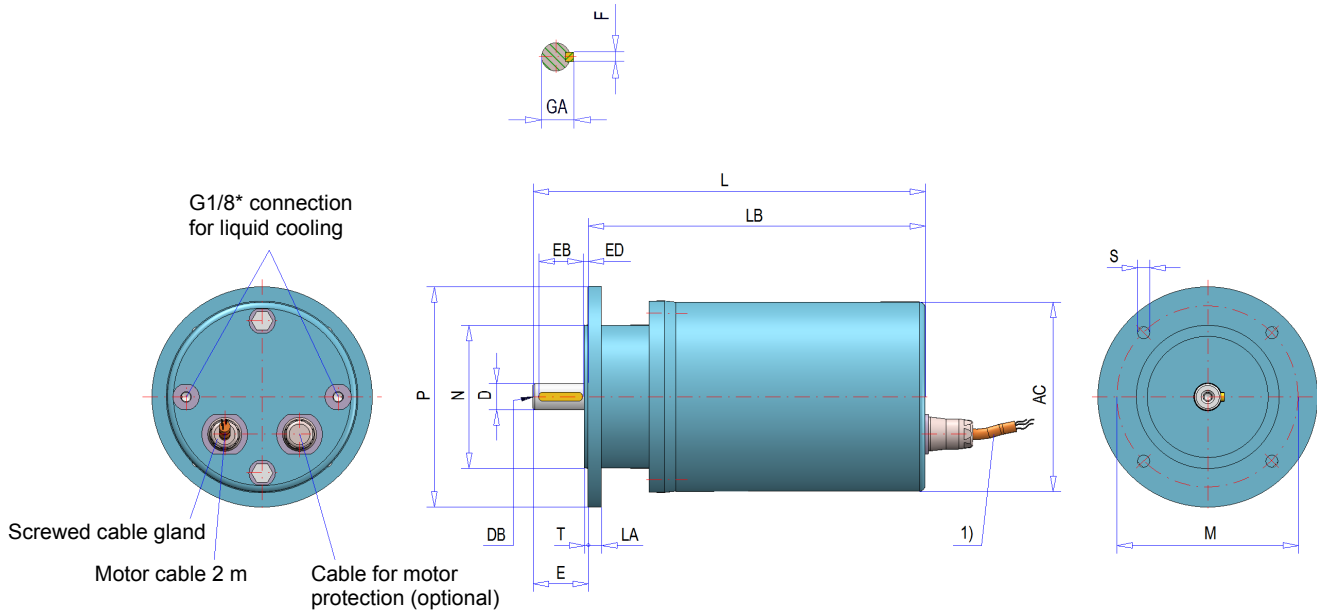
* Design IM B14 / IM 3601, IM V18 / IM 3611, IM V19 / IM 3631 (see page 1/5)

Hygiene motors (stainless steel housing) – liquid cooling, cooling type IC 3S7

Types GUF 71 K - 90 L

Protection class IP66 – IP68

Design B5 *



1) Standard: 2 m cable (other lengths on request)
For motor protection (PTC/thermal switch) a 2nd cable of same length

Fits and tolerances see page 8/2
Subject to technical amendments

Type	D	E	DB	AC	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
GUF 71K/L	11	23	M4	143	12.5	4	18	2.5	287	264	9	115	95	140	3.5	14
GUF 71K/L	14	30	M5	143	16	5	25	2.5	294	264	9	130	110	160	3.5	14
GUF 71K/L	19	40	M6	143	21.5	6	32	4	304	264	11	165	130	200	3.5	14
GUF 90S/L	11	23	M4	172	12.5	4	18	2.5	329	308	9	115	95	140	3.5	12
GUF 90S/L	14	30	M5	172	16	5	25	2.5	336	308	9	130	110	160	3.5	12
GUF 90S/L	19	40	M6	172	21.5	6	32	4	346	308	11	165	130	200	3.5	12
GUF 90S/L	24	50	M8	172	27	8	40	5	356	306	11	165	130	200	3.5	12
GUF 90S/L	28	60	M10	172	31	8	50	5	366	306	14	215	180	250	3.5	12

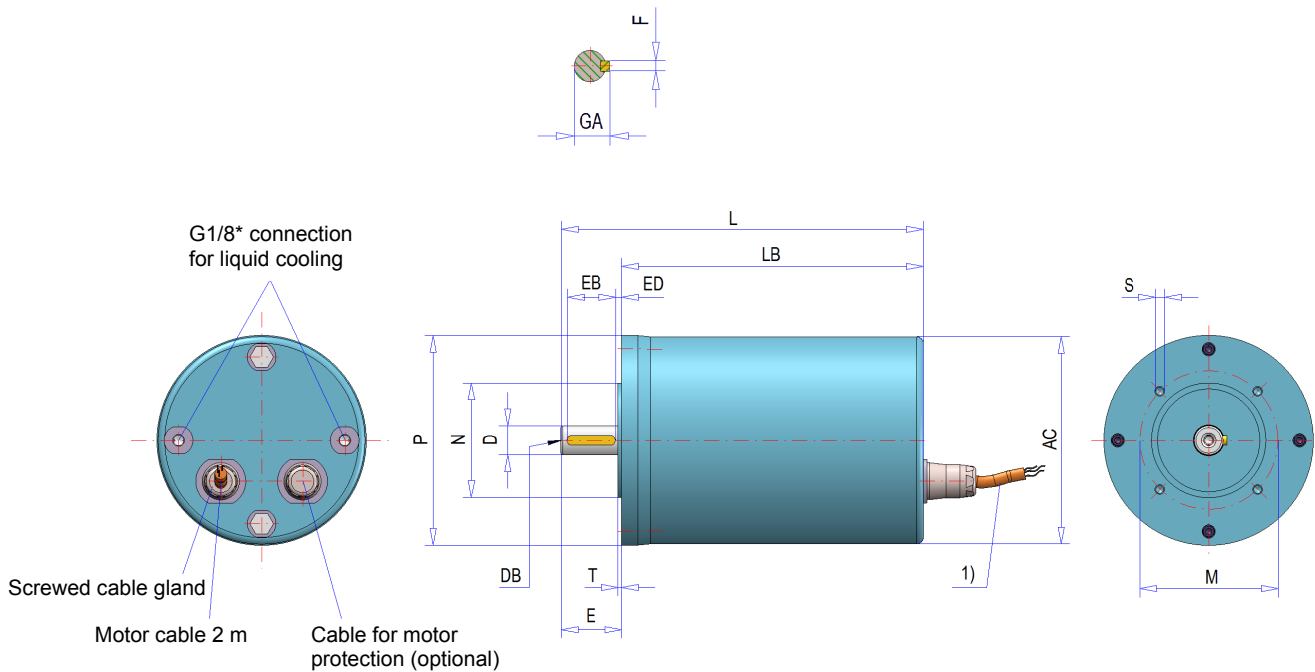
* Design IM B5 / IM 3001, IM V1 / IM 3011, IM V3 / IM 3031 (see page 1/5)

Hygiene motors (stainless steel housing) – liquid cooling, cooling type IC 3S7

Types GUF 71 K - 90 L

Protection class IP66 – IP68

Design B14 *



1) Standard: 2 m cable (other lengths on request)

For motor protection (PTC/thermal switch) a 2nd cable of same length

2) Outer diameter of flange P contrary to allocation as per EN 50347; bolt circle of fastening bores M

Fits and tolerances see page 8/2

Subject to technical amendments

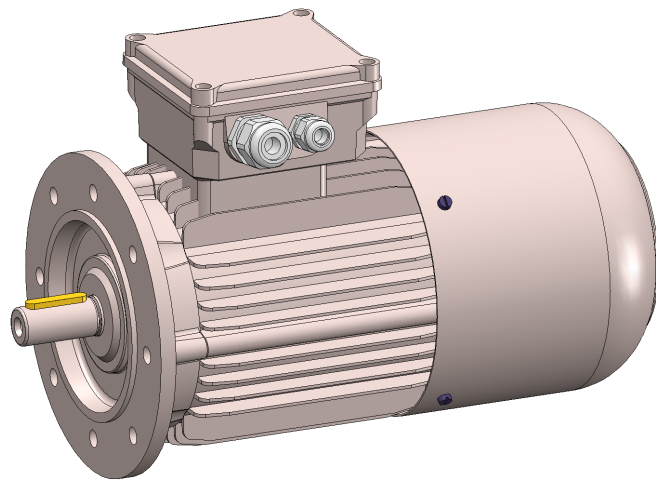
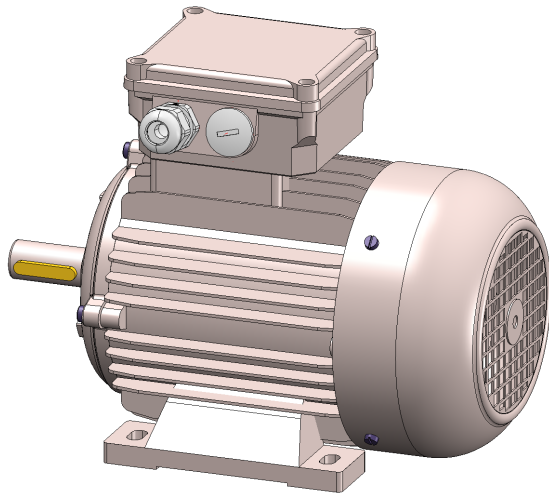
Type	D	E	DB	AC	GA	F	EB	ED	L	LB	S	M	N	P ²⁾	T	LA
GUF 71 K/L	11	23	M4	143	12.5	4	18	2.5	229	206	M5	75	60	145	3	15
GUF 71 K/L	14	30	M5	143	16	5	25	2.5	236	206	M6	85	70	145	3	15
GUF 71 K/L	19	40	M6	143	21.5	6	32	4	246	206	M6	100	80	145	3	15
GUF 90 S/L	11	23	M4	172	12.5	4	18	2.5	294	271	M5	75	60	174	2.5	15
GUF 90 S/L	14	30	M5	172	16	5	25	2.5	301	271	M6	85	70	174	2.5	15
GUF 90 S/L	19	40	M6	172	21.5	6	32	4	291	251	M6	100	80	174	3	12
GUF 90 S/L	24	50	M8	172	27	8	40	5	301	251	M8	115	95	174	3	15
GUF 90 S/L	28	60	M10	172	31	8	50	5	311	251	M8	130	110	174	3.5	14

* Design IM B14 / IM 3601, IM V18 / IM 3611, IM V19 / IM 3631 (see page 1/5)

**Explosion protected motors,
series R3G + R3D**

15

EXPLOSION-PROTECTED ELECTRIC MOTORS



For dimensional sheets see page 15/11.



Explosion-protected electric motors R3G + R3D

HEW series R3D and R3G were specially developed for applications in explosive environments. Motors of ignition protection type II 3G Ex nA IIC T3-T4 Gc (equipment for Zone 2) are exclusively available as stand-alone motor, motors of ignition protection type II 3D Ex tc IIIB T135°C Dc (equipment for Zone 22) are available as stand-alone and brake motor. The drives are available as 2-pole, 4-pole, 6-pole and 8-pole versions; pole-changing versions are available on request. With regard to design, the dust-protected brake motors (equipment for Zone 22) match the standard brake motors of series R (see Parts 10, at least protection class IP55). The magnet section of the brake was optimised in order to comply with the explosion protection requirements.

Applicable ignition protection types for electrical machines of type R3G + R3D

Ignition protection type Code letter	Specification	Protection notion	Application with type of electrical machine
Ignition protection type "n"	DIN EN 60079-15 Equipment for zone 2	No sparks, arcs or impermissible temperatures occur during operation. If sparks, arcs or impermissible temperatures occur inside the equipment, the housings and the terminal box have to be of protection class IP54 requiring more than 30 seconds to drop by 2 mbar at an overpressure of 4 mbar (gas-proof), or housings and terminal boxes are pressurised in a simple way.	All motor types, e.g.: - squirrel-cage motors - slip ring motors - collector motors etc. with motor protection switch and overpressure monitoring. Prevent sparks formed during operation from escaping. Manufacturer's information regarding these measures.
Dust protection "t"	DIN EN 60079-31 Equipment for zone 22	This type of ignition protection is based on a restriction of the maximum temperature of the housing surface and restriction of dust ingress by using "dust-proof" housings.	All electrical motors featuring protection by housings with restricted surface temperature.



Gas - explosion protection

Ignition temperature - temperature class

The ignition temperature depends on many factors such as surface size, shape, type and characteristics. In IEC 60079-20-1, IEC; CENELEC and other standardisation committees agreed upon a defined procedure of determining the ignition temperature closely approaching the lowest practically possible value.

Gases and vapours are accordingly divided into temperature classes. Complying with these temperature classes, the surface temperatures of electrical equipment and other technical devices are designed such that an ignition due to the surface temperature is impossible. The standards set out the permissible exceedances and compulsory lower deviations from these control values.

Temperature class	Ignition temperature range of the mixture	Permissible surface temperature of electrical equipment	Permissible temperature rise
T1	> + 450 °C	+ 400 °C	+ 410 °C
T2	> + 300...≤ + 450°C	+ 300 °C	+ 260 °C
T3	> + 200...≤ + 300°C	+ 200 °C	+ 160 °C
T4	> + 135...≤ + 200°C	+ 135 °C	+ 95 °C

Dust - explosion protection

Surface temperature - protection class

The IP protection class is a major feature of the dust explosion protection. Depending on the ambient conditions, there are different dust tightness requirements on the motor. Another key measure for dust explosion protection is to restrict the surface temperature of the motors to a value lying below the ignition and smouldering temperature of the dust in question.

Application location	Presence of an explosive dust atmosphere	rarely or briefly	rarely or briefly
	Dust type	Conductive*	Non-conductive
	Zone	22	22
Equipment	Device group	III	III
	Device category	3D	3D
	Sub-groups	IIIC / IIIB / IIIA	IIIB / IIIA
	Protection class	IP6X	IP5X
	Housing temperatures	max. 135°C	max. 135°C
	Certificate	EC Declaration of Conformity of the manufacturer	EC Declaration of Conformity of the manufacturer

* The R3D (Zone 22) series motors are not available for group IIIC "conductive dust".



Permissible use of motors according to their labelling depending of the assignment of zones

Device group	Device category	Assignment of zones	Definition acc. to BetrSichV [Ordinance on Industrial Safety and Health]	Obligation of certification
For combustible gases, vapours and mists				
II	1G*	0	Zone 0 comprises areas where an explosive atmosphere consisting of a mixture of air and gases, vapours and mists is present permanently, for an extended period of time or frequently.	Yes
II	2G	1	Zone 1 comprises areas where an explosive atmosphere consisting of a mixture of air and gases, vapours and mists occurs sometimes.	Yes
II	3G	2	Zone 2 comprises areas where an explosive atmosphere consisting of a mixture of air and gases, vapours and mists is unlikely to occur; if it does occur, this will by all probability happen only very rarely and for a short period of time only.	No
For inflammable dust				
II	1D*	20	Zone 20 comprises areas where an explosive atmosphere consisting of a mixture of air and gases is present permanently, for an extended period of time or frequently.	Yes
II	2D	21	Zone 21 comprises areas where an explosive atmosphere consisting of a mixture of air and gases occurs sometimes.	Yes
II	3D	22	Zone 22 comprises areas where an explosive atmosphere consisting of swirled dust is unlikely to occur; if it does occur, this will by all probability happen only very rarely and for a short period of time only.	No

*unusual for electric motors

Maintaining the explosion protection

Maintaining the explosion protection during operation:

Electrical machines have to be protected against overheating caused by overloading. The motor protection depends on the operating mode and also on the electrical machine and its use.

The systems monitoring the motors have to comply with the requirements of directives 94/9/EC and EN 1127-1.

Operating mode	Motor protection
S1	Motor protection switch acc. to DIN EN 60034-1; DIN EN 60079-14 Motor protection switch and temperature sensor in the winding as additional protection
S2	Motor protection switch runtime timer and/or temperature sensor in the winding as additional protection. Master protection device: only temperature sensor in the winding (permissible only with approved controllers/trigging devices)
S3 – S10*	Master protection device: only temperature sensor in the winding (permissible only with approved controllers/trigging devices)

Definition of operating modes acc. to DIN EN 60034-1

* Motors of type R3G (Zone 2) may be operated on a frequency inverter only if the requirements of DIN EN 60079-15 / Part 8.10.2 are complied with.



Three-phase motors

Number of poles: 2

Nominal data at 400V, 50 Hz

Thermal class F

Operating mode: S1

Synchronous speed: 3000 rpm

Surface cooling IC 411

Type	Nominal power	Nominal speed	Nominal current	Power factor	Nominal torque	Start-up to nominal current	Start-up to nominal torque	Breakdown to nominal torque	Moment of inertia	Weight IM B3
R3D R3G	P_N kW	n_N rpm	I_N A	$\cos \varphi$	M_N Nm	I_A/I_N	M_A/M_N	M_K/M_N	J kgm ²	M appr. kg

63K/2	0.18	2780	0.55	0.72	0.62	3.5	2.4	3.4	0.00014	4.5
63L/2	0.25	2800	0.70	0.81	0.84	4.3	2.8	4.3	0.00019	5
71K/2	0.37	2810	0.95	0.78	1.3	4.6	2.2	2.7	0.00034	6
71L/2	0.55	2835	1.3	0.82	1.9	5.6	2.9	2.8	0.00042	7
80K/2	0.75	2845	1.65	0.84	2.5	5.3	3.2	3.2	0.00064	9
80L/2	1.1	2855	2.40	0.85	3.7	6.2	3.1	3.2	0.00079	10
90S/2	1.5	2890	3.40	0.80	5.0	5.9	2.5	3.2	0.00124	14
90L/2	2.2	2870	4.50	0.88	7.3	6.3	2.8	2.9	0.00155	17
100L/2	3.0	2845	6.45	0.84	10.2	6.1	3.2	3.0	0.00255	20
112M/2	4.0	2875	8.1	0.87	13.3	4.5	2.2	3.6	0.0043	29
132S/2	5.5	2900	10.5	0.90	18	5.1	2.3	3.4	0.0097	42
132S/20	7.5	2890	14.0	0.91	24.7	6.7	2.4	3.0	0.0122	48
160M/2	11.0	2930	22.5	0.89	35.4	6.6	2.1	4.0	0.0294	104
160M/20	15.0	2950	27.2	0.89	48.7	8.2	3.3	3.5	0.0394	119
160L/2	18.5	2950	34.0	0.87	59.8	9.3	4.1	4.0	0.0459	135
180M/2	22.0	2950	40.0	0.89	71	6.0	4.0	4.1	0.0615	174
180L/2	30.0	2950	53.2	0.92	97	7.2	2.5	3.7	0.0704	185

Subject to technical amendments



Three-phase motors

Number of poles: 4

Nominal data at 400V, 50 Hz

Thermal class F

Operating mode: S1

Synchronous speed: 1500 rpm

Surface cooling IC 411

Type	Nominal power	Nominal speed	Nominal current	Power factor	Nominal torque	Start-up to nominal current	Start-up to nominal torque	Breakdown to nominal torque	Moment of inertia	Weight IM B3
R3D R3G	P_N kW	n_N rpm	I_N A	$\cos \varphi$	M_N Nm	I_A/I_N	M_A/M_N	M_k/M_N	J kgm ²	M appr. kg

63K/4	0.12	1350	0.45	0.68	0.85	2.95	2.1	2.5	0.00020	4.5
63L/4	0.18	1380	0.65	0.65	1.3	3.10	2.3	2.5	0.00025	5
71K/4	0.25	1415	0.70	0.76	1.7	4.4	2.5	3.1	0.00052	6.5
71L/4	0.37	1400	1.0	0.72	2.5	4.2	2.4	2.6	0.00637	7.5
80K/4	0.55	1375	1.4	0.76	3.9	4.0	2.3	2.2	0.00099	9
80L/4	0.75	1400	1.90	0.75	5.0	4.2	2.1	2.3	0.00126	10
90S/4	1.1	1420	2.7	0.75	7.4	4.5	2.2	2.6	0.00193	13.5
90L/4	1.5	1410	3.5	0.80	10.2	5.1	2.3	2.7	0.00243	15
100L/4	2.2	1420	4.9	0.81	14.9	4.6	1.8	2.3	0.00387	19
100L/40	3.0	1420	6.5	0.81	19.9	5.1	2.1	2.5	0.00498	23
112M/4	4.0	1440	8.3	0.81	26.5	6.2	2.3	3.0	0.0101	34
132S/4	5.5	1450	12	0.78	36.5	5.7	2.3	2.4	0.0210	47
132M/4	7.5	1450	15	0.84	49.5	5.9	2.2	2.8	0.0275	64
160M/4	11	1440	22.5	0.81	72	4.7	2.3	2.5	0.05122	109
160L/4	15	1460	30.2	0.80	98	5.0	2.7	3	0.0667	129
180M/4	18.5	1470	36	0.86	120	4.2	3.1	3.2	0.1135	177
180L/4	22	1460	43	0.86	144	5.5	2.6	2.7	0.1346	200

Subject to technical amendments



Three-phase motors

Number of poles: 6

Nominal data at 400V, 50 Hz

Thermal class F

Operating mode: S1

Synchronous speed: 1000 rpm

Surface cooling IC 411

Type	Nominal power	Nominal speed	Nominal current	Power factor	Nominal torque	Start-up to nominal current	Start-up to nominal torque	Breakdown to nominal torque	Moment of inertia	Weight IM B3
R3D R3G	P_N kW	n_N rpm	I_N A	$\cos \varphi$	M_N Nm	I_A/I_N	M_A/M_N	M_k/M_N	J kgm ²	M appr. kg

63K/6	0.09	870	0.40	0.75	1.0	2.5	1.7	1.8	0.00029	4.5
63L/6	0.12	880	0.55	0.73	1.2	2.5	2.9	3.0	0.00042	5.0
71K/6	0.18	920	0.65	0.67	1.8	2.9	2.1	2.25	0.00081	6.5
71L/6	0.25	915	0.95	0.69	2.6	2.6	1.9	2.2	0.00101	7.5
80K/6	0.37	940	1.3	0.62	3.8	3.6	2.2	2.2	0.00191	10
80L/6	0.55	920	1.7	0.74	5.8	3.5	2.5	2.6	0.00239	11
90S/6	0.75	925	2.4	0.65	7.7	3.2	2.2	2.6	0.00303	14.5
90L/6	1.1	910	3.05	0.69	11.5	3.5	2.0	2.4	0.00416	16.5
100L/6	1.5	920	3.70	0.76	15.0	4.0	1.8	2.25	0.00857	21.5
112M/6	2.2	960	5.60	0.70	22.0	5.2	2.75	2.8	0.0158	31
132S/6	3.0	970	7.4	0.71	29.7	5.4	2.45	2.68	0.0262	46
132M/6	4.0	965	9.4	0.73	40	5.2	2.1	3.1	0.0323	52
132M/60	5.5	965	12.6	0.75	55	5.3	1.9	2.6	0.0384	55
160M/6	7.5	970	16	0.76	75.6	4.4	1.9	2.6	0.0792	112
160L/6	11.0	970	22.6	0.83	108	5.3	1.6	2.3	0.1099	135
180L/6	15.0	965	30.5	0.82	148	4.5	2.4	2.9	0.1650	200

Subject to technical amendments



Three-phase motors

Number of poles: 2

Nominal data at 400V, 50 Hz

Thermal class F

Operating mode: S1

Synchronous speed: 3000 rpm

Surface cooling IC 411

Size Type	Nominal power	Nominal speed	Nominal current	Power factor	Nominal torque	Start-up to nominal current	Start-up to nominal torque	Breakdown to nominal torque	Braking torque	Moment of inertia	Weight IM B3
R3D	P_N kW	n_N rpm	I_N A	$\cos \varphi$	M_N Nm	I_A/I_N	M_A/M_N	M_k/M_N	M_{Bmax} Nm	J kgm ²	M appr. kg

63K/2-B4	0.18	2780	0.55	0.72	0.62	3.5	2.4	3.4	4	0.00016	5.5
63L/2-B4	0.25	2800	0.70	0.81	0.84	4.3	2.8	4.3	4	0.00021	6.0
71K/2-B4	0.37	2810	0.95	0.78	1.3	4.6	2.2	2.7	4	0.00036	7.0
71L/2-B4	0.55	2835	1.3	0.82	1.9	5.6	2.9	2.8	4	0.00043	8.0
80K/2-B8	0.75	2845	1.65	0.84	2.5	5.3	3.2	3.2	8	0.00070	10.5
80L/2-B8	1.1	2855	2.40	0.85	3.7	6.2	3.1	3.2	8	0.00085	11.5
90S/2-B16	1.5	2890	3.40	0.80	5.0	5.9	2.5	3.2	16	0.00144	16
90L/2-B16	2.2	2870	4.50	0.88	7.3	6.3	2.8	2.9	16	0.00175	19
100L/2-B32	3.0	2845	6.45	0.84	10.2	6.1	3.2	3.0	32	0.00290	23.5
112M/2-B60	4.0	2875	8.1	0.87	13.3	4.5	2.2	3.6	60	0.0049	34.5
132S/2-B80	5.5	2900	10.5	0.90	18	5.1	2.3	3.4	80	0.0105	50
132S/20-B80	7.5	2890	14.0	0.91	24.7	6.7	2.4	3.0	80	0.0130	56
160M/2-B150	11.0	2930	22.5	0.89	35.4	6.6	2.1	4.0	150	0.0306	116
160M/20-B150	15.0	2950	27.2	0.89	48.7	8.2	3.3	3.5	150	0.0406	131
160L/2-B150	18.5	2950	34.0	0.87	59.8	9.3	4.1	4.0	150	0.0471	147
180M/2-B260	22.0	2950	40.0	0.89	71	6.0	4.0	4.1	260	0.0724	193
180L/2-B260	30.0	2950	53.2	0.92	97	7.2	2.5	3.7	260	0.0810	204

Subject to technical amendments



Three-phase motors

Number of poles: 4

Nominal data at 400V, 50 Hz

Thermal class F

Operating mode: S1

Synchronous speed: 1500 rpm

Surface cooling IC 411

Size Type	Nominal power	Nominal speed	Nominal current	Power factor	Nominal torque	Start-up to nominal current	Start-up to nominal torque	Breakdown to nominal torque	Braking torque	Moment of inertia	Weight IM B3
R3D	P _N kW	n _N rpm	I _N A	cos φ	M _N Nm	I _A /I _N	M _A /M _N	M _k /M _N	M _{Bmax} Nm	J kgm ²	M appr. kg

63K/4-B4	0.12	1350	0.45	0.68	0.85	2.95	2.1	2.5	4	0.00022	5.5
63L/4-B4	0.18	1380	0.65	0.65	1.3	3.10	2.3	2.5	4	0.00027	6.0
71K/4-B4	0.25	1415	0.70	0.76	1.7	4.4	2.5	3.1	4	0.00053	7.5
71L/4-B4	0.37	1400	1.0	0.72	2.5	4.2	2.4	2.6	4	0.00065	8.5
80K/4-B8	0.55	1375	1.4	0.76	3.9	4.0	2.3	2.2	8	0.00105	10.5
80L/4-B8	0.75	1400	1.90	0.75	5.0	4.2	2.1	2.3	8	0.00132	11.5
90S/4-B16	1.1	1420	2.70	0.75	7.4	4.5	2.2	2.6	16	0.00213	16.0
90L/4-B16	1.5	1410	3.5	0.80	10.2	5.1	2.3	2.7	16	0.00263	17.5
100L/4-B32	2.2	1420	4.9	0.81	14.9	4.6	1.8	2.3	32	0.00422	23
100L/40-B32	3.0	1420	6.5	0.81	19.9	5.1	2.1	2.5	60	0.00533	27
112M/4-B60	4.0	1440	8.3	0.81	26.5	6.2	2.3	3.0	80	0.0108	39.5
132S/4-B80	5.5	1450	12	0.78	36.5	5.7	2.3	2.4	80	0.0218	55
132M/4-B80	7.5	1450	15	0.84	49.5	5.9	2.2	2.8	150	0.0283	72
160M/4-B150	11	1440	22.5	0.81	72	4.7	2.3	2.5	150	0.0524	121
160L/4-B150	15	1460	30.2	0.80	98	5.0	2.7	3	150	0.0679	141
180M/4-B260	18.5	1470	36	0.86	120	4.2	3.1	3.2	260	0.1154	197
180L/4-B260	22	1460	43	0.86	144	5.5	2.6	2.7	260	0.1246	220

Subject to technical amendments



Three-phase motors

Number of poles: 6

Nominal data at 400V, 50 Hz

Thermal class F

Operating mode: S1

Synchronous speed: 1000 rpm

Surface cooling IC 411

Type	Nominal power	Nominal speed	Nominal current	Power factor	Nominal torque	Start-up to nominal current	Start-up to nominal torque	Breakdown to nominal torque	Braking torque	Moment of inertia	Weight IM B3
R3D	P_N kW	n_N rpm	I_N A	$\cos \varphi$	M_N Nm	I_A/I_N	M_A/M_N	M_k/M_N	M_{Bmax} Nm	J kgm ²	M appr. kg
63K/6-B4	0.09	870	0.40	0.75	1.0	2.5	1.7	1.8	4	0.00031	5.5
63L/6-B4	0.12	880	0.55	0.73	1.2	2.5	2.9	3.0	4	0.00044	6
71K/6-B4	0.18	920	0.65	0.67	1.8	2.9	2.1	2.25	4	0.00083	7.5
71L/6-B4	0.25	915	0.95	0.69	2.6	2.6	1.9	2.2	4	0.00103	8.5
80K/6-B8	0.37	940	1.3	0.62	3.8	3.6	2.2	2.2	8	0.00197	11.5
80L/6-B8	0.55	920	1.7	0.74	5.8	3.5	2.5	2.6	8	0.00245	12.5
90S/6-B16	0.75	925	2.4	0.65	7.7	3.2	2.2	2.6	16	0.00323	17
90L/6-B16	1.1	910	3.05	0.69	11.5	3.5	2.0	2.4	16	0.00436	20
100L/6-B32	1.5	920	3.7	0.76	15.0	4.0	1.8	2.25	32	0.00892	25
112M/6-B60	2.2	960	5.6	0.70	22.0	5.2	2.75	2.8	60	0.0164	36.5
132S/6-B80	3.0	970	7.4	0.71	29.7	5.4	2.45	2.68	80	0.0270	54
132M/6-B80	4.0	965	9.4	0.73	40	5.2	2.1	3.1	80	0.0324	60
132M/60-B80	5.5	965	12.6	0.75	55	5.3	1.9	2.6	150	0.0392	63
160M/6-B150	7.5	970	16	0.76	75.6	4.4	1.9	2.6	150	0.0804	124
160L/6-B150	11.0	970	22.6	0.83	108	5.3	1.6	2.3	150	0.1100	147
180L/6-B260	15.0	965	30.5	0.82	148	4.5	2.4	2.9	260	0.1669	220

Subject to technical amendments

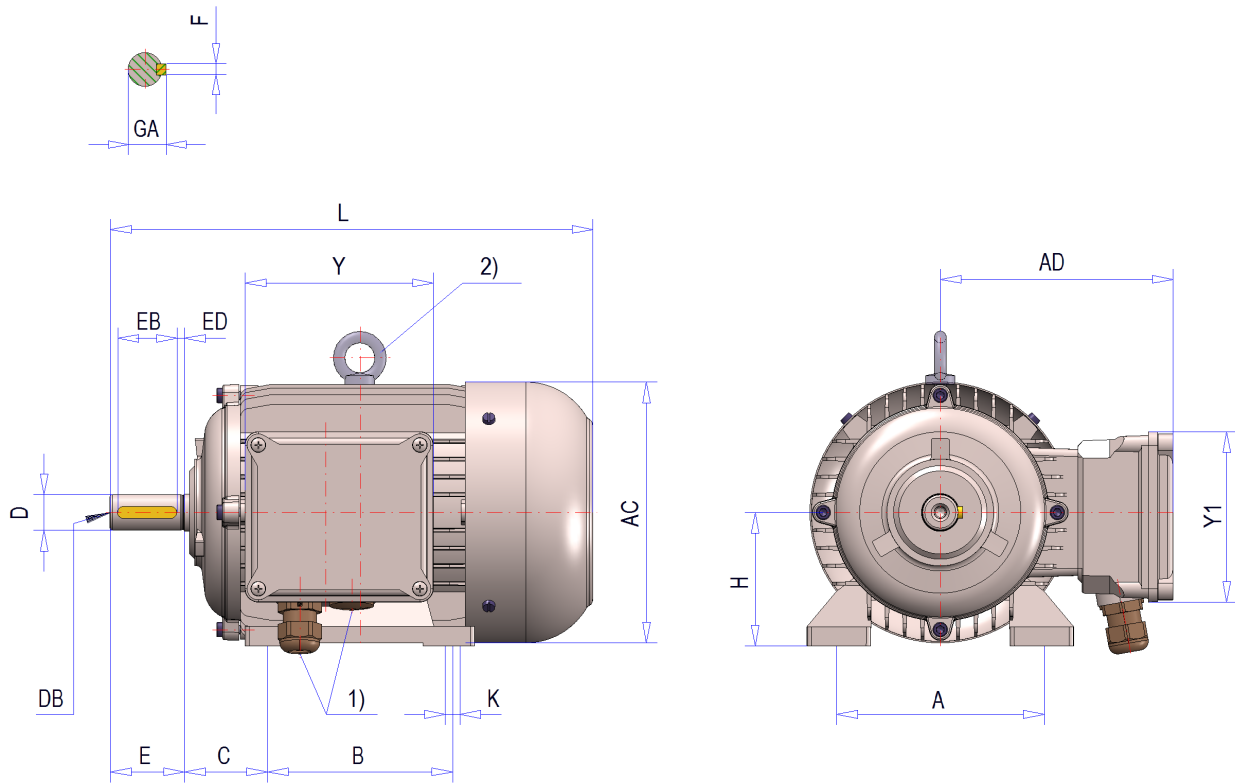
Explosion protected brake motors – surface cooling, cooling type IC411 (internal ventilation)

Types R3... 63 K – 180 L

Equipment for Zone 2 and Zone 22

Protection class \geq IP55

Design B3 *



1) See Planning section, page 1/12
2) With lifting eye from size 112 onward

Fits and tolerances see page 8/2
Subject to technical amendments

Type	B	A	K	H	C	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L
R3... 63 K/L	80	100	7	63	40	11	23	M4	123	121	117	103	12.5	4	18	2.5	211
R3... 71 K/L	90	112	7	71	45	14	30	M5	138	130	117	103	16	5	25	2.5	243
R3... 80 K/L	100	125	9.5	80	50	19	40	M6	156	144	127	115	21.5	6	32	4	274
R3... 90 S	100	140	10	90	56	24	50	M8	176	157	127	115	27	8	40	5	301
R3... 90 L	125	140	10	90	56	24	50	M8	176	157	127	115	27	8	40	5	326
R3... 100 L	140	160	11.2	100	63	28	60	M10	194	166	127	115	31	8	50	5	366
R3... 112 M	140	190	11.2	112	70	28	60	M10	218	178	127	115	31	8	50	5	383
R3... 132 S	140	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	449
R3... 132 M	178	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	487
R3... 160 M	210	254	14.5	160	108	42	110	M16	310	244	186	186	45	12	90	10	588
R3... 160 L	254	254	14.5	160	108	42	110	M16	310	244	186	186	45	12	90	10	632
R3... 180 M	241	279	13	180	121	48	110	M16	348	254	175	190	51.5	14	100	5	653
R3... 180 L	279	279	13	180	121	48	110	M16	348	254	175	190	51.5	14	100	5	691

* Design IM B3 / IM 1001, IM B6 / IM 1051, IM B7 / IM 1061, IM B8 / IM 1071, IM V5 / IM 1011, IM V6 / IM 1031 (see page 1/5)

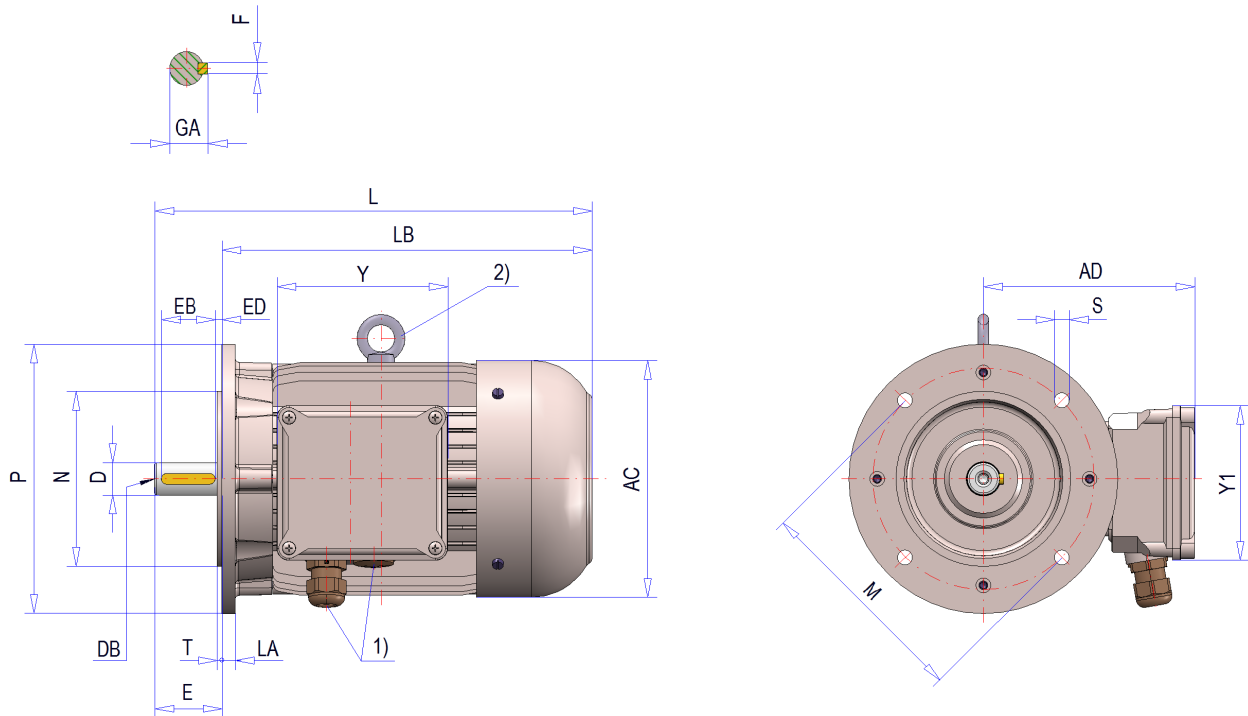
Explosion protected brake motors – surface cooling, cooling type IC411 (internal ventilation)

Types R3...F 63 K – 180 L

Equipment for Zone 2 and Zone 22

Protection class \geq IP55

Design B5 *



1) See Planning section, page 1/12
 2) With lifting eye from size 112 onward

Fits and tolerances see page 8/2
 Subject to technical amendments

Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
R3...F 63 K/L	11	23	M4	123	121	117	103	12.5	4	18	2.5	211	188	9	115	95	140	3	10
R3...F 71 K/L	14	30	M5	138	130	117	103	16	5	25	2.5	243	213	9	130	110	160	3.5	10
R3...F 80 K/L	19	40	M6	156	144	127	115	21.5	6	32	4	274	234	9	165	130	200	3.5	10
R3...F 90 S	24	50	M8	176	157	127	115	27	8	40	5	301	251	9	165	130	200	3.5	10
R3...F 90 L	24	50	M8	176	157	127	115	27	8	40	5	326	276	9	165	130	200	3.5	10
R3...F 100 L	28	60	M10	194	166	127	115	31	8	50	5	366	306	9	215	180	250	4	14
R3...F 112 M	28	60	M10	218	178	127	115	31	8	50	5	383	323	11	215	180	250	4	13
R3...F 132 S	38	80	M12	258	197	145	130	41	10	70	5	449	369	14	265	230	300	4	11.5
R3...F 132 M	38	80	M12	258	197	145	130	41	10	70	5	487	407	14	265	230	300	4	11.5
R3...F 160 M	42	110	M16	310	244	186	186	45	12	90	10	588	478	18	300	250	350	5	13.5
R3...F 160 L	42	110	M16	310	244	186	186	45	12	90	10	632	522	18	300	250	350	5	13.5
R3...F 180 M	48	110	M16	348	254	175	190	51.5	14	100	5	653	543	18	300	250	350	5	14
R3...F 180 L	48	110	M16	348	254	175	190	51.5	14	100	5	691	581	18	300	250	350	5	14

* Design IM B5 / IM 3001, IM V1 / IM 3011, IM V3 / IM 3031 (see page 1/5)

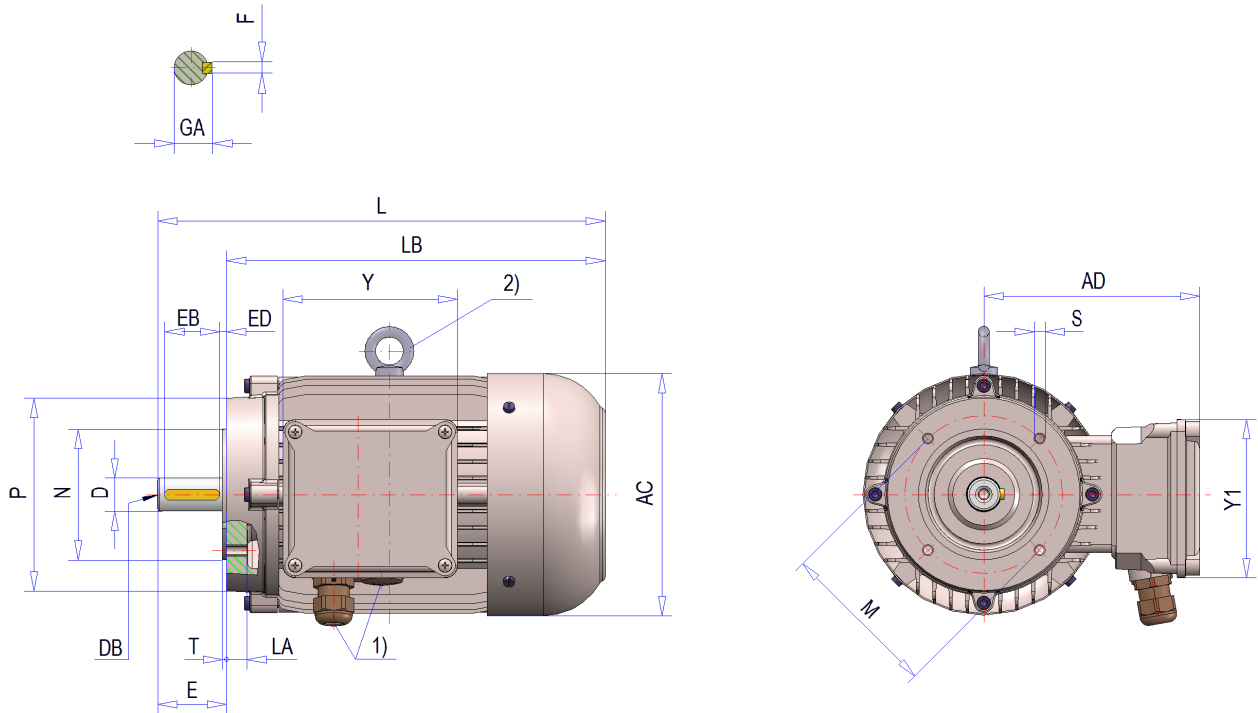
Explosion protected brake motors – surface cooling, cooling type IC411 (internal ventilation)

Types R3...F 63 K – 180 L

Equipment for Zone 2 and Zone 22

Protection class \geq IP55

Design B14 *



- 1) See Planning section, page 1/12
- 2) With lifting eye from size 112 onward

Fits and tolerances see page 8/2
Subject to technical amendments

Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
R3...F 63 K/L	11	23	M4	123	121	117	103	12.5	4	18	2.5	211	188	M5	75	60	90	2.5	9.5
R3...F 71 K/L	14	30	M5	138	130	117	103	16	5	25	2.5	243	213	M6	85	70	105	2.5	10
R3...F 80 K/L	19	40	M6	156	144	127	115	21.5	6	32	4	274	234	M6	100	80	120	3	12.5
R3...F 90 S	24	50	M8	176	157	127	115	27	8	40	5	301	251	M8	115	95	140	3	15
R3...F 90 L	24	50	M8	176	157	127	115	27	8	40	5	326	276	M8	115	95	140	3	15
R3...F 100 L	28	60	M10	194	166	127	115	31	8	50	5	366	306	M8	130	110	160	3.5	12.5
R3...F 112 M	28	60	M10	218	178	127	115	31	8	50	5	383	323	M8	130	110	160	3.5	16
R3...F 132 S	38	80	M12	258	197	145	130	41	10	70	5	449	369	M10	165	130	200	3.5	15
R3...F 132 M	38	80	M12	258	197	145	130	41	10	70	5	487	407	M10	165	130	200	3.5	15
R3...F 160 M	42	110	M16	310	244	186	186	45	12	90	10	588	478	M12	215	180	250	4	14
R3...F 160 L	42	110	M16	310	244	186	186	45	12	90	10	632	522	M12	215	180	250	4	14
R3...F 180 M	48	110	M16	348	254	175	190	51.5	14	100	5	653	543	M12	215	180	250	4	15
R3...F 180 L	48	110	M16	348	254	175	190	51.5	14	100	5	691	581	M12	215	180	250	4	15

* Design IM B14 / IM 3601, IM V18 / IM 3611, IM V19 / IM 3631 (see page 1/5)

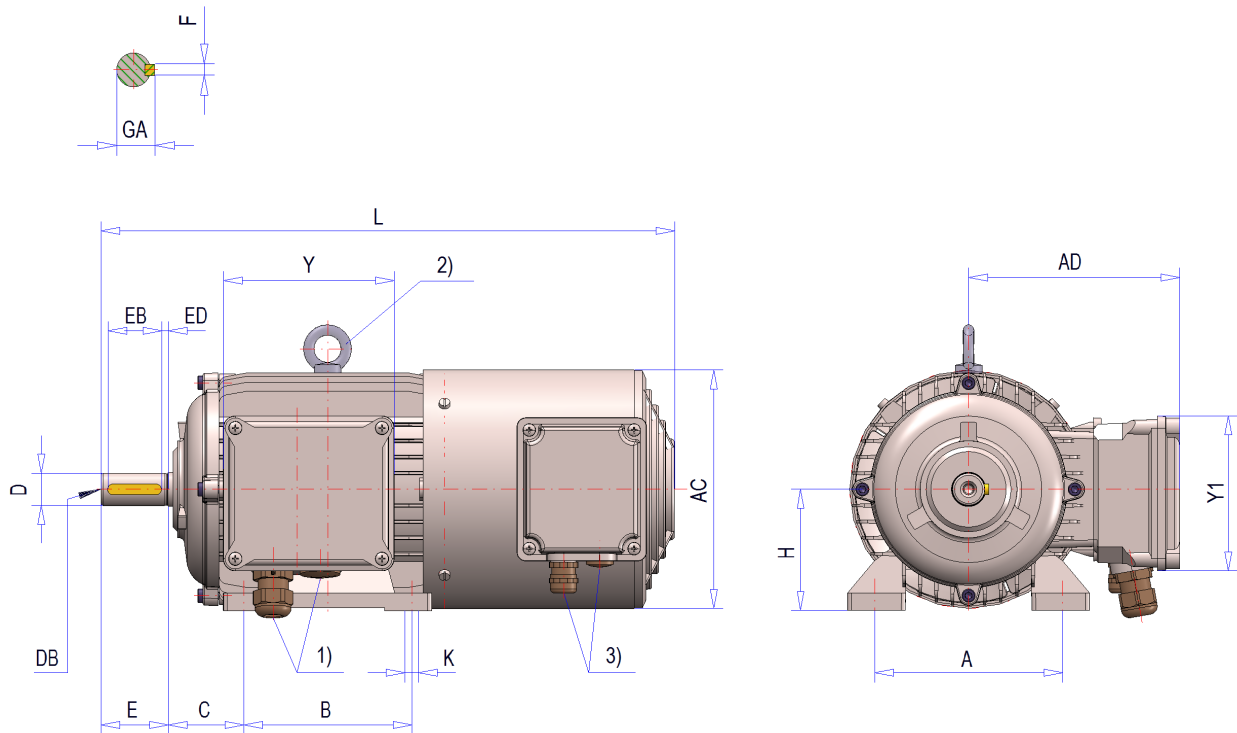
Explosion protected electric motors – surface cooling, cooling type IC416 (external ventilation)

Types R3... 63 K – 180 L

Equipment for Zone 2 and Zone 22

Protection class \geq IP55

Design B3 *



1) See planning section page 1/12

2) With lifting eye from size 112 onward

3) 1x cable gland M16x1.5 / 1x plug screw M16x1.5

Fits and tolerances see page 8/2
Subject to technical amendments

Type	B	A	K	H	C	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L
R3... 63 K/L	80	100	7	63	40	11	23	M4	124	121	117	103	12.5	4	18	2.5	309
R3... 71 K/L	90	112	7	71	45	14	30	M5	139	130	117	103	16	5	25	2.5	337
R3... 80 K/L	100	125	9.5	80	50	19	40	M6	157	144	127	115	21.5	6	32	4	367
R3... 90 S	100	140	10	90	56	24	50	M8	177	157	127	115	27	8	40	5	402
R3... 90 L	125	140	10	90	56	24	50	M8	177	157	127	115	27	8	40	5	427
R3... 100 L	140	160	11.2	100	63	28	60	M10	195	166	127	115	31	8	50	5	465
R3... 112 M	140	190	11.2	112	70	28	60	M10	218	178	127	115	31	8	50	5	483
R3... 132 S	140	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	578
R3... 132 M	178	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	616
R3... 160 M	210	254	14.5	160	108	42	110	M16	311	244	186	186	45	12	90	10	737
R3... 160 L	254	254	14.5	160	108	42	110	M16	311	244	186	186	45	12	90	10	781
R3... 180 M	241	279	13	180	121	48	110	M16	348	254	175	190	51.5	14	100	5	800
R3... 180 L	279	279	13	180	121	48	110	M16	348	254	175	190	51.5	14	100	5	838

* Design IM B3 / IM 1001, IM B6 / IM 1051, IM B7 / IM 1061, IM B8 / IM 1071, IM V5 / IM 1011, IM V6 / IM 1031 (see page 1/5)

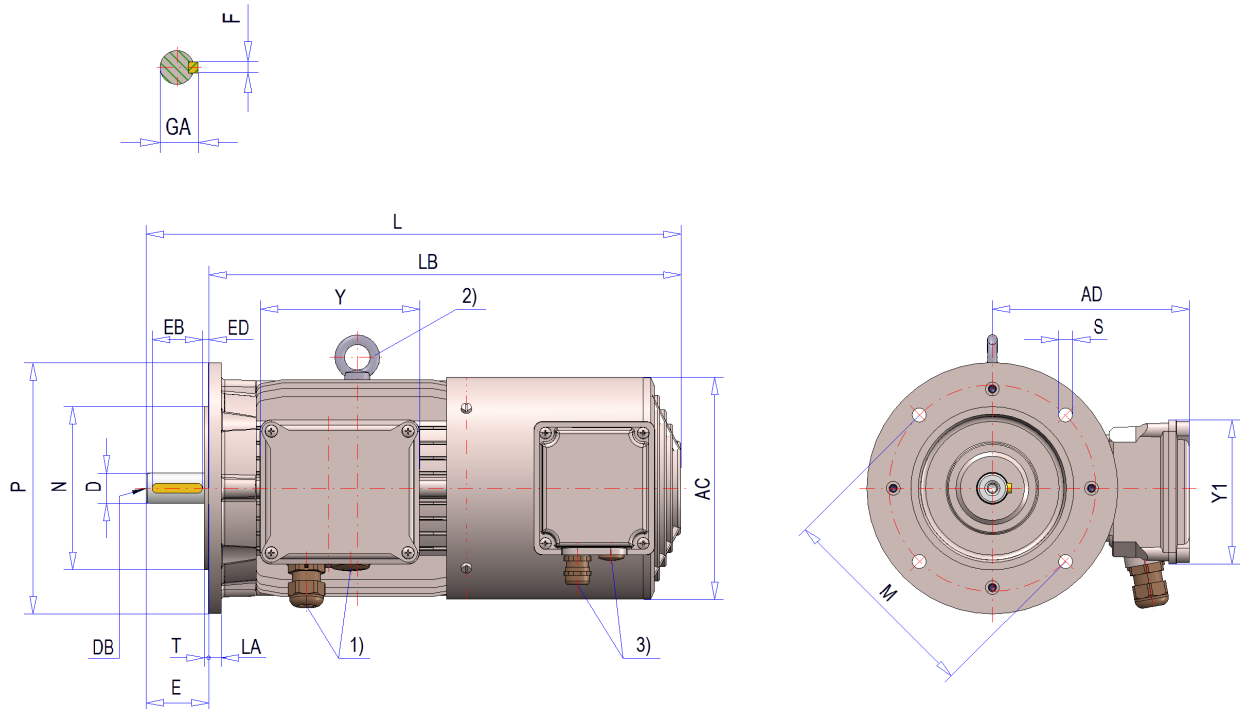
Explosion protected electric motors – surface cooling, cooling type IC416 (external ventilation)

Types R3...F 63 K – 180 L

Equipment for Zone 2 and Zone 22

Protection class \geq IP55

Design B5 *



1) See planning section page 1/12

2) With lifting eye from size 112 onward

3) 1x cable gland M16x1.5 / 1x plug screw M16x1.5

Fits and tolerances see page 8/2

Subject to technical amendments

Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
R3...F 63 K/L	11	23	M4	124	121	117	103	12.5	4	18	2.5	309	286	9	115	95	140	3	10
R3...F 71 K/L	14	30	M5	139	130	117	103	16	5	25	2.5	337	307	9	130	110	160	3.5	10
R3...F 80 K/L	19	40	M6	157	144	127	115	21.5	6	32	4	367	327	9	165	130	200	3.5	10
R3...F 90 S	24	50	M8	177	157	127	115	27	8	40	5	402	352	9	165	130	200	3.5	10
R3...F 90 L	24	50	M8	177	157	127	115	27	8	40	5	427	377	9	165	130	200	3.5	10
R3...F 100 L	28	60	M10	195	166	127	115	31	8	50	5	465	405	9	215	180	250	4	14
R3...F 112 M	28	60	M10	218	178	127	115	31	8	50	5	483	423	11	215	180	250	4	13
R3...F 132 S	38	80	M12	258	197	145	130	41	10	70	5	578	498	14	265	230	300	4	11.5
R3...F 132 M	38	80	M12	258	197	145	130	41	10	70	5	616	536	14	265	230	300	4	11.5
R3...F 160 M	42	110	M16	311	244	186	186	45	12	90	10	737	627	18	300	250	350	5	13.5
R3...F 160 L	42	110	M16	311	244	186	186	45	12	90	10	781	671	18	300	250	350	5	13.5
R3...F 180 M	48	110	M16	348	254	175	190	51.5	14	100	5	800	690	18	300	250	350	5	14
R3...F 180 L	48	110	M16	348	254	175	190	51.5	14	100	5	838	728	18	300	250	350	5	14

* Design IM B5 / IM 3001, IM V1 / IM 3011, IM V3 / IM 3031 (see page 1/5)

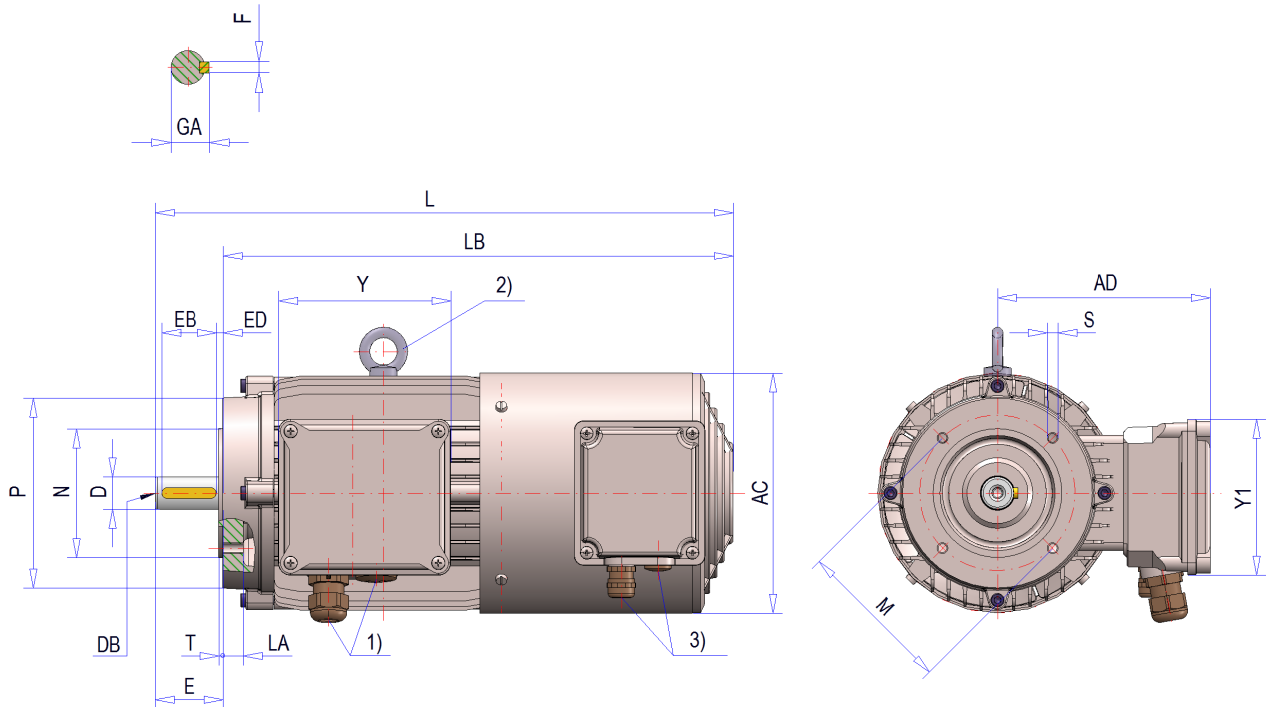
Explosion protected electric motors – surface cooling, cooling type IC416 (external ventilation)

Types R3...F 63 K – 180 L

Equipment for zone 2

Protection class \geq IP55

Design B14 *



1) See planning section page 1/12

2) With lifting eye from size 112 onward

3) 1x cable gland M16x1.5 / 1x plug screw M16x1.5

Fits and tolerances see page 8/2
Subject to technical amendments

Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
R3...F 63 K/L	11	23	M4	124	121	117	103	12.5	4	18	2.5	309	286	M5	75	60	90	2.5	9.5
R3...F 71 K/L	14	30	M5	139	130	117	103	16	5	25	2.5	337	307	M6	85	70	105	2.5	10
R3...F 80 K/L	19	40	M6	157	144	127	115	21.5	6	32	4	367	327	M6	100	80	120	3	12.5
R3...F 90 S	24	50	M8	177	157	127	115	27	8	40	5	402	352	M8	115	95	140	3	15
R3...F 90 L	24	50	M8	177	157	127	115	27	8	40	5	427	377	M8	115	95	140	3	15
R3...F 100 L	28	60	M10	195	167	127	115	31	8	50	5	465	405	M8	130	110	160	3.5	12.5
R3...F 112 M	28	60	M10	218	178	127	115	31	8	50	5	483	423	M8	130	110	160	3.5	16
R3...F 132 S	38	80	M12	258	197	145	130	41	10	70	5	578	498	M10	165	130	200	3.5	15
R3...F 132 M	38	80	M12	258	197	145	130	41	10	70	5	616	536	M10	165	130	200	3.5	15
R3...F 160 M	42	110	M16	311	244	186	186	45	12	90	10	764	654	M12	215	180	250	4	14
R3...F 160 L	42	110	M16	311	244	186	186	45	12	90	10	808	698	M12	215	180	250	4	14
R3...F 180 M	48	110	M16	348	254	175	190	51.5	14	100	5	834	724	M12	215	180	250	4	15
R3...F 180 L	48	110	M16	348	254	175	190	51.5	14	100	5	872	762	M12	215	180	250	4	15

* Design IM B14 / IM 3601, IM V18 / IM 3611, IM V19 / IM 3631 (see page 1/5)

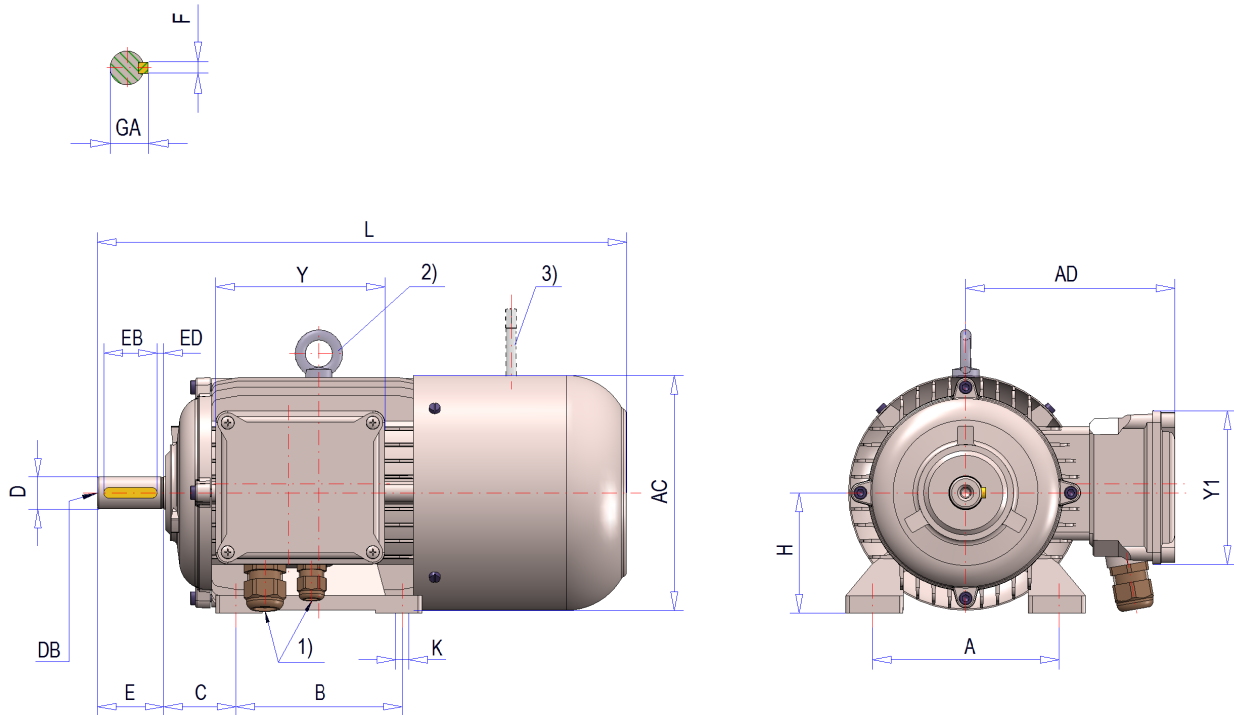
Explosion protected brake motors – surface cooling, cooling type IC411 (internal ventilation)

Types R3D 63 K – 180 L

Equipment for zone 22

Protection class \geq IP55

Design B3 *



1) See planning section page 1/12

2) With lifting eye from size 112 onward

3) Manual release as option (can be ordered in positions 0°/90°/180°/270° see page 1/11)

Fits and tolerances see page 8/2

Subject to technical amendments

Type	B	A	K	H	C	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L
R3D 63 K/L ...B4	80	100	7	63	40	11	23	M4	123	121	117	103	12.5	4	18	2.5	260
R3D 71 K/L ...B4	90	112	7	71	45	14	30	M5	138	130	117	103	16	5	25	2.5	298
R3D 80 K/L ...B8	100	125	9.5	80	50	19	40	M6	156	144	127	115	21.5	6	32	4	331
R3D 90 S ...B16	100	140	10	90	56	24	50	M8	176	157	127	115	27	8	40	5	369
R3D 90 L ...B16	125	140	10	90	56	24	50	M8	176	157	127	115	27	8	40	5	394
R3D 100 L ...B32	140	160	11.2	100	63	28	60	M10	194	166	127	115	31	8	50	5	444
R3D 112 M ...B60	140	190	11.2	112	70	28	60	M10	218	178	127	115	31	8	50	5	464
R3D 132 S ...B80	140	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	537
R3D 132 M ...B80	178	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	575
R3D 160 M ...B150	210	254	14.5	160	108	42	110	M16	310	244	186	186	45	12	90	10	682
R3D 160 L ...B150	254	254	14.5	160	108	42	110	M16	310	244	186	186	45	12	90	10	726
R3D 180 M ...B260	241	279	13	180	121	48	110	M16	348	254	175	190	51.5	14	100	5	768
R3D 180 L ...B260	279	279	13	180	121	48	110	M16	348	254	175	190	51.5	14	100	5	806

* Design IM B3 / IM 1001, IM B6 / IM 1051, IM B7 / IM 1061, IM B8 / IM 1071, IM V5 / IM 1011, IM V6 / IM 1031 (see page 1/5)

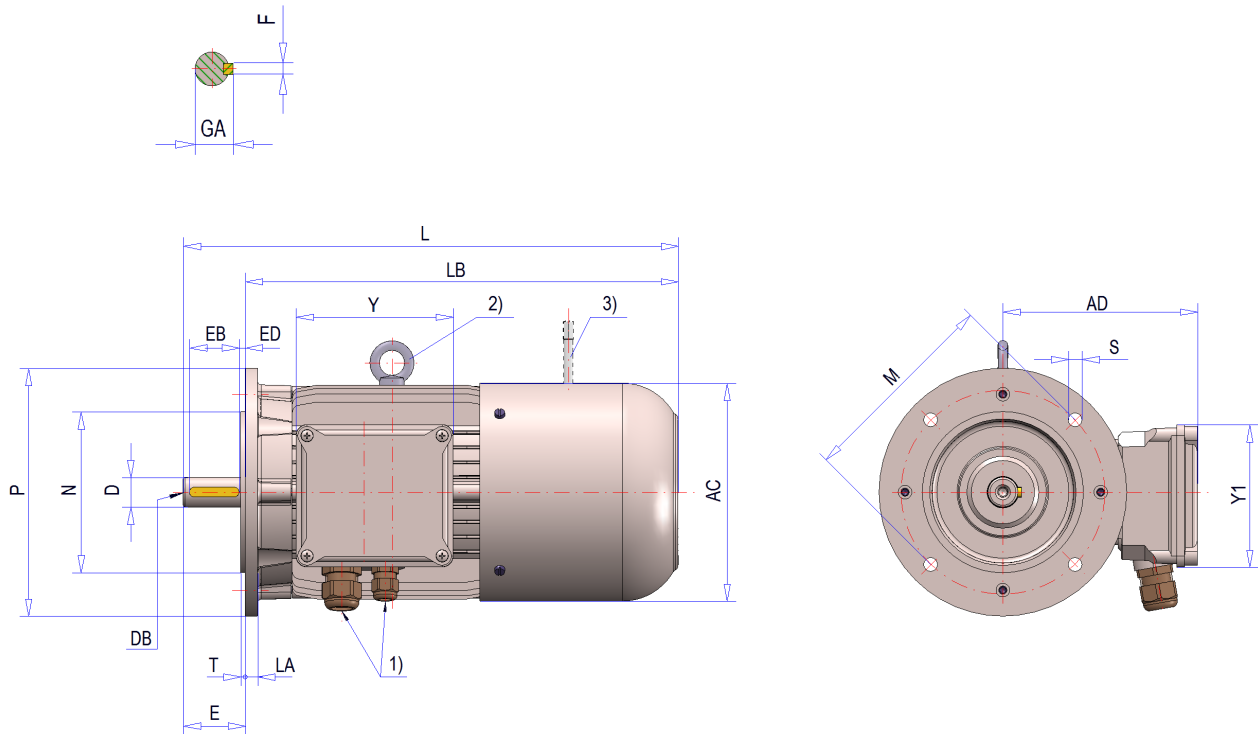
Explosion protected brake motors – surface cooling, cooling type IC411 (internal ventilation)

Types R3DF 63 K – 180 L

Equipment for zone 22

Protection class \geq IP55

Design B5 *



1) See planning section page 1/12

2) With lifting eye from size 112 onward

3) Manual release as option (can be ordered in positions 0°/90°/180°/270° see page 1/11)

Fits and tolerances see page 8/2
Subject to technical amendments

Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
R3DF 63 K/L ...B4	11	23	M4	123	121	117	103	12.5	4	18	2.5	260	237	9	115	95	140	3	10
R3DF 71 K/L ...B4	14	30	M5	138	130	117	103	16	5	25	2.5	298	268	9	130	110	160	3.5	10
R3DF 80 K/L ...B8	19	40	M6	156	144	127	115	21.5	6	32	4	331	291	9	165	130	200	3.5	10
R3DF 90 S ...B16	24	50	M8	176	157	127	115	27	8	40	5	369	319	9	165	130	200	3.5	10
R3DF 90 L ...B16	24	50	M8	176	157	127	115	27	8	40	5	394	344	9	165	130	200	3.5	10
R3DF 100 L ...B32	28	60	M10	194	166	127	115	31	8	50	5	444	384	9	215	180	250	4	14
R3DF 112 M ...B60	28	60	M10	218	178	127	115	31	8	50	5	464	404	11	215	180	250	4	13
R3DF 132 S ...B80	38	80	M12	258	197	145	130	41	10	70	5	537	457	14	265	230	300	4	11.5
R3DF 132 M ...B80	38	80	M12	258	197	145	130	41	10	70	5	575	495	14	265	230	300	4	11.5
R3DF 160 M ...B150	42	110	M16	310	244	186	186	45	12	90	10	682	572	18	300	250	350	5	13.5
R3DF 160 L ...B150	42	110	M16	310	244	186	186	45	12	90	10	726	616	18	300	250	350	5	13.5
R3DF 180 M ...B260	48	110	M16	348	254	175	190	51.5	14	100	5	768	658	18	300	250	350	5	14
R3DF 180 L ...B260	48	110	M16	348	254	175	190	51.5	14	100	5	806	696	18	300	250	350	5	14

* Design IM B5 / IM 3001, IM V1 / IM 3011, IM V3 / IM 3031 (see page 1/5)

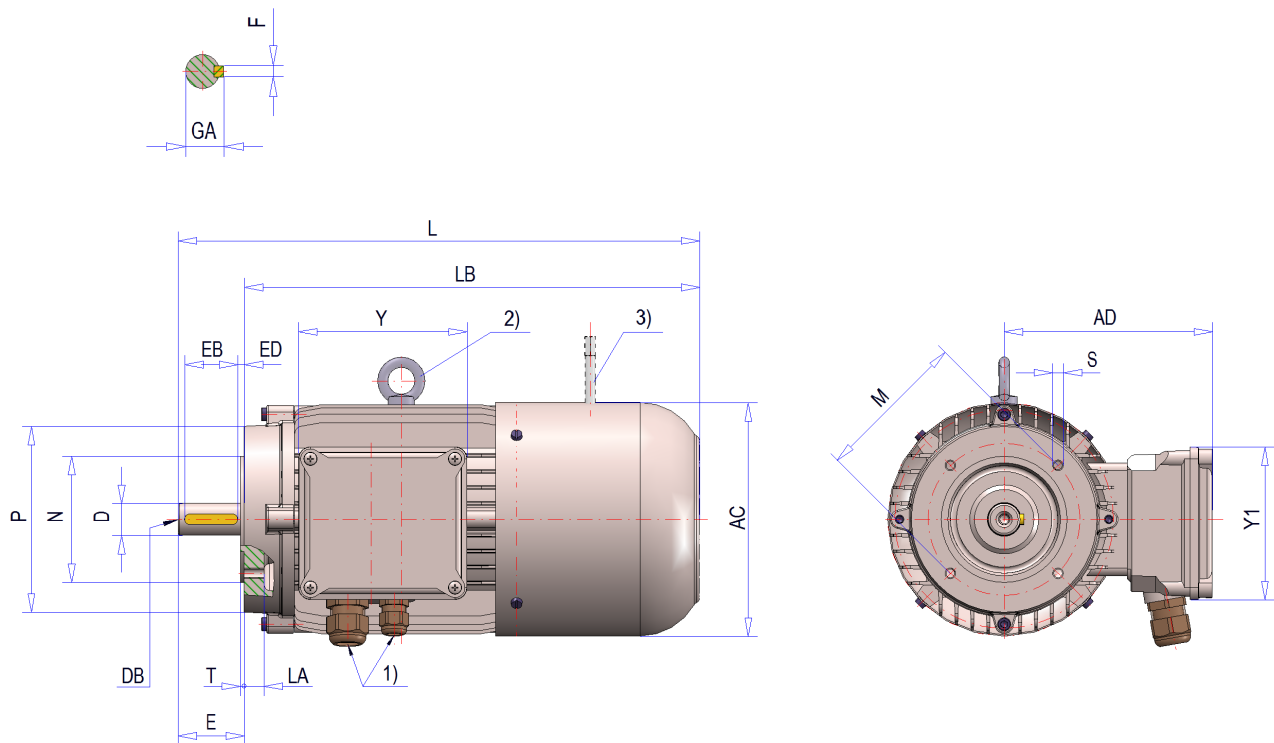
Explosion protected brake motors – surface cooling, cooling type IC411 (internal ventilation)

Types R3DF 63 K – 180 L

Equipment for zone 22

Protection class \geq IP55

Design B14 *



1) See planning section page 1/12

2) With lifting eye from size 112 onward

3) Manual release as option (can be ordered in positions 0°/90°/180°/270° see page 1/11)

Fits and tolerances see page 8/2

Subject to technical amendments

Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
R3DF 63 K/L ...B4	11	23	M4	123	121	117	103	12.5	4	18	2.5	260	237	M5	75	60	90	2.5	9.5
R3DF 71 K/L ...B4	14	30	M5	138	130	117	103	16	5	25	2.5	298	268	M6	85	70	105	2.5	10
R3DF 80 K/L ...B8	19	40	M6	156	144	127	115	21.5	6	32	4	331	291	M6	100	80	120	3	12.5
R3DF 90 S ...B16	24	50	M8	176	157	127	115	27	8	40	5	369	319	M8	115	95	140	3	15
R3DF 90 L ...B16	24	50	M8	176	157	127	115	27	8	40	5	394	344	M8	115	95	140	3	15
R3DF 100 L ...B32	28	60	M10	194	166	127	115	31	8	50	5	444	384	M8	130	110	160	3.5	12.5
R3DF 112 M ...B60	28	60	M10	218	178	127	115	31	8	50	5	464	404	M8	130	110	160	3.5	16
R3DF 132 S ...B80	38	80	M12	258	197	145	130	41	10	70	5	537	457	M10	165	130	200	3.5	15
R3DF 132 M ...B80	38	80	M12	258	197	145	130	41	10	70	5	575	495	M10	165	130	200	3.5	15
R3DF 160 M ...B150	42	110	M16	310	244	186	186	45	12	90	10	682	572	M12	215	180	250	4	14
R3DF 160 L ...B150	42	110	M16	310	244	186	186	45	12	90	10	726	616	M12	215	180	250	4	14
R3DF 180 M ...B260	48	110	M16	348	254	175	190	51.5	14	100	5	768	658	M12	215	180	250	4	15
R3DF 180 L ...B260	48	110	M16	348	254	175	190	51.5	14	100	5	806	696	M12	215	180	250	4	15

* Design IM B14 / IM 3601, IM V18 / IM 3611, IM V19 / IM 3631 (see page 1/5)

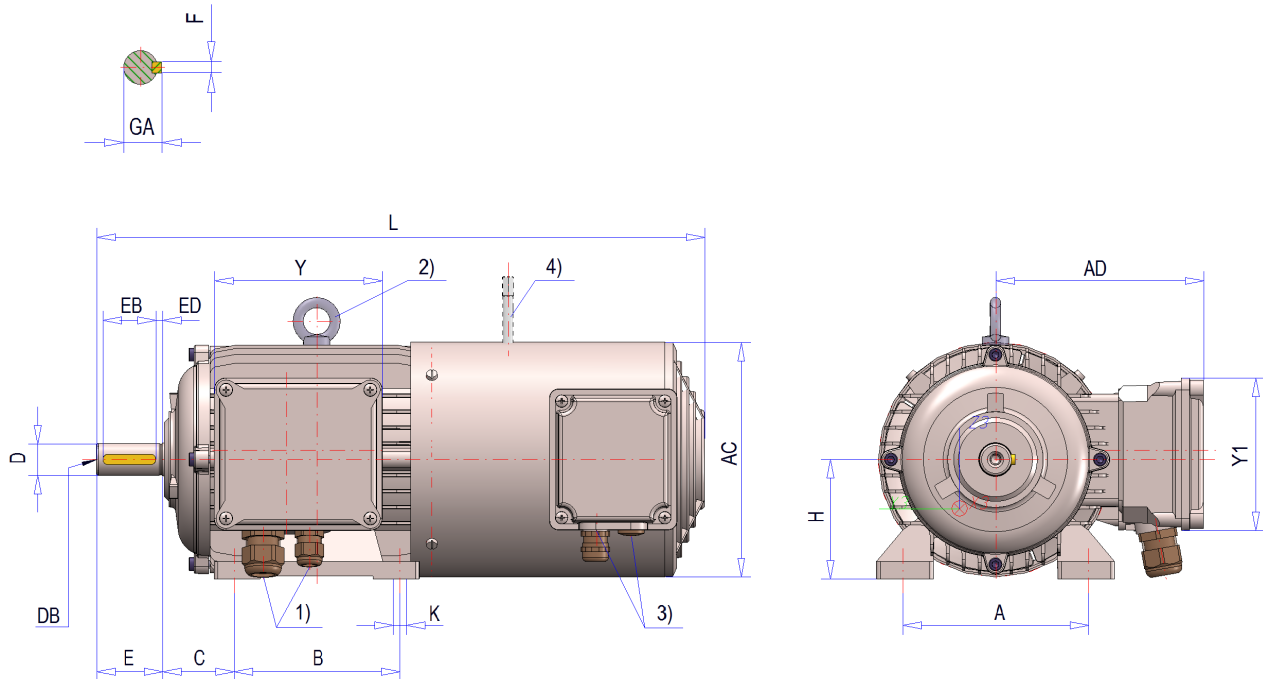
Explosion protected brake motors – surface cooling, cooling type IC416 (external ventilation)

Types R3D 63 K – 180 L

Equipment for zone 22

Protection class \geq IP55

Design B3 *



- 1) See planning section page 1/12
- 2) With lifting eye from size 112 onward
- 3) 1x M16x1.5 cable gland / 1x M16x1.5 plug screw
- 4) Manual release as option (can be ordered in positions 0°/90°/180°/270° see page 1/11)

Fits and tolerances see page 8/2
Subject to technical amendments

Type	B	A	K	H	C	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L
R3D 63 K/L ...B4	80	100	7	63	40	11	23	M4	124	121	117	103	12.5	4	18	2.5	324
R3D 71 K/L ...B4	90	112	7	71	45	14	30	M5	139	130	117	103	16	5	25	2.5	367
R3D 80 K/L ...B8	100	125	9.5	80	50	19	40	M6	157	144	127	115	21.5	6	32	4	402
R3D 90 S ...B16	100	140	10	90	56	24	50	M8	177	157	127	115	27	8	40	5	437
R3D 90 L ...B16	125	140	10	90	56	24	50	M8	177	157	127	115	27	8	40	5	462
R3D 100 L ...B32	140	160	11.2	100	63	28	60	M10	195	166	127	115	31	8	50	5	510
R3D 112 M ...B60	140	190	11.2	112	70	28	60	M10	218	178	127	115	31	8	50	5	533
R3D 132 S ...B80	140	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	652
R3D 132 M ...B80	178	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	690
R3D 160 M ...B150	210	254	14.5	160	108	42	110	M16	311	244	186	186	45	12	90	10	792
R3D 160 L ...B150	254	254	14.5	160	108	42	110	M16	311	244	186	186	45	12	90	10	836
R3D 180 M ...B260	241	279	13	180	121	48	110	M16	348	254	175	190	51.5	14	100	5	925
R3D 180 L ...B260	279	279	13	180	121	48	110	M16	348	254	175	190	51.5	14	100	5	963

* Design IM B3 / IM 1001, IM B6 / IM 1051, IM B7 / IM 1061, IM B8 / IM 1071, IM V5 / IM 1011, IM V6 / IM 1031 (see page 1/5)

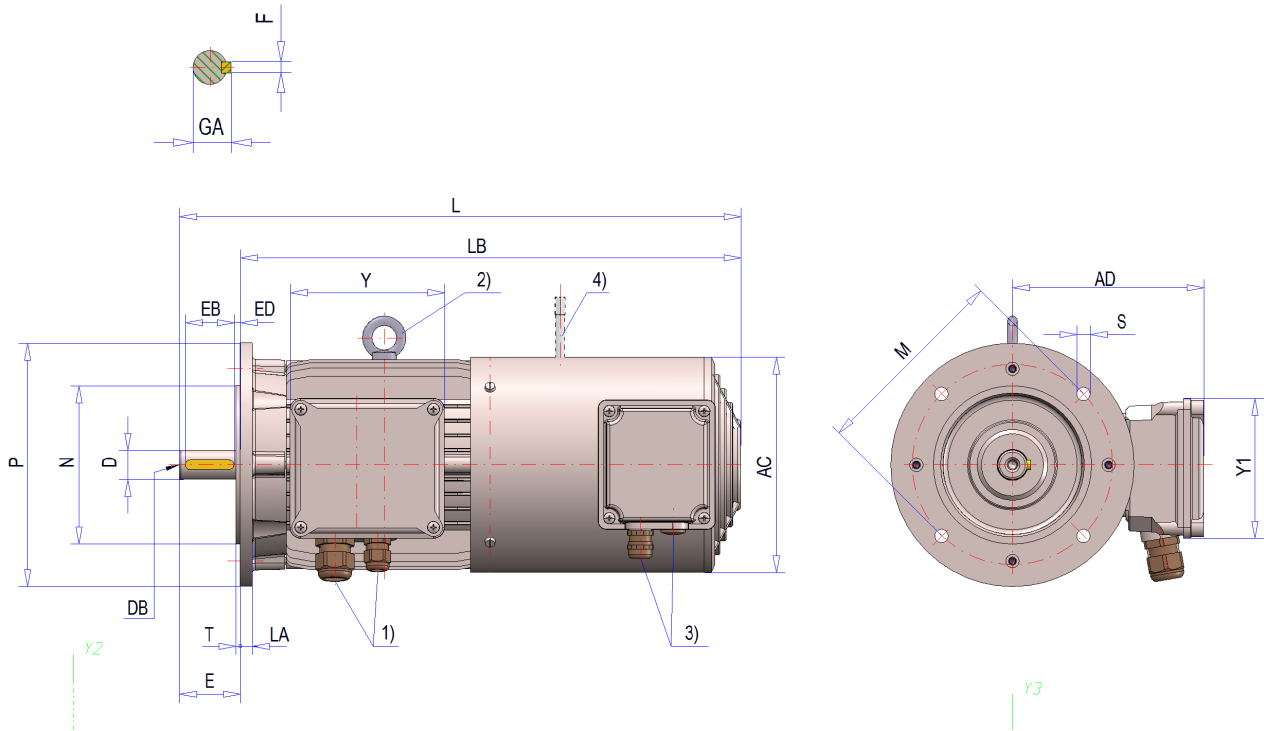
Explosion protected brake motors – surface cooling, cooling type IC416 (external ventilation)

Types R3DF 63 K – 180 L

Equipment for zone 22

Protection class \geq IP55

Design B5 *



- 1) See planning section page 1/12
- 2) With lifting eye from size 112 onward
- 3) 1x M16x1.5 cable gland / 1x M16x1.5 plug screw
- 4) Manual release as option (can be ordered in positions 0°/90°/180°/270° see page 1/11)

Fits and tolerances see page 8/2
Subject to technical amendments

Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
R3DF 63 K/L ...B4	11	23	M4	124	121	117	103	12.5	4	18	2.5	324	301	9	115	95	140	3	10
R3DF 71 K/L ...B4	14	30	M5	139	130	117	103	16	5	25	2.5	367	337	9	130	110	160	3.5	10
R3DF 80 K/L ...B8	19	40	M6	157	144	127	115	21.5	6	32	4	402	362	9	165	130	200	3.5	10
R3DF 90 S ...B16	24	50	M8	177	157	127	115	27	8	40	5	437	387	9	165	130	200	3.5	10
R3DF 90 L ...B16	24	50	M8	177	157	127	115	27	8	40	5	462	412	9	165	130	200	3.5	10
R3DF 100 L ...B32	28	60	M10	195	166	127	115	31	8	50	5	510	450	9	215	180	250	4	14
R3DF 112 M ...B60	28	60	M10	219	178	127	115	31	8	50	5	533	473	11	215	180	250	4	13
R3DF 132 S ...B80	38	80	M12	258	197	145	130	41	10	70	5	652	572	14	265	230	300	4	11.5
R3DF 132 M ...B80	38	80	M12	258	197	145	130	41	10	70	5	690	610	14	265	230	300	4	11.5
R3DF 160 M ...B150	42	110	M16	311	244	186	186	45	12	90	10	792	682	18	300	250	350	5	13.5
R3DF 160 L ...B150	42	110	M16	311	244	186	186	45	12	90	10	836	726	18	300	250	350	5	13.5
R3DF 180 M ...B260	48	110	M16	348	254	175	190	51.5	14	100	5	925	815	18	300	250	350	5	14
R3DF 180 L ...B260	48	110	M16	348	254	175	190	51.5	14	100	5	963	853	18	300	250	350	5	14

* Design IM B5 / IM 3001, IM V1 / IM 3011, IM V3 / IM 3031 (see page 1/5)

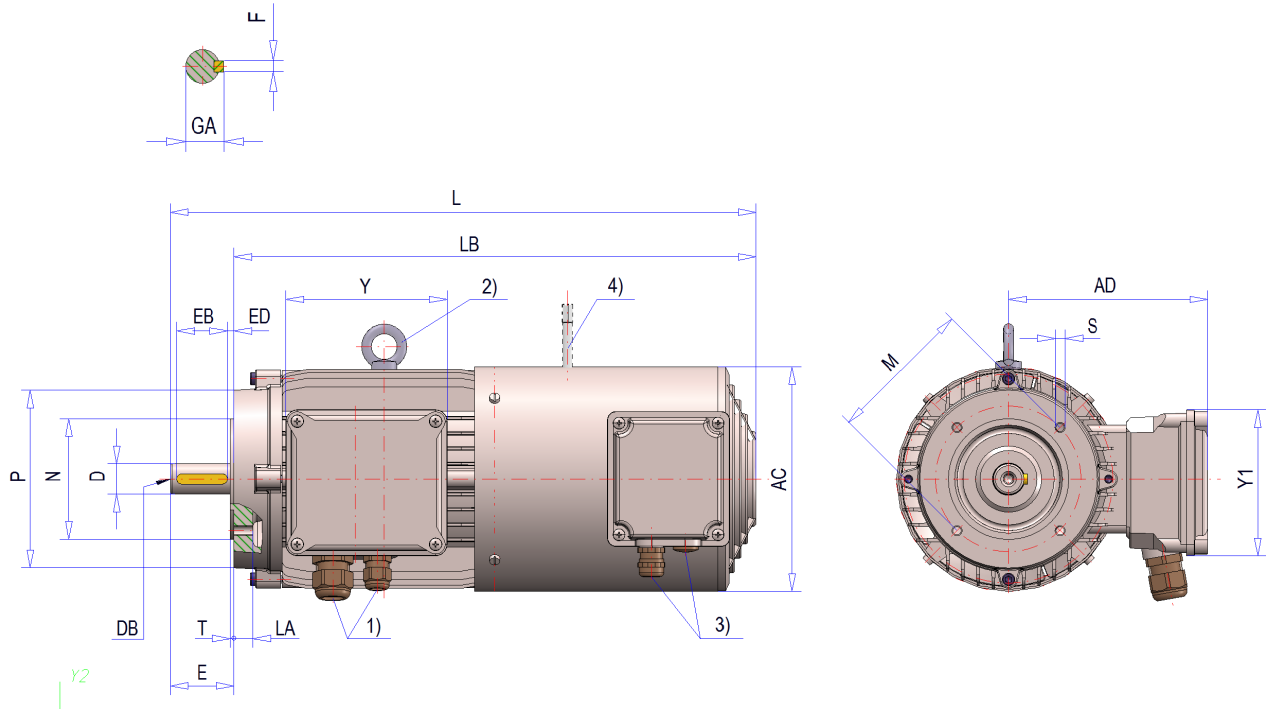
Explosion protected brake motors – surface cooling, cooling type IC416 (external ventilation)

Types R3DF 63 K – 180 L

Equipment for zone 22

Protection class \geq IP55

Design B14 *



- 1) See planning section page 1/12
- 2) With lifting eye from size 112 onward
- 3) 1x M16x1.5 cable gland / 1x M16x1.5 plug screw
- 4) Manual release as option (can be ordered in positions 0°/90°/180°/270° see page 1/11)

Fits and tolerances see page 8/2
Subject to technical amendments

Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
R3DF 63 K/L ...B4	11	23	M4	124	121	117	103	12.5	4	18	2.5	324	301	M5	75	60	90	2.5	9.5
R3DF 71 K/L ...B4	14	30	M5	139	130	117	103	16	5	25	2.5	367	337	M6	85	70	105	2.5	10
R3DF 80 K/L ...B8	19	40	M6	157	144	127	115	21.5	6	32	4	402	362	M6	100	80	120	3	12.5
R3DF 90 S ...B16	24	50	M8	177	157	127	115	27	8	40	5	437	387	M8	115	95	140	3	15
R3DF 90 L ...B16	24	50	M8	177	157	127	115	27	8	40	5	462	412	M8	115	95	140	3	15
R3DF 100 L ...B32	28	60	M10	195	166	127	115	31	8	50	5	510	450	M8	130	110	160	3.5	12.5
R3DF 112 M ...B60	28	60	M10	219	178	127	115	31	8	50	5	533	473	M8	130	110	160	3.5	16
R3DF 132 S ...B80	38	80	M12	258	197	145	130	41	10	70	5	652	572	M10	165	130	200	3.5	15
R3DF 132 M ...B80	38	80	M12	258	197	145	130	41	10	70	5	690	610	M10	165	130	200	3.5	15
R3DF 160 M ...B150	42	110	M16	311	244	186	186	45	12	90	10	819	709	M12	215	180	250	4	14
R3DF 160 L ...B150	42	110	M16	311	244	186	186	45	12	90	10	863	753	M12	215	180	250	4	14
R3DF 180 M ...B260	48	110	M16	348	254	175	190	51.5	14	100	5	959	849	M12	215	180	250	4	15
R3DF 180 L ...B260	48	110	M16	348	254	175	190	51.5	14	100	5	997	887	M12	215	180	250	4	15

* Design IM B14 / IM 3601, IM V18 / IM 3611, IM V19 / IM 3631 (see page 1/5)

Planning section explosion protected DEx series motors



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Overview of HEW production line

HEW has been producing asynchronous motors for more than 120 years. Our product line comprises the following variants:

- **Explosion-protected 3-phase motors**
- **Explosion-protected 3-phase brake motors**
- Standard three-phase motors (see catalogue part Model series R)
- Standard pole-changing three-phase motors (see catalogue part Model series R)
- Standard pole-changing three-phase fan drives (see catalogue part Model series R)
- Reluctance motors (see catalogue part Model series R)
- Single-phase motors (see catalogue part Model series R)
- Brake motors (see catalogue part Model series R)
- Rotating field motors (see catalogue part Model series R)
- Submersible motors (see catalogue part Model series R)
- Hygiene motors (see catalogue part Model series R)
- **Explosion protected three-phase motors for use in Zone 2**(see catalogue part Model series R)
- **Explosion protected three-phase (brake) motors for use in Zone 22**(see catalogue part Model series R)

Due to their high-quality insulation system, our motors are suited for inverter operation.

As a rule, they are manufactured in thermal class F and come with a PTC (other temperature sensors are available on request).

Operating three-phase motors in demanding drive systems often requires feedback elements to be fitted. On customer's request, HEW also supplies the motors with incremental encoders from various manufacturers. Explosion-protected three-phase motors or three-phase brake motors can be equipped with such encoders.

Standard motors come in protection class IP 55. Higher protection levels are available on request (see page 16/8).

Versions in compliance with other standards or guidelines (e.g. Gost R, VIK or GL) are available on request.

Primer/paint

HEW motors are provided with a primer as standard. The primer is a low-solvent two-component polyacrylic product. The quick-drying primer coat can be applied as an undercoat, primer or primer filler to all metallic surfaces.

On customer's request, the motors are available with a two-component polyacrylic paint (acc. to RAL table). Special paint coats for extreme environmental conditions are also available on request.

Ignition protection types of electrical machines

Ignition protection type Code letter	Standard	Protection notion	Application with type of electrical machine
Pressurised encapsulation "d"	DIN EN 60079-1 Equipment for Zone 1+2	All parts which are ignition sources are contained in a pressure-tight housing whose the seal is a spark-proof gap, so that an explosion in an explosive atmosphere inside the housing will not be transferred to the surrounding explosive atmosphere.	All motor types, e.g.: - squirrel cage motors - slip ring motors - collector motors For all operating modes S1 to S10, for all aggravated start-up conditions and speed-controlled drives
Increased safety "e"	DIN EN 60079-7 Equipment for Zone 1+2	In this context, measures have to be taken that safely prevent the formation of sparks, arcs and impermissible heat provided the equipment is operated properly and as intended.	Only squirrel cage motors with appropriately adjusted motor protection switch. The specified t_E times have to be complied with.
Ignition protection type "n"	DIN EN 60079-15 Equipment for zone 2	No sparks, arcs or impermissible temperatures occur during operation. If sparks, arcs or impermissible temperatures occur inside the equipment, the housings and the terminal box have to be of protection class IP54 requiring more than 30 seconds to drop by 2 mbar at an overpressure of 4 mbar (gas-proof), or housings and terminal boxes are pressurised in a simple way.	All motor types, e.g.: Squirrel cage motors - slip ring motors - collector motors etc. with motor protection switch and overpressure monitoring. Prevent sparks formed during operation from escaping. See the manufacturer's information regarding these measures.
Dust protection "t"	DIN EN 60079-31 Equipment for Zone 21+22	This type of ignition protection is based on a restriction of the maximum temperature of the housing surface and restriction of dust ingress by using "dust-proof" or "dust protected" housings.	All electrical motors featuring protection by housings with restricted surface temperature.

Gas - explosion protection

Ignition temperature - temperature class

The ignition temperature depends on many factors such as surface size, shape, type and characteristics. In IEC 60079-20-1, IEC; CENELEC and other standardisation committees agreed upon a defined procedure of determining the ignition temperature closely approaching the lowest practically possible value.

Gases and vapours are accordingly divided into temperature classes. Complying with these temperature classes, the surface temperatures of electrical equipment and other technical devices are designed such that an ignition due to the surface temperature is impossible. The standards set out the permissible exceedances and compulsory lower deviations from these control values.

The standard motors comply with the highest IIC group and temperature class T4 that include all lower groups and temperature classes. Motors of temperature class T4 have – with regard to size – the same power as standard motors not protected against explosion. The motors are also available in temperature classes T5 and T6 on request. In this case, the nominal power may have to be adapted to account for the permissible housing temperature.

Temperature class	Ignition temperature range of the mixture	Permissible surface temperature of electrical equipment	Permissible temperature rise
T1	> + 450 °C	+ 400 °C	+ 410 °C
T2	> + 300...≤ + 450°C	+ 300 °C	+ 260 °C
T3	> + 200...≤ + 300°C	+ 200 °C	+ 160 °C
T4	> + 135...≤ + 200°C	+ 135 °C	+ 95 °C
T5	> + 100...≤ + 135°C	+ 100 °C	+ 60 °C
T6	> + 85...≤ + 100°C	+ 85 °C	+ 45 °C

Examples of gases and vapours to temperature classes and explosion subgroups assignment

	T1	T2	T3	T4	T5	T6
IIA	Methane	Propane	Benzine	Acetaldehyde		
IIB		Ethylene	Diethyl ether			
IIC	Hydrogen	Acetylene				Carbon disulphide

Dust - explosion protection

Surface temperature - protection class

The IP protection class is a major feature of the dust explosion protection. Depending on the ambient conditions, there are different dust tightness requirements on the motor. Another key measure for dust explosion protection is to restrict the surface temperature of the motors to a value lying below the ignition and smouldering temperature of the dust in question.

Application location	Presence of an explosive dust atmosphere	occasionally	rarely or briefly	rarely or briefly
	Dust type	all types	Conductive	Non-conductive
	Zone	21	22	22
Equipment	Device group	II	II	II
	Device category	2D	3D	3D
	Protection class	IP6X	IP6X	IP5X
	Temperature Housing temperatures	max. 135°C	max. 135°C	max. 135°C
	Certificate	EC-type examination certificate of testing facility	EC Declaration of Conformity of the manufacturer	EC Declaration of Conformity of the manufacturer

Permissible use of motors according to their labelling depending of the assignment of zones

Device group	Device category	Assignment of zones	Definition acc. to BetrSichV [Ordinance on Industrial Safety and Health]	Obligation of certification
For combustible gases, vapours and mists				
II	1G*	0	Zone 0 comprises areas where an explosive atmosphere consisting of a mixture of air and gases, vapours and mists is present permanently, for an extended period of time or frequently.	Yes
II	2G	1	Zone 1 comprises areas where an explosive atmosphere consisting of a mixture of air and gases, vapours and mists occurs sometimes.	Yes
II	3G	2	Zone 2 comprises areas where an explosive atmosphere consisting of a mixture of air and gases, vapours and mists is not likely to occur. If it does occur, then in all probability only seldom and for a short period.	No
For inflammable dust				
II	1D*	20	Zone 20 comprises areas where an explosive atmosphere consisting of a mixture of air and gases is present permanently, for an extended period of time or frequently.	Yes
II	2D	21	Zone 21 comprises areas where an explosive atmosphere consisting of a mixture of air and gases occurs sometimes.	Yes
II	3D	22	Zone 22 comprises areas where an explosive atmosphere consisting of swirled dust is not likely to occur. If it does occur, then in all probability only very seldom and for a short period.	No

*unusual for electric motors

Maintaining the explosion protection

Maintaining the explosion protection during operation:

Electrical machines have to be protected against overheating caused by overloading. The motor protection depends on the operating mode and also on the electrical machine and its use.

The systems monitoring the motors have to comply with the requirements of directives 94/9/EC and EN 1127-1.

Operating mode	Motor protection
S1	Motor protection switch acc. to DIN EN 60034-1; DIN EN 60079-14 Motor protection switch and temperature sensor in the winding as additional protection
S2	Motor protection switch runtime timer and/or temperature sensor in the winding as additional protection. Master protection device: only temperature sensor in the winding (permissible only with approved controllers/triggering devices)
S3 – S10	Master protection device: only temperature sensor in the winding (permissible only with approved controllers/triggering devices)

Definition of operating modes acc. to DIN EN 60034-1



Explosion-protected electric motors

Explosion-protected (pressure-proof encapsulated) motors are used in industrial plants where atmospheres containing explosive, flammable vapours, gases or dusts can occur (e.g. in the chemical industry, oil refineries, etc.).

They are 3-phase asynchronous motors with squirrel cage rotor acc. to DIN EN 60079 (gas explosion protection) and (dust explosion protection).

The motor housings are pressure-proof enclosures acc. to DIN EN 60079-1. The terminal boxes can be "pressure-proof encapsulated" acc. to DIN EN 60079-1 or with "increased safety" acc. to DIN EN 60079-7.

The following standards and regulations were used to design, produce and test the electric motors:

Title (Rotating electrical machines)	IEC international	EN-CENELEC Europe	DIN Germany
Rating and operating behaviour	IEC 60034-1	EN 60034-1	DIN EN 60034-1
Degrees of protection provided by integral design of rotating electrical machines (IP code) - Classification	IEC 60034-5	EN 60034-5	DIN EN 60034-5
Methods of cooling (IC code)	IEC 60034-6	EN 60034-6	DIN EN 60034-6
Classification of types of construction, mounting arrangements and terminal box position (IM Code)	IEC 60034-7	EN 60034-7	DIN EN 60034-7
Connection designations and direction of rotation	IEC 60034-8	EN 60034-8	DIN EN 60034-8
Noise level limits	IEC 60034-9	EN 60034-9	DIN EN 60034-9
Starting performance of three-phase cage induction motors except pole-changing motors	IEC 60034-12	EN 60034-12	DIN EN 60034-12
Mechanical vibration of certain machines with shaft heights 56 mm and higher - Measurement, evaluation and limits of vibration severity	IEC 60034-14	EN 60034-14	DIN EN 60034-14
Efficiency classes of single-speed, three-phase, cage-induction motors (IE code)	IEC 60034-30	EN 60034-30	DIN EN 60034-30
Three-phase asynchronous motors for general applications with standardised dimensions and power ratings	IEC 60072-1 *	EN 50347 *	DIN EN 50347 *
Electrical equipment for explosive atmospheres - General requirements	IEC 60079-0	EN 60079-0	DIN EN 60079-0
Electrical equipment for explosive atmospheres - Pressure-proof encapsulation "d"	IEC 60079-1	EN 60079-1	DIN EN 60079-1
Electrical equipment for explosive atmospheres - Increased safety "e"	IEC 60079-7	EN 60079-7	DIN EN 60079-7
Electrical equipment for use in areas with combustible dust - Protection by housing	IEC 60079-31	EN 60079-31	DIN EN 60079-31

* Applies to dimensions and sizes only

Mechanical design

Designs

Overview of design and IM code (international mounting) of the most frequently used versions acc. to DIN EN 60034-7.

horizontal shaft		vertical shaft		vertical shaft	
IM Code I	IM Code II	IM Code I	IM Code II	IM Code I	IM Code II
IM B3	IM 1001	IM V5	IM 1011	IM V6	IM 1031
IM B5	IM 3001	IM V1	IM 3011	IM V3	IM 3031
IM B14	IM 3601	IM V18	IM 3611	IM V19	IM 3631
IM B35	IM 2001	IM V15	IM 2011	IM V35	IM 2031
IM B34	IM 2101	IM V17	IM 2111	IM V37	IM 2131
IM B6	IM 1051				
IM B7	IM 1061				
IM B8	IM 1071				



Designs

The designs of electric motors and their symbols comply with DIN EN 60034-7. Our motors are available in basic designs IM B3; IM B5 and IM B14.

The table on page 16/8 shows the symbols and possible configurations of the standard models we manufacture. The motors of type IM B3 can also be operated in mounting positions IM B6, IM B7 and IM B8. In addition to standard flange sizes, a great number of other flange sizes is also available (see page 1/10).

Vertical designs with the shaft end at the bottom or top must be protected against water drops or foreign bodies that could fall into the motor. Designs with the shaft end pointing down are usually protected with a roof. But this protection is not required if the machine features such a protective cover.

Motors installed outside have to be protected against direct sun irradiation.

IP protection classes

DIN EN 60034-5 identifies the protection classes of rotating electrical machines with a code comprised of the code letters IP (International Protection) and two code numbers.

1st code number (0 to 6): protection levels for protection against contact and foreign objects.

2nd code number (0 to 8): protection levels for protection against water.

The motors come in protection class IP 55. Motors with higher protection are also available on request.

Protection against solid foreign objects and liquids: IP protection class

Protection class	Protection against contact and penetration of solid foreign bodies (1st digit)
IP 55 / IP 56	Full protection against touching of live and moving internal parts. Protection against ingress of dust: The ingress of dust is not entirely prevented but dust cannot enter in amounts that would impair the satisfactory operation of the machine.
IP 65	Full protection against touching of live and moving internal parts. The ingress of dust is entirely prevented.

Protection class	Protection against the ingress of water (2nd digit)
IP 55 / IP 65	The motor is protected against water jets from all directions.
IP 56	Machine protected against heavy seas. Harmful amounts of water by heavy seas or water in a powerful jet must not enter the housing.

Other protection classes available on request



Housing version

Explosion protection standards applied during production and testing of motors.

Standard	IEC international	Germany/Europe
Electrical devices in explosive areas Standard version	IEC 60079-0	DIN EN 60079-0
Electrical devices for operation in explosive areas Pressurised encapsulation "d"	IEC 60079-1	DIN EN 60079-1
Electrical devices for operation in explosive areas Increased safety "e"	IEC 60079-7	DIN EN 60079-7

Construction

The electric motors are fully encapsulated and have an internal fan. Cooling occurs by ambient air the fan blows over the outer ribbed surface (cooling system IC 411 acc. to DIN EN 60034-6). Motors up to size 250 come with a cast iron housing. From size 280 onward, welded housings and cast iron terminal boxes are used.

Size	Stator housing	Bearing covers	Terminal box
63	Cast iron, screwed feet, (terminal box cast on the stator housing)	Steel or cast iron B 5, B 14 screwed	Cast iron
71			
80			
90			
100			
112			
132			
160	Cast iron, screwed feet (separate, rotatable terminal box)		
180			
200			
225			
250			
280	Welded steel sheet metal, welded feet (separate, rotatable terminal box)		
315			



Flange variants

To ensure short delivery times, all motor types of sizes 63 to 250 were designed with screwed flanges and/or feet. This also makes it possible to build all designs possible acc. to DIN EN 60034-7 using a basic motor.

Available flanges

Size	FF flanges Ø in mm ⁽¹⁾										FT flanges Ø in mm ⁽¹⁾						
	115	130	165	215	265	300	350	400	500	600	75	85	100	115	130	165	215
	A flanges Ø in mm ⁽²⁾										C flanges Ø in mm ⁽²⁾						
	140	160	200	250	300	350	400	450	550	660	90	105	120	140	160	200	250
63	X	O									X	O	O				
71		X	O								O	X	O	O	O		
80		O	X								O	O	X	O	O		
90		O	X								O	O	O	X	O		
100			O	X										O	X	O	
112			O	X										O	X	O	
132				O	X											X	O
160					O	X											X
180					O	X											O
200					O	O	X										
225							O	X	O								
250								O	X	O							
280								O	X	O							
315									O	X							

X = assignment as per standard

O = special flange

Other flange variants available on request

Note

1) New designation of as per DIN EN 50347

2) Old designation as per DIN 42948

**Storage**

The following table lists the bearings used in each of the motors. The bearings of motors with 4, 6 and 8-poles have a service life of approx. 20 000 hours unless the load values specified in the tables on pages 16/13 and 16/14 are not exceeded.

Only bearings made by renowned manufacturers are installed. If desired by the customer, we also install other bearing types and sizes in the motors (depending on the respective design).

The bearings of standard versions of sizes 63 to 250 on the drive side and the non-driving side of sizes 280 to 315 are fixed bearings.

Bearing

Size	Poles	DS bearing	NS bearing	Sealing ring
63	2-8	6202 2Z C3	6202 2Z C3	12 x 32 x 7
71	2-8	6203 2Z C3	6203 2Z C3	17 x 40 x 7
80	2-8	6204 2Z C3	6204 2Z C3	20 x 47 x 7
90	2-8	6205 2Z C3	6205 2Z C3	25 x 52 x 7
100	2-8	6206 2Z C3	6206 2Z C3	30 x 62 x 7
112	2-8	6206 2Z C3	6206 2Z C3	30 x 62 x 7
132	2-8	6208 2Z C3	6208 2Z C3	40 x 80 x 10
160	2-8	6309 2Z C3	6309 2Z C3	45 x 80 x 10
180	2-8	6310 2Z C3	6310 2Z C3	50 x 72 x 10
200	2-8	6312 2Z C3	6312 2Z C3	60 x 80 x 10
225	2-8	6313 2Z C3	6313 2Z C3	65 x 90 x 10
250	2-8	6314 2Z C3	6314 2Z C3	70 x 110 x 13
280	2-8	6316 2Z C3	6316 2Z C3	80 x 105 x 13
315	2-8	6317 2Z C3	6317 2Z C3	85 x 115 x 13

Motors of size 160 and onward with roller bearings are available

Motors with insulated bearings are available

Shaft ends

The shaft ends are cylindrical and their design complies with DIN EN 50347; their assignment to sizes and power complies with DIN 42673 Part 3.

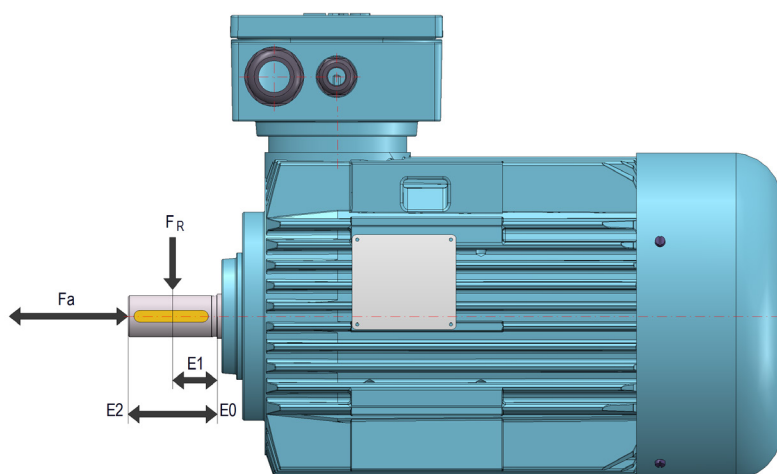
The DS shaft end of all motors has a centre bore acc. to DIN 332 Part 2 shape D. The NS shaft end features a centre bore acc. to DIN 332 Part 1. The motors always come with parallel keys complying with DIN 6885 Part 1. Versions with a second free shaft end are available on request.

- up to a diameter of 50 mm – ISO k6
- 50 mm and more – ISO m6

Shaft diameter	11 mm	14 mm	19 mm	24 mm	28 mm	38 mm	From 42 to 48 mm	From 55 to 80 mm
Internal thread	M5	M5	M6	M8	M10	M12	M16	M20

Radial and axial forces

Permissible loads on the free shaft end



The nominal load of the bearings has been calculated for a minimum service life of 20 000 hours at a frequency of 50 Hz. Only axial loads were considered. The service life of the bearings is shorter when a combination of axial and radial loads is present.

Maximum radial load

Maximum load on the free shaft end F_a [kN]												
Unit arrangement	IM B7 IM B8 IM B14 IM B34 IM B3 IM B35 IM B5 IMJ B6				IM V18 IM V19 IM V 1 IM V3 IM V5 IM V6							
					Weight of rotor shaft in load direction				Weight of rotor shaft contrary to load direction			
	2-pole	4-pole	6-pole	8-pole	2-pole	4-pole	6-pole	8-pole	2-pole	4-pole	6-pole	8-pole
63	0.26	0.26	0.31	0.34	0.27	0.27	0.32	0.35	0.13	0.13	0.15	0.17
71	0.27	0.34	0.39	0.43	0.33	0.43	0.47	0.52	0.35	0.46	0.51	0.55
80	0.36	0.45	0.52	0.57	0.43	0.55	0.62	0.69	0.47	0.60	0.69	0.76
90	0.41	0.51	0.59	0.65	0.48	0.61	0.69	0.77	0.54	0.68	0.79	0.86
100	0.55	0.69	0.79	0.88	0.64	0.81	0.92	1.03	0.75	0.94	1.07	1.11
112	0.55	0.69	0.79	0.88	0.63	0.77	0.89	1.00	0.76	0.98	1.10	1.14
132	0.83	1.04	1.20	1.32	0.92	1.13	1.30	1.48	1.16	1.47	1.67	1.82
160	1.52	1.91	2.19	2.41	1.65	2.10	2.40	2.65	2.13	2.68	3.08	3.31
180	1.77	2.24	2.56	2.82	1.85	2.30	2.71	3.00	2.55	3.26	3.74	4.13
200	2.23	2.94	3.37	3.71	2.39	3.06	3.54	3.89	3.45	4.38	4.91	5.50
225	2.66	3.36	3.85	4.23	2.71	3.30	3.78	4.25	4.03	5.05	5.94	6.28
250	2.98	3.76	4.30	4.73	2.92	3.85	4.07	4.48	4.62	5.55	6.81	7.46
280	3.50	4.41	5.05	5.56	3.18	3.76	4.52	4.82	5.51	7.13	7.94	8.89
315	3.58	4.51	5.17	5.69	2.33	2.31	2.01	2.55	6.09	8.15	9.34	10.05

Maximale Radialbelastung

Size	Number of poles	Radial force F_R [kN]		
		E_0	E_1	E_2
63	2	0.39	0.36	0.34
	4	0.39	0.36	0.34
	6	0.44	0.41	0.38
	8	0.49	0.45	0.42
71	2	0.48	0.43	0.39
	4	0.60	0.54	0.50
	6	0.69	0.62	0.56
	8	0.76	0.68	0.62
80	2	0.64	0.57	0.51
	4	0.81	0.72	0.65
	6	0.93	0.83	0.74
	8	1.02	0.91	0.82
90	2	0.72	0.64	0.57
	4	0.90	0.80	0.71
	6	1.04	0.92	0.82
	8	1.14	1.01	0.90
100	2	1.01	0.9	0.81
	4	1.28	1.15	1.04
	6	1.45	1.30	1.17
	8	1.61	1.43	1.30
112	2	0.99	0.87	0.79
	4	1.23	1.09	1.08
	6	1.42	1.25	1.12
	8	1.57	1.39	1.24
132	2	1.56	1.38	1.23
	4	1.96	1.78	1.55
	6	2.24	1.98	1.77
	8	2.45	2.16	1.96
160	2	2.99	2.63	2.35
	4	3.83	3.38	3.02
	6	4.33	3.81	3.40
	8	4.79	4.22	3.78
180	2	3.55	3.14	2.84
	4	4.43	3.82	3.53
	6	5.10	4.52	4.08
	8	5.63	5.00	4.52
200	2	4.33	4.24	3.60
	4	4.45	4.95	4.52
	6	6.28	5.71	5.23
	8	6.88	6.25	5.72
225	2	10.40	9.45	8.32
	4	13.10	11.65	10.49
	6	15.03	13.37	12.03
	8	16.60	14.78	13.39
250	2	11.64	10.41	9.4
	4	14.77	13.22	11.96
	6	16.97	15.20	13.75
	8	18.73	16.78	15.19
280	2	14.52	13.03	11.80
	4	18.18	16.31	14.76
	6	20.93	18.78	17.02
	8	22.93	20.56	18.62
315	2	16.55	14.92	13.57
	4	20.62	18.57	16.86
	6	19.73	17.58	15.82
	8	21.93	19.56	17.62



Bearing lubrication

The standard version motors are fitted with permanently lubricated bearings.
 Any deviation from the nominal operating temperature affects the service life of the motor bearings.
 (Heed the manufacturer's recommendations for extreme operating conditions)

Motors with regreasing device:

Motors of size 160 and above can be fitted with a regreasing device. The specified regreasing intervals and grease types have to be heeded for these motors. After regreasing, the motor should be run without load to distribute the grease.

The effectiveness of proper bearing greasing should be tested by measuring the bearing cover temperature of the running motor. The regreasing intervals have to be shortened if the measured temperature exceeds + 80 °C. Regreasing intervals should be halved for every 15 K of temperature rise. If this is impossible, special lubricants for very high operating temperatures should be used.

Lubricating the ball bearings - intervals in operating hours

Size	Quantity of grease [g]	Speed [rpm]					
		3600	3000	1800	1500	1000	500
160	25	7000	9500	14000	17000	21000	24000
180	30	6000	8000	13500	16000	20000	23000
200	40	4000	6000	11000	13000	17000	21000
225	50	3000	5000	10000	12500	16500	20000
250	60	2500	4000	9000	11500	15000	18000
280	70	2000	3500	8000	10500	14000	17000
315	90	2000	3500	6500	8500	12500	16000

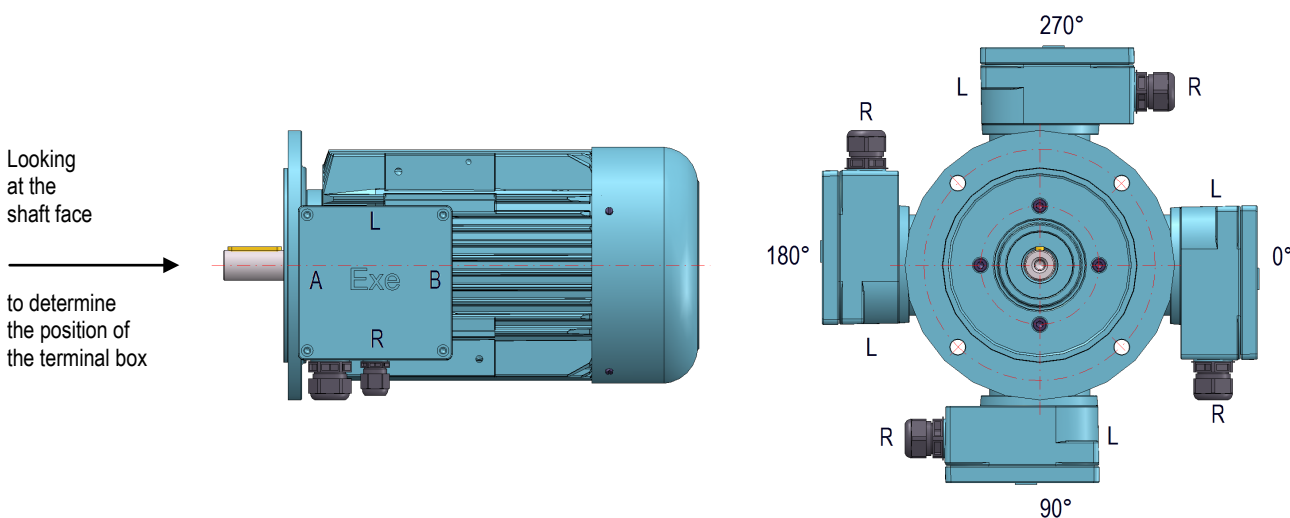
Lubricating the roller bearings - intervals in operating hours

Size	Quantity of grease [g]	Speed [rpm]					
		3600	3000	1800	1500	1000	500
160	13	3500	4300	7000	8500	10500	12000
180	15	3000	4000	6800	8000	10000	11500
200	20	2000	3000	5500	6500	8500	10500
225	25	1500	2500	5000	6300	8300	10000
250	30	1300	2000	4500	5500	7500	9000
280	35	1000	1800	4000	5300	7000	8500
315	45	1000	1700	3000	4300	6000	8000

Terminal box configuration and cable entries

The position of the terminal box and the cable entries is available according to the table below:

Size	Version	Standard version	Special version	Version	Standard version	Special version
63	Foot	270°B, L, R	on request	Flange	0°B, L, R	on request
71	Foot	270°B, L, R	on request	Flange	0°B, L, R	on request
80	Foot	270°R	270° A, B, L	Flange	0° R	0° A, B, L / 90° A, B, R, L 180° A, B, R, L / 270° A, B, R, L
90	Foot	270°R	270° A, B, L	Flange	0° R	0° A, B, L / 90° A, B, R, L 180° A, B, R, L / 270° A, B, R, L
100	Foot	270°R	270° A, B, L	Flange	0° R	0° A, B, L / 90° A, B, R, L 180° A, B, R, L / 270° A, B, R, L
112	Foot	270°R	270° A, B, L	Flange	0° R	0° A, B, L / 90° A, B, R, L 180° A, B, R, L / 270° A, B, R, L
132	Foot	270°R	270° A, B, L	Flange	0° R	0° A, B, L / 90° A, B, R, L 180° A, B, R, L / 270° A, B, R, L
160	Foot	270°R	270° A, B, L	Flange	0° R	0° A, B, L / 90° A, B, R, L 180° A, B, R, L / 270° A, B, R, L
180	Foot	270°R	270° A, B, L	Flange	0° R	0° A, B, L / 90° A, B, R, L 180° A, B, R, L / 270° A, B, R, L
200	Foot	270°R	270° A, B, L	Flange	0° R	0° A, B, L / 90° A, B, R, L 180° A, B, R, L / 270° A, B, R, L
225	Foot	270°R	270° A, B, L	Flange	0° R	0° A, B, L / 90° A, B, R, L 180° A, B, R, L / 270° A, B, R, L
250	Foot	270°R	0° A, B, R, L	Flange	0° R	0° A, B, L / 90° A, B, R, L 180° A, B, R, L / 270° A, B, R, L
280	Foot	270°R	0° A, B, R, L 180° A, B, R, L 270° A, B, L	Flange	0° R	0° A, B, L / 90° A, B, R, L 180° A, B, R, L / 270° A, B, R, L
315	Foot	270°R	0° A, B, R, L 180° A, B, R, L 270° A, B, L	Flange	0° R	0° A, B, L / 90° A, B, R, L 180° A, B, R, L / 270° A, B, R, L



Standard terminal box configuration: 0°R



Three-phase motors

Ex e type terminal boxes have threaded bores (acc. to table) and pertaining Ex e cable glands.

By default, Ex d type terminal boxes come with the threaded bores (acc. to table). The cable glands are not included (other threads on request).

Terminal boxes and cable entries				
Size	Terminals For cables with maximum cross section (mm ²)	Cable entries for power cables		
		Ex e housing		Ex d housing
		Threaded bore	Outer diameter of cable (mm)	Threaded bore
63	2.5	4 x M20 x 1.5	6.5 to 12	4 x M20 x 1.5
71	2.5	4 x M20 x 1.5	6.5 to 12	4 x M20 x 1.5
80 90 100	4	1 x M25 x 1.5 1 x M20 x 1.5	13 to 18 6.5 to 12	1 x M25 x 1.5 1 x M20 x 1.5
112	4	1 x M32 x 1.5 1 x M20 x 1.5	13 to 18 6.5 to 12	1 x M32 x 1.5 1 x M20 x 1.5
132	4	2 x M32 x 1.5 1 x M20 x 1.5	13 to 18 6.5 to 12	2 x M32 x 1.5 1 x M20 x 1.5
160 180	16	2 x M40 x 1.5 1 x M20 x 1.5	22 to 32 6.5 to 12	2 x M40 x 1.5 1 x M20 x 1.5
200 225	16	2 x M50 x 1.5 1 x M20 x 1.5	32 to 38 6.5 to 12	2 x M50 x 1.5 1 x M20 x 1.5
250 280 315	95-300	2 x M63 x 1.5 1 x M20 x 1.5	37 to 44 6.5 to 12	2 x M63 x 1.5 1 x M20 x 1.5

Additional bores for cable glands are available on request.

Special motor versions (e.g. with standstill heatings) come with an additional M20 x 1.5 cable entry.



Three-phase motors

Noise and vibrations

Noise level:

The noise level of the motors is below the values DIN EN 60034-9 permits for externally cooled motors.

Maximum permissible noise level L in dB (distance of one metre to the motor surface)						
Values for surface-cooled motors						
Nominal power P [kW]	Speed [rpm]					
	600 < n ≤ 960	960 < n ≤ 1320	1320 < n ≤ 1900	1900 < n ≤ 2360	2360 < n ≤ 3150	3150 < n ≤ 3750
P ≤ 1,1	67	70	71	74	75	79
1.1 < P ≤ 2.2	69	70	73	78	80	82
2.1 < P ≤ 5.5	72	74	77	82	83	85
5.5 < P ≤ 11	75	78	81	86	87	90
11 < P ≤ 22	78	82	85	87	91	93
22 < P ≤ 37	80	84	86	89	92	95
37 < P ≤ 55	81	86	88	92	94	97
55 < P ≤ 110	84	89	92	93	96	98
110 < P ≤ 220	87	91	94	96	98	100

Vibrations:

The rotors of the motors have been dynamically balanced with fan and half of the parallel key fitted. The vibration amplitude complies with vibration severity level A (normal) acc. to DIN EN 60034-14.

Vibration limit values [mm/s]				
Speed [rpm] 600 to 3600				
Degrees	Machine installation	Axis height		
		56 to 132	160 to 280	315
A (normal)	free suspension	1.6	2.2	2.8
	rigid clamping	1.3	1.8	2.3
B (reduced)	free suspension	0.7	1.1	1.8
	rigid clamping	-	0.9	1.5



Electrical design

Output, voltage and frequency

The data given in section Technical Data relate to continuous operation (S1 acc. to DIN EN 60034-1) of the motors at nominal voltage, nominal frequency, max. coolant temperature + 40°C and an installation elevation ≤ 1000 m above sea level.

Voltage fluctuations up to $\pm 5\%$ and frequency fluctuations up to $\pm 2\%$ are permitted. The performance data remain unchanged and the maximum permissible winding temperature is not exceeded within these tolerances.

On request, motors with nominal voltages between 110 V and 690 V and nominal frequencies of 50 Hz or 60 Hz are available. Motors designed for 380 V, 400 V and 415 V and a frequency of 50 Hz can also be operated at 440 V and 480 V with a frequency of 60 Hz. A 15% higher load is possible in this case. The speed increases by approx. 20% while the start-up and maximum torque is by 18% lower.

The following must also be taken into consideration when selecting the best possible motor output: required power of working machines; operating mode; start-up, braking and reversing mode, torque curve of working machine; mains conditions (FI operation); cooling, coolant temperature; installation elevation.

Heating and thermal classes

The choice of individual insulation system components determines the classification in the thermal classes in accordance with DIN EN 60034-1.

The stator windings of the motors comply with thermal class F. The stator windings are always manufactured with phase insulation as well as high-quality enamelled wire and impregnating resin. The high degree of electrical strength that this achieves is the guarantee of problem-free use of the motors on the frequency inverter.

Motors complying with thermal class H with windings for operation under extreme conditions and frequent switch-on/switch-off cycles and are also available on request.

Actuations

The windings of motors with nominal power of up to 2.2 kW are designed in 400 V star circuit. Motor with higher powers are designed in 400 V delta circuit (star-delta start). Pole-changing motors with a speed ratio of 2:1 are designed in Dahlander circuit (separate winding available on request). Other pole ratios are designed with two separate windings in star circuit.

Overload

The motors are designed such that, after having reached their operating temperature, they can be operated with the 1.5-fold load for two minutes without causing any damage.

Rotation direction

Basically, the motors are suited for both directions of rotation. The winding leads U1, V1, W1 of the motors are designed such that the motor turns in clockwise direction if they are connected to the 3-phase mains to L1, L2, L3 respectively. The motor turns counter clockwise if two outer leads are swapped (e.g. L1 with L2). The rotation direction is indicated when looking at the shaft face (DS).

Earthing and PE connection

The motors feature a PE connection in the terminal box and an additional external PE terminal on the motor housing.

Operation on the frequency converter

When operated on a frequency inverter, the speed of three-phase asynchronous motors can be set or adjusted continuously via the frequency. Careful planning is the prerequisite for optimum matching of inverter and motor.

The pressure-resistant encapsulated HEW motors may be used in the following frequency ranges.

Motor size	Permissible frequency range
63	5 Hz – 87 Hz
71 – 160	5 Hz – 100 Hz
180 – 315	5 Hz – 87 Hz

The integrated PTC must be used as a stand-alone motor protection.

The motor selection primarily depends on the desired speed range and the torque curve of the working machine. During planning, the most critical working point has to be determined. Then the motor size and the number of poles are selected. The most critical working point will often be reached at the lowest frequency because the reduced cooling capacity of the internally ventilated motor requires the torque to be reduced in relation to the nominal torque. But it can also be in field weakening operation if the motor is used in this mode.

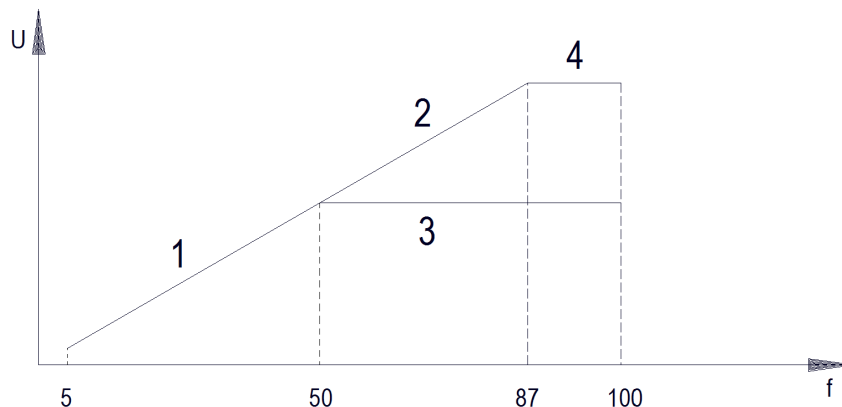
The flux remains constant and the motor operates at a constant torque (taking into account the torque reduction caused by reduced cooling with low frequencies) if the inverter voltage is increased proportionally with the frequency. We speak of field weakening operation with the motor torque decreasing at $1/f$ if the voltage remains constant and only the frequency rises (Caution: the breakdown torque decreases by the square of $1/f$).

The multitude of factors influencing inverter operation shows that careful planning is required not only to obtain smooth operation but also a cost-optimised solution.

The tables on pages 20/1 to 20/4 show the permissible torques for the typical speed ranges of motors with 2, 4, 6 and 8 poles. The operating possibility of the motors depends on the voltage version selected (230/400 V or 400/690 V).

Please do not hesitate to contact our Technical Department if you have any questions.

Schematic diagram



- | | | |
|---|-------------------------------------|---|
| 1 | U/f constant up to 50 Hz | Power rises proportional to the speed
Motor torque acc. to tables on page 20/1 to 20/4 |
| 2 | U/f constant between 50 and 87 Hz | Power rises proportional to the speed
Constant motor torque |
| 3 | U constant between 50 and 87 Hz | Power remains constant, motor torque decreases at $50/f$ |
| 4 | U constant between 87 and 100 Hz | Power remains constant, motor torque decreases at $87/f$ |



Motor protection

The motor protection has to comply with DIN EN 60079-14 and directive 94/9EC. A motor protection switch or equivalent device has to protect all poles of the motor against impermissible heating caused by overloading. An equivalent protective device would be a PTC resistor for winding temperature monitoring in conjunction with an approved triggering device, if necessary.

Exclusive protection with temperature sensor is mandatory for all operating modes other than S1, such as inverter operation, switching operation, short-term operation, heavy starting, etc. This also provides protection in case of reduced cooling air flow and/or excessively high ambient temperatures.

Standard pressure-resistant encapsulated HEW motors come with a PTC. As an option, the motors can also be equipped with additional temperature sensors such as advance warning or thermostatic switch (bimetallic sensor).

Cooling (ventilation)

All motors are equipped with a robust and temperature-resistant plastic or aluminium fan.

External ventilation (IC 416):

Motors of size 80 onward can be equipped with an optional external fan in order to increase the effective output or to comply with the temperature class in case of inverter or switching operation.

All external fans come with three-phase connection.

Installation altitude and coolant temperature

For coolant temperatures other than 40° C or or installation altitudes above 1000 m above sea level, power reductions are required. In this case, the nominal power has to be corrected using the factors in the table below.

Installation altitude above sea level	Ambient temperature in °C			
	40	45	50	60
1000 m	1.00	0.96	0.92	0.82
1500 m	0.97	0.95	0.89	0.79
2000 m	0.94	0.90	0.86	0.77
2500 m	0.90	0.86	0.83	0.74
3000 m	0.86	0.82	0.79	0.70
3500 m	0.82	0.79	0.75	0.67
4000 m	0.77	0.74	0.71	0.63

In special cases, the motors can be operated without power reduction at ambient temperatures > 40°C after consultation with the manufacturer.



Standstill heating

Standstill heating against condensation:

the motors should be equipped with a standstill heater to prevent heavy condensation of the stator windings in case of great temperature deviations and load changes, e.g. periodic standstill times.

Standstill heating for low temperature operation:

For an ambient temperature of $< -20^{\circ}\text{C}$, a standstill heating is mandatory (operation permitted up to -50°C).

The standstill heating must **not** be switched on while the motor is in operation.

Standstill heating against condensation			Standstill heating for low temperature		
Motor size	Heating power [W]	Supply voltage* [V]	Motor size	Heating power [W]	Supply voltage* [V]
63	12.5	$230 \pm 10\%$	63	12.5	$230 \pm 10\%$
71	12.5	$230 \pm 10\%$	71	12.5	$230 \pm 10\%$
80	25	$230 \pm 10\%$	80	25	$230 \pm 10\%$
90	25	$230 \pm 10\%$	90	25	$230 \pm 10\%$
100	25	$230 \pm 10\%$	100	50	$230 \pm 10\%$
112	50	$230 \pm 10\%$	112	50	$230 \pm 10\%$
132	50	$230 \pm 10\%$	132	50	$230 \pm 10\%$
160	50	$230 \pm 10\%$	160	75	$230 \pm 10\%$
180	75	$230 \pm 10\%$	180	150	$230 \pm 10\%$
200	75	$230 \pm 10\%$	200	200	$230 \pm 10\%$
225	100	$230 \pm 10\%$	225	200	$230 \pm 10\%$
250	150	$230 \pm 10\%$	250	300	$230 \pm 10\%$
280	200	$230 \pm 10\%$	280	300	$230 \pm 10\%$
315	250	$230 \pm 10\%$	315	400	$230 \pm 10\%$

*Special voltage on request

Special motor version

Motors with encoder

As an option, the motors are available with hollow shaft encoder featuring the following data:

	Standard version	Special version
Make:	Kübler	Kübler
Connection:	2 m cable without plug	other cable length (without plug)
Pulses/revolution:	1024	10 – 5000
Output signal:	TTL or HTL	on request
Supply voltage:	5 V or 10-30 V	-
Type of ignition protection	II 2G Ex d IIC T6	-

Dimension sheets: See page 23.2 (motors with encoder)

Motors with motor cable

Optionally the motors can be supplied with a motor cable instead of with a terminal box. Connection to the motor occurs with a pressure-proof cable gland on the motor housing. The standard cable length is 2.0 m. Other cable lengths are available on request..

Dimension sheets: See page 23.3 (motors with motor cable)

Motors with special shaft and special flange

As an option, the motors - in particular in conjunction with a gear - are available with special flanges and special oil-tight shafts.

Dimension sheets on request



Special versions overview

As an option, the following special motor versions can also be delivered:

Size	63	71	80	90	100	112	132	160	180	200	225	250	280	315
Non-standard voltage	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Non-standard frequency	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Special shaft	•	•	•	•	•	•	•	•	•	•	•	•	•	•
2nd shaft end	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Special flange	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Concentricity R	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Fixed bearing DS	Standard												•	•
Oil-tight	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Protection class IP 56	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Protection class IP 65	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Protection class IP 66	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Protective shield	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Vibration severity level B	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Tropicalised installation	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Standstill heater against condensation	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Standstill heating for low temperature (< -20°)	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Roller bearing								•	•	•	•	•	•	•
Insulated bearing				•	•	•	•	•	•	•	•	•	•	•
Regreasing device								•	•	•	•	•	•	•
Motors with brake type BMH		•	•	•	•	•	•							
Motors with brake type KB (Kendrion)		•	•	•	•	•	•	•	•					
Motors with brake type BD (VIS)	•	•	•	•	•	•	•	•	•	•	•	•	•	
Motors with external fan			•	•	•	•	•	•	•	•	•	•	•	•
Motors with encoder	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Motors with motor cable	•	•	•	•	•	•	•	•	•	•	•			
Temperature class T5	on request													
Temperature class T6	on request													
Approval 2D/Zone 21		•	•	•	•	•	•	•	•	•	•	•		
UNIVERSAL version	•	•	•	•	•	•	•	•	•	•	•	•	•	•
GL approval	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Gost-R approval		•	•	•	•	•	•	•	•	•	•	•	•	•
Special Paint Specification	•	•	•	•	•	•	•	•	•	•	•	•	•	•

• Option available on request.

Explosion protected three-phase motors (single speed)



Three-phase motors

Number of poles: 2

Nominal data at 400V, 50Hz

Heat class F

Operating mode: S1

Synchronous speed: 3000 rpm

Surface cooling IC411

Type DEx DDEx	Nominal power P_N kW	Nominal speed n rpm	Efficiency η %	Power factor $\cos \varphi$	Nominal current (400V) I_N A	Nominal torque M_N Nm	Start-up to nominal current I_A/I_N	Start-up to nominal torque M_A/M_N	Breakdown to nominal torque M_K/M_N	Moment of inertia J kgm ²	Weight IM B3 M appr. kg
63K/2	0.18	2750	64.5	0.77	0.52	0.62	3.9	3.0	2.9	0.00014	13
63L/2	0.25	2765	67.0	0.80	0.67	0.86	4.2	2.7	2.7	0.00019	14
71K/2	0.37	2820	67.2	0.81	0.98	1.3	5.4	3.0	3.2	0.00034	15
71L/2	0.55	2800	72.7	0.86	1.28	1.9	5.4	2.8	3.1	0.00042	16
80K/2	0.75	2810	77.5	0.87	1.61	2.5	4.9	2.6	2.8	0.00063	24
80L/2	1.1	2775	78.8	0.88	2.29	3.8	5.1	2.8	2.9	0.00079	26
90S/2	1.5	2855	81.6	0.86	3.07	5.0	6.1	2.8	3.1	0.00124	32
90L/2	2.2	2845	80.8	0.89	4.4	7.4	5.9	2.7	2.7	0.00155	34
100L/2	3.0	2875	79.5	0.85	6.4	10	5.7	3.0	3.3	0.0025	42.5
112M/2	4.0	2880	84.0	0.88	7.8	13	6.9	2.7	3.1	0.0045	58
132S/2	5.5	2910	87.0	0.88	10.4	18	6.3	2.6	3.0	0.0097	77
132S/20	7.5	2920	87.7	0.88	14.1	25	6.9	3.0	3.3	0.0122	84
160M/2	11	2940	89.0	0.86	20.6	36	7.9	3.8	3.3	0.0294	148
160M/20	15	2940	90.6	0.90	26.5	49	7.9	3.4	3.0	0.0391	166
160L/2	18.5	2945	91.6	0.91	32.2	60	7.4	3.1	3.1	0.0459	178
180GM/2	22	2945	91.4	0.88	39.5	71	6.9	2.8	2.9	0.0615	205
200GL/2	30	2955	88.5	0.90	54.4	97	6.9	2.4	2.6	0.104	240
200GL/20	37	2970	88.6	0.91	66.5	119	9.0	3.3	3.0	0.127	250
225GM/2	45	2970	89.6	0.88	82.0	145	7.6	2.5	3.1	0.222	375
250GM/2	55	2970	89.3	0.91	98.0	177	6.6	2.1	2.2	0.675	485
280S/2	75	2980	90.8	0.88	136	241	8.2	3.0	2.7	0.95	650
280M/2	90	2980	92.0	0.90	158	289	8.1	3.0	2.6	1.10	700
315S/2	110	2970	92.0	0.94	186	353	7.2	2.5	3.1	1.6	820
315M/2	132	2985	92.0	0.93	223	425	7.5	2.8	2.8	1.8	930
315M/20	160	2975	90.0	0.94	272	515	8.1	2.9	3.1	2.2	1240
315L/2	200	2980	93.0	0.90	345	640	6.9	2.3	2.6	2.8	1380

Subject to technical amendments



Three-phase motors

Number of poles: 4
Operating mode: S1

Nominal data at 400V, 50Hz
Synchronous speed: 1500 rpm

Heat class F
Surface cooling IC411

Type DEx DDEx	Nominal power P_N kW	Nominal speed n rpm	Efficiency η %	Power factor $\cos \varphi$	Nominal current (400V) I_N A	Nominal torque M_N Nm	Start-up to nominal current I_A/I_N	Start-up to nominal torque M_A/M_N	Breakdown to nominal torque M_K/M_N	Moment of inertia J kgm ²	Weight IM B3 M appr. kg
63K/4	0.12	1345	59.5	0.69	0.42	0.85	2.8	2.2	2.3	0.00021	13
63L/4	0.18	1370	65.0	0.65	0.61	1.25	3.2	2.5	2.6	0.00029	14
71K/4	0.25	1370	67.0	0.78	0.69	1.7	3.8	2.15	2.2	0.00051	15
71L/4	0.37	1385	72.5	0.78	0.95	2.6	4.0	2.15	2.3	0.00063	16
80K/4	0.55	1405	80.4	0.76	1.3	3.8	5.2	2.3	2.4	0.0010	24
80L/4	0.75	1380	81.0	0.81	1.65	5.2	4.6	2.6	2.7	0.0013	26
90S/4	1.1	1410	80.9	0.82	2.4	7.5	4.8	2.15	2.5	0.0020	32
90L/4	1.5	1415	80.6	0.8	3.35	10	5.2	2.5	2.8	0.0026	35
100L/4	2.2	1410	82.5	0.82	4.7	15	4.6	2.0	2.5	0.0039	42.5
100L/40	3.0	1415	80.4	0.83	6.5	20	5.0	2.1	2.6	0.0050	46
112M/4	4.0	1435	85.4	0.81	8.3	27	6.1	2.8	3.1	0.0101	60
132S/4	5.5	1435	86.0	0.85	10.8	37	5.1	2.2	2.4	0.0211	84
132M/4	7.5	1445	88.9	0.84	14.5	50	6.0	2.5	2.8	0.0279	93.5
160M/4	11	1460	87.1	0.83	22.0	72	6.9	2.9	3.1	0.0542	159
160L/4	15	1465	90.8	0.83	29.0	98	7.4	3.1	3.0	0.0712	178
180GM/4	18.5	1470	91.4	0.83	35.2	121	6.9	3.1	2.5	0.1129	215
180GL/4	22	1470	91.8	0.85	40.7	143	7.1	3.1	2.6	0.1339	236
200GL/4	30	1470	89.6	0.91	53.4	195	6.8	2.7	2.8	0.213	250
225GS/4	37	1475	92.2	0.87	66.6	240	7.0	2.9	2.4	0.362	310
225GM/4	45	1475	92.5	0.87	80.5	291	7.3	3.3	2.7	0.429	390
250GM/4	55	1480	92.5	0.89	98.0	355	7.7	3.4	2.7	0.875	600
280S/4	75	1485	92.2	0.84	138	482	7.6	3.0	2.4	1.88	610
280M/4	90	1490	94.0	0.84	166	578	7.8	2.8	2.6	2.25	685
315S/4	110	1485	90.7	0.84	209	706	6.2	2.6	2.5	3.5	820
315M/4	132	1485	92.2	0.88	235	851	6.9	3.0	2.5	3.9	930
315M/40	160	1490	93.0	0.84	298	1027	5.8	1.9	2.1	5.0	1240
315L/4	200	1485	93.0	0.88	351	1285	6.8	1.5	1.6	6.1	1380

Subject to technical amendments



Three-phase motors

Number of poles: 6

Nominal data at 400V, 50Hz

Heat class F

Operating mode: S1

Synchronous speed: 1000 rpm

Surface cooling IC411

Type DEx DDEx	Nominal power P_N kW	Nominal speed n rpm	Efficiency η %	Power factor $\cos \varphi$	Nominal current (400V) I_N A	Nominal torque M_N Nm	Start-up to nominal current I_A/I_N	Start-up to nominal torque M_A/M_N	Breakdown to nominal torque M_k/M_N	Moment of inertia J kgm ²	Weight IM B3 M appr. kg
63K/6	0.09	895	51.0	0.61	0.42	1.0	2.3	2.2	2.3	0.00031	13
63L/6	0.12	900	55.0	0.60	0.52	1.3	2.5	2.5	2.5	0.00042	14
71K/6	0.18	930	60.0	0.65	0.67	1.9	3.1	2.1	2.3	0.00081	15
71L/6	0.25	940	64.0	0.67	0.85	2.6	3.7	2.2	2.5	0.00101	16
80K/6	0.37	925	67.0	0.72	1.1	3.8	3.6	2.3	2.5	0.0019	25
80L/6	0.55	915	72.0	0.74	1.5	5.7	4.1	2.35	2.5	0.0024	26.5
90S/6	0.75	915	70.0	0.74	2.1	7.8	3.7	1.8	2.1	0.0032	32
90L/6	1.1	915	73.0	0.73	3.0	12	4.1	2.1	2.3	0.0042	35
100L/6	1.5	930	76.0	0.77	3.7	15	4.7	2.2	2.3	0.0066	46
112M/6	2.2	960	82.0	0.78	5.0	22	6.1	2.6	2.7	0.0158	60
132S/6	3.0	975	83.5	0.79	6.6	29	6.3	2.3	2.5	0.0272	84
132M/6	4.0	960	83.0	0.80	8.8	40	6.3	2.4	2.9	0.0323	88
132M/60	5.5	955	83.5	0.81	11.8	55	6.1	2.3	2.9	0.0384	95
160M/6	7.5	970	86.0	0.80	15.8	74	6.7	2.7	2.4	0.0812	161
160L/6	11.0	965	88.5	0.77	23.5	109	6.0	2.2	2.3	0.1092	182
180GL/6	15.0	965	90.4	0.85	28.2	148	6.4	1.9	2.3	0.2270	236
200GL/6	18.5	965	91.0	0.81	36.0	183	6.0	1.9	2.4	0.244	240
200GL/60	22.0	965	91.5	0.81	43.0	219	6.0	1.9	2.4	0.279	250
225GM/6	30.0	985	91.9	0.82	57.5	290	7.0	2.0	2.5	0.661	390
250GM/6	37.0	985	93.5	0.83	69.0	359	6.0	2.8	2.6	1.125	480
280S/6	45.0	985	94.5	0.84	82.0	437	6.3	2.5	2.7	2.30	610
280M/6	55.0	985	95.0	0.84	101	534	6.0	2.4	2.8	2.63	685
315S/6	75.0	980	95.0	0.82	140	732	5.9	2.5	2.8	4.6	820
315M/6	90.0	985	95.5	0.84	163	874	5.1	2.1	2.9	5.3	930
315M/60	110.0	990	91.5	0.88	198	1060	6.5	2.5	2.4	6.0	1240
315L/6	132.0	993	92.0	0.84	249	1275	7.0	2.6	2.4	7.3	1380

Subject to technical amendments



Three-phase motors

Number of poles: 8
Operating mode: S1

Nominal data at 400V, 50Hz
Synchronous speed: 750 rpm

Heat class F
Surface cooling IC411

Type DEx DDEx	Nominal power P_N kW	Nominal speed n rpm	Efficiency η %	Power factor $\cos \varphi$	Nominal current (400V) I_N A	Nominal torque M_N Nm	Start-up to nominal current I_A/I_N	Start-up to nominal torque M_A/M_N	Breakdown to nominal torque M_k/M_N	Moment of inertia J kgm ²	Weight IM B3 M appr. kg
63L/8	0.06	650	31.0	0.73	0.50	0.88	2.0	2.0	2.1	0.00042	14
71K/8	0.09	680	38.0	0.67	0.51	1.3	2.0	2.0	2.1	0.00081	15
71L/8	0.12	655	45.0	0.71	0.54	1.7	2.4	1.8	2.1	0.00101	16
80K/8	0.18	680	61.0	0.65	0.66	2.6	2.9	2.1	2.2	0.0019	25
80L/8	0.25	680	58.0	0.68	0.92	3.5	3.1	2.1	2.3	0.0024	26.5
90S/8	0.37	685	66.0	0.65	1.25	5.2	3.0	1.7	2.0	0.0032	32
90L/8	0.55	685	69.0	0.66	1.75	7.7	3.1	1.75	2.1	0.0042	35
100L/8	0.75	690	69.0	0.69	2.3	10	3.5	1.8	2.1	0.0066	42.5
100L/80	1.1	695	70.0	0.7	3.25	15	3.8	1.9	2.2	0.0086	46
112M/8	1.5	710	78.0	0.67	4.15	20	4.3	2.0	2.5	0.0158	60
132S/8	2.2	710	79.0	0.74	5.5	30	4.3	1.9	2.2	0.0261	79
132M/80	3.0	710	80.0	0.76	7.2	40	4.8	2.1	2.3	0.0345	85
160M/8	4.0	720	82.6	0.71	10.0	53	4.8	1.8	2.3	0.0688	146
160M/80	5.5	715	84.0	0.71	13.4	74	4.8	1.8	2.1	0.0894	160
160L/8	7.5	725	86.5	0.75	16.7	99	5.8	2.3	2.1	0.1203	182
180GL/8	11.0	715	86.7	0.74	25.0	147	4.2	1.8	2.5	0.2270	236
200GL/8	15.0	720	91.0	0.82	29.0	196	4.5	2.1	2.5	0.378	250
225GS/8	18.5	710	91.0	0.79	37.0	249	4.6	2.1	2.6	0.570	310
225GM/8	22.0	715	91.5	0.77	45.0	294	4.6	2.1	2.6	0.678	390
250GM/8	30.0	730	92.8	0.79	59.0	398	5.4	1.7	2.4	1.18	480
280S/8	37.0	730	93.0	0.78	74.0	485	6.0	1.9	2.3	2.30	610
280M/8	45.0	735	93.5	0.78	90.0	586	6.4	1.9	2.7	2.63	685
315S/8	55.0	735	94.5	0.81	104	716	6.2	2.2	2.3	4.6	820
315M/8	75.0	740	94.5	0.82	140	969	6.3	1.8	2.1	5.3	930
315M/80	90.0	740	91.1	0.83	173	1160	6.7	2.5	2.5	6.0	1240
315L/8	110.0	740	90.0	0.83	213	1420	6.9	2.6	2.5	7.3	1380

Subject to technical amendments

**Explosion protected three-phase motors,
efficiency class IE2**



Three-phase motors

Efficiency IE2 – DIN EN 60034-30

Number of poles: 2

Nominal data at 400V, 50Hz

Heat class F

Operating mode: S1

Synchronous speed: 3000 rpm

Surface cooling IC411

Type DEx DDEx	Nominal power P _N kW	Nominal speed n rpm	Efficiency η %	Power factor cos φ	Nominal current (400V) I _N A	Nominal torque M _N Nm	Start-up to nominal current I _A /I _N	Start-up to nominal torque M _A /M _N	Breakdown to nominal torque M _k /M _N	Moment of inertia J kgm ²	Weight IM B3 M appr. kg
80KH/2	0.75	2825	82.2	0.85	1.55	2.5	4.9	2.6	2.8	0.00063	24
80LH/2	1.1	2860	85.9	0.86	2.15	3.8	5.1	2.8	2.9	0.00079	26
90SH/2	1.5	2865	85.9	0.84	3.0	5.0	6.1	2.8	3.1	0.00124	32
90LH/2	2.2	2870	84.9	0.87	4.3	7.3	5.9	2.7	2.7	0.00155	34
100LH/2	3.0	2885	84.9	0.85	6.0	10	5.7	3.0	3.3	0.0025	42.5
112MH/2	4.0	2890	86.2	0.87	7.7	13.2	6.9	2.7	3.1	0.0045	58
132SH/2	5.5	2910	89.6	0.86	10.3	18	6.3	2.6	3.0	0.0097	77
132SH/20	7.5	2920	88.9	0.87	14.0	25	6.9	3.0	3.3	0.0122	84
160MH/2	11	2940	90.5	0.86	20.4	36	7.9	3.8	3.3	0.0294	148
160MH/20	15	2940	91.8	0.89	26.5	49	7.9	3.4	3.0	0.0391	166
160LH/2	18.5	2945	91.2	0.91	32.2	60	7.4	3.1	3.1	0.0459	178
180GMH/2	22	2945	91.4	0.88	39.5	71	6.9	2.8	2.9	0.0615	205
200GLH/2	30	2955	92.0	0.89	53.0	97	6.9	2.4	2.6	0.104	240
200GLH/20	37	2970	92.5	0.90	64.2	119	9.0	3.3	3.0	0.127	250
225GMH/2	45	2970	93.1	0.88	79.4	145	7.6	2.5	3.1	0.222	375

Subject to technical amendments



Three-phase motors

Efficiency IE2 – DIN EN 60034-30

Number of poles: 4

Nominal data at 400V, 50Hz

Heat class F

Operating mode: S1

Synchronous speed: 1500 rpm

Surface cooling IC411

Type DEx DDEx	Nominal power P _N kW	Nominal speed n rpm	Efficiency η %	Power factor cos φ	Nominal current (400V) I _N A	Nominal torque M _N Nm	Start-up to nominal current I _A /I _N	Start-up to nominal torque M _A /M _N	Breakdown to nominal torque M _k /M _N	Moment of inertia J kgm ²	Weight IM B3 M appr. kg
80LH/4	0.75	1380	81.0	0.81	1.65	5.2	4.6	2.2	2.4	0.00125	26
90SH/4	1.1	1410	81.7	0.81	2.4	7.5	4.8	2.1	2.5	0.00204	32
90LH/4	1.5	1420	83.0	0.79	3.3	10.1	5.2	2.4	2.8	0.0026	35
100LH/4	2.2	1420	85.2	0.81	4.6	14.8	4.6	2.0	2.5	0.00388	43
100LH/40	3.0	1415	85.9	0.80	6.3	20.2	5.0	2.2	2.6	0.00499	46
112MH/4	4.0	1440	86.9	0.81	8.2	26.5	6.1	2.6	3.1	0.01014	60
132SH/4	5.5	1445	88.6	0.83	10.8	36.0	5.1	2.2	2.4	0.02113	84
132MH/4	7.5	1450	88.9	0.84	14.5	49.5	6.0	2.6	2.8	0.02793	94
160MH/4	11.0	1465	90.1	0.82	21.5	72.0	6.9	2.9	3.1	0.05417	159
160LH/4	15.0	1470	91.5	0.83	28.5	97.5	7.4	2.6	3.0	0.07116	178
180GMH/4	18.5	1470	91.4	0.83	35.2	120	6.9	3.1	2.5	0.1129	215
180GLH/4	22.0	1470	91.8	0.85	40.7	143	7.1	3.1	2.6	0.1339	236
200GLH/4	30.0	1475	92.7	0.89	52.7	195	7.5	2.8	2.8	0.21298	250
225GSH/4	37.0	1475	93.0	0.85	67.4	240	7.0	2.9	2.4	0.36225	310
225GMH/4	45.0	1480	93.4	0.87	81.2	291	7.3	3.0	2.7	0.42845	390

Subject to technical amendments

Explosion protected three-phase motors (pole-switching)



Three-phase motors

Number of poles: 4-2

Nominal data at 400 V, 50 Hz Δ /YY

Heat class F

Operating mode: S1

Synchronous speed: 1500/3000 rpm

Surface cooling IC411

Type	Nominal power	Nominal speed	Nominal current (400V)	Nominal torque	Start-up to nominal current	Start-up to nominal torque	Moment of inertia	Weight IM B3																																																																																																																																																																																																																																																																																																																																																																																				
DEx DDEx	P _N kW	n rpm	I _N A	M _N Nm	I _A /I _N	M _K /M _N	J kgm ²	M appr. kg																																																																																																																																																																																																																																																																																																																																																																																				
63K/4-2	0.09	1380	0.45	0.62	3.2	2.2	0.00021	13																																																																																																																																																																																																																																																																																																																																																																																				
	0.12	2800	0.50	0.41	3.5	2.1			63L/4-2	0.12	1390	0.50	0.82	3.6	2.2	0.00029	14	0.18	2800	0.55	0.61	3.8	2.0	71K/4-2	0.21	1380	0.75	1.45	3.6	2.1	0.00051	16	0.28	2800	0.90	0.96	3.9	2.1	71L/4-2	0.30	1380	1.05	2.08	3.8	2.1	0.00063	17	0.43	2800	1.25	1.47	4.0	2.0	80K/4-2	0.50	1370	1.26	3.49	3.7	1.8	0.0010	25	0.65	2760	1.43	2.25	3.4	1.9	80L/4-2	0.70	1365	1.75	4.90	4.1	2.0	0.0013	28	0.85	2810	1.85	2.89	5.5	2.4	90S/4-2	1.1	1415	2.60	7.42	4.4	1.9	0.0020	34	1.4	2800	2.95	4.78	4.7	2.0	90L/4-2	1.5	1410	3.30	10.2	4.9	2.1	0.0026	36	1.9	2850	3.90	6.37	5.3	2.3	100L/4-2	1.8	1430	4.16	12.0	4.8	2.0	0.0039	45	2.4	2860	5.25	8.01	5.0	1.9	100L/4-20	2.6	1420	5.65	17.5	5.8	2.1	0.0050	49	3.2	2870	6.60	10.7	6.6	2.3	112M/4-2	3.7	1460	8.40	24.2	6.6	2.8	0.0101	64	4.4	2890	8.50	14.5	7.4	2.9	132S/4-2	5.0	1460	11.5	32.7	6.2	2.7	0.0211	89	6.0	2900	11.9	19.8	6.4	2.8	132M/4-2	6.1	1450	13.8	40.2	6.7	2.5	0.0279	99	7.5	2910	15.4	24.6	6.9	2.3	160M/4-2	9.0	1465	19.5	58.7	6.5	2.3	0.0542	170	10.5	2930	22.0	34.2	7.5	2.2	160L/4-2	12	1470	27.5	78.0	7.2	2.8	0.0712	189	15	2940	31.0	48.7	7.5	2.7	180GM/4-2	14	1470	29	100	6.8	2.5	0.1129	220	17	2940	33	55.2	7.5	2.5	180GL/4-2	17	1475	35	110	6.9	2.5	0.1339	240	20	2950	39	64.7	7.5	2.5	200GL/4-2	20	1475	41	130	7.0	2.5	0.213	260	23	2950	46	74.5	7.5	2.5	225GS/4-2	24	1480	46	155	7.0	2.5	0.362	320	28	2955	59	90.5	7.5	2.5	225GM/4-2	29	1485	62	186	7.2	2.5	0.429	400	34	2960	66	109	7.6	2.6	250GM/4-2	36	1485	77	231	7.1	2.4	0.875	490	45	2960	87	145	7.5	2.5	280S/4-2	46	1480	85	296	6.8	2.0	1.88	610	58	2970	95	186	7.0	2.0	280M/4-2	65	1480	128	419	6.6	1.8	2.25	685	80	2970	142	257	6.8	1.8	315S/4-2	78	1485	154	501	6.5	1.8	3.5	820	90	2970	176	289	6.0	1.7	315M/4-2	90	1485	156	578	6.5	1.8	3.9	930	100	2970	190	321	6.2	1.7	315M/4-20	100	1485	208	643	6.2	1.8	5.0	1240	120	2970	230
63L/4-2	0.12	1390	0.50	0.82	3.6	2.2	0.00029	14																																																																																																																																																																																																																																																																																																																																																																																				
	0.18	2800	0.55	0.61	3.8	2.0			71K/4-2	0.21	1380	0.75	1.45	3.6	2.1	0.00051	16	0.28	2800	0.90	0.96	3.9	2.1	71L/4-2	0.30	1380	1.05	2.08	3.8	2.1	0.00063	17	0.43	2800	1.25	1.47	4.0	2.0	80K/4-2	0.50	1370	1.26	3.49	3.7	1.8	0.0010	25	0.65	2760	1.43	2.25	3.4	1.9	80L/4-2	0.70	1365	1.75	4.90	4.1	2.0	0.0013	28	0.85	2810	1.85	2.89	5.5	2.4	90S/4-2	1.1	1415	2.60	7.42	4.4	1.9	0.0020	34	1.4	2800	2.95	4.78	4.7	2.0	90L/4-2	1.5	1410	3.30	10.2	4.9	2.1	0.0026	36	1.9	2850	3.90	6.37	5.3	2.3	100L/4-2	1.8	1430	4.16	12.0	4.8	2.0	0.0039	45	2.4	2860	5.25	8.01	5.0	1.9	100L/4-20	2.6	1420	5.65	17.5	5.8	2.1	0.0050	49	3.2	2870	6.60	10.7	6.6	2.3	112M/4-2	3.7	1460	8.40	24.2	6.6	2.8	0.0101	64	4.4	2890	8.50	14.5	7.4	2.9	132S/4-2	5.0	1460	11.5	32.7	6.2	2.7	0.0211	89	6.0	2900	11.9	19.8	6.4	2.8	132M/4-2	6.1	1450	13.8	40.2	6.7	2.5	0.0279	99	7.5	2910	15.4	24.6	6.9	2.3	160M/4-2	9.0	1465	19.5	58.7	6.5	2.3	0.0542	170	10.5	2930	22.0	34.2	7.5	2.2	160L/4-2	12	1470	27.5	78.0	7.2	2.8	0.0712	189	15	2940	31.0	48.7	7.5	2.7	180GM/4-2	14	1470	29	100	6.8	2.5	0.1129	220	17	2940	33	55.2	7.5	2.5	180GL/4-2	17	1475	35	110	6.9	2.5	0.1339	240	20	2950	39	64.7	7.5	2.5	200GL/4-2	20	1475	41	130	7.0	2.5	0.213	260	23	2950	46	74.5	7.5	2.5	225GS/4-2	24	1480	46	155	7.0	2.5	0.362	320	28	2955	59	90.5	7.5	2.5	225GM/4-2	29	1485	62	186	7.2	2.5	0.429	400	34	2960	66	109	7.6	2.6	250GM/4-2	36	1485	77	231	7.1	2.4	0.875	490	45	2960	87	145	7.5	2.5	280S/4-2	46	1480	85	296	6.8	2.0	1.88	610	58	2970	95	186	7.0	2.0	280M/4-2	65	1480	128	419	6.6	1.8	2.25	685	80	2970	142	257	6.8	1.8	315S/4-2	78	1485	154	501	6.5	1.8	3.5	820	90	2970	176	289	6.0	1.7	315M/4-2	90	1485	156	578	6.5	1.8	3.9	930	100	2970	190	321	6.2	1.7	315M/4-20	100	1485	208	643	6.2	1.8	5.0	1240	120	2970	230	385	6.0	1.6												
71K/4-2	0.21	1380	0.75	1.45	3.6	2.1	0.00051	16																																																																																																																																																																																																																																																																																																																																																																																				
	0.28	2800	0.90	0.96	3.9	2.1			71L/4-2	0.30	1380	1.05	2.08	3.8	2.1	0.00063	17	0.43	2800	1.25	1.47	4.0	2.0	80K/4-2	0.50	1370	1.26	3.49	3.7	1.8	0.0010	25	0.65	2760	1.43	2.25	3.4	1.9	80L/4-2	0.70	1365	1.75	4.90	4.1	2.0	0.0013	28	0.85	2810	1.85	2.89	5.5	2.4	90S/4-2	1.1	1415	2.60	7.42	4.4	1.9	0.0020	34	1.4	2800	2.95	4.78	4.7	2.0	90L/4-2	1.5	1410	3.30	10.2	4.9	2.1	0.0026	36	1.9	2850	3.90	6.37	5.3	2.3	100L/4-2	1.8	1430	4.16	12.0	4.8	2.0	0.0039	45	2.4	2860	5.25	8.01	5.0	1.9	100L/4-20	2.6	1420	5.65	17.5	5.8	2.1	0.0050	49	3.2	2870	6.60	10.7	6.6	2.3	112M/4-2	3.7	1460	8.40	24.2	6.6	2.8	0.0101	64	4.4	2890	8.50	14.5	7.4	2.9	132S/4-2	5.0	1460	11.5	32.7	6.2	2.7	0.0211	89	6.0	2900	11.9	19.8	6.4	2.8	132M/4-2	6.1	1450	13.8	40.2	6.7	2.5	0.0279	99	7.5	2910	15.4	24.6	6.9	2.3	160M/4-2	9.0	1465	19.5	58.7	6.5	2.3	0.0542	170	10.5	2930	22.0	34.2	7.5	2.2	160L/4-2	12	1470	27.5	78.0	7.2	2.8	0.0712	189	15	2940	31.0	48.7	7.5	2.7	180GM/4-2	14	1470	29	100	6.8	2.5	0.1129	220	17	2940	33	55.2	7.5	2.5	180GL/4-2	17	1475	35	110	6.9	2.5	0.1339	240	20	2950	39	64.7	7.5	2.5	200GL/4-2	20	1475	41	130	7.0	2.5	0.213	260	23	2950	46	74.5	7.5	2.5	225GS/4-2	24	1480	46	155	7.0	2.5	0.362	320	28	2955	59	90.5	7.5	2.5	225GM/4-2	29	1485	62	186	7.2	2.5	0.429	400	34	2960	66	109	7.6	2.6	250GM/4-2	36	1485	77	231	7.1	2.4	0.875	490	45	2960	87	145	7.5	2.5	280S/4-2	46	1480	85	296	6.8	2.0	1.88	610	58	2970	95	186	7.0	2.0	280M/4-2	65	1480	128	419	6.6	1.8	2.25	685	80	2970	142	257	6.8	1.8	315S/4-2	78	1485	154	501	6.5	1.8	3.5	820	90	2970	176	289	6.0	1.7	315M/4-2	90	1485	156	578	6.5	1.8	3.9	930	100	2970	190	321	6.2	1.7	315M/4-20	100	1485	208	643	6.2	1.8	5.0	1240	120	2970	230	385	6.0	1.6																											
71L/4-2	0.30	1380	1.05	2.08	3.8	2.1	0.00063	17																																																																																																																																																																																																																																																																																																																																																																																				
	0.43	2800	1.25	1.47	4.0	2.0			80K/4-2	0.50	1370	1.26	3.49	3.7	1.8	0.0010	25	0.65	2760	1.43	2.25	3.4	1.9	80L/4-2	0.70	1365	1.75	4.90	4.1	2.0	0.0013	28	0.85	2810	1.85	2.89	5.5	2.4	90S/4-2	1.1	1415	2.60	7.42	4.4	1.9	0.0020	34	1.4	2800	2.95	4.78	4.7	2.0	90L/4-2	1.5	1410	3.30	10.2	4.9	2.1	0.0026	36	1.9	2850	3.90	6.37	5.3	2.3	100L/4-2	1.8	1430	4.16	12.0	4.8	2.0	0.0039	45	2.4	2860	5.25	8.01	5.0	1.9	100L/4-20	2.6	1420	5.65	17.5	5.8	2.1	0.0050	49	3.2	2870	6.60	10.7	6.6	2.3	112M/4-2	3.7	1460	8.40	24.2	6.6	2.8	0.0101	64	4.4	2890	8.50	14.5	7.4	2.9	132S/4-2	5.0	1460	11.5	32.7	6.2	2.7	0.0211	89	6.0	2900	11.9	19.8	6.4	2.8	132M/4-2	6.1	1450	13.8	40.2	6.7	2.5	0.0279	99	7.5	2910	15.4	24.6	6.9	2.3	160M/4-2	9.0	1465	19.5	58.7	6.5	2.3	0.0542	170	10.5	2930	22.0	34.2	7.5	2.2	160L/4-2	12	1470	27.5	78.0	7.2	2.8	0.0712	189	15	2940	31.0	48.7	7.5	2.7	180GM/4-2	14	1470	29	100	6.8	2.5	0.1129	220	17	2940	33	55.2	7.5	2.5	180GL/4-2	17	1475	35	110	6.9	2.5	0.1339	240	20	2950	39	64.7	7.5	2.5	200GL/4-2	20	1475	41	130	7.0	2.5	0.213	260	23	2950	46	74.5	7.5	2.5	225GS/4-2	24	1480	46	155	7.0	2.5	0.362	320	28	2955	59	90.5	7.5	2.5	225GM/4-2	29	1485	62	186	7.2	2.5	0.429	400	34	2960	66	109	7.6	2.6	250GM/4-2	36	1485	77	231	7.1	2.4	0.875	490	45	2960	87	145	7.5	2.5	280S/4-2	46	1480	85	296	6.8	2.0	1.88	610	58	2970	95	186	7.0	2.0	280M/4-2	65	1480	128	419	6.6	1.8	2.25	685	80	2970	142	257	6.8	1.8	315S/4-2	78	1485	154	501	6.5	1.8	3.5	820	90	2970	176	289	6.0	1.7	315M/4-2	90	1485	156	578	6.5	1.8	3.9	930	100	2970	190	321	6.2	1.7	315M/4-20	100	1485	208	643	6.2	1.8	5.0	1240	120	2970	230	385	6.0	1.6																																										
80K/4-2	0.50	1370	1.26	3.49	3.7	1.8	0.0010	25																																																																																																																																																																																																																																																																																																																																																																																				
	0.65	2760	1.43	2.25	3.4	1.9			80L/4-2	0.70	1365	1.75	4.90	4.1	2.0	0.0013	28	0.85	2810	1.85	2.89	5.5	2.4	90S/4-2	1.1	1415	2.60	7.42	4.4	1.9	0.0020	34	1.4	2800	2.95	4.78	4.7	2.0	90L/4-2	1.5	1410	3.30	10.2	4.9	2.1	0.0026	36	1.9	2850	3.90	6.37	5.3	2.3	100L/4-2	1.8	1430	4.16	12.0	4.8	2.0	0.0039	45	2.4	2860	5.25	8.01	5.0	1.9	100L/4-20	2.6	1420	5.65	17.5	5.8	2.1	0.0050	49	3.2	2870	6.60	10.7	6.6	2.3	112M/4-2	3.7	1460	8.40	24.2	6.6	2.8	0.0101	64	4.4	2890	8.50	14.5	7.4	2.9	132S/4-2	5.0	1460	11.5	32.7	6.2	2.7	0.0211	89	6.0	2900	11.9	19.8	6.4	2.8	132M/4-2	6.1	1450	13.8	40.2	6.7	2.5	0.0279	99	7.5	2910	15.4	24.6	6.9	2.3	160M/4-2	9.0	1465	19.5	58.7	6.5	2.3	0.0542	170	10.5	2930	22.0	34.2	7.5	2.2	160L/4-2	12	1470	27.5	78.0	7.2	2.8	0.0712	189	15	2940	31.0	48.7	7.5	2.7	180GM/4-2	14	1470	29	100	6.8	2.5	0.1129	220	17	2940	33	55.2	7.5	2.5	180GL/4-2	17	1475	35	110	6.9	2.5	0.1339	240	20	2950	39	64.7	7.5	2.5	200GL/4-2	20	1475	41	130	7.0	2.5	0.213	260	23	2950	46	74.5	7.5	2.5	225GS/4-2	24	1480	46	155	7.0	2.5	0.362	320	28	2955	59	90.5	7.5	2.5	225GM/4-2	29	1485	62	186	7.2	2.5	0.429	400	34	2960	66	109	7.6	2.6	250GM/4-2	36	1485	77	231	7.1	2.4	0.875	490	45	2960	87	145	7.5	2.5	280S/4-2	46	1480	85	296	6.8	2.0	1.88	610	58	2970	95	186	7.0	2.0	280M/4-2	65	1480	128	419	6.6	1.8	2.25	685	80	2970	142	257	6.8	1.8	315S/4-2	78	1485	154	501	6.5	1.8	3.5	820	90	2970	176	289	6.0	1.7	315M/4-2	90	1485	156	578	6.5	1.8	3.9	930	100	2970	190	321	6.2	1.7	315M/4-20	100	1485	208	643	6.2	1.8	5.0	1240	120	2970	230	385	6.0	1.6																																																									
80L/4-2	0.70	1365	1.75	4.90	4.1	2.0	0.0013	28																																																																																																																																																																																																																																																																																																																																																																																				
	0.85	2810	1.85	2.89	5.5	2.4			90S/4-2	1.1	1415	2.60	7.42	4.4	1.9	0.0020	34	1.4	2800	2.95	4.78	4.7	2.0	90L/4-2	1.5	1410	3.30	10.2	4.9	2.1	0.0026	36	1.9	2850	3.90	6.37	5.3	2.3	100L/4-2	1.8	1430	4.16	12.0	4.8	2.0	0.0039	45	2.4	2860	5.25	8.01	5.0	1.9	100L/4-20	2.6	1420	5.65	17.5	5.8	2.1	0.0050	49	3.2	2870	6.60	10.7	6.6	2.3	112M/4-2	3.7	1460	8.40	24.2	6.6	2.8	0.0101	64	4.4	2890	8.50	14.5	7.4	2.9	132S/4-2	5.0	1460	11.5	32.7	6.2	2.7	0.0211	89	6.0	2900	11.9	19.8	6.4	2.8	132M/4-2	6.1	1450	13.8	40.2	6.7	2.5	0.0279	99	7.5	2910	15.4	24.6	6.9	2.3	160M/4-2	9.0	1465	19.5	58.7	6.5	2.3	0.0542	170	10.5	2930	22.0	34.2	7.5	2.2	160L/4-2	12	1470	27.5	78.0	7.2	2.8	0.0712	189	15	2940	31.0	48.7	7.5	2.7	180GM/4-2	14	1470	29	100	6.8	2.5	0.1129	220	17	2940	33	55.2	7.5	2.5	180GL/4-2	17	1475	35	110	6.9	2.5	0.1339	240	20	2950	39	64.7	7.5	2.5	200GL/4-2	20	1475	41	130	7.0	2.5	0.213	260	23	2950	46	74.5	7.5	2.5	225GS/4-2	24	1480	46	155	7.0	2.5	0.362	320	28	2955	59	90.5	7.5	2.5	225GM/4-2	29	1485	62	186	7.2	2.5	0.429	400	34	2960	66	109	7.6	2.6	250GM/4-2	36	1485	77	231	7.1	2.4	0.875	490	45	2960	87	145	7.5	2.5	280S/4-2	46	1480	85	296	6.8	2.0	1.88	610	58	2970	95	186	7.0	2.0	280M/4-2	65	1480	128	419	6.6	1.8	2.25	685	80	2970	142	257	6.8	1.8	315S/4-2	78	1485	154	501	6.5	1.8	3.5	820	90	2970	176	289	6.0	1.7	315M/4-2	90	1485	156	578	6.5	1.8	3.9	930	100	2970	190	321	6.2	1.7	315M/4-20	100	1485	208	643	6.2	1.8	5.0	1240	120	2970	230	385	6.0	1.6																																																																								
90S/4-2	1.1	1415	2.60	7.42	4.4	1.9	0.0020	34																																																																																																																																																																																																																																																																																																																																																																																				
	1.4	2800	2.95	4.78	4.7	2.0			90L/4-2	1.5	1410	3.30	10.2	4.9	2.1	0.0026	36	1.9	2850	3.90	6.37	5.3	2.3	100L/4-2	1.8	1430	4.16	12.0	4.8	2.0	0.0039	45	2.4	2860	5.25	8.01	5.0	1.9	100L/4-20	2.6	1420	5.65	17.5	5.8	2.1	0.0050	49	3.2	2870	6.60	10.7	6.6	2.3	112M/4-2	3.7	1460	8.40	24.2	6.6	2.8	0.0101	64	4.4	2890	8.50	14.5	7.4	2.9	132S/4-2	5.0	1460	11.5	32.7	6.2	2.7	0.0211	89	6.0	2900	11.9	19.8	6.4	2.8	132M/4-2	6.1	1450	13.8	40.2	6.7	2.5	0.0279	99	7.5	2910	15.4	24.6	6.9	2.3	160M/4-2	9.0	1465	19.5	58.7	6.5	2.3	0.0542	170	10.5	2930	22.0	34.2	7.5	2.2	160L/4-2	12	1470	27.5	78.0	7.2	2.8	0.0712	189	15	2940	31.0	48.7	7.5	2.7	180GM/4-2	14	1470	29	100	6.8	2.5	0.1129	220	17	2940	33	55.2	7.5	2.5	180GL/4-2	17	1475	35	110	6.9	2.5	0.1339	240	20	2950	39	64.7	7.5	2.5	200GL/4-2	20	1475	41	130	7.0	2.5	0.213	260	23	2950	46	74.5	7.5	2.5	225GS/4-2	24	1480	46	155	7.0	2.5	0.362	320	28	2955	59	90.5	7.5	2.5	225GM/4-2	29	1485	62	186	7.2	2.5	0.429	400	34	2960	66	109	7.6	2.6	250GM/4-2	36	1485	77	231	7.1	2.4	0.875	490	45	2960	87	145	7.5	2.5	280S/4-2	46	1480	85	296	6.8	2.0	1.88	610	58	2970	95	186	7.0	2.0	280M/4-2	65	1480	128	419	6.6	1.8	2.25	685	80	2970	142	257	6.8	1.8	315S/4-2	78	1485	154	501	6.5	1.8	3.5	820	90	2970	176	289	6.0	1.7	315M/4-2	90	1485	156	578	6.5	1.8	3.9	930	100	2970	190	321	6.2	1.7	315M/4-20	100	1485	208	643	6.2	1.8	5.0	1240	120	2970	230	385	6.0	1.6																																																																																							
90L/4-2	1.5	1410	3.30	10.2	4.9	2.1	0.0026	36																																																																																																																																																																																																																																																																																																																																																																																				
	1.9	2850	3.90	6.37	5.3	2.3			100L/4-2	1.8	1430	4.16	12.0	4.8	2.0	0.0039	45	2.4	2860	5.25	8.01	5.0	1.9	100L/4-20	2.6	1420	5.65	17.5	5.8	2.1	0.0050	49	3.2	2870	6.60	10.7	6.6	2.3	112M/4-2	3.7	1460	8.40	24.2	6.6	2.8	0.0101	64	4.4	2890	8.50	14.5	7.4	2.9	132S/4-2	5.0	1460	11.5	32.7	6.2	2.7	0.0211	89	6.0	2900	11.9	19.8	6.4	2.8	132M/4-2	6.1	1450	13.8	40.2	6.7	2.5	0.0279	99	7.5	2910	15.4	24.6	6.9	2.3	160M/4-2	9.0	1465	19.5	58.7	6.5	2.3	0.0542	170	10.5	2930	22.0	34.2	7.5	2.2	160L/4-2	12	1470	27.5	78.0	7.2	2.8	0.0712	189	15	2940	31.0	48.7	7.5	2.7	180GM/4-2	14	1470	29	100	6.8	2.5	0.1129	220	17	2940	33	55.2	7.5	2.5	180GL/4-2	17	1475	35	110	6.9	2.5	0.1339	240	20	2950	39	64.7	7.5	2.5	200GL/4-2	20	1475	41	130	7.0	2.5	0.213	260	23	2950	46	74.5	7.5	2.5	225GS/4-2	24	1480	46	155	7.0	2.5	0.362	320	28	2955	59	90.5	7.5	2.5	225GM/4-2	29	1485	62	186	7.2	2.5	0.429	400	34	2960	66	109	7.6	2.6	250GM/4-2	36	1485	77	231	7.1	2.4	0.875	490	45	2960	87	145	7.5	2.5	280S/4-2	46	1480	85	296	6.8	2.0	1.88	610	58	2970	95	186	7.0	2.0	280M/4-2	65	1480	128	419	6.6	1.8	2.25	685	80	2970	142	257	6.8	1.8	315S/4-2	78	1485	154	501	6.5	1.8	3.5	820	90	2970	176	289	6.0	1.7	315M/4-2	90	1485	156	578	6.5	1.8	3.9	930	100	2970	190	321	6.2	1.7	315M/4-20	100	1485	208	643	6.2	1.8	5.0	1240	120	2970	230	385	6.0	1.6																																																																																																						
100L/4-2	1.8	1430	4.16	12.0	4.8	2.0	0.0039	45																																																																																																																																																																																																																																																																																																																																																																																				
	2.4	2860	5.25	8.01	5.0	1.9			100L/4-20	2.6	1420	5.65	17.5	5.8	2.1	0.0050	49	3.2	2870	6.60	10.7	6.6	2.3	112M/4-2	3.7	1460	8.40	24.2	6.6	2.8	0.0101	64	4.4	2890	8.50	14.5	7.4	2.9	132S/4-2	5.0	1460	11.5	32.7	6.2	2.7	0.0211	89	6.0	2900	11.9	19.8	6.4	2.8	132M/4-2	6.1	1450	13.8	40.2	6.7	2.5	0.0279	99	7.5	2910	15.4	24.6	6.9	2.3	160M/4-2	9.0	1465	19.5	58.7	6.5	2.3	0.0542	170	10.5	2930	22.0	34.2	7.5	2.2	160L/4-2	12	1470	27.5	78.0	7.2	2.8	0.0712	189	15	2940	31.0	48.7	7.5	2.7	180GM/4-2	14	1470	29	100	6.8	2.5	0.1129	220	17	2940	33	55.2	7.5	2.5	180GL/4-2	17	1475	35	110	6.9	2.5	0.1339	240	20	2950	39	64.7	7.5	2.5	200GL/4-2	20	1475	41	130	7.0	2.5	0.213	260	23	2950	46	74.5	7.5	2.5	225GS/4-2	24	1480	46	155	7.0	2.5	0.362	320	28	2955	59	90.5	7.5	2.5	225GM/4-2	29	1485	62	186	7.2	2.5	0.429	400	34	2960	66	109	7.6	2.6	250GM/4-2	36	1485	77	231	7.1	2.4	0.875	490	45	2960	87	145	7.5	2.5	280S/4-2	46	1480	85	296	6.8	2.0	1.88	610	58	2970	95	186	7.0	2.0	280M/4-2	65	1480	128	419	6.6	1.8	2.25	685	80	2970	142	257	6.8	1.8	315S/4-2	78	1485	154	501	6.5	1.8	3.5	820	90	2970	176	289	6.0	1.7	315M/4-2	90	1485	156	578	6.5	1.8	3.9	930	100	2970	190	321	6.2	1.7	315M/4-20	100	1485	208	643	6.2	1.8	5.0	1240	120	2970	230	385	6.0	1.6																																																																																																																					
100L/4-20	2.6	1420	5.65	17.5	5.8	2.1	0.0050	49																																																																																																																																																																																																																																																																																																																																																																																				
	3.2	2870	6.60	10.7	6.6	2.3			112M/4-2	3.7	1460	8.40	24.2	6.6	2.8	0.0101	64	4.4	2890	8.50	14.5	7.4	2.9	132S/4-2	5.0	1460	11.5	32.7	6.2	2.7	0.0211	89	6.0	2900	11.9	19.8	6.4	2.8	132M/4-2	6.1	1450	13.8	40.2	6.7	2.5	0.0279	99	7.5	2910	15.4	24.6	6.9	2.3	160M/4-2	9.0	1465	19.5	58.7	6.5	2.3	0.0542	170	10.5	2930	22.0	34.2	7.5	2.2	160L/4-2	12	1470	27.5	78.0	7.2	2.8	0.0712	189	15	2940	31.0	48.7	7.5	2.7	180GM/4-2	14	1470	29	100	6.8	2.5	0.1129	220	17	2940	33	55.2	7.5	2.5	180GL/4-2	17	1475	35	110	6.9	2.5	0.1339	240	20	2950	39	64.7	7.5	2.5	200GL/4-2	20	1475	41	130	7.0	2.5	0.213	260	23	2950	46	74.5	7.5	2.5	225GS/4-2	24	1480	46	155	7.0	2.5	0.362	320	28	2955	59	90.5	7.5	2.5	225GM/4-2	29	1485	62	186	7.2	2.5	0.429	400	34	2960	66	109	7.6	2.6	250GM/4-2	36	1485	77	231	7.1	2.4	0.875	490	45	2960	87	145	7.5	2.5	280S/4-2	46	1480	85	296	6.8	2.0	1.88	610	58	2970	95	186	7.0	2.0	280M/4-2	65	1480	128	419	6.6	1.8	2.25	685	80	2970	142	257	6.8	1.8	315S/4-2	78	1485	154	501	6.5	1.8	3.5	820	90	2970	176	289	6.0	1.7	315M/4-2	90	1485	156	578	6.5	1.8	3.9	930	100	2970	190	321	6.2	1.7	315M/4-20	100	1485	208	643	6.2	1.8	5.0	1240	120	2970	230	385	6.0	1.6																																																																																																																																				
112M/4-2	3.7	1460	8.40	24.2	6.6	2.8	0.0101	64																																																																																																																																																																																																																																																																																																																																																																																				
	4.4	2890	8.50	14.5	7.4	2.9			132S/4-2	5.0	1460	11.5	32.7	6.2	2.7	0.0211	89	6.0	2900	11.9	19.8	6.4	2.8	132M/4-2	6.1	1450	13.8	40.2	6.7	2.5	0.0279	99	7.5	2910	15.4	24.6	6.9	2.3	160M/4-2	9.0	1465	19.5	58.7	6.5	2.3	0.0542	170	10.5	2930	22.0	34.2	7.5	2.2	160L/4-2	12	1470	27.5	78.0	7.2	2.8	0.0712	189	15	2940	31.0	48.7	7.5	2.7	180GM/4-2	14	1470	29	100	6.8	2.5	0.1129	220	17	2940	33	55.2	7.5	2.5	180GL/4-2	17	1475	35	110	6.9	2.5	0.1339	240	20	2950	39	64.7	7.5	2.5	200GL/4-2	20	1475	41	130	7.0	2.5	0.213	260	23	2950	46	74.5	7.5	2.5	225GS/4-2	24	1480	46	155	7.0	2.5	0.362	320	28	2955	59	90.5	7.5	2.5	225GM/4-2	29	1485	62	186	7.2	2.5	0.429	400	34	2960	66	109	7.6	2.6	250GM/4-2	36	1485	77	231	7.1	2.4	0.875	490	45	2960	87	145	7.5	2.5	280S/4-2	46	1480	85	296	6.8	2.0	1.88	610	58	2970	95	186	7.0	2.0	280M/4-2	65	1480	128	419	6.6	1.8	2.25	685	80	2970	142	257	6.8	1.8	315S/4-2	78	1485	154	501	6.5	1.8	3.5	820	90	2970	176	289	6.0	1.7	315M/4-2	90	1485	156	578	6.5	1.8	3.9	930	100	2970	190	321	6.2	1.7	315M/4-20	100	1485	208	643	6.2	1.8	5.0	1240	120	2970	230	385	6.0	1.6																																																																																																																																																			
132S/4-2	5.0	1460	11.5	32.7	6.2	2.7	0.0211	89																																																																																																																																																																																																																																																																																																																																																																																				
	6.0	2900	11.9	19.8	6.4	2.8			132M/4-2	6.1	1450	13.8	40.2	6.7	2.5	0.0279	99	7.5	2910	15.4	24.6	6.9	2.3	160M/4-2	9.0	1465	19.5	58.7	6.5	2.3	0.0542	170	10.5	2930	22.0	34.2	7.5	2.2	160L/4-2	12	1470	27.5	78.0	7.2	2.8	0.0712	189	15	2940	31.0	48.7	7.5	2.7	180GM/4-2	14	1470	29	100	6.8	2.5	0.1129	220	17	2940	33	55.2	7.5	2.5	180GL/4-2	17	1475	35	110	6.9	2.5	0.1339	240	20	2950	39	64.7	7.5	2.5	200GL/4-2	20	1475	41	130	7.0	2.5	0.213	260	23	2950	46	74.5	7.5	2.5	225GS/4-2	24	1480	46	155	7.0	2.5	0.362	320	28	2955	59	90.5	7.5	2.5	225GM/4-2	29	1485	62	186	7.2	2.5	0.429	400	34	2960	66	109	7.6	2.6	250GM/4-2	36	1485	77	231	7.1	2.4	0.875	490	45	2960	87	145	7.5	2.5	280S/4-2	46	1480	85	296	6.8	2.0	1.88	610	58	2970	95	186	7.0	2.0	280M/4-2	65	1480	128	419	6.6	1.8	2.25	685	80	2970	142	257	6.8	1.8	315S/4-2	78	1485	154	501	6.5	1.8	3.5	820	90	2970	176	289	6.0	1.7	315M/4-2	90	1485	156	578	6.5	1.8	3.9	930	100	2970	190	321	6.2	1.7	315M/4-20	100	1485	208	643	6.2	1.8	5.0	1240	120	2970	230	385	6.0	1.6																																																																																																																																																																		
132M/4-2	6.1	1450	13.8	40.2	6.7	2.5	0.0279	99																																																																																																																																																																																																																																																																																																																																																																																				
	7.5	2910	15.4	24.6	6.9	2.3			160M/4-2	9.0	1465	19.5	58.7	6.5	2.3	0.0542	170	10.5	2930	22.0	34.2	7.5	2.2	160L/4-2	12	1470	27.5	78.0	7.2	2.8	0.0712	189	15	2940	31.0	48.7	7.5	2.7	180GM/4-2	14	1470	29	100	6.8	2.5	0.1129	220	17	2940	33	55.2	7.5	2.5	180GL/4-2	17	1475	35	110	6.9	2.5	0.1339	240	20	2950	39	64.7	7.5	2.5	200GL/4-2	20	1475	41	130	7.0	2.5	0.213	260	23	2950	46	74.5	7.5	2.5	225GS/4-2	24	1480	46	155	7.0	2.5	0.362	320	28	2955	59	90.5	7.5	2.5	225GM/4-2	29	1485	62	186	7.2	2.5	0.429	400	34	2960	66	109	7.6	2.6	250GM/4-2	36	1485	77	231	7.1	2.4	0.875	490	45	2960	87	145	7.5	2.5	280S/4-2	46	1480	85	296	6.8	2.0	1.88	610	58	2970	95	186	7.0	2.0	280M/4-2	65	1480	128	419	6.6	1.8	2.25	685	80	2970	142	257	6.8	1.8	315S/4-2	78	1485	154	501	6.5	1.8	3.5	820	90	2970	176	289	6.0	1.7	315M/4-2	90	1485	156	578	6.5	1.8	3.9	930	100	2970	190	321	6.2	1.7	315M/4-20	100	1485	208	643	6.2	1.8	5.0	1240	120	2970	230	385	6.0	1.6																																																																																																																																																																																	
160M/4-2	9.0	1465	19.5	58.7	6.5	2.3	0.0542	170																																																																																																																																																																																																																																																																																																																																																																																				
	10.5	2930	22.0	34.2	7.5	2.2			160L/4-2	12	1470	27.5	78.0	7.2	2.8	0.0712	189	15	2940	31.0	48.7	7.5	2.7	180GM/4-2	14	1470	29	100	6.8	2.5	0.1129	220	17	2940	33	55.2	7.5	2.5	180GL/4-2	17	1475	35	110	6.9	2.5	0.1339	240	20	2950	39	64.7	7.5	2.5	200GL/4-2	20	1475	41	130	7.0	2.5	0.213	260	23	2950	46	74.5	7.5	2.5	225GS/4-2	24	1480	46	155	7.0	2.5	0.362	320	28	2955	59	90.5	7.5	2.5	225GM/4-2	29	1485	62	186	7.2	2.5	0.429	400	34	2960	66	109	7.6	2.6	250GM/4-2	36	1485	77	231	7.1	2.4	0.875	490	45	2960	87	145	7.5	2.5	280S/4-2	46	1480	85	296	6.8	2.0	1.88	610	58	2970	95	186	7.0	2.0	280M/4-2	65	1480	128	419	6.6	1.8	2.25	685	80	2970	142	257	6.8	1.8	315S/4-2	78	1485	154	501	6.5	1.8	3.5	820	90	2970	176	289	6.0	1.7	315M/4-2	90	1485	156	578	6.5	1.8	3.9	930	100	2970	190	321	6.2	1.7	315M/4-20	100	1485	208	643	6.2	1.8	5.0	1240	120	2970	230	385	6.0	1.6																																																																																																																																																																																																
160L/4-2	12	1470	27.5	78.0	7.2	2.8	0.0712	189																																																																																																																																																																																																																																																																																																																																																																																				
	15	2940	31.0	48.7	7.5	2.7			180GM/4-2	14	1470	29	100	6.8	2.5	0.1129	220	17	2940	33	55.2	7.5	2.5	180GL/4-2	17	1475	35	110	6.9	2.5	0.1339	240	20	2950	39	64.7	7.5	2.5	200GL/4-2	20	1475	41	130	7.0	2.5	0.213	260	23	2950	46	74.5	7.5	2.5	225GS/4-2	24	1480	46	155	7.0	2.5	0.362	320	28	2955	59	90.5	7.5	2.5	225GM/4-2	29	1485	62	186	7.2	2.5	0.429	400	34	2960	66	109	7.6	2.6	250GM/4-2	36	1485	77	231	7.1	2.4	0.875	490	45	2960	87	145	7.5	2.5	280S/4-2	46	1480	85	296	6.8	2.0	1.88	610	58	2970	95	186	7.0	2.0	280M/4-2	65	1480	128	419	6.6	1.8	2.25	685	80	2970	142	257	6.8	1.8	315S/4-2	78	1485	154	501	6.5	1.8	3.5	820	90	2970	176	289	6.0	1.7	315M/4-2	90	1485	156	578	6.5	1.8	3.9	930	100	2970	190	321	6.2	1.7	315M/4-20	100	1485	208	643	6.2	1.8	5.0	1240	120	2970	230	385	6.0	1.6																																																																																																																																																																																																															
180GM/4-2	14	1470	29	100	6.8	2.5	0.1129	220																																																																																																																																																																																																																																																																																																																																																																																				
	17	2940	33	55.2	7.5	2.5			180GL/4-2	17	1475	35	110	6.9	2.5	0.1339	240	20	2950	39	64.7	7.5	2.5	200GL/4-2	20	1475	41	130	7.0	2.5	0.213	260	23	2950	46	74.5	7.5	2.5	225GS/4-2	24	1480	46	155	7.0	2.5	0.362	320	28	2955	59	90.5	7.5	2.5	225GM/4-2	29	1485	62	186	7.2	2.5	0.429	400	34	2960	66	109	7.6	2.6	250GM/4-2	36	1485	77	231	7.1	2.4	0.875	490	45	2960	87	145	7.5	2.5	280S/4-2	46	1480	85	296	6.8	2.0	1.88	610	58	2970	95	186	7.0	2.0	280M/4-2	65	1480	128	419	6.6	1.8	2.25	685	80	2970	142	257	6.8	1.8	315S/4-2	78	1485	154	501	6.5	1.8	3.5	820	90	2970	176	289	6.0	1.7	315M/4-2	90	1485	156	578	6.5	1.8	3.9	930	100	2970	190	321	6.2	1.7	315M/4-20	100	1485	208	643	6.2	1.8	5.0	1240	120	2970	230	385	6.0	1.6																																																																																																																																																																																																																														
180GL/4-2	17	1475	35	110	6.9	2.5	0.1339	240																																																																																																																																																																																																																																																																																																																																																																																				
	20	2950	39	64.7	7.5	2.5			200GL/4-2	20	1475	41	130	7.0	2.5	0.213	260	23	2950	46	74.5	7.5	2.5	225GS/4-2	24	1480	46	155	7.0	2.5	0.362	320	28	2955	59	90.5	7.5	2.5	225GM/4-2	29	1485	62	186	7.2	2.5	0.429	400	34	2960	66	109	7.6	2.6	250GM/4-2	36	1485	77	231	7.1	2.4	0.875	490	45	2960	87	145	7.5	2.5	280S/4-2	46	1480	85	296	6.8	2.0	1.88	610	58	2970	95	186	7.0	2.0	280M/4-2	65	1480	128	419	6.6	1.8	2.25	685	80	2970	142	257	6.8	1.8	315S/4-2	78	1485	154	501	6.5	1.8	3.5	820	90	2970	176	289	6.0	1.7	315M/4-2	90	1485	156	578	6.5	1.8	3.9	930	100	2970	190	321	6.2	1.7	315M/4-20	100	1485	208	643	6.2	1.8	5.0	1240	120	2970	230	385	6.0	1.6																																																																																																																																																																																																																																													
200GL/4-2	20	1475	41	130	7.0	2.5	0.213	260																																																																																																																																																																																																																																																																																																																																																																																				
	23	2950	46	74.5	7.5	2.5			225GS/4-2	24	1480	46	155	7.0	2.5	0.362	320	28	2955	59	90.5	7.5	2.5	225GM/4-2	29	1485	62	186	7.2	2.5	0.429	400	34	2960	66	109	7.6	2.6	250GM/4-2	36	1485	77	231	7.1	2.4	0.875	490	45	2960	87	145	7.5	2.5	280S/4-2	46	1480	85	296	6.8	2.0	1.88	610	58	2970	95	186	7.0	2.0	280M/4-2	65	1480	128	419	6.6	1.8	2.25	685	80	2970	142	257	6.8	1.8	315S/4-2	78	1485	154	501	6.5	1.8	3.5	820	90	2970	176	289	6.0	1.7	315M/4-2	90	1485	156	578	6.5	1.8	3.9	930	100	2970	190	321	6.2	1.7	315M/4-20	100	1485	208	643	6.2	1.8	5.0	1240	120	2970	230	385	6.0	1.6																																																																																																																																																																																																																																																												
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	28	2955	59	90.5	7.5	2.5			225GM/4-2	29	1485	62	186	7.2	2.5	0.429	400	34	2960	66	109	7.6	2.6	250GM/4-2	36	1485	77	231	7.1	2.4	0.875	490	45	2960	87	145	7.5	2.5	280S/4-2	46	1480	85	296	6.8	2.0	1.88	610	58	2970	95	186	7.0	2.0	280M/4-2	65	1480	128	419	6.6	1.8	2.25	685	80	2970	142	257	6.8	1.8	315S/4-2	78	1485	154	501	6.5	1.8	3.5	820	90	2970	176	289	6.0	1.7	315M/4-2	90	1485	156	578	6.5	1.8	3.9	930	100	2970	190	321	6.2	1.7	315M/4-20	100	1485	208	643	6.2	1.8	5.0	1240	120	2970	230	385	6.0	1.6																																																																																																																																																																																																																																																																											
225GM/4-2	29	1485	62	186	7.2	2.5	0.429	400																																																																																																																																																																																																																																																																																																																																																																																				
	34	2960	66	109	7.6	2.6			250GM/4-2	36	1485	77	231	7.1	2.4	0.875	490	45	2960	87	145	7.5	2.5	280S/4-2	46	1480	85	296	6.8	2.0	1.88	610	58	2970	95	186	7.0	2.0	280M/4-2	65	1480	128	419	6.6	1.8	2.25	685	80	2970	142	257	6.8	1.8	315S/4-2	78	1485	154	501	6.5	1.8	3.5	820	90	2970	176	289	6.0	1.7	315M/4-2	90	1485	156	578	6.5	1.8	3.9	930	100	2970	190	321	6.2	1.7	315M/4-20	100	1485	208	643	6.2	1.8	5.0	1240	120	2970	230	385	6.0	1.6																																																																																																																																																																																																																																																																																										
250GM/4-2	36	1485	77	231	7.1	2.4	0.875	490																																																																																																																																																																																																																																																																																																																																																																																				
	45	2960	87	145	7.5	2.5			280S/4-2	46	1480	85	296	6.8	2.0	1.88	610	58	2970	95	186	7.0	2.0	280M/4-2	65	1480	128	419	6.6	1.8	2.25	685	80	2970	142	257	6.8	1.8	315S/4-2	78	1485	154	501	6.5	1.8	3.5	820	90	2970	176	289	6.0	1.7	315M/4-2	90	1485	156	578	6.5	1.8	3.9	930	100	2970	190	321	6.2	1.7	315M/4-20	100	1485	208	643	6.2	1.8	5.0	1240	120	2970	230	385	6.0	1.6																																																																																																																																																																																																																																																																																																									
280S/4-2	46	1480	85	296	6.8	2.0	1.88	610																																																																																																																																																																																																																																																																																																																																																																																				
	58	2970	95	186	7.0	2.0			280M/4-2	65	1480	128	419	6.6	1.8	2.25	685	80	2970	142	257	6.8	1.8	315S/4-2	78	1485	154	501	6.5	1.8	3.5	820	90	2970	176	289	6.0	1.7	315M/4-2	90	1485	156	578	6.5	1.8	3.9	930	100	2970	190	321	6.2	1.7	315M/4-20	100	1485	208	643	6.2	1.8	5.0	1240	120	2970	230	385	6.0	1.6																																																																																																																																																																																																																																																																																																																								
280M/4-2	65	1480	128	419	6.6	1.8	2.25	685																																																																																																																																																																																																																																																																																																																																																																																				
	80	2970	142	257	6.8	1.8			315S/4-2	78	1485	154	501	6.5	1.8	3.5	820	90	2970	176	289	6.0	1.7	315M/4-2	90	1485	156	578	6.5	1.8	3.9	930	100	2970	190	321	6.2	1.7	315M/4-20	100	1485	208	643	6.2	1.8	5.0	1240	120	2970	230	385	6.0	1.6																																																																																																																																																																																																																																																																																																																																							
315S/4-2	78	1485	154	501	6.5	1.8	3.5	820																																																																																																																																																																																																																																																																																																																																																																																				
	90	2970	176	289	6.0	1.7			315M/4-2	90	1485	156	578	6.5	1.8	3.9	930	100	2970	190	321	6.2	1.7	315M/4-20	100	1485	208	643	6.2	1.8	5.0	1240	120	2970	230	385	6.0	1.6																																																																																																																																																																																																																																																																																																																																																						
315M/4-2	90	1485	156	578	6.5	1.8	3.9	930																																																																																																																																																																																																																																																																																																																																																																																				
	100	2970	190	321	6.2	1.7			315M/4-20	100	1485	208	643	6.2	1.8	5.0	1240	120	2970	230	385	6.0	1.6																																																																																																																																																																																																																																																																																																																																																																					
315M/4-20	100	1485	208	643	6.2	1.8	5.0	1240																																																																																																																																																																																																																																																																																																																																																																																				
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Subject to technical amendments



Three-phase motors

Number of poles: 6-4

Nominal data at 400 V, 50 Hz Y/Y

Heat class F

Operating mode: S1

Synchronous speed: 1000/1500 rpm

Surface cooling IC411

Type	Nominal power	Nominal speed	Nominal current (400V)	Nominal torque	Start-up to nominal current	Start-up to nominal torque	Moment of inertia	Weight IM B3
DEx DDEx	P _N kW	n rpm	I _N A	M _N Nm	I _a /I _N	M _k /M _N	J kgm ²	M appr. kg
71K/6-4	0.15	920	0.75	1.55	2.6	1.6	0.00051	16
	0.2	1440	0.85	1.33	3.3	1.6		
71L/6-4	0.21	920	1.2	2.18	2.6	2.0	0.00063	17
	0.3	1420	1.35	2.02	3.4	1.9		
80K/6-4	0.22	930	0.7	2.26	3.3	1.9	0.0010	25
80L/6-4	0.32	1455	1.05	2.10	4.2	2.1	0.0013	28
	0.26	940	0.94	2.64	3.5	2.2		
	0.4	1425	1.28	2.68	3.6	1.9		
90S/6-4	0.45	945	1.5	4.55	3.6	2.1	0.0020	34
90L/6-4	0.66	1450	1.75	4.35	5.3	2.2	0.0026	36
	0.6	960	1.8	5.97	3.6	2.1		
	0.9	1425	2.1	6.03	4.4	1.9		
100 L/6-4	0.9	960	2.4	8.95	4.0	1.8	0.0039	45
100 L/6-40	1.3	1420	3.0	8.74	4.5	1.9	0.0050	49
	1.1	960	2.8	10.9	4.3	1.8		
	1.7	1450	3.7	11.2	4.7	2.1		
112M/6-4	1.5	970	3.55	14.8	5.3	2.2	0.0101	64
132S/6-4	2.2	965	5.05	21.8	5.7	1.9	0.0211	89
	3.0	1465	6.0	19.6	6.1	2.1		
132M/6-4	3.0	975	6.7	29.4	6.5	2.2	0.0279	99
160M/6-4	4.5	1460	8.9	29.4	6.3	1.9	0.0542	155
	3.8	965	9.0	37.6	6.0	2.0		
	5.7	1465	13.0	37.2	6.5	1.8		
160L/6-4	5.5	980	13.3	53.6	7.0	2.1	0.0712	197
180GM/6-4	8	1480	16.8	51.6	7.0	2.0	0.1129	220
	7.5	980	16.6	73.1	6.3	2.0		
180GL/6-4	11	1470	22	71.5	6.5	1.6	0.1339	240
200GL/6-4	9	980	20	87.7	6.5	2.0	0.213	260
	13	1470	26	84.5	7.0	1.5		
	13	980	31	126	6.8	2.1		
225GS/6-4	19	1470	39	123	7.2	2.2	0.362	320
225GM/6-4	23	980	40	185	6.0	2.0	0.429	400
	23	1470	48	149	6.3	2.2		
	27	1470	56	175	6.5	2.0		
250GM/6-4	27	980	53	263	6.0	2.1	0.875	490
280S/6-4	32	1470	65	207	6.5	2.2	1.88	610
	32	985	63	310	6.5	2.3		
280M/6-4	45	1475	89	291	7.0	2.7	2.25	685
	37	985	72	358	6.5	2.3		
	55	1475	108	356	7.0	2.7		
315S/6-4	45	985	88	436	6.8	2.1	3.5	820
315M/6-4	67	1485	130	430	7.2	2.3	3.9	930
	55	985	108	533	6.8	2.1		
	80	1485	155	514	7.2	2.3		

Subject to technical amendments



Three-phase motors

Number of poles: 8-4

Nominal data at 400 V, 50 Hz Δ/YY

Heat class F

Operating mode: S1

Synchronous speed: 750/1500 rpm

Surface cooling IC411

Type	Nominal power	Nominal speed	Nominal current (400V)	Nominal torque	Start-up to nominal current	Start-up to nominal torque	Moment of inertia	Weight IM B3
DEx DDEx	P_N kW	n rpm	I_N A	M_N Nm	I_a/I_N	M_k/M_N	J kgm ²	M appr. kg
63L/8-4	0.030	670	0.45	0.42	2.0	1.7	0.00042	14
	0.12	1390	0.50	0.82	3.4	1.9		
71K/8-4	0.048	650	0.32	0.70	2.1	1.7	0.00081	16
	0.22	1370	0.57	1.53	3.8	2.0		
71L/8-4	0.07	650	0.47	1.00	2.1	1.7	0.00101	17
	0.32	1370	0.82	2.23	3.8	2.0		
80K/8-4	0.2	690	0.83	2.77	2.8	2.0	0.0019	25
	0.3	1380	0.79	2.08	3.9	2.2		
80L/8-4	0.27	690	1.08	3.74	2.9	2.1	0.0024	28
	0.4	1400	0.96	2.73	4.5	2.2		
90S/8-4	0.42	705	1.9	5.69	2.8	2.0	0.0032	34
	0.8	1390	1.9	5.50	3.9	1.8		
90L/8-4	0.5	710	2.3	6.73	3.1	2.1	0.0042	36
	1.0	1410	2.25	6.77	4.3	1.9		
100L/8-4	0.9	690	3.05	12.5	3.2	2.1	0.0066	45
	1.3	1380	3.0	9.00	4.2	2.1		
100L/8-40	1.0	720	3.2	13.3	3.9	2.1	0.0086	49
	1.6	1430	3.35	10.7	5.3	2.2		
112M/8-4	1.5	710	4.25	20.2	4.6	2.2	0.0158	64
	2.5	1430	5.0	16.7	5.7	2.1		
132S/8-4	2.3	720	6.7	30.5	5.3	2.3	0.0272	89
	3.6	1450	7.3	23.7	6.9	2.2		
132M/8-4	3.0	720	9.5	39.8	4.5	2.3	0.0323	99
	5.0	1445	9.9	33.0	5.4	2.3		
160M/8-4	4.0	725	10.5	52.7	5.2	1.8	0.0812	155
	5.5	1460	10.8	36.0	7.0	1.8		
160M/8-40	4.6	725	12.8	60.6	4.6	1.8	0.1092	165
	7.3	1460	14.6	47.8	7.0	1.9		
160L/8-4	6.8	725	21	89.6	4.8	1.8	0.1092	197
	11	1460	23	72.0	7.0	2.0		
180GL/8-4	11	725	29	144	4.6	1.7	0.227	240
	15	1460	30	98.1	7.0	2.0		
200GL/8-4	15	730	33	196	5.3	1.6	0.244	260
	20	1465	44	130	6.8	1.8		
225GS/8-4	18	730	42	235	5.3	1.6	0.570	320
	24	1465	50	156	6.8	1.8		
225GM/8-4	22	730	50	287	5.0	1.6	0.661	400
	28	1465	55	182	7.0	2.0		
250GM/8-4	30	730	67	392	4.5	1.6	1.125	490
	42	1465	80	273	6.5	2.0		
280S/8-4	35	735	80	454	4.6	1.6	2.30	610
	51	1470	96	331	6.5	1.6		
280M/8-4	42	735	88	545	5.0	1.6	2.63	685
	60	1470	105	389	6.3	1.6		
315S/8-4	52	740	109	671	5.0	1.6	4.6	820
	68	1475	130	440	6.4	1.6		
315M/8-4	70	740	147	903	5.8	1.7	5.3	930
	90	1475	173	582	6.5	1.6		

Subject to technical amendments



Three-phase motors

Number of poles: 8-6

Nominal data at 400 V, 50 Hz Y/Y

Heat class F

Operating mode: S1

Synchronous speed: 750-1000 rpm

Surface cooling IC411

Type	Nominal power	Nominal speed	Nominal current (400V)	Nominal torque	Start-up to nominal current	Breakdown to nominal torque	Moment of inertia	Weight IM B3
DEx DDEx	P _N kW	n rpm	I _N A	M _N Nm	I _A /I _N	M _k /M _N	J kgm ²	M appr. kg
90S/8-6	0.35	695	1.35	4.81	2.7	1.7	0.0323	34
	0.45	960	1.5	4.48	3.3	1.8		
90L/8-6	0.45	695	1.68	6.18	2.7	1.8	0.00419	36
	0.6	960	2.07	5.97	3.5	2.0		
100 L/8-6	0.6	715	2.05	8.01	2.9	1.6	0.00657	45
100 L/8-60	0.8	970	2.15	7.88	4.1	1.8	0.00857	49
	0.75	710	2.4	10.1	3.1	1.6		
112M/8-6	0.9	720	2.8	11.9	4.2	2.2	0.0158	64
	1.2	970	3.0	11.8	5.1	2.4		
132S/8-6	1.5	725	5.05	19.8	4.8	2.5	0.02722	89
132M/8-6	2.0	975	5.5	19.6	6.2	2.4	0.03229	99
	2.2	725	6.8	29.0	3.9	2.1		
3.0	975	8.1	29.4	5.3	2.2			
160M/8-6	3.5	725	8.8	46.1	5.5	2.3	0.08121	155
160L/8-6	5.0	975	12.0	49.0	6.4	2.1	0.10916	197
	5.0	725	12.0	65.9	5.5	2.4		
7.0	975	16.0	68.6	6.5	2.2			
180GL/8-6	7.0	725	18	92.2	5.5	2.0	0.227	240
200GL/8-6	9.5	980	24	92.6	6.2	1.8	0.24369	260
	10	725	23	131	5.5	2.3		
13	980	27	126	6.8	2.1			
225GS/8-6	13	725	29	171	5.3	1.7	0.57008	320
225GM/8-6	16	975	36	156	6.2	1.6	0.66117	400
	17	725	42	223	5.4	1.7		
22	975	54	215	6.5	1.6			
250GM/8-6	22	730	51	287	5.8	1.9	1.125	490
280S/8-6	30	985	65	290	6.5	1.6	2.3	610
	27	735	63	350	5.8	1.8		
280M/8-6	35	985	80	339	6.5	1.6	2.625	685
	33	735	74	428	6.0	1.8		
41	985	90	397	6.7	1.6			
315S/8-6	40	735	90	519	6.0	1.8	4.625	820
315M/8-6	50	985	102	484	7.0	1.6	5.25	930
	48	735	103	623	6.0	1.8		
62	985	125	601	7.0	1.6			

Subject to technical amendments

**Explosion protected three-phase motors,
operation with frequency inverter**

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Frequency inverter operation: 2-pole motors

Operation	Mains	Frequency inverter operation													
		IC 411		IC 411		IC 411		IC 411		IC 411		IC 411		IC 416 external ventilation	
Torque curve		M ~ n ²		constant		constant		constant		constant		M ~ 50/f		constant	
Frequency	50Hz	5 - 50Hz		20 - 50Hz		10 - 50Hz		5 - 50Hz		50 - 87Hz *		50 - 87Hz		5 - 50Hz	
Synchronous speed		300 - 3000		1200 - 3000		600 - 1500		300 - 3000		3000 - 5220		3000 - 5220		300 - 3000	
Control range		1 : 10		1 : 2,5		1 : 5		1 : 10		1 : 1,74		1 : 1,74		1 : 10	
Voltage/Frequency		U/f = constant		U/f = constant		U/f = constant		U/f = constant		U/f = constant		U = constant		U/f = constant	
Power/torque	P	P/kW	M/Nm	P/kW	M/Nm	P/kW	M/Nm	P/kW	M/Nm	P/kW	M/Nm	P/kW	M/Nm	P/kW	M/Nm
	kW	at/Hz	at/Hz	at/Hz	at/Hz	at/Hz	at/Hz	at/Hz	at/Hz	at/Hz	at/Hz	at/Hz	at/Hz	at/Hz	at/Hz
Type / DEx or DDEx		50	50	50	20	50	10	50	5	87	50-87	50-87	87	50	5-50
63K/2	0.18	0.18	0.62	0.18	0.61	0.17	0.57	0.16	0.54	0.30	0.62	0.18	0.36	0.18	0.62
63L/2	0.25	0.25	0.86	0.25	0.86	0.23	0.78	0.22	0.74	0.42	0.86	0.25	0.50	0.25	0.86
71K/2	0.37	0.37	1.25	0.35	1.2	0.3	1	0.22	0.74	0.64	1.25	0.37	0.71	0.37	1.25
71L/2	0.55	0.55	1.9	0.52	1.8	0.45	1.5	0.33	1.1	0.96	1.9	0.55	1.1	0.55	1.9
80K/2	0.75	0.75	2.6	0.7	2.4	0.6	2	0.5	1.7	1.3	2.6	0.75	1.5	0.75	2.6
80L/2	1.1	1.1	3.7	1	3.4	0.9	3	0.75	2.5	1.9	3.7	1.1	2.1	1.1	3.7
90S/2	1.5	1.5	5	1.4	4.7	1.2	4	1	3.3	2.6	5	1.5	2.9	1.5	5
90L/2	2.2	2.2	7.4	2	6.7	1.7	5.7	1.4	4.7	3.8	7.4	2.2	4.2	2.2	7.4
100L/2	3	3	10	2.7	8.9	2.2	7.2	1.8	5.9	5.2	10	3	5.7	3	10
112M/2	4	4	13	3.7	12	3.2	11	2.5	8.2	7	13	4	7.4	4	13
132S/2	5.5	5.5	18	5	16	4.5	15	3.7	12	9.6	18	5.5	10.3	5.5	18
132M/20	7.5	7.5	25	7	23	6	20	5	16	13	25	7.5	14.2	7.5	25
160M/2	11	11	36	10	32	9	29	7.5	24	19	36	11	21	11	36
160M/20	15	14.5	47	13	42	12	39	10	32	25.2	47	14.5	27	14.5	47
160L/2	18.5	17.5	57	16	52	15	49	12.5	41	30.5	57	17.5	33	17.5	57
180GM/2	22	20	65	19	62	17	56	15	49	35	65	20	37	20	65
200GL/2	30	27	87	26	84	24	76	21	68	47	87	27	50	27	87
200GL/20	37	33	107	32	103	28	90	26	84	56	107	33	61	33	107
225GM/2	45	40	130	37	119	34	110	32	101	69	130	40	75	40	130
250GM/2	55	50	159	45	145	43	138	39	124	86	159	50	91	50	159
280S/2	75	67	217	60	193	58	186	53	169	-	-	67	124	67	217
280M/2	90	81	260	73	234	70	225	63	202	-	-	81	150	81	260
315S/2	110	100	318	90	288	88	282	78	247	-	-	100	182	100	318
315M/2	132	119	382	110	353	105	331	93	297	-	-	119	219	119	382
315M/20	160	144	458	135	433	125	400	112	358	-	-	144	263	144	458
315L/2	200	180	575	165	528	156	500	140	447	-	-	180	330	180	575

* Operation only possible with 230/400 V winding
 - 230/400 V winding from size 280 onward on request

Subject to technical amendments



Frequency inverter operation: 4-pole motors

Operation	Mains	Frequency inverter operation													
		IC 411		IC 411		IC 411		IC 411		IC 411		IC 411		IC 416 external ventilation	
Torque curve		M ~ n ²		constant		constant		constant		constant		M ~ 50/f		constant	
Frequency	50Hz	5 - 50Hz		20 - 50Hz		10 - 50Hz		5 - 50Hz		50 - 87Hz *		50 - 87Hz		5 - 50Hz	
Synchronous speed		150 - 1500		600 - 1500		300 - 1500		150 - 1500		1500 - 2610		1500 - 2610		150 - 1500	
Control range		1 : 10		1 : 2,5		1 : 5		1 : 10		1 : 1,74		1 : 1,74		1 : 10	
Voltage/Frequency		U/f = constant		U/f = constant		U/f = constant		U/f = constant		U/f = constant		U = constant		U/f = constant	
Power/torque	P kW	P/kW at/Hz	M/Nm at/Hz	P/kW at/Hz	M/Nm at/Hz	P/kW at/Hz	M/Nm at/Hz	P/kW at/Hz	M/Nm at/Hz	P/kW at/Hz	M/Nm at/Hz	P/kW at/Hz	M/Nm at/Hz	P/kW at/Hz	M/Nm at/Hz
Type / DEx or DDEx		50	50	50	20	50	10	50	5	87	50-87	50-87	87	50	5-50
63K/4	0.12	0.12	0.85	0.12	0.85	0.11	0.75	0.11	0.75	0.21	0.85	0.12	0.49	0.12	0.85
63L/4	0.18	0.18	1.25	0.18	1.25	0.17	1.18	0.16	1.1	0.31	1.25	0.18	0.72	0.18	1.25
71K/4	0.25	0.25	1.7	0.22	1.5	0.19	1.25	0.18	1.2	0.43	1.7	0.25	1	0.25	1.7
71L/4	0.37	0.37	2.5	0.33	2.2	0.28	1.9	0.22	1.5	0.64	2.5	0.37	1.4	0.37	2.5
80K/4	0.55	0.55	3.8	0.52	3.5	0.45	3	0.33	2.2	0.96	3.8	0.55	2.2	0.55	3.8
80L/4	0.75	0.75	5.2	0.7	4.8	0.6	4	0.5	3.3	1.3	5.2	0.75	3	0.75	5.2
90S/4	1.1	1.1	7.5	1	6.7	0.9	6	0.75	5	1.9	7.5	1.1	4.3	1.1	7.5
90L/4	1.5	1.5	10	1.4	9.5	1.2	8	1	6.7	2.6	10	1.5	5.7	1.5	10
100L/4	2.2	2.2	15	2	13	1.7	11	1.4	9.3	3.8	15	2.2	8.5	2.2	15
100L/40	3	3	20	2.8	19	2.2	15	1.8	12	5.2	20	3	11.4	3	20
112M/4	4	4	27	3.6	24	3	20	2.5	16	7	27	4	15.4	4	27
132S/4	5.5	5.5	37	5	33	4.4	29	3.7	24	9.6	37	5.5	21	5.5	37
132M/4	7.5	7.5	50	7	46	6	39	5	33	13	50	7.5	28.5	7.5	50
160M/4	11	11	72	10	65	9	58	7.5	49	19	72	11	41	11	72
160L/4	15	15	98	13.5	88	12	78	10	65	26	98	15	56	15	98
180GM/4	18.5	18	118	17	111	15	97	12.5	81	31	118	18	67	18	118
180GL/4	22	21	137	20	130	18	117	15	97	37	137	21	78	21	137
200GL/4	30	28	183	27	176	24	156	21	136	49	183	28	104	28	183
225GS/4	37	34	220	32	206	29	188	26	168	59	220	34	126	34	220
225GM/4	45	41	265	39	250	35	227	32	207	71	265	41	152	41	265
250GM/4	55	50	322	48	305	43	278	39	248	86	322	50	185	50	322
280S/4	75	68	437	65	415	58	373	53	337	-	-	68	251	68	437
280M/4	90	82	525	78	497	70	450	64	405	-	-	82	302	82	525
315S/4	110	100	643	95	607	86	550	77	494	-	-	100	369	100	643
315M/4	132	120	771	115	732	105	673	94	596	-	-	120	443	120	771
315M/40	160	145	929	138	883	126	801	113	719	-	-	145	534	145	929
315L/4	200	180	1157	173	1102	160	1026	140	897	-	-	180	665	180	1157

* Operation only possible with 230/400 V winding
 - 230/400 V winding from size 280 onward on request

Subject to technical amendments



Frequency inverter operation: 6-pole motors

Operation	Mains	Frequency inverter operation													
		IC 411		IC 411		IC 411		IC 411		IC 411		IC 411		IC 416 external ventilation	
Torque curve		M ~ n ²		constant		constant		constant		constant		M ~ 50/f		constant	
Frequency	50Hz	5 - 50Hz		20 - 50Hz		10 - 50Hz		5 - 50Hz		50 - 87Hz *		50 - 87Hz		5 - 50Hz	
Synchronous speed		100 - 1000		400 - 1000		200 - 1000		100 - 1000		1000 - 1740		1000 - 1740		100 - 1000	
Control range		1 : 10		1 : 2,5		1 : 5		1 : 10		1 : 1,74		1 : 1,74		1 : 10	
Voltage/Frequency		U/f = constant		U/f = constant		U/f = constant		U/f = constant		U/f = constant		U = constant		U/f = constant	
Power/torque	P	P/kW	M/Nm	P/kW	M/Nm	P/kW	M/Nm	P/kW	M/Nm	P/kW	M/Nm	P/kW	M/Nm	P/kW	M/Nm
	kW	at/Hz	at/Hz	at/Hz	at/Hz	at/Hz	at/Hz	at/Hz	at/Hz	at/Hz	at/Hz	at/Hz	at/Hz	at/Hz	at/Hz
Type / DEx or DDEx		50	50	50	20	50	10	50	5	87	50-87	50-87	87	50	5-50
63K/6	0.09	0.09	1.0	0.08	0.89	0.07	0.78	0.06	0.67	0.15	1.0	0.09	0.58	0.09	1.0
63L/6	0.12	0.12	1.3	0.11	1.2	0.09	0.98	0.08	0.87	0.21	1.3	0.12	0.75	0.12	1.3
71K/6	0.18	0.18	1.9	0.15	1.6	0.13	1.3	0.11	1.1	0.32	1.9	0.18	1.1	0.18	1.9
71L/6	0.25	0.25	2.5	0.22	2.2	0.18	1.8	0.18	1.6	0.43	2.5	0.25	1.5	0.25	2.5
80K/6	0.37	0.37	3.8	0.33	3.4	0.27	2.7	0.22	2.2	0.64	3.8	0.37	2.2	0.37	3.8
80L/6	0.55	0.55	5.7	0.5	5.1	0.4	4	0.33	3.3	0.95	5.7	0.55	3.3	0.55	5.7
90S/6	0.75	0.75	7.8	0.65	6.7	0.55	5.5	0.42	4.2	1.3	7.8	0.75	4.5	0.75	7.8
90L/6	1.1	1.1	11.4	0.9	9.2	0.8	8	0.6	6	1.9	11.4	1.1	6.6	1.1	11.4
100L/6	1.5	1.5	15	1.4	14	1.1	11	0.9	9	2.6	15	1.5	8.6	1.5	15
112M/6	2.2	2.2	22	2.0	20	1.7	17	1.3	13	3.8	22	2.2	13	2.2	22
132S/6	3	3	30	2.7	27	2.2	22	1.8	18	5.2	30	3	17.5	3	30
132M/6	4	4	40	3.5	35	3	30	2.5	25	6.9	40	4	23	4	40
132M/60	5.5	5.5	55	4.8	48	4	40	3.3	33	9.5	55	5.5	32	5.5	55
160M/6	7.5	7.5	74	7	69	6	59	5	49	13	74	7.5	43	7.5	74
160L/6	11	11	110	10	98	9	88	7.5	73	19	110	11	63	11	110
180GM/6	15	14	133	13	128	12	118	10	98	24	133	14	76	15	148
200GL/6	18.5	18	171	16	157	14	137	12	118	31	171	18	98	18.5	183
200GL/60	22	20	196	19	188	17	157	15	147	35	196	20	113	22	218
225GM/6	30	27	262	25	242	23	223	21	204	47	262	27	151	30	293
250GM/6	37	34	323	32	308	29	281	26	252	59	323	34	186	37	359
280S/6	45	41	393	39	376	35	338	32	309	-	-	41	226	45	437
280M/6	55	50	481	48	459	43	415	39	374	-	-	50	276	55	534
315S/6	75	69	672	65	629	58	571	54	512	-	-	69	378	75	732
315M/6	90	82	795	78	752	71	681	64	623	-	-	82	452	90	874
315M/60	110	100	960	96	917	87	831	78	756	-	-	100	551	110	1060
315L/6	132	120	1150	115	1100	104	997	94	906	-	-	120	660	132	1275

* Operation only possible with 230/400 V winding
 - 230/400 V winding from size 280 onward on request

Subject to technical amendments



Frequency inverter operation: 8-pole motors

Operation	Mains	Frequency inverter operation													
		IC 411		IC 411		IC 411		IC 411		IC 411		IC 411		IC 416 external ventilation	
Torque curve		M ~ n ²		constant		constant		constant		constant		M ~ 50/f		constant	
Frequency	50Hz	5 - 50Hz		20 - 50Hz		10 - 50Hz		5 - 50Hz		50 - 87Hz *		50 - 87Hz		5 - 50Hz	
Synchronous speed		75 - 750		300 - 750		150 - 750		75 - 750		750 - 1305		750 - 1305		75 - 750	
Control range		1 : 10		1 : 2,5		1 : 5		1 : 10		1 : 1,74		1 : 1,74		1 : 10	
Voltage/Frequency		U/f = constant		U/f = constant		U/f = constant		U/f = constant		U/f = constant		U = constant		U/f = constant	
Power/torque	P	P/kW	M/Nm	P/kW	M/Nm	P/kW	M/Nm	P/kW	M/Nm	P/kW	M/Nm	P/kW	M/Nm	P/kW	M/Nm
	kW	at/Hz	at/Hz	at/Hz	at/Hz	at/Hz	at/Hz	at/Hz	at/Hz	at/Hz	at/Hz	at/Hz	at/Hz	at/Hz	at/Hz
Type / DEx or DDEx		50	50	50	20	50	10	50	5	87	50-87	50-87	87	50	5-50
63L/8	0.06	0.06	0.90	0.05	0.75	0.04	0.60	0.04	0.60	0.10	0.90	0.06	0.52	0.06	0.90
71K/8	0.09	0.09	1.25	0.08	1.1	0.07	0.96	0.06	0.83	0.16	1.25	0.09	0.72	0.09	1.25
71L/8	0.12	0.12	1.7	0.11	1.5	0.1	1.4	0.08	1.1	0.21	1.7	0.12	1.0	0.12	1.7
80K/8	0.18	0.18	2.5	0.16	2.2	0.13	1.7	0.11	1.5	0.32	2.5	0.18	1.5	0.18	2.5
80L/8	0.25	0.25	3.4	0.22	3.0	0.16	2.4	0.15	2.2	0.43	3.4	0.25	2.0	0.25	3.4
90S/8	0.37	0.37	5.1	0.33	4.4	0.27	3.6	0.22	3.0	0.64	5.1	0.37	3.0	0.37	5.1
90L/8	0.55	0.55	7.5	0.5	6.7	0.4	5.4	0.33	4.4	0.95	7.5	0.55	4.3	0.55	7.5
100L/8	0.75	0.75	10.2	0.65	8.7	0.55	7.4	0.42	5.6	1.3	10.2	0.75	5.9	0.75	10.2
100L/80	1.1	1.1	15.1	0.9	12	0.8	11	0.6	8.1	1.9	15.1	1.1	8.7	1.1	15.1
112M/8	1.5	1.5	20.2	1.4	19	1.1	15	0.9	12	2.6	20.2	1.5	12	1.5	20.2
132S/8	2.2	2.2	30	2	27	1.7	23	1.3	17	3.8	30	2.2	17.5	2.2	30
132M/8	3	3	40.5	2.7	36	2.2	29	1.8	24	5.2	40.5	3	24	3	40.5
160M/8	4	4	53.5	3.5	46	3	40	2.5	33	6.9	53.5	4	31	4	53.5
160M/80	5.5	5.5	73	4.8	64	4	53	3.3	44	9.5	73	5.5	42	5.5	73
160L/8	7.5	7.5	100	7	82	6	72	4.5	59	13	100	7.5	58	7.5	100
180GL/8	11	11	146	10	131	8	104	7	91	19	146	11	84	11	146
200GL/8	15	14	186	13	172	12	159	10	132	24	183	14	107	15	196
225GS/8	18.5	17.5	235	16.8	225	15	200	14	188	30	233	17.5	135	18.5	249
225GM/8	22	21	280	20	267	18	240	16	213	36	277	21	161	22	293
250GM/8	30	28	366	27	353	24	314	22	287	48	363	28	210	30	398
280S/8	37	34	444	33	431	30	392	27	353	-	-	34	255	37	485
280M/8	45	41	533	40	519	36	467	32	415	-	-	41	306	45	586
315S/8	55	50	650	48	623	44	571	39	506	-	-	50	374	55	716
315M/8	75	68	877	65	838	59	761	53	684	-	-	68	504	75	969
315M/80	90	81	1045	77	993	70	903	63	813	-	-	81	600	90	1160
315L/8	110	100	1290	95	1226	86	1110	77	994	-	-	100	742	110	1420

* Operation only possible with 230/400 V winding
 - 230/400 V winding from size 280 onward on request

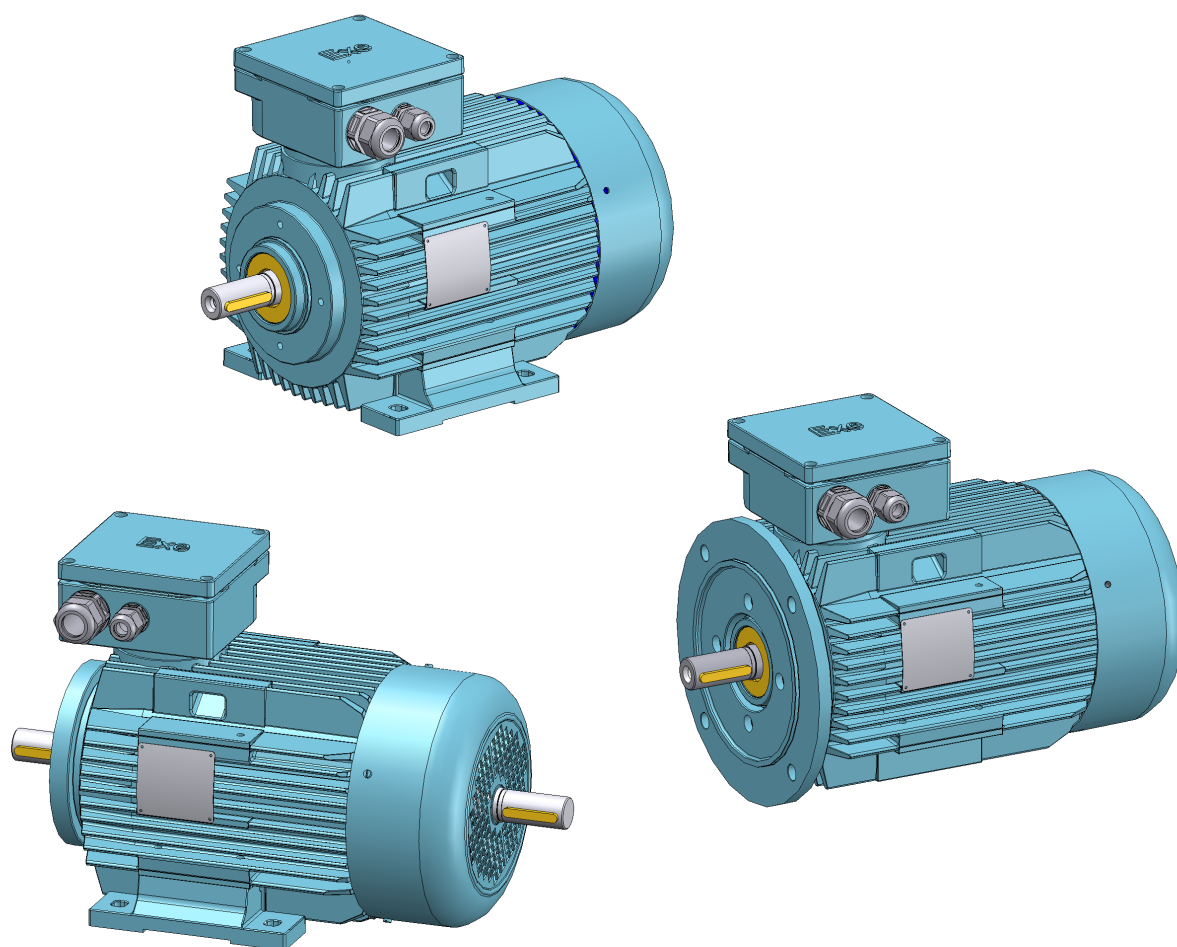
Subject to technical amendments

Dimensional sheets for 17 / 18 / 19 / 20

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EXPLOSION-PROTECTED 3-PHASE MOTORS

Dimensional sheets for 17 / 18 / 19 / 20

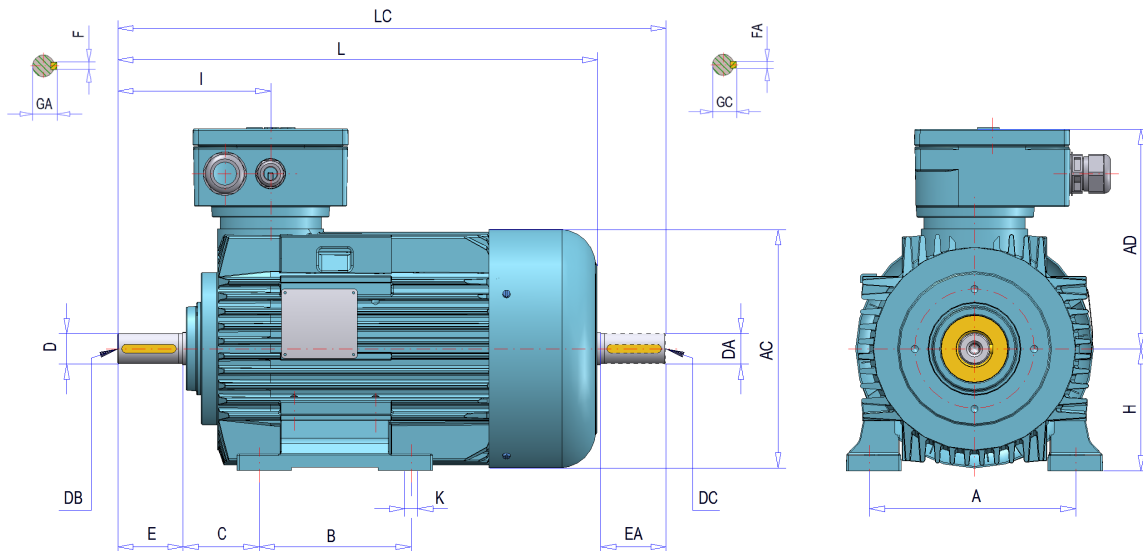


Three-phase motors

Types DEx 63 – 315
 Temperature class T1 to T4
 Cooling type: IC 411

Design:

IM B3 / IM1001
 IM V5 / IM 1011
 IM V6 / IM 1031



Fits and tolerances see page 8/2
 Subject to technical amendments

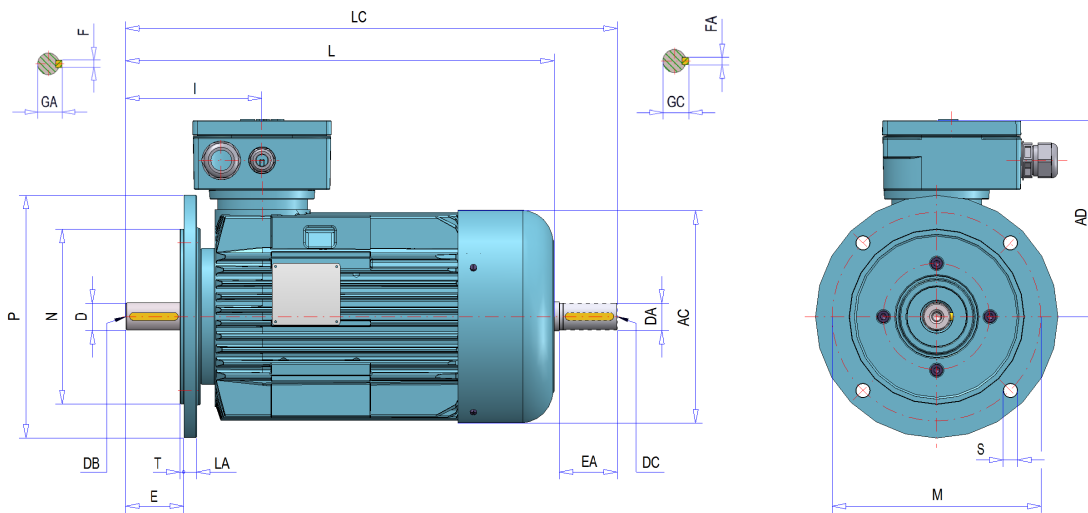
Type	B	A	K	H	C	D/DA	E/EA	DB/DC	AC	AD	GA/GC	F/FA	I	L	LC
DEx 63 K/L	80	100	7	63	40	11	23	M5	125	147	12.5	4	87	238	269
DEx 71 K/L	90	112	9	71	45	14	30	M5	139	147	16	5	97	272	307
DEx 80 K/L	100	125	10	80	50	19	40	M6	157	169	21.5	6	117	319	362
DEx 90 S	100	140	10	90	56	24	50	M8	177	181	27	8	129	363	415
DEx 90 L	125	140	10	90	56	24	50	M8	177	181	27	8	129	363	415
DEx 100 L	140	160	12	100	63	28	60	M10	195	188	31	8	142	418	483
DEx 112 M	140	190	12	112	70	28	60	M10	219	199	31	8	142	442	504
DEx 132 S	140	216	12	132	89	38	80	M12	258	218	41	10	165	536	620
DEx 132 M	178	216	12	132	89	38	80	M12	258	218	41	10	165	536	620
DEx 160 M	210	254	14	160	108	42	110	M16	310	276	45	12	255	669	784
DEx 160 L	254	254	14	160	108	42	110	M16	310	276	45	12	255	669	784
DEx 180 M	241	279	14	180	121	48	110	M16	345	316	51	14	297	707	830
DEx 180 L	279	279	14	180	121	48	110	M16	345	316	51	14	297	707	830
DEx 200L	305	318	18	200	133	55	110	M20	385	346	59	16	308	790	910
DEx 225S	286	356	18	225	149	60	140	M20	435	364	64	18	340	854	975
DEx 225M-2	311	356	18	225	149	55	110	M20	435	364	59	16	310	854	975
DEx 225M	311	356	18	225	149	60	140	M20	435	364	64	18	340	884	1035
DEx 250M-2	349	406	24	250	168	60	140	M20	491	437	64	18	410	1007	1160
DEx 250M	349	406	24	250	168	65	140	M20	491	437	69	18	410	1007	1160
DEx 280S-2	368	457	24	280	190	65	140	M20	537	464	69	18	410	1036	1191
DEx 280S	368	457	24	280	190	75	140	M20	537	464	79.5	20	410	1036	1191
DEx 280M-2	419	457	24	280	190	65	140	M20	537	464	69	18	410	1096	1096
DEx 280M	419	457	24	280	190	75	140	M20	537	464	79.5	20	410	1096	1251
DEx 315S-2	406	508	28	315	216	65	140	M20	617	544	69	18	454	1050	1210
DEx 315S	406	508	28	315	216	80	170	M20	617	544	85	22	484	1080	1270
DEx 315M-2	457	508	28	315	216	65	140	M20	617	544	69	18	454	1220	1380
DEx 315M	457	508	28	315	216	80	170	M20	617	544	85	22	484	1250	1440
DEx 315M-20	457	508	28	315	216	65	140	M20	617	544	69	18	454	1220	1380
DEx 315M0	457	508	28	315	216	80	170	M20	617	544	85	22	484	1250	1440
DEx 315L-2	457	508	28	315	216	65	140	M20	617	544	69	18	454	1300	1460
DEx 315L	457	508	28	315	216	80	170	M20	617	544	85	22	484	1330	1520

Three-phase motors

Types DEx 63 – 315
 Temperature class T1 to T4
 Cooling type: IC 411

Design:

IM B5 / IM 3001
 IM V1 / IM 3011
 IM V3 / IM 3031



Fits and tolerances see page 8/2
 Subject to technical amendments

Type	D/DA	E/EA	DB/DC	AC	AD	GA/GC	F/FA	I	S	X	M	N	P	T	LA	L	LC
DEx 63 K/L	11	23	M5	125	147	12.5	4	105	9	4	115	95	140	3	8	238	268.5
DEx 71 K/L	14	30	M5	139	147	16	5	114	9	4	130	110	160	3.5	10	272	307
DEx 80 K/L	19	40	M6	157	169	21.5	6	131	12	4	165	130	200	3.5	10	319	362
DEx 90 S	24	50	M8	177	181	27	8	140	12	4	165	130	200	3.5	10	363	415
DEx 90 L	24	50	M8	177	181	27	8	140	14	4	165	130	200	3.5	10	363	415
DEx 100 L	28	60	M10	195	188	31	8	158	14	4	215	180	250	4	11	418	483
DEx 112 M	28	60	M10	219	199	31	8	159	14	4	215	180	250	4	11	442	504
DEx 132 S	38	80	M12	258	218	41	10	181	14	4	265	230	300	4	16	536	620
DEx 132 M	38	80	M12	258	218	41	10	181	14	4	265	230	300	4	16	536	620
DEx 160 M	42	110	M16	310	276	45	12	255	18	4	300	250	350	4	19	669	784
DEx 160 L	42	110	M16	310	276	45	12	255	18	4	300	250	350	4	19	669	784
DEx 180GM	48	110	M16	345	316	51	14	297	18	4	300	250	350	4	15	707	830
DEx 180GL	48	110	M16	345	316	51	14	297	18	4	300	250	350	4	15	707	830
DEx 200GL	55	110	M20	385	346	59	16	308	18	4	350	300	400	4	18	790	910
DEx 225GS	60	140	M20	435	364	64	18	341	18	8	400	350	450	8	18	854	975
DEx 225GM-2	55	110	M20	435	364	59	16	311	18	8	400	350	450	8	18	854	975
DEx 225GM	60	140	M20	435	364	64	18	341	18	8	400	350	450	8	18	884	1035
DEx 250GM-2	60	140	M20	491	437	64	18	380	19	8	500	450	550	8	18	1007	1160
DEx 250GM	65	140	M20	491	437	69	18	380	19	8	500	450	550	8	18	1007	1160
DEx 280S-2	65	140	M20	537	464	69	18	382	19	8	500	450	550	8	18	1036	1191
DEx 280S	75	140	M20	537	464	79.5	20	382	19	8	500	450	550	8	18	1036	1191
DEx 280M-2	65	140	M20	537	464	69	18	382	19	8	500	450	550	8	18	1096	1096
DEx 280M	75	140	M20	537	464	79.5	20	382	19	8	500	450	550	8	18	1096	1251
DEx 315S-2	65	140	M20	617	544	69	18	454	24	8	600	550	660	8	18	1050	1210
DEx 315S	80	170	M20	617	544	85	22	484	24	8	600	550	660	8	18	1080	1270
DEx 315M-2	65	140	M20	617	544	69	18	454	24	8	600	550	660	8	18	1220	1380
DEx 315M	80	170	M20	617	544	85	22	484	24	8	600	550	660	8	18	1250	1440
DEx 315M-20	65	140	M20	617	544	69	18	454	24	8	600	550	660	8	18	1220	1380
DEx 315M0	80	170	M20	617	544	85	22	484	24	8	600	550	660	8	18	1250	1440
DEx 315L-2	65	140	M20	617	544	69	18	454	24	8	600	550	660	8	18	1300	1460
DEx 315L	80	170	M20	617	544	85	22	484	24	8	600	550	660	8	18	1330	1520

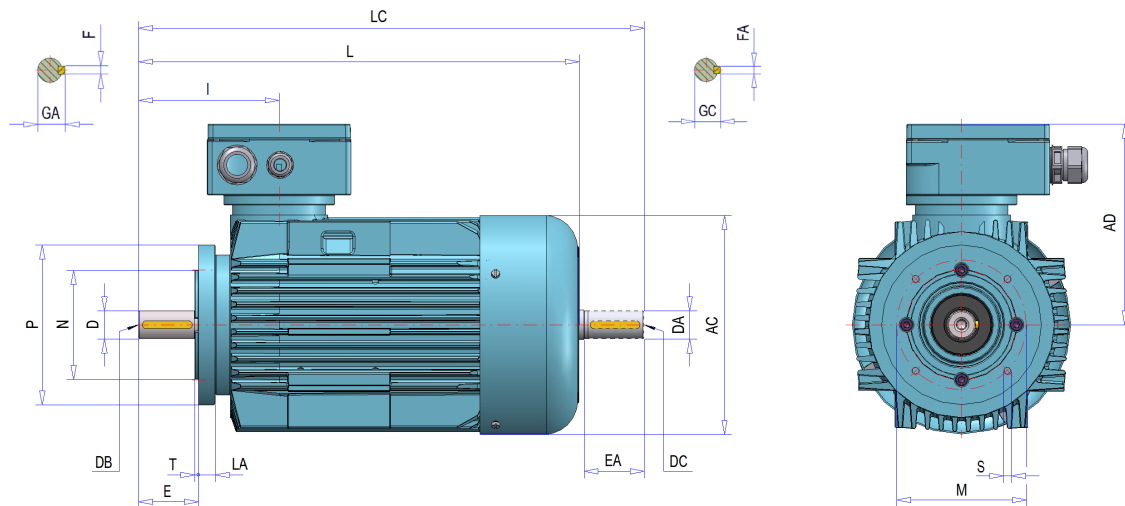
X Number of bores

Three-phase motors

Types DEx 63 – 315
 Temperature class T1 to T4
 Cooling type IC 411

Design:

IM B14 / IM 3601
 IM V18 / IM 3611
 IM V19 / IM 3631



Fits and tolerances see page 8/2
 Subject to technical amendments

Type	D/DA	E/EA	DB/DC	AC	AD	GA/GC	F/FA	I	S	X	M	N	P	T	LA	L	LC
DEx 63 K/L	11	23	M5	125	147	12.5	4	87	M5	4	75	60	90	2.5	14	238	269
DEx 71 K/L	14	30	M5	139	147	16	5	97	M6	4	85	70	105	2.5	20	272	307
DEx 80 K/L	19	40	M6	157	169	21.5	6	117	M6	4	100	80	120	3	10	319	362
DEx 90 S	24	50	M8	177	181	27	8	129	M8	4	115	95	140	3	10	363	415
DEx 90 L	24	50	M8	177	181	27	8	129	M8	4	115	95	140	3	10	363	415
DEx 100 L	28	60	M10	195	188	31	8	142	M8	4	130	110	160	3.5	17	418	483
DEx 112 M	28	60	M10	219	199	31	8	142	M8	4	130	110	160	3.5	17	442	504
DEx 132 S	38	80	M12	258	218	41	10	165	M10	4	165	130	200	3.5	23	536	620
DEx 132 M	38	80	M12	258	218	41	10	165	M10	4	165	130	200	3.5	23	536	620
DEx 160 M	42	110	M16	310	276	45	12	255	M12	4	215	180	250	4	17	669	784
DEx 160 L	42	110	M16	310	276	45	12	255	M12	4	215	180	250	4	17	669	784

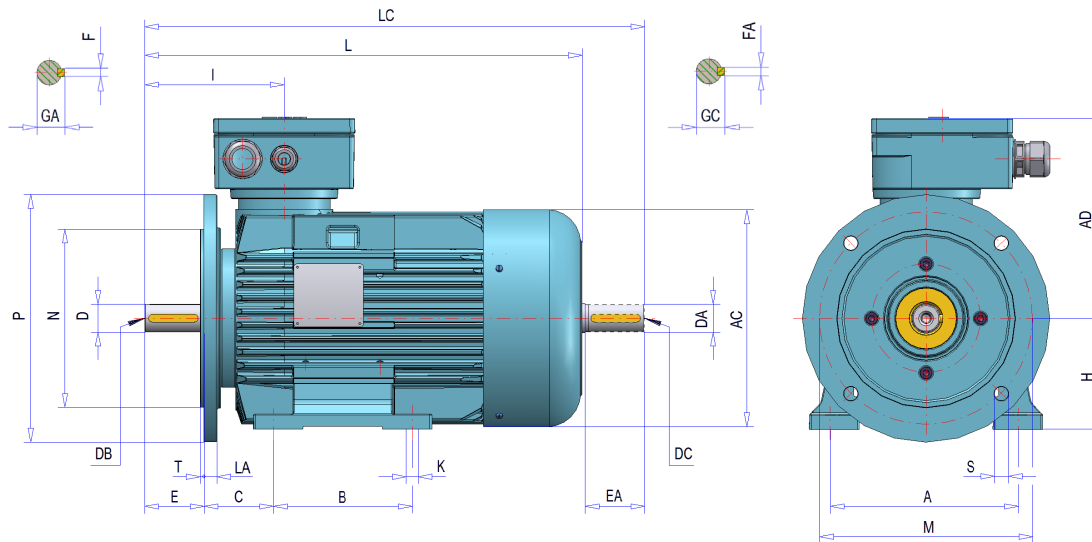
X Number of bores

Three-phase motors

Types DEx 63 – 315
 Temperature class T1 to T4
 Cooling type IC 411

Design:

IM B35 / IM 2001
 IM V15 / IM 2011
 IM V35 / IM 2031



Fits and tolerances see page 8/2
 Subject to technical amendments

Type	B	A	K	H	C	D/DA	E/EA	DB/DC	AC	AD	GA/GC	F/FA	I	S	X	M	N	P	T	LA	L	LC
DEx 63 K/L	80	100	7	63	40	11	23	M5	125	147	12.5	4	87	9	4	115	95	140	3	8	238	269
DEx 71 K/L	90	112	9	71	45	14	30	M5	139	147	16	5	97	9	4	130	110	160	3.5	10	272	307
DEx 80 K/L	100	125	10	80	50	19	40	M6	157	169	21.5	6	117	12	4	165	130	200	3.5	10	319	362
DEx 90 S	100	140	10	90	56	24	50	M8	177	181	27	8	129	12	4	165	130	200	3.5	10	363	415
DEx 90 L	125	140	10	90	56	24	50	M8	177	181	27	8	129	14	4	165	130	200	3.5	10	363	415
DEx 100 L	140	160	12	100	63	28	60	M10	195	188	31	8	142	14	4	215	180	250	4	11	418	483
DEx 112 M	140	190	12	112	70	28	60	M10	219	199	31	8	142	14	4	215	180	250	4	11	442	504
DEx 132 S	140	216	12	132	89	38	80	M12	258	218	41	10	165	14	4	265	230	300	4	16	536	620
DEx 132 M	178	216	12	132	89	38	80	M12	258	218	41	10	165	14	4	265	230	300	4	16	536	620
DEx 160 M	210	254	14	160	108	42	110	M16	310	276	45	12	255	18	4	300	250	350	4	19	669	784
DEx 160 L	254	254	14	160	108	42	110	M16	310	276	45	12	255	18	4	300	250	350	4	19	669	784
DEx 180 M	241	279	14	180	121	48	110	M16	345	316	51	14	297	18	4	300	250	350	4	15	707	830
DEx 180 L	279	279	14	180	121	48	110	M16	345	316	51	14	297	18	4	300	250	350	4	15	707	830
DEx 200L	305	318	18	200	133	55	110	M20	385	346	59	16	308	18	4	350	300	400	4	18	790	910
DEx 225S	286	356	18	225	149	60	140	M20	435	364	64	18	340	18	8	400	350	450	8	18	854	975
DEx 225M-2	311	356	18	225	149	55	110	M20	435	364	59	16	310	18	8	400	350	450	8	18	854	975
DEx 225M	311	356	18	225	149	60	140	M20	435	364	64	18	340	18	8	400	350	450	8	18	884	1035
DEx 250M-2	349	406	24	250	168	60	140	M20	491	437	64	18	410	19	8	500	450	550	8	18	1007	1160
DEx 250M	349	406	24	250	168	65	140	M20	491	437	69	18	410	19	8	500	450	550	8	18	1007	1160
DEx 280S-2	368	457	24	280	190	65	140	M20	537	464	69	18	410	19	8	500	450	550	8	18	1036	1191
DEx 280S	368	457	24	280	190	75	140	M20	537	464	79.5	20	410	19	8	500	450	550	8	18	1036	1191
DEx 280M-2	419	457	24	280	190	65	140	M20	537	464	69	18	410	19	8	500	450	550	8	18	1096	1096
DEx 280M	419	457	24	280	190	75	140	M20	537	464	79.5	20	410	19	8	500	450	550	8	18	1096	1251
DEx 315S-2	406	508	28	315	216	65	140	M20	617	544	69	18	454	24	8	600	550	660	8	18	1050	1210
DEx 315S	406	508	28	315	216	80	170	M20	617	544	85	22	484	24	8	600	550	660	8	18	1080	1270
DEx 315M-2	457	508	28	315	216	65	140	M20	617	544	69	18	454	24	8	600	550	660	8	18	1220	1380
DEx 315M	457	508	28	315	216	80	170	M20	617	544	85	22	484	24	8	600	550	660	8	18	1250	1440
DEx 315M-20	457	508	28	315	216	65	140	M20	617	544	69	18	454	24	8	600	550	660	8	18	1220	1380
DEx 315M0	457	508	28	315	216	80	170	M20	617	544	85	22	484	24	8	600	550	660	8	18	1250	1440
DEx 315L-2	457	508	28	315	216	65	140	M20	617	544	69	18	454	24	8	600	550	660	8	18	1300	1460
DEx 315L	457	508	28	315	216	80	170	M20	617	544	85	22	484	24	8	600	550	660	8	18	1330	1520

X Number of bores

Explosion protected three-phase brake motors

Motors with brake

Brake motors are three-phase asynchronous motors with squirrel cage rotor equipped with a mechanical spring-loaded brake (electrically released). The brakes come with a separate terminal box. Braking does not subject the motor winding to a thermal load. The brake motors are used for lifting and travelling drives, machine tools, packaging machines, transport and conveyor technology, servo drives, etc.

Brake motors are characterised by:

- shortening of ancillary times by reduced motor coast-down times
- locking brake in case of power failure
- exact approaching of a certain position
- increased motor switching frequency
- matching of braking torque to work conditions
- high operational safety due to robust design
- long service life

The brake motors are available with the following brake types:

- Motors with integrated brake (size 71 to 132) type BMH
- Motors with integrated brake/fan side (size 71 to 180) type KB (Kendrion)
- Motors with integrated brake/flange side (size 63 to 280) type BD (VIS)

They are exclusively intended for dry operation.

Voltage and circuit type

The brakes also available for voltages other than the standard voltages 24 V, 103 V, 180 V, and 205 V. A rectifier is used to connect the brakes to an AC supply. These rectifiers, specially developed for supplying DM solenoids, are protected with a varistor circuit against voltage peaks that occur in connection with switching, contact chatter, excessively long cables or poor mains conditions. The brake motors can be equipped with one-way or bridge rectifiers located in the terminal box.

Brake motor power data

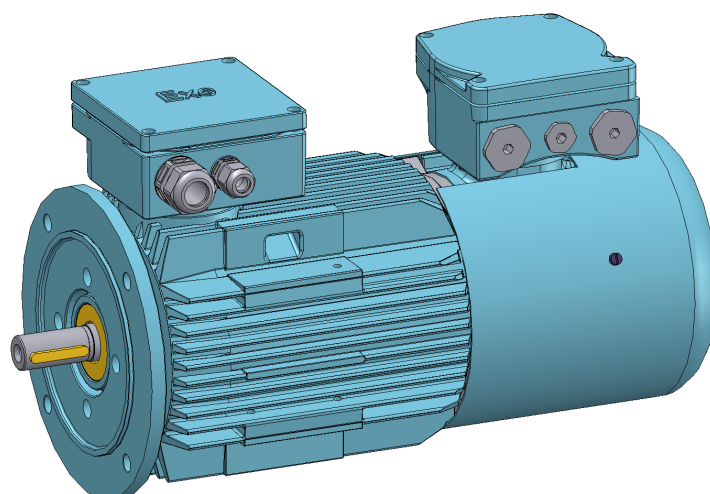
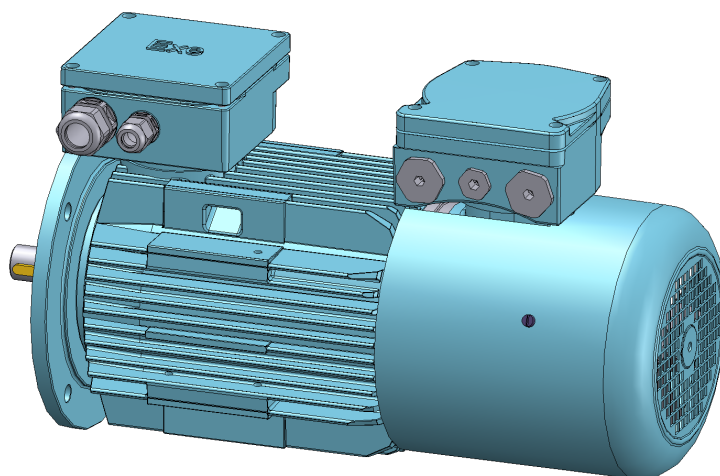
Brake size and motor size usually correspond in such a manner that the switching frequency to be obtained with the brake motor is not restricted by the brake but by the motor temperature. The permissible switching frequency calculated from the moment of inertia, counter torque and load factors can in most cases be assumed to also be the permissible brake switching frequency for the spring-loaded brake. This value must be higher than the required number of start-ups or brake procedures per hour.

Explosion-protected

three-phase brake motors

with brake/type BMH

Dimensional sheet



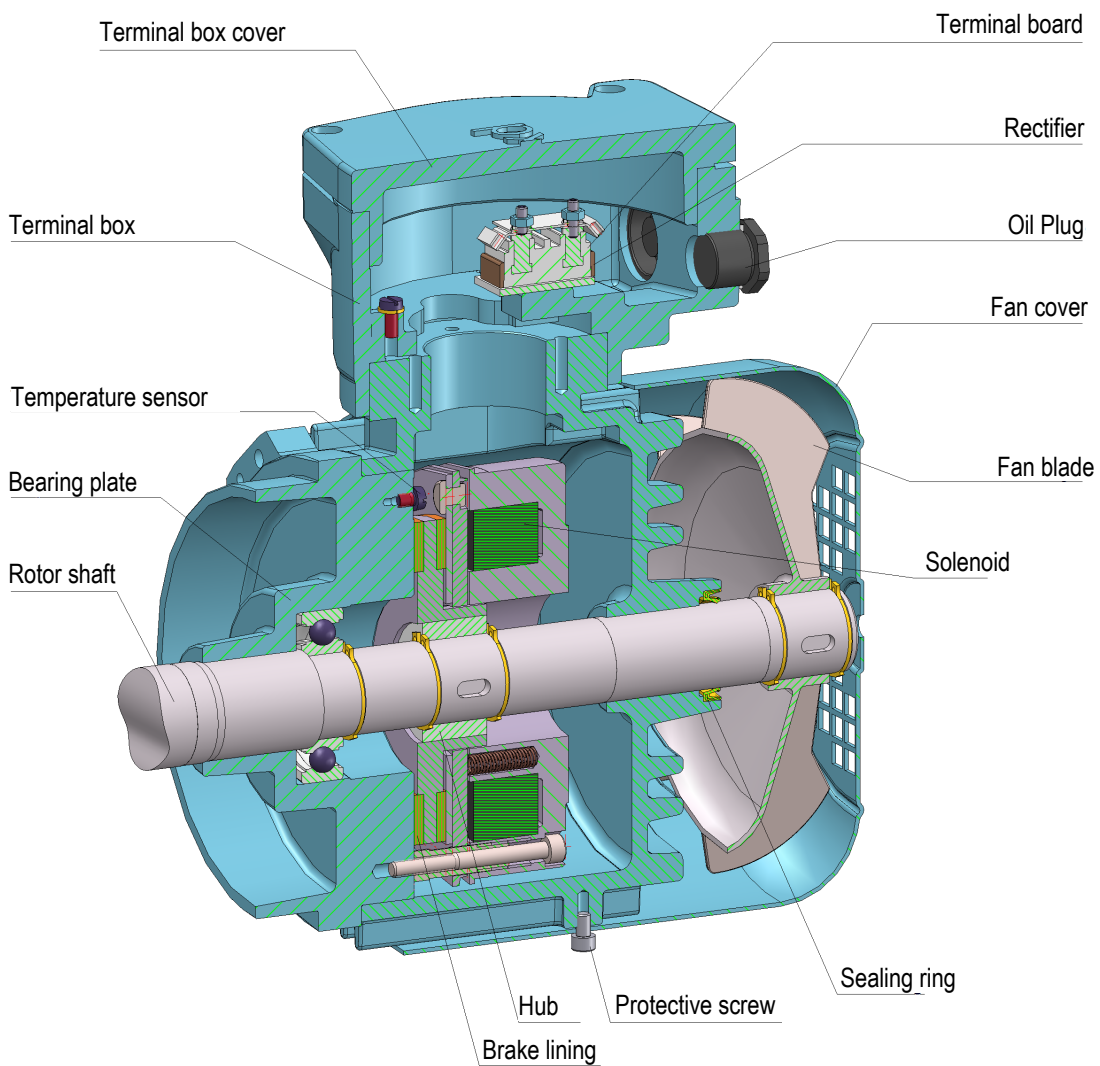
Motors with brake/type BMH

This brake is a single-disc brake with two friction surfaces. In the deenergised state, one or several pressure springs generate the braking torque by friction locking. The brake is released electromagnetically.

To release the brake, a direct current excites the solenoid of the magnet part. The resulting magnetic force pulls the armature disc against the spring force to the magnet part. The rotor is no longer subjected to the spring force and can turn freely.

Generating the braking torque

During braking, the pressure springs push the rotor axially sliding on the hub or shaft via the armature disc against the counter friction surface. When the brake is applied, there is an air gap S_{Re} between armature disc and magnet part.



Technical data

Size/type	Braking torque [Nm]	Max. speed n_{max} [rpm]	Nominal input power $P_{20^{\circ}C}$ [W]	Moment of inertia J_B $kgm^2 \cdot 10^{-4}$	Weight (brake) [appr. kg]
DEx71-BMH5	5	6000	22	0.13	1.0
DEx80-BMH10	10	6000	28	0.45	2.0
DEx90-BMH20	20	6000	34	1.6	3.0
DEx100-BMH40	40	6000	42	3.6	5.0
DEx112-BMH60	60	3600	50	4.7	6.5
DEx132-BMH100	100	3600	64	11.0	10.0

Assignment of motor size/brake torque (reduced brake torques on request)

Brake type BMH	BMH5	BMH10	BMH20	BMH40	BMH60	BMH80
Braking torque [Nm]	5	10	20	40	60	80

Size 71	x					
Size 80		x				
Size 90			x			
Size 100				x		
Size 112					x	
Size 132						x

Version

The brakes comply with ignition protection types II 2G Ex d IIC Gb and II 2D Ex tb IIIC Db and therefore are approved for application in Zone 1 and Zone 2, as well as Zone 21 and Zone 22. By default, the brakes are suitable for a temperature range of $-20^{\circ}C$ to $+40^{\circ}C$ (special version $-50^{\circ}C$ to $+60^{\circ}C$ available). The brakes feature a thermostatic switch for temperature monitoring.

Special designs:

- Brake motors with second shaft end
- Brake motors with additional flywheel mass
The additional flywheel mass installed in the fan cowl enables jerk-free starting and stopping of the motor.
- Brake motors with external fan

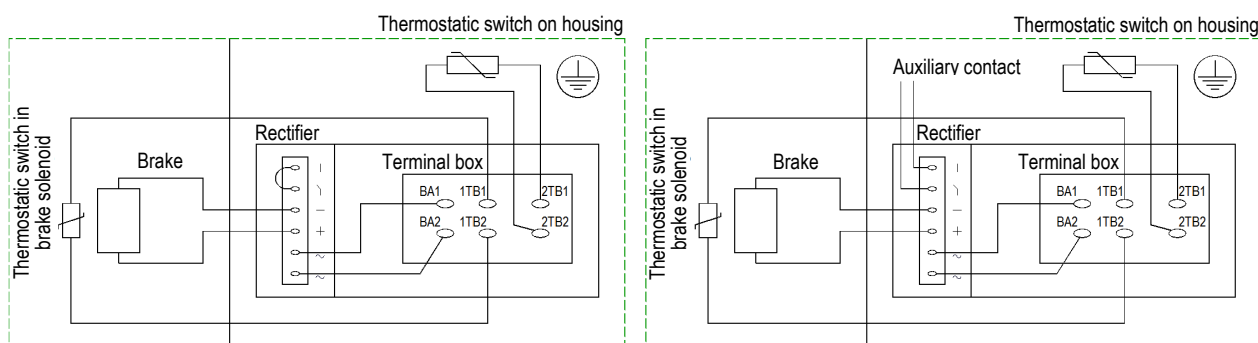
Brake motors of type “integrated brake/type BMH” come in two basic circuit variants:

AC switching

By default, the AC side of the rectifier is connected to the motor terminals, and the DC side to the brake solenoid. This results in a smooth, delayed brake engagement.

DC switching

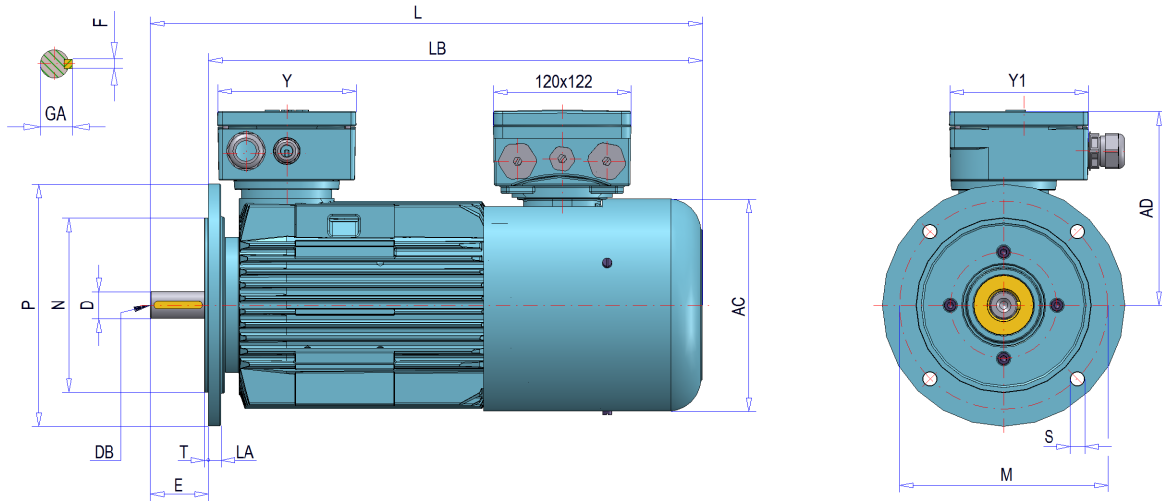
The AC side of the rectifier is connected to the motor terminals. During switch-off, the DC circuit between rectifier and brake solenoid is interrupted with an auxiliary contact of the motor protection switch.



Three-phase brake motors

Types DEx 71 -- 132
 Temperature class T1 to T4
 Cooling type IC 411

Design: IM B5 / IM 3001
 IM V1 / IM 3011
 IM V3 / IM 3031



Fits and tolerances see page 8/2
 Subject to technical amendments

Type	D	E	DB	AC	AD	Y	Y1	GA	F	L	LB	S	X	M	N	P	T	LA
DEx 71 K/L ...BMH5	14	30	M5	139	147	124	132	16	5	331	301	9	4	130	110	160	3.5	9
DEx 80 K/L ...BMH10	19	40	M6	157	169	144	144	21.5	6	363	323	11	4	165	130	200	3.5	10
DEx 90 S ...BMH20	24	50	M8	177	181	144	144	27	8	395	345	11	4	165	130	200	3.5	10
DEx 90 L ...BMH20	24	50	M8	177	181	144	144	27	8	420	370	11	4	165	130	200	3.5	10
DEx 100 L ...BMH40	28	60	M10	195	188	144	144	31	8	450	390	13.5	4	215	180	250	4	11
DEx 112 M ...BMH60	28	60	M10	219	199	144	144	31	8	509	449	13.5	4	215	180	250	4	11
DEx 132 S ...BMH100	38	80	M12	253	218	144	144	41	10	573	493	13.5	4	265	230	300	4	12
DEx 132 M ...BMH100	38	80	M12	253	218	144	144	41	10	611	531	13.5	4	265	230	300	4	12

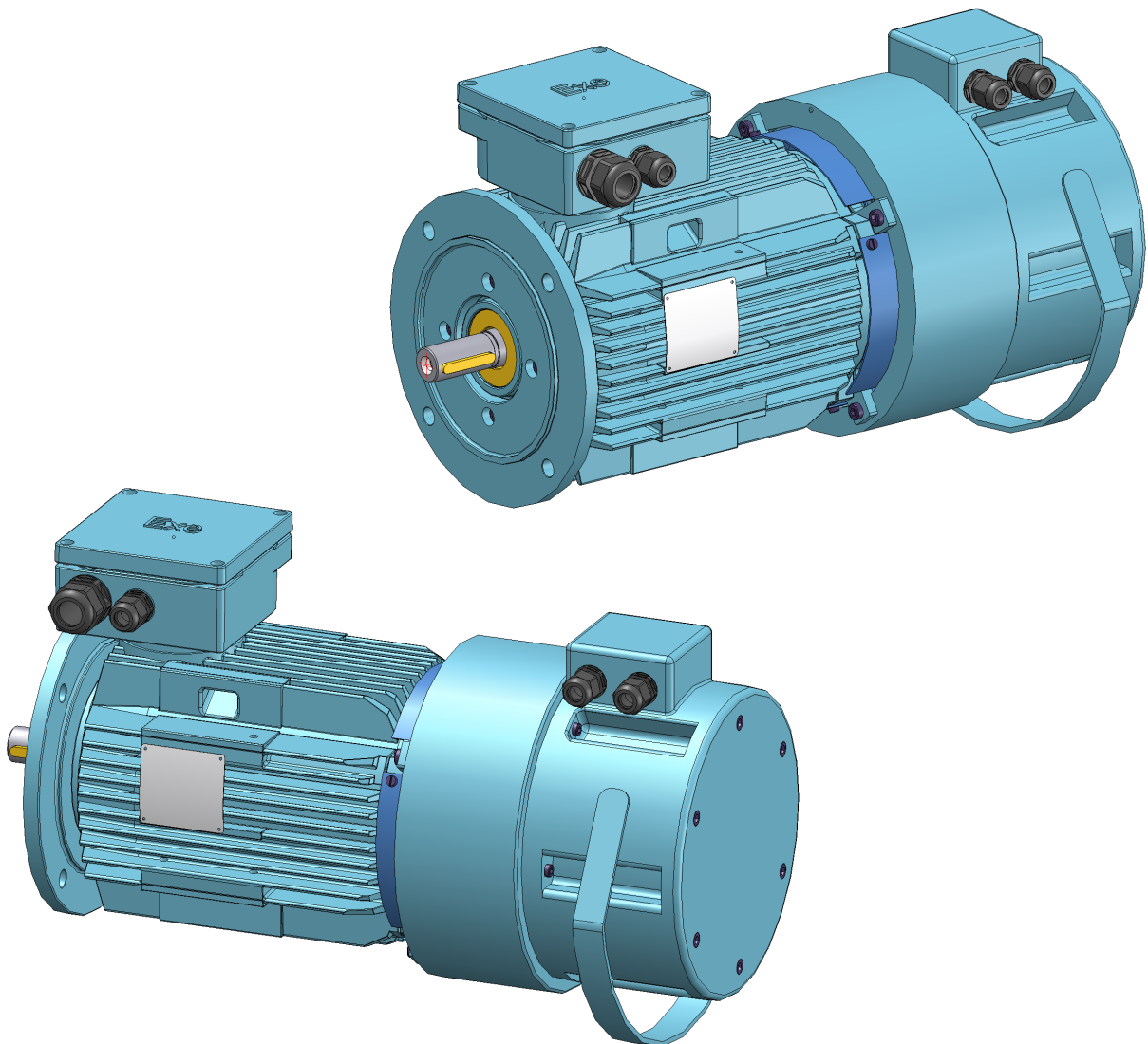
X Number of bores

Explosion-protected

three-phase brake motors

with brake / type KB (Kendrion)

Dimensional sheet



Motors with brake / type KB (Kendrion)

Technical data

Size/type	Braking torque [Nm]	Max. speed n_{max} [rpm]	Nominal input power $P_{20^{\circ}C}$ [W]	Moment of inertia J_B $kgm^2 \cdot 10^{-4}$	Weight (brake) [appr. kg]
KB size 10	10	6000	56	2.5	15
KB size 11	20	6000	56	2.5	15
KB size 13	50	3000	82	22	29
KB size 16	100	3000	82	22	29
KB size 19	150	3000	91	125	57
KB size 24	330	3000	91	125	57

Assignment of motor size/brake torque (reduced brake torques on request)

Brake type KB	KB10	KB20	KB50	KB100	KB150	KB330
Braking torque [Nm]	10	20	50	100	150	330

Size 71	x	o				
Size 80	o	x				
Size 90	o	x				
Size 100			x	o		
Size 112			x	o		
Size 132			o	x		
Size 160				o	x	o
Size 180					o	x

x = standard assignment

o = possible assignment

Version

The brakes comply with ignition protection types II 2G Ex de IIC T5 and II 2D Ex tD A21 IP67 T100°C and therefore are approved for application in Zone 1 and Zone 2, as well as Zone 21 and Zone 22. By default, the brakes are suitable for a temperature range of –20°C to +40°C. The brakes feature a thermostatic switch for temperature monitoring.

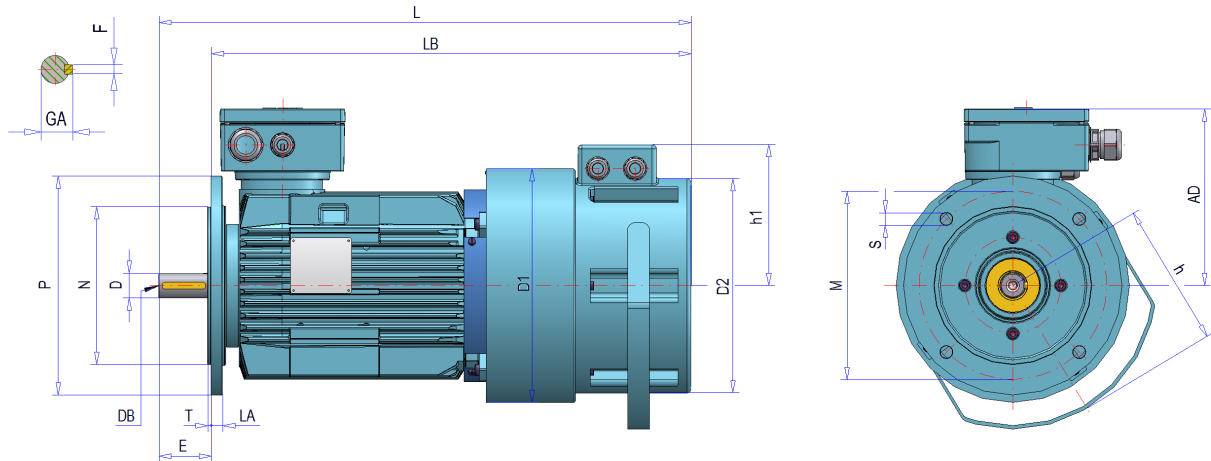
Special designs:

- Brakes with manual release
As an option, the brake is also available with manual release. When the manual release is actuated while the brake is deenergised, the brake releases mechanically, and the shaft can be moved easily.
- Temperature monitoring with PTC instead of with thermostatic switch

Three-phase brake motors

Types DEx 71 -- 180
 Temperature class T1 to T4
 Cooling type IC 411

Design: IM B5 / IM 3001
 IM V1 / IM 3011
 IM V3 / IM 3031



Fits and tolerances see page 8/2
 Subject to technical amendments

Type	D	E	DB	D1	D2	AD	h	h1	GA	F	L	LB	S	X	M	N	P	T	LA
DEx 71 K/L ...KB10	14	30	M5	192	178	147	134	133	16	5	420	390	9	4	130	110	160	3.5	10
DEx 80 K/L ...KB11	19	40	M6	192	178	169	134	133	21.5	6	460	420	12	4	165	130	200	3.5	10
DEx 90 S ...KB11	24	50	M8	220	178	181	134	133	27	8	510	460	12	4	165	130	200	3.5	10
DEx 90 L ...KB11	24	50	M8	220	178	181	134	133	27	8	510	460	12	4	165	130	200	3.5	10
DEx 100 L ...KB13	28	60	M10	267	245	188	164	161	31	8	590	530	14	4	215	180	250	4	11
DEx 112 M ...KB13	28	60	M10	267	245	199	164	161	31	8	610	550	14	4	215	180	250	4	11
DEx 132 S ...KB16	38	80	M12	301	245	218	164	161	41	10	736	656	14	4	265	230	300	4	16
DEx 132 M ...KB16	38	80	M12	301	245	218	164	161	41	10	736	656	14	4	265	230	300	4	16
DEx 160 M ...KB19	42	110	M16	350	330	276	215	205	45	12	850	740	18	4	300	250	350	5	19
DEx 160 L ...KB19	42	110	M16	350	330	276	215	205	45	12	850	740	18	4	300	250	350	5	19
DEx 180GM ...KB24	48	110	M16	405	330	302	215	205	51	14	914	804	18	4	300	250	350	5	15
DEx 180GL ...KB24	48	110	M16	405	330	302	215	205	51	14	914	804	18	4	300	250	350	5	15

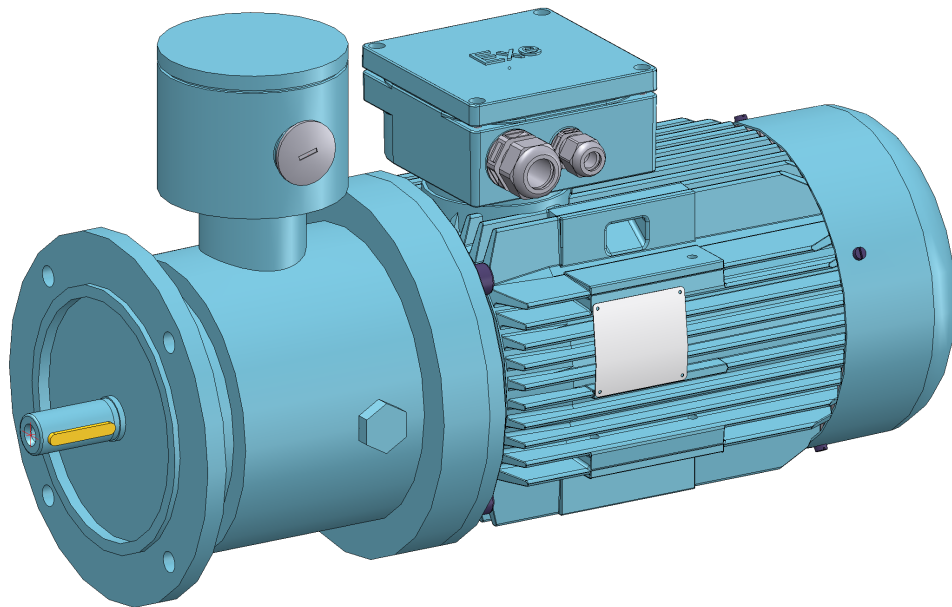
X Number of bores

Explosion-protected

three-phase brake motors

with brake type BD (VIS)

Dimensional sheet





Motors with brake/type BD (VIS)

Technical data

Size/type	Braking torque [Nm]	Max. speed n_{max} [rpm]	Nominal input power $P_{20^{\circ}C}$ [W]	Moment of inertia J_B kgm ² · 10 ⁻⁴	Weight (brake) [appr. kg]
VIS 63	8	3600	40	1.85	15
VIS 71	8	3600	40	1.90	16
VIS 80	22	3600	50	3.95	32
VIS 90	22	3600	50	3.95	34
VIS 100	40	3600	80	8.6	50
VIS 112	60	3600	80	8.6	50
VIS 132	150	3600	105	33.2	78
VIS 160	180	2800	105	33.8	82
VIS 180	335	2500	180	54	135
VIS 200	460	2500	180	54	150
VIS 225	500	2500	180	57	175

Assignment of motor size/brake torque (reduced brake torques on request)

Brake type BD	BD8	BD22	BD40	BD60	BD150	BD180	BD335	BD460	BD500
Braking torque [Nm]	8	22	40	60	150	180	335	460	500

Size 63	x								
Size 71	x								
Size 80		x							
Size 90		x							
Size 100			x						
Size 112				x					
Size 132					x				
Size 160						x			
Size 180							x		
Size 200								x	
Size 225									x

Version

The brakes comply with ignition protection types II 2G Ex d IIC T5 Gb and II 2D Ex tb IIIC T100°C and therefore are approved for application in Zone 1 and Zone 2, as well as Zone 21 and Zone 22. By default, the brakes are suitable for a temperature range of -50°C to +60°C. The brakes feature a thermostatic switch for temperature monitoring.

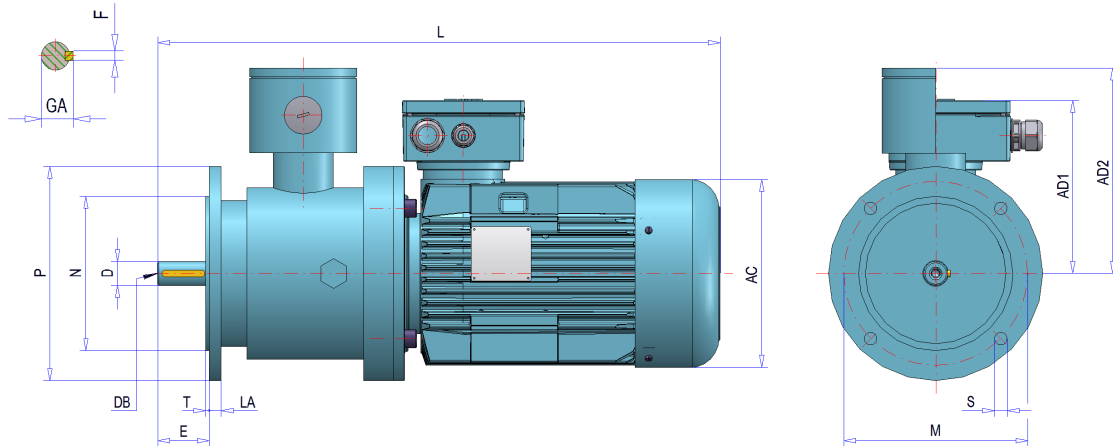
Special designs:

- Brakes with manual release
As an option, the brake is also available with manual release. When the manual release is actuated while the brake is deenergised, the brake releases mechanically, and the shaft can be moved easily.
- Brakes with standstill heating against condensation
- Temperature monitoring with PTC instead of with thermostatic switch
- Brake motors with second shaft end
- Brake motors with additional flywheel mass
The additional flywheel mass installed in the fan cowl enables jerk-free starting and stopping of the motor.
- Brake motors with external fan and/or hollow shaft encoder

Three-phase brake motors

Types DEx 63 -- 225
 Temperature class T1 to T4
 Cooling type IC 411

Design: IM B5 / IM 3001
 IM V1 / IM 3011
 IM V3 / IM 3031



Fits and tolerances see page 8/2
 Subject to technical amendments

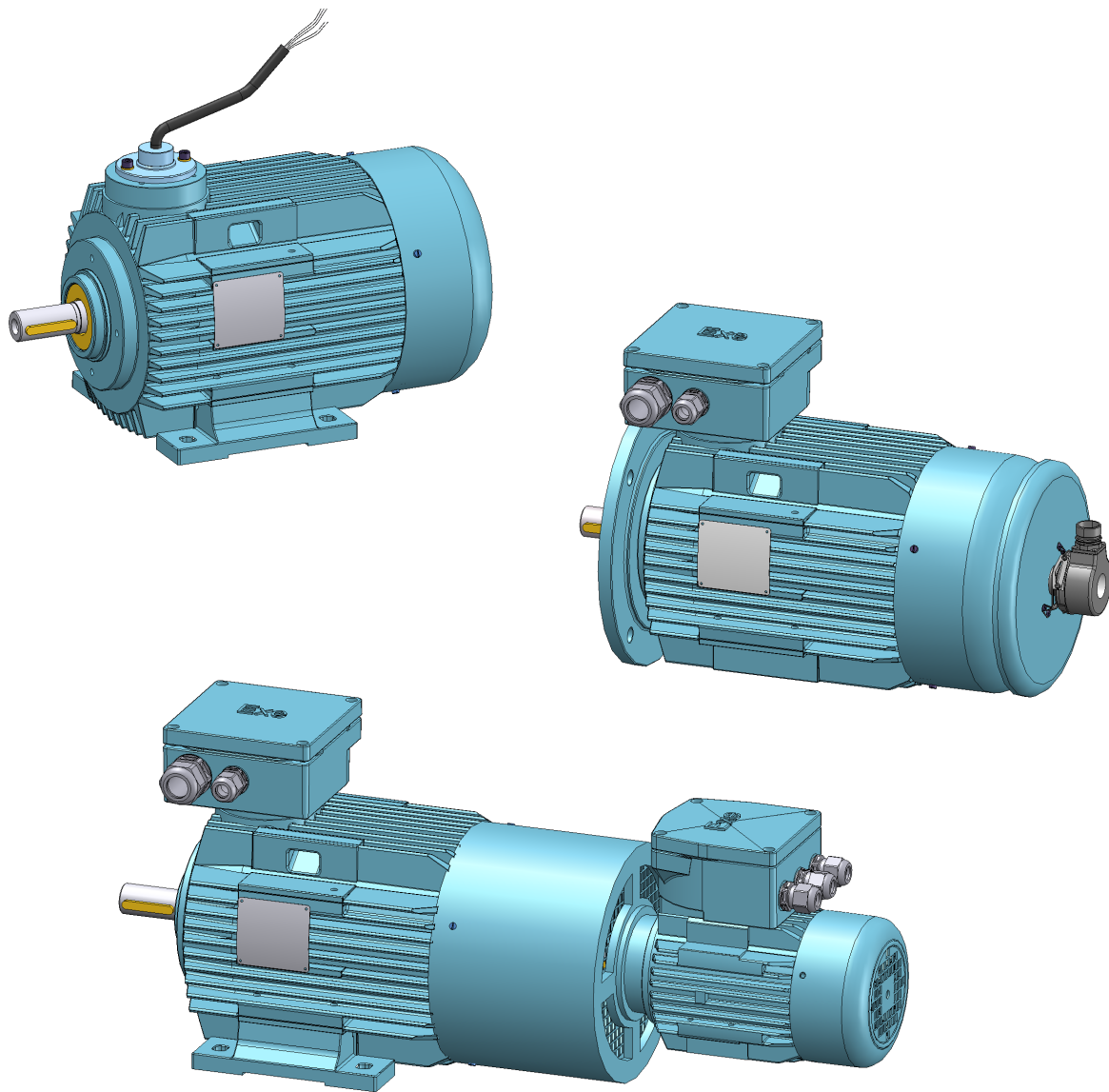
Type	D	E	DB	AC	AD1	AD2	GA	F	S	X	M	N	P	T	LA	L
Dex 63 K/L ...BD8	11	23	M5	125	147	169	12.5	4	9	4	115	95	140	3	10	383
Dex 71 K/L ...BD8	14	30	M5	139	147	169	16	5	9	4	130	110	160	3.5	10	417
Dex 80 K/L ...BD22	19	40	M6	157	169	199	21.5	6	12	4	165	130	200	3.5	12	515
Dex 90 S/L ...BD22	24	50	M8	177	181	199	27	8	12	4	165	130	200	3.5	120	558
Dex 100 L ...BD40	28	60	M10	195	188	224	31	8	14	4	215	180	250	4	14	632
Dex 112 M ...BD60	28	60	M10	219	199	224	31	8	14	4	215	180	250	4	14	654
Dex 132 S/M ...BD150	38	80	M12	258	218	249	41	10	14	4	265	230	300	4	18	777
Dex 160 M/L ...BD180	42	110	M16	310	276	249	45	12	18	4	300	250	350	4	18	911
Dex 180 M/L ...BD335	48	110	M16	345	316	267	51	14	18	4	300	250	350	4	21	1009
Dex 200L ...BD460	55	110	M20	385	346	267	59	16	18	4	350	300	400	4	21	1098
Dex 225S ...BD500	60	140	M20	435	364	267	64	18	18	8	400	350	450	4	21	1154
Dex 225M-2 ...BD500	60	140	M20	435	364	267	59	16	18	8	400	350	450	4	21	1154
Dex 225M ...BD500	60	140	M20	435	364	267	64	18	18	8	400	350	450	4	21	1154

X Number of bores

**Explosion protected three-phase motors,
special design**

EXPLOSION-PROTECTED 3-PHASE MOTORS

Special version

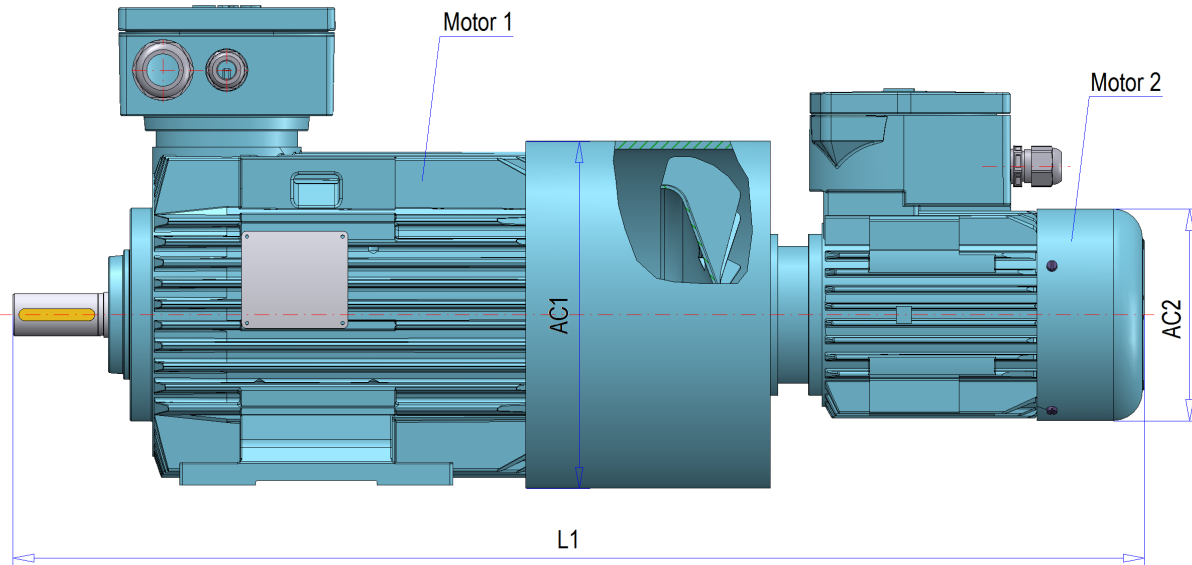


Three-phase motors

Types DEx 80 – 315
 Temperature class T1 to T4
 Cooling type: IC 411

Special version

As an option, size 63-315 motors are available with external fan (see page 16/20)



Subject to technical amendments

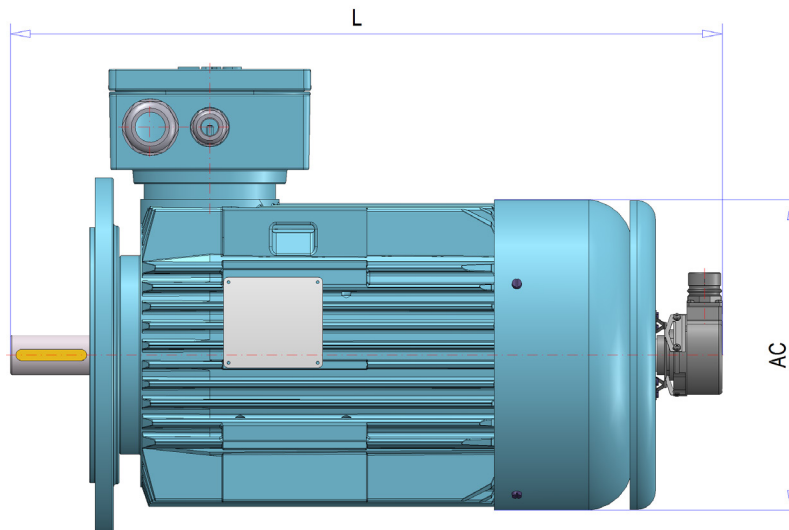
Type (Motor 1)	Motor 2 (Type)	AC1	AC2	L1	Weight (4-pole - B3) [approx. in kg]
DEx 80 K/L	71K/2	159	139	614	44 / 46
DEx 90 S/L	71K/2	180	139	637	52 / 55
DEx 100 L/L0	71K/2	198	139	695	63 / 66
DEx 112 M	71K/2	222	139	726	81
DEx 132 S/M	71K/2	261	139	822	106 / 116
DEx 160 M/L	71K/2	317	139	954	188 / 207
DEx 180GM/L	80K/4	355	157	1026	256 / 277
DEx 200GL	80K/4	391	157	1135	296
DEx 225GS	80K/4	439	157	1218	360
DEx 225GM-2	80K/4	439	157	1184	425
DEx 225GM	80K/4	439	157	1218	440
DEx 250GM-2	90L/4	491	177	1380	528
DEx 250GM	90L/4	491	177	1380	523
DEx 280S-2	90L/4	537	178	1422	695
DEx 280S	90L/4	537	178	1422	655
DEx 280M-2	90L/4	537	179	1482	745
DEx 280M	90L/4	537	179	1482	730
DEx 315S-2	90L/4	617	180	1429	867
DEx 315S	90L/4	617	180	1459	867
DEx 315M-2	90L/4	617	181	1599	977
DEx 315M	90L/4	617	181	1629	977
DEx 315M-20	90L/4	617	182	1599	1287
DEx 315M0	90L/4	617	182	1629	1287
DEx 315L-2	90L/4	617	183	1679	1427
DEx 315L	90L/4	617	183	1709	1427

Three-phase motors

Types DEx 63 – 315
 Temperature class T1 to T4
 Cooling type: IC 411

Special version

As an option, size 63-315 motors are available with hollow shaft encoder (see page 16/21)



Subject to technical amendments

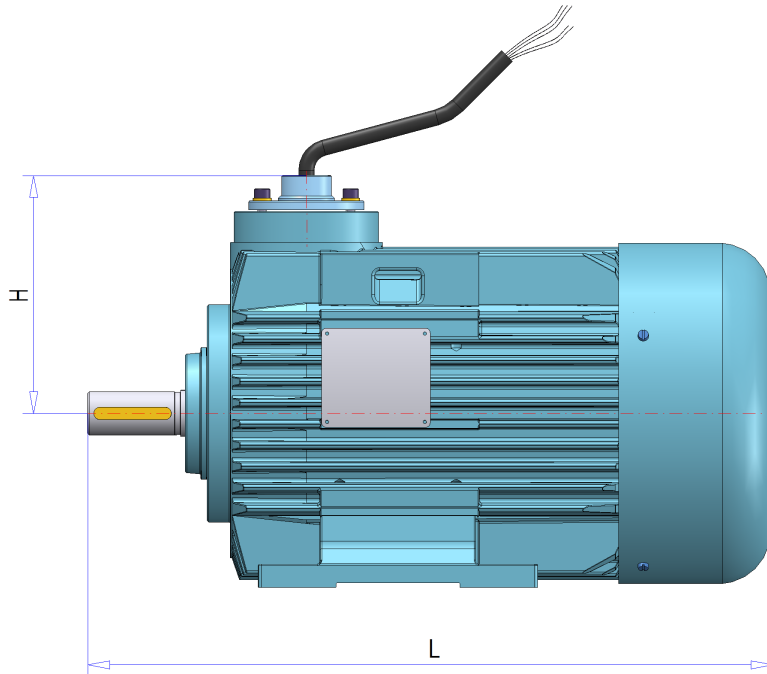
Type (Motor 1)	AC	L	Weight (4-pole - B3) [approx. in kg]
DEx 63 K/L	125	353	15 / 16
DEx 71 K/L	139	386	17 / 18
DEx 80 K/L	157	435	26 / 28
DEx 90 S/L	177	478	34 / 37
DEx 100 L/L0	195	534	45 / 48
DEx 112 M	219	556	62
DEx 132 S/M	258	640	86 / 96
DEx 160 M/L	310	788	161 / 180
DEx 180GM/L	345	828	217 / 238
DEx 200GL	385	940	252
DEx 225GS	435	1025	312
DEx 225GM-2	435	995	377
DEx 225GM	435	1025	392
DEx 250GM-2	491	On request	487
DEx 250GM	491	On request	482
DEx 280S-2	537	On request	652
DEx 280S	537	On request	612
DEx 280M-2	537	On request	702
DEx 280M	537	On request	687
DEx 315S-2	617	On request	822
DEx 315S	617	On request	822
DEx 315M-2	617	On request	932
DEx 315M	617	On request	932
DEx 315M-20	617	On request	1242
DEx 315M0	617	On request	1242
DEx 315L-2	617	On request	1382
DEx 315L	617	On request	1382

Three-phase motors

Types DEx 63 – 225
 Temperature class T1 to T4
 Cooling type: IC 411

Special version

As an option, size 63-225 motors are available with direct cable connection instead of with terminal box (cable length on customer's request)



Subject to technical amendments

Type	L	H	Weight (4-pole - B3) [approx. in kg]
DEx 63 K/L	238	112	9 / 10
DEx 71 K/L	271	112	11 / 12
DEx 80 K/L	317	126	20 / 22
DEx 90 S/L	360	135	28 / 31
DEx 100 L/L0	416	142	38 / 42
DEx 112 M	438	154	56
DEx 132 S/M	534	179	80 / 89
DEx 160 M/L	667	211	147 / 166
DEx 180GM/L	704	256	203 / 224
DEx 200GL	790	288	238
DEx 225GS	882	308	298
DEx 225GM-2	852	308	363
DEx 225GM	852	308	378