

**General Catalogue Herforder-Elektromotoren-Werke**



Date: 02/11/2021  
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## Planning section **R-series motors**

### Planning section R-series motors

#### Contents

#### Overview of production range

**HEW** has produced asynchronous motors for more than 125 years. Our product range includes the following versions:

- Standard three-phase motors
- Standard pole-changing 3-phase motors
- Standard pole-changing 3-phase motors for 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 Section Explosion protected DEX Series motors)
- Explosion protected three-phase brake motors (see catalogue Section Explosion protected DEX Series motors)

Due to their high-quality insulation system, our motors are suitable for operation with frequency inverters.

Standard versions are produced as thermal class F. Thermal class H is available as an option. The windings can also be equipped with a PTC or thermal switch. Other temperature monitoring elements, standstill heating and enhanced tropical and moisture protection are available on request.

Operation of three-phase motors in demanding drive systems often requires feedback elements to be fitted.

On request by the customer, HEW can also supply 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 optionally equipped with these encoders.

Standard motors are produced in protection class IP 54. Higher protection levels are optionally available (*Section Protection classes*).

Versions which comply with other standards or directives (e.g. UL/CSA, VIK or DNV-GL) are available on request.

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## Planning section R-series motors

### Primer / Paint

HEW motors can be supplied with various coating systems. The products can be supplied with or without primer or with a coating system based on DIN EN ISO 12944 corrosivity categories. Standard painting is based on corrosivity category C1. Higher standard corrosivity categories are available on request.

#### **Standard HEW colours:**

- RAL 5010 (gentian blue)
- RAL 7031 (blue-grey)
- RAL 6011 (reseda green)

#### **Preferred RAL colours** can be supplied at short notice:

- RAL 2003 (pastel orange)
- RAL 2004 (pure orange)
- RAL 3020 (traffic red)
- RAL 5003 (sapphire blue)
- RAL 5009 (azure blue)
- RAL 6018 (yellow-green)
- RAL 7035 (light grey)
- RAL 9005 (deep black)

**Special colours** according to various colour schemes are also available after prior examination. Please contact us if necessary.

#### **Gloss values**

Our standard gloss value is **high gloss**.

Our standard textured paint is only available as gloss

Special gloss values are available after prior examination. Please contact us if necessary.

## Planning section R-series motors

### Efficiencies

Long life, safety and environmental compatibility have always been part of our company philosophy. For this reason, careful and responsible handling of resources led to the development of energy-saving motors and drive solutions at an early stage.

The issue of efficiency is becoming increasingly important due to EU regulations (REGULATION (EU) 2019/1781 OF THE EUROPEAN COMMISSION of 1 October 2019).

In addition to this regulation, other national regulations must be observed.

#### **EU Regulation (EU) No. 2019/1781**

This regulation stipulates the energy efficiency requirements for the environmentally compatible design of electric motors.

The following applies as of 1 July 2021:

- the energy efficiency of 2, 4, 6 or 8 pole three-phase motors with a nominal output power of at least 0.75 kW and a maximum of 1,000 kW which are not explosion protected motors with enhanced safety must at least correspond to efficiency level IE3.
- The energy efficiency of 2, 4, 6 or 8 pole three-phase motors with a nominal output power of at least 0.12 kW and less than 0.75 kW which are not explosion protected motors with enhanced safety must at least correspond to efficiency level IE2;

The regulation designates "motors" as single speed three-phase 50Hz, 60Hz or 50/60Hz squirrel-cage rotor induction motors with the following characteristics:

- Operation with sine-wave voltage:
- 2 to 8 pole
- Nominal voltage  $U_N = 50V$  up to 1000V;
- Nominal output power  $P_N$  between 0.12kW and up to 1000kW;
- Designed for continuous operation and
- Intended for direct operation on the public power grid.

The regulation does not apply to:

- Motors which are fully integrated into a product (e.g. gear units, pumps, fans or compressors), whose energy efficiency cannot be tested independently of the product even with the use of a temporary bearing plate and drive bearing; the motor must (in addition to attachment components such as a screws) have common components with the driven appliance (e.g. a shaft or housing) and must not be designed so that it can be separated from and operated independently from the driven appliance; The motor must no longer be operable in the event of separation;
- Motors with integrated speed control (compact drives), whose energy efficiency cannot be tested independently from the speed control;
- Motors with integrated brakes which form an integral part of the internal design of the motor and which can neither be removed nor supplied from a separate power source during efficiency testing;

## Planning section R-series motors

- Specially designed motors which are exclusively specified for the following operating conditions:
  - o Altitudes of more than 4,000 meters above sea level;
  - o Ambient temperatures in excess of 60°C;
  - o Maximum ambient temperature in excess of 400°C;
  - o Ambient temperature below – 30 °C or
  - o Coolant liquid temperature at the inlet of the product below 0°C or above 32°C
- Motors which are specially designed and specified for operation where they are fully submerged in a liquid;
- Motors which are specially suitable for the required safety of nuclear power installations in the sense of Article 3 of Directive 2009/71/Euratom of the Council.
- Explosion protected motors which are designed and certified for underground plant according to Annex I Number 1 of Directive 2014/34/EU of the European Parliament and Council;
- Motors in cordless or battery-operated appliances;
- Motors in hand-held appliances whose weight is supported manually during operation;
- Motors in manually guided mobile appliances which are moved during operation;
- Motors with mechanical commutators;
- Fully encapsulated self-cooled motors (TENV motors => Cooling type IC410);
- Motors which are sold prior to 1 July 2029 as replacements for identical motors integrated into products which were sold and specially marketed prior to 1 July 2022;
- Multiple speed motors, i.e. motors with several windings or switched windings which have different numbers of poles and speeds;
- Motors specifically designed to drive electric vehicles.

### **Standard IEC 60034-30-1: Efficiency classification of mains-powered three-phase motors (IE Code)**

In the standard cited above, the associated efficiency limits for the particular efficiency level are defined according to the rated power and number of poles.

## Planning section R-series motors

### 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	---
Rotating electrical machines – ratings and direction of rotation	DIN EN 60034-1 (VDE 0530-1)	EN 60034-1	IEC 60034-1
Rotating electrical machines – protection classes due to the general construction of rotating electrical machines (IP Code)	DIN EN 60034-5 (VDE 0530-5)	EN 60034-5	IEC 60034-5
Rotating electrical machines – categorisation of cooling method (IC Code)	DIN EN 60034-6	EN 60034-6	IEC 60034-6
Rotating electrical machines – classification of types of construction, mounting arrangements and terminal box position (IM Code)	DIN EN 60034-7	EN 60034-7	IEC 60034-7
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 – noise limits	DIN EN 60034-9 (VDE 0530-9)	EN 60034-9	IEC 60034-9
Rotating electrical machines – starting performance of three-phase squirrel cage induction motors except pole-changing motors	DIN EN 60034-12 (VDE 0530-12)	EN 60034-12	IEC 60034-12
Rotating electrical machines – mechanical vibration of particular machines with shaft heights 56 mm and higher - Measurement, evaluation and limits of vibration severity	DIN EN60034-14 (VDE 0530-14)	EN 60034-14	IEC 60034-14
Rotating electrical machines – efficiency classification of mains-powered three-phase motors (IE Code)	DIN EN 60034-30-1 (VDE 0530-30-1)	EN 60034-30-1	IEC 60034-30-1
Standard voltages	DIN EN 60038 (VDE 175-1)	EN 60038	IEC 60038

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


## Planning section R-series motors

### Mechanical design

#### Designs

Overview of design and IM code (international mounting) of the most frequently used versions according 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

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



## Planning section R-series motors

### Protection classes

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

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

**2nd code digit (0 to 8):** Protection levels for protection against water.

**HEW standard motors are supplied in protection class IP 54.**

The following table lists the protection classes for electric motors.

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

Protection class	1st code digit	2nd code number
	Protection against contact and foreign objects.	Protection against water
<b>IP 54</b>	Protection against contact with and approaching of live parts as well as contact with moving parts inside the housing. Entry of dust is not entirely prevented but dust cannot enter in amounts which would impair the satisfactory operation of the machine.	Water sprayed onto the machine from all directions must not have any detrimental effect.
<b>IP 55</b>		Water sprayed onto the machine with a nozzle from all directions must not have any detrimental effect.
<b>IP 56</b>		Harmful amounts of water due to heavy seas or powerful water jets 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 downward (e.g. V1 / V5 / V18).

### Housing designs

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

In deviation from the standard range, sizes 80-160 are available in cast iron (on request).

## Planning section R-series motors

### Flange variants

#### Available flanges

Designation according to DIN EN 50347	FF100	FF115	FF130	FF165	FF215	FF265	FF300
"Old" designation according to 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 according to DIN EN 50347	FT65	FT75	FT85	FT100	FT115	FT130	FT165	FT215
"Old" designation according to 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 = Categorisation according to standard (DIN EN 50347)

o = Special flange

Other flange variants available on request

#### Note

Designation according to DIN EN 50347

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

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

Old designation according to DIN 42948

**A** corresponds to the outer flange diameter of flange B5

**C** corresponds to the outer flange diameter of flange B14

## Planning section R-series motors

### Bearings

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

#### Standard bearing categories

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.

#### Cylindrical roller bearings

Cylindrical roller bearings can be fitted on request if the permissible radial forces are exceeded (see Section Radial and axial forces).

## Planning section R-series motors

### Constructional design of bearings



Fig. 1: Constructional design of bearings sizes 63-112

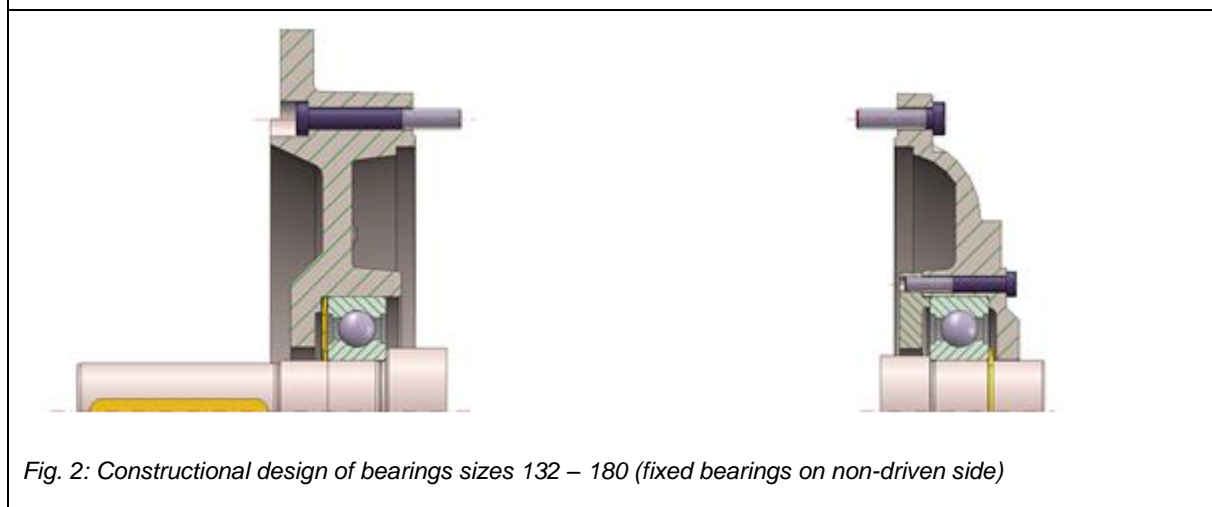


Fig. 2: Constructional design of bearings sizes 132 – 180 (fixed bearings on non-driven side)

## Planning section R-series motors

### Shaft ends

IEC 60034-7 defines the motor sides as follows:

DS (D side) = Driving side of motor (Driving side)

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

Designations still common in Germany:

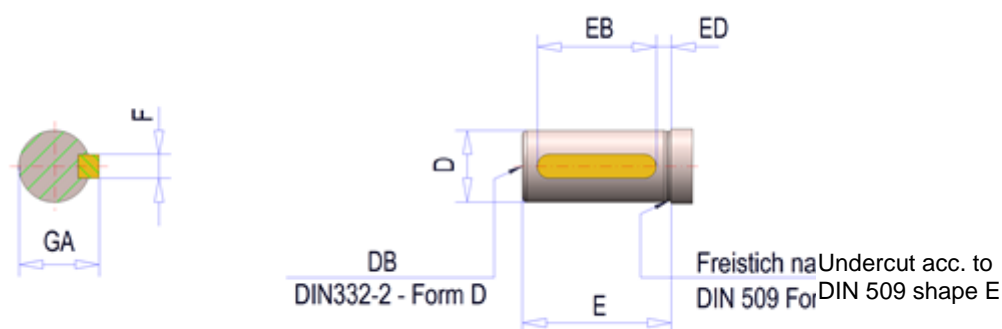
DS = AS (A side)

NS = BS (B side)

The shaft ends are cylindrical and their dimensions, tolerances and power categories correspond to DIN EN 50347.

Up to a diameter of 50 mm the tolerance of the shaft diameter is k6 (ISO), and m6 (ISO) for diameters in excess of 50 mm

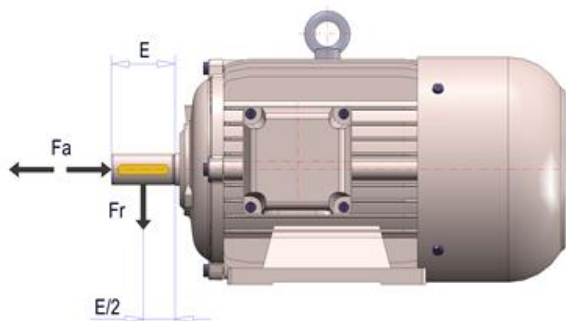
The DS shaft end of all standard motors has a centre bore according to DIN 322-2 shape D. The NS shaft end has a centre hole according to DIN 322-1. The motor is supplied with parallel keys which comply with DIN 6885-1 shape A. Versions with a second free shaft end are available on request by the customer.



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

## Planning section R-series motors

### Radial and axial forces



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

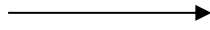
The above permissible loads are either radial or axial forces and apply for 50 Hz operation and a calculated bearing service life of 20,000 h. The values are reduced by approx. 10% for 60 Hz operation.

## Planning section R-series motors

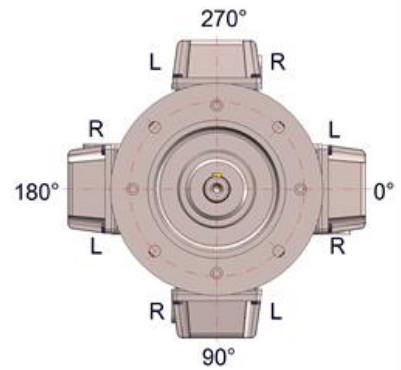
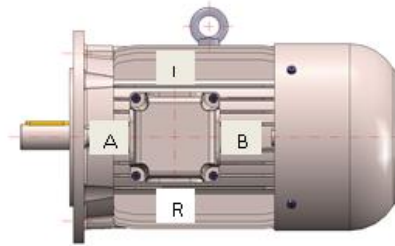
### Terminal box position

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

Looking toward the shaft face

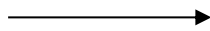


for determination of the terminal box position

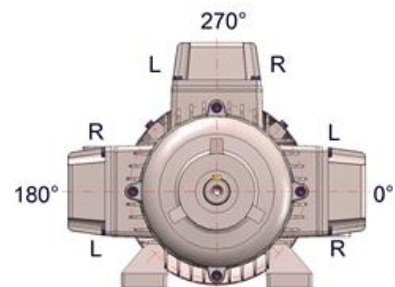
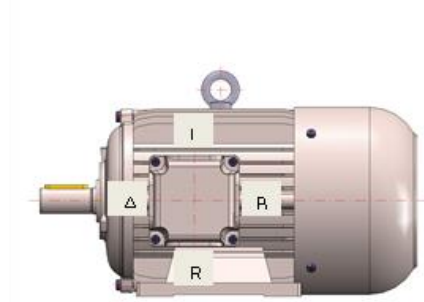


### Standard terminal box configuration = 0°R

Looking toward the shaft face



for determination of the terminal box position



As standard, the brake release lever (if present) and the terminal box for the external fan are in line with the terminal box of the motor. Other versions must be ordered separately.

## Planning section R-series motors

### Cable glands in the terminal box

The terminal boxes have DIN EN 60423 threads for DIN EN 50262 cable glands, but are supplied without glands.

Explosion-protected motors Zone 2 / Zone 22 are supplied with ATEX cable glands and ATEX plug screws.

The customer is responsible for correct connection in compliance with the relevant VDE standards. A terminal strip according 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 is used for size 180.

Cast iron housings (special version on request) have terminal boxes which are also made of cast iron.

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

<sup>1)</sup> One-piece terminal box cover

<sup>2)</sup> Closed with screw plug

Other versions must 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 motors > 6 versions must be agreed on with HEW.

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



## Planning section R-series motors

### Noise

All motors operate within the noise limits specified in DIN EN 60034-9. The value which is stated is the A-evaluated average value of the measurement surface noise pressure level  $L_{pA}$  at a distance of 1 m and noise power level  $L_{WA}$

These values only apply to single-revolution three-phase motors in thermal class "F" for 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	
	$L_{pA}$	$L_{WA}$	$L_{pA}$	$L_{WA}$	$L_{pA}$	$L_{WA}$	$L_{pA}$	$L_{WA}$
	dB (A)	dB (A)	dB (A)	dB (A)	dB (A)	dB (A)	dB (A)	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 different operating conditions are available on request.

### Vibration

All motor rotors are dynamically balanced with half parallel keys in accordance with DIN ISO 21940-32.

The vibration characteristics of the motors correspond to 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.

For standard motors with a speed between 600 rpm and 3600 rpm the vibration speed  $V_{eff}$  [mm/s] is measured.

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
<b>A</b>	1.6	2.2
<b>B</b>	0.7	1.1

## Planning section R-series motors

### 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 P <sub>n</sub>	Torque Factor M <sub>n</sub>	Current Factor I <sub>n</sub>
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 specifications of DIN EN 60034-1. Special voltages and frequencies and wide-range voltage versions are available on request by the customer.

(see Operation with frequency inverters).

The nominal power applies for 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 to select the optimum motor output:

- Required machine output
- Operating mode
- Start-up, braking and reversing mode
- Torque curve of the machine
- Mains characteristics
- Cooling, coolant temperature
- Installation altitude etc.

## Planning section **R-series motors**

### Heating and thermal classes

The choice of the individual insulation system components determines the thermal class categorisation according to DIN EN 60034-1.

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

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

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

As standard, HEW supplies motors with thermal class F.

The windings are manufactured with phase insulation as well as high-quality enamelled wire and impregnating resin. The high degree of electrical strength which this achieves guarantees problem-free use of the motors with frequency inverters.

### Capacity

According to DIN EN 60034-1, the motors may 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

In general, the motors are suited for both directions of rotation. The winding ends U1, V1, W1 of the motors are designed so that the motor rotates in clockwise direction if they are connected to the 3-phase mains in the sequence L1, L2, L3.

Counter clockwise running is achieved by exchanging two outer leads (e.g. L1 with L2).

The rotation direction is indicated as seen when looking toward the shaft face (DS).

### Earthing and PE connection

The motors are provided with a PE connection near to the terminal strip. Explosion-protected motors are always equipped with an additional external earthing terminal on the housing.

## Planning section R-series motors

### Operation on 60 Hz mains

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

Frequency Hz	Voltage Factor – $U_N$	Output Factor – $P_N$	Speed Factor – $n_N$	Torque Factor – $M_N$	Starting torque Factor - $M_A$	Breakdown torque Factor - $M_k$
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 with frequency inverters

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

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

The motor selection primarily depends on the desired speed range and the torque curve of the machine. This is followed by the selection of the winding and the cut-off frequency (breakdown frequency).

Depending on the minimum and maximum speed, it must be determined whether the motor requires an external fan. This depends on the following factors:

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

## Planning section R-series motors

U/f = constant up to 50 Hz:

Field weakening mode above 50 Hz

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/P <sub>n</sub>	M/M <sub>n</sub>	P/P <sub>n</sub>	M/M <sub>n</sub>
5	40 <sup>1)</sup>	Δ / Y <sup>2)</sup>			0.10	1.00
50	400	Δ / Y <sup>2)</sup>	1.00	1.00	1.00	1.00
87	400	Δ / Y <sup>2)</sup>			1.00	0.57

1) - Boost setting ignored

2) - Depending on the winding version

When operated with an inverter with U/f = constant, the flux and the torque in the motor remain constant. The inverter, winding version and specification of the cut-off frequency determine the range in which such operation is possible.

In field weakening mode, the voltage remains constant, and only the frequency is increased. The torque reduces in proportion to 1/f (constant power operation).

The tables show the various power and torque curves over a frequency range up to 87 Hz.

Boost setting:

To keep the flux constant, the inverter output voltage must be increased in the lower frequency range using the static boost. This prevents excessive slippage, which would cause the motor to overheat and fail. The amount of the increase depends on the size, the number of poles and the motor design and must be optimised according to the drive.

## Planning section R-series motors

U/f = constant up to 87 Hz:

Winding version 230 / 400 V

Maximum inverter output voltage 400 V

			Mains		Inverter	
f Hz	U V	Circuit	P/P <sub>n</sub>	M/M <sub>n</sub>	P/P <sub>n</sub>	M/M <sub>n</sub>
5	23 <sup>1)</sup>	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) - Depending on the winding version

Special versions on demand

## Planning section R-series motors

### Motor protection

A motor protection switch which monitors 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 large temperature fluctuations. The following options exist for this:

- **Temperature switch as NC (PTO)**

If the temperature for the thermal class is exceeded, the temperature switch automatically opens the auxiliary circuit and only switches on 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 for the thermal class of the motor is exceeded, the temperature sensors quickly 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: The safety device is self-monitoring; low switching tolerance; fast device switch-on of.

- **Measurement of winding or bearing temperature**

With the use of PT 100 or PT 1000 platinum temperature sensors, the temperatures in the motor windings or bearings can be measured directly.

Versions with KTY sensors are available on request.

As standard, the temperature monitoring connections are fed out to a terminal strip in the main terminal box. If required, a separate terminal box for auxiliary equipment can be fitted.

## Planning section R-series motors

### Installation altitude and coolant temperature

For coolant temperatures other than 40° C or for installation altitudes above 1000 m above sea level, power reductions are necessary. In this case, the nominal power must 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	0.9	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 request by the customer, 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 versions.

Unventilated (IC 410):

Used for special motors with adapted power or limited duty cycle (on request).

Liquid cooling (IC 3S7):

Used for hygiene motors (*see Section Hygiene motors*).



## Planning section R-series motors

### Standstill heating

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

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

Motor size	Heating power W	Supply voltage V
63	25	230 ± 10%
71	25	230 ± 10%
80	25	230 ± 10%
90	52	230 ± 10%
100	52	230 ± 10%
112	52	230 ± 10%
132	42	230 ± 10%
160	80	230 ± 10%
180	80	230 ± 10%

## Three-phase motors, Series R

## Three-phase motors, Series R

### 2-pole 400V-50Hz IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 3000 rpm

Type	Efficiency class	Rated power	Rated speed	Rated current	Power factor	Efficiency	Rated torque	Start-up to rated current	Start-up to rated torque	Breakdown to rated torque	Moment of inertia	Weight (IM B3)
		$P_N$ [kW]	$n_N$ [rpm]	$I_N$ [A]	$\cos \varphi$	$\eta$ [%]	$M_N$ [Nm]	$I_A / I_N$	$M_A / M_N$	$M_k / M_N$	$J$ [kgm <sup>2</sup> ]	$m$ [kg]
63K/2	IE2	0.18	2835	0.50	0.74	60.4	0.61	5.00	3.20	3.55	0.00014	4.50
63L/2	IE2	0.25	2820	0.60	0.81	64.8	0.85	5.45	3.05	3.35	0.00019	5.00
71K/2	IE2	0.37	2835	0.85	0.82	69.5	1.25	5.35	2.60	3.05	0.00034	6.00
71L/2	IE2	0.55	2840	1.20	0.83	74.1	1.85	5.95	3.00	3.30	0.00042	7.00
80K/2	IE3	0.75	2840	1.65	0.81	80.7	2.52	5.95	3.40	3.60	0.00064	9.00
80L/2	IE3	1.10	2850	2.35	0.81	82.7	3.69	6.80	4.50	4.00	0.00079	10.00
90L/2	IE3	1.50	2910	3.05	0.83	84.2	4.92	9.15	4.30	4.70	0.00155	17.00
90L/2	IE3	2.20	2875	4.50	0.83	85.9	7.31	7.70	3.95	3.90	0.00155	17.00
100V/2	IE3	3.00	2930	5.70	0.87	87.1	9.78	11.95	5.75	5.50	0.00360	30.00
112M/20	IE3	4.00	2940	7.75	0.85	88.1	13.0	10.70	3.90	4.80	0.00557	38.00
132S/20	IE3	5.50	2945	10.1	0.88	89.2	17.8	10.45	3.70	4.60	0.01220	48.00
132S/200	IE3	7.50	2945	13.8	0.87	90.1	24.3	11.00	4.25	4.95	0.01470	54.00
160M/20	IE3	11.00	2965	19.7	0.88	91.2	35.4	12.35	5.00	5.30	0.03940	119.00
160L/2	IE3	15.00	2960	26.2	0.90	91.9	48.4	12.00	5.15	5.05	0.04590	135.00
160L/20	IE3	18.50	2960	33.7	0.86	92.4	59.7	12.60	3.90	5.60	0.05640	141.00
180L/20	IE3	22.00	2965	38.0	0.90	92.7	70.9	11.95	3.90	4.70	0.07910	180.00
-	IE3	30.00	Technical data in preparation									

Subject to technical amendments

## Three-phase motors, Series R

2-pole 460V-60Hz IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 360 rpm

Type	Efficiency class	Rated power	Rated speed	Rated current	Power factor	Efficiency	Rated torque	Start-up to rated current	Start-up to rated torque	Breakdown to rated torque	Moment of inertia	Weight (IM B3)
		$P_N$ [kW]	$n_N$ [rpm]	$I_N$ [A]	$\cos \varphi$	$\eta$ [%]	$M_N$ [Nm]	$I_A / I_N$	$M_A / M_N$	$M_K / M_N$	$J$ [kgm <sup>2</sup> ]	$m$ [kg]
-	IE2	0.18	Technical data in preparation									
-	IE2	0.25										
71K/2	IE2	0.37	3410	0.70	0.85	72.0	1.04	5.25	2.25	2.75	0.00034	6.00
71L/2	IE2	0.55	3440	1.00	0.86	74.0	1.53	7.00	3.30	3.55	0.00042	7.00
80K/2	IE3	0.75	3455	1.45	0.80	77.0	2.07	7.30	4.45	4.15	0.00064	9.00
80L/2	IE3	1.10	3470	2.05	0.80	84.0	3.03	8.00	4.55	4.55	0.00079	10.00
90L/2	IE3	1.50	3515	2.60	0.84	85.5	4.08	10.70	4.35	5.25	0.00155	17.00
90L/2	IE3	2.20	3500	3.85	0.82	86.5	6.00	9.10	4.00	4.60	0.00155	17.00
100V/2	IE3	3.00	3530	4.80	0.88	88.5	8.12	13.50	4.80	5.50	0.00360	30.00
132S/200	IE3	4.00	3560	6.25	0.90	88.5	10.7	12.50	4.35	5.50	0.01470	54.00
132S/200	IE3	5.50	3555	8.55	0.90	89.5	14.8	11.96	4.15	5.30	0.01470	54.00
132S/200	IE3	7.50	3550	11.7	0.89	90.2	20.2	11.05	3.85	4.90	0.01470	54.00
160M/20	IE3	11.00	3565	16.8	0.89	91.0	29.5	12.35	4.50	4.90	0.03940	119.00
160M/20	IE3	15.00	3560	23.2	0.88	91.0	40.2	11.05	4.05	4.40	0.03940	119.00
-	IE3	18.50	Technical data in preparation									
-	IE3	22.00										
-	IE3	30.00										

Subject to technical amendments

## Three-phase motors, Series R

4-pole 400V-50Hz IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 1500 rpm

Type	Efficiency class	Rated power	Rated speed	Rated current	Power factor	Efficiency	Rated torque	Start-up to rated current	Start-up to rated torque	Breakdown to rated torque	Moment of inertia	Weight (IM B3)
		$P_N$ [kW]	$n_N$ [rpm]	$I_N$ [A]	$\cos \varphi$	$\eta$ [%]	$M_N$ [Nm]	$I_A/I_N$	$M_A/M_N$	$M_K/M_N$	J [kgm <sup>2</sup> ]	m [kg]
63K/4	IE2	0.12	1360	0.40	0.71	59.1	0.84	3.10	2.05	2.30	0.00020	4.50
63L/4	IE2	0.18	1370	0.60	0.63	64.7	1.25	3.40	2.95	2.95	0.00025	5.00
71K/4	IE2	0.25	1415	0.70	0.70	68.5	1.69	4.35	2.30	2.65	0.00052	6.50
71L/4	IE2	0.37	1405	0.95	0.76	72.7	2.51	4.55	2.40	2.60	0.00064	7.50
80K/4	IE2	0.55	1405	1.40	0.74	77.1	3.74	4.65	2.35	2.65	0.00099	9.00
80L/40	IE3	0.75	1425	1.85	0.72	82.5	5.03	6.00	3.30	3.15	0.00150	14.50
90L/40	IE3	1.10	1445	2.50	0.75	84.1	7.27	6.85	3.50	4.00	0.00285	17.00
90V/4	IE3	1.50	1440	3.35	0.76	85.3	9.95	7.20	3.40	4.15	0.00355	21.00
100L/400	IE3	2.20	1450	4.65	0.79	86.7	14.5	8.10	3.85	4.25	0.00559	25.00
100V/4	IE3	3.00	1445	6.25	0.80	87.7	19.8	7.95	3.55	4.20	0.00718	30.00
112V/4	IE3	4.00	1455	8.15	0.80	88.6	26.3	8.80	3.70	4.55	0.01268	40.00
132M/4	IE3	5.50	1465	11.2	0.79	89.6	35.9	8.35	3.75	4.00	0.02750	64.00
132V/4	IE3	7.50	1465	15.4	0.78	90.4	48.9	8.85	4.25	4.50	0.03750	74.00
160L/40	IE3	11.00	1475	21.7	0.80	91.4	71.2	9.60	4.00	3.90	0.08040	142.00
160V/4	IE3	15.00	1475	29.9	0.79	92.1	97.1	8.95	3.80	3.85	0.09150	152.00
180L/40	IE3	18.50	1475	34.9	0.83	92.6	119.8	9.25	4.10	3.60	0.16630	225.00
-	IE3	22.00	Technical data in preparation									

Subject to technical amendments

## Three-phase motors, Series R

4-pole 460V-60Hz IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 1800 rpm

Type	Efficiency class	Rated power	Rated speed	Rated current	Power factor	Efficiency	Rated torque	Start-up to rated current	Start-up to rated torque	Breakdown to rated torque	Moment of inertia	Weight (IM B3)
		$P_N$ [kW]	$n_N$ [rpm]	$I_N$ [A]	$\cos \varphi$	$\eta$ [%]	$M_N$ [Nm]	$I_A / I_N$	$M_A / M_N$	$M_K / M_N$	$J$ [kgm <sup>2</sup> ]	$m$ [kg]
-	IE2	0.12	Technical data in preparation									
63L/4	IE2	0.18	1695	0.55	0.56	68.0	1.01	4.05	3.75	3.75	0.00025	5.00
71K/4	IE2	0.25	1730	0.65	0.65	70.0	1.38	5.05	2.65	3.15	0.00052	6.50
71L/4	IE2	0.37	1720	0.80	0.71	72.0	2.05	5.30	2.70	3.00	0.00637	7.50
80K/4	IE2	0.55	1720	1.20	0.71	75.5	3.05	5.50	2.70	3.05	0.00099	9.00
80L/40	IE3	0.75	1735	1.55	0.71	83.5	4.13	6.70	3.30	3.60	0.00150	14.50
90V/4	IE3	1.10	1745	2.05	0.77	86.5	6.02	8.40	3.70	4.30	0.00355	21.00
90V/4	IE3	1.50	1745	2.85	0.77	86.5	8.21	8.10	3.70	4.45	0.00355	21.00
112M/4	IE3	2.20	1760	3.95	0.78	89.5	11.9	9.75	3.15	4.70	0.01010	34.00
112V/4	IE3	3.00	1760	5.30	0.79	89.5	16.3	10.60	3.80	5.30	0.01268	40.00
132M/4	IE3	4.00	1770	7.05	0.79	89.5	21.6	9.95	4.20	4.45	0.02750	64.00
132V/4	IE3	5.50	1770	9.70	0.78	91.7	29.7	9.85	4.15	5.05	0.03750	74.00
160L/40	IE3	7.50	1780	12.7	0.81	91.7	40.2	9.40	3.25	3.95	0.08040	142.00
160V/4	IE3	11.00	1780	18.9	0.79	92.4	59.0	9.15	3.20	4.15	0.09150	152.00
160V/4	IE3	15.00	1775	25.4	0.80	93.0	80.7	8.25	2.85	3.75	0.09150	152.00
180L/40	IE3	18.50	1780	30.3	0.82	93.6	99.2	9.10	3.25	4.00	0.16630	225.00
-	IE3	22.00	Technical data in preparation									

Subject to technical amendments

## Three-phase motors, Series R

6-pole 400V-50Hz IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 1000 rpm

Type	Efficiency class	Rated power	Rated speed	Rated current	Power factor	Efficiency	Rated torque	Start-up to rated current	Start-up to rated torque	Breakdown to rated torque	Moment of inertia	Weight (IM B3)
		$P_N$ [kW]	$n_N$ [rpm]	$I_N$ [A]	$\cos \varphi$	$\eta$ [%]	$M_N$ [Nm]	$I_A/I_N$	$M_A/M_N$	$M_K/M_N$	$J$ [kgm <sup>2</sup> ]	$m$ [kg]
63K/6	-	0.09	870	0.40	0.75	43.3	0.99	2.50	1.70	1.80	0.00029	4.50
63L/6	IE2	0.12	915	0.55	0.57	50.6	1.25	2.60	2.65	2.75	0.00042	5.00
71K/6	IE2	0.18	930	0.65	0.65	56.6	1.85	3.05	1.80	2.30	0.00081	6.50
71L/6	IE2	0.25	925	0.80	0.69	61.6	2.58	3.25	1.75	2.20	0.00101	7.50
80K/6	IE2	0.37	930	1.10	0.70	67.6	3.80	3.55	2.00	2.35	0.00191	10.00
80L/6	IE2	0.55	915	1.50	0.74	73.1	5.74	3.80	2.05	2.20	0.00239	11.00
90L/60	IE3	0.75	945	2.05	0.66	78.9	7.58	5.00	2.95	3.20	0.00419	18.20
90V/6	IE3	1.10	950	2.85	0.69	81.0	11.1	5.15	2.45	3.05	0.00649	22.50
100V/6	IE3	1.50	955	3.60	0.73	82.5	15.0	5.80	2.90	3.25	0.01122	28.00
112V/6	IE3	2.20	965	5.25	0.70	84.3	21.8	7.40	3.70	4.20	0.02000	43.00
132M/6	IE3	3.00	970	7.50	0.67	85.6	29.5	6.55	3.35	3.40	0.03230	52.00
132M/600	IE3	4.00	975	10.2	0.65	86.8	39.2	7.50	3.85	3.80	0.04240	64.00
132V/6	IE3	5.50	970	12.5	0.72	88.0	54.1	7.55	3.60	3.70	0.05057	75.00
160L/6	IE3	7.50	980	15.5	0.77	89.1	73.1	9.00	3.20	4.35	0.10990	135.00
180L/6	IE3	11.00	980	23.1	0.76	90.3	107.2	8.70	3.20	4.20	0.16500	200.00

Subject to technical amendments



## Three-phase motors, Series R

6-pole 460V-60Hz IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 1200 rpm

Type	Efficiency class	Rated power	Rated speed	Rated current	Power factor	Efficiency	Rated torque	Start-up to rated current	Start-up to rated torque	Breakdown to rated torque	Moment of inertia	Weight (IM B3)
		$P_N$ [kW]	$n_N$ [rpm]	$I_N$ [A]	$\cos \varphi$	$\eta$ [%]	$M_N$ [Nm]	$I_A / I_N$	$M_A / M_N$	$M_K / M_N$	$J$ [kgm <sup>2</sup> ]	$m$ [kg]
	-	0.09	Technical data in preparation									
	IE2	0.12										
	IE2	0.18										
	IE2	0.25										
	IE2	0.37										
	IE2	0.55										
90V/6	IE3	0.75	1160	1.65	0.68	82.50	6.17	5.75	2.40	3.35	0.00649	22.50
	IE3	1.10	Technical data in preparation									
	IE3	1.50										
	IE3	2.20										
	IE3	3.00										
	IE3	4.00										
	IE3	5.50										
	IE3	7.50										
	IE3	11.00										

Subject to technical amendments

Date: 02/11/2021  
Version: 2.1

## Three-phase motors, Series R

8-pole 400V-50Hz IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 750 rpm

Type	Efficiency class	Rated power	Rated speed	Rated current	Power factor	Efficiency	Rated torque	Start-up to rated current	Start-up to rated torque	Breakdown to rated torque	Moment of inertia	Weight IM B3
		$P_N$ [kW]	$n_N$ [rpm]	$I_N$ [A]	$\cos \varphi$	$\eta$ [%]	$M_N$ [Nm]	$I_A / I_N$	$M_A / M_N$	$M_K / M_N$	$J$ [kgm <sup>2</sup> ]	$m$ [kg]
63K/8	-	0.06	665	0.45	0.60	32.1	0.86	1.60	1.95	2.10	0.00029	4.50
63L/8	-	0.09	630	0.50	0.67	38.8	1.36	1.70	2.20	2.20	0.00042	5.00
71K/8	IE2	0.12	695	0.65	0.56	39.8	1.65	2.35	1.85	2.30	0.00081	6.00
71L/8	IE2	0.18	685	0.85	0.58	45.9	2.51	2.35	1.75	2.00	0.00101	7.00
80K/8	IE2	0.25	690	1.05	0.60	50.6	3.46	2.65	1.80	2.10	0.00191	9.00
80L/8	IE2	0.37	685	1.45	0.61	56.1	5.16	2.90	2.00	2.25	0.00239	10.00
90L/8	IE2	0.55	695	2.15	0.57	61.7	7.56	2.80	1.75	2.05	0.00416	14.50
100L/80	IE3	0.75	710	2.35	0.61	75.0	10.1	4.10	2.10	2.65	0.00857	21.50
100V/8	IE3	1,10	710	3,30	0.62	77,7	14,8	4,10	2,35	2,65	0,01262	31,50
112M/80	IE3	1.50	715	4.50	0.60	79.7	20.0	4.40	2.55	2.80	0.01781	37.00
132S/8	IE3	2.20	715	5.60	0.70	81.9	29.4	4.75	2.30	2.80	0.02610	42.00
132M/8	IE3	3.00	715	7.50	0.70	83.5	40.1	5.00	2.55	2.85	0.03450	49.00
160M/8	IE3	4.00	720	9.40	0.72	84.8	53.1	4.95	1.95	2.60	0.06880	101.00
160M/80	IE3	5.50	725	12.2	0.74	86.2	72.4	5.40	1.90	2.65	0.08740	116.00
160L/8	IE3	7.50	730	18.0	0.68	87.3	98.1	6.00	2.40	3.15	0.11820	136.00
180L/8	IE3	11.00	725	22.9	0.78	88.6	144.9	5.90	1.95	2.55	0.20310	200.00

Subject to technical amendments



## Three-phase motors, **Series R**

8-pole 460V-60Hz IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 900 rpm

Type	Efficiency class	Rated power	Rated speed	Rated current	Power factor	Efficiency	Rated torque	Start-up to rated current	Start-up to rated torque	Breakdown to rated torque	Moment of inertia	Weight (IM B3)
		$P_N$ [kW]	$n_N$ [rpm]	$I_N$ [A]	$\cos \varphi$	$\eta$ [%]	$M_N$ [Nm]	$I_A / I_N$	$M_A / M_N$	$M_K / M_N$	J [kgm <sup>2</sup> ]	m [kg]
	-	0.06	Technical data in preparation									
	-	0.09										
	IE2	0.12										
	IE2	0.18										
	IE2	0.25										
	IE2	0.37										
	IE2	0.55										
	IE3	0.75										
	IE3	1.10										
	IE3	1.50										
	IE3	2.20										
	IE3	3.00										
	IE3	4.00										
	IE3	5.50										
	IE3	7.50										
	IE3	11.00										

Subject to technical amendments

## Three-phase motors, Series R

12-pole 400V-50Hz IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 500 rpm

Type	Efficiency class	Rated power	Rated speed	Rated current	Power factor	Efficiency	Rated torque	Start-up to rated current	Start-up to rated torque	Breakdown to rated torque	Moment of inertia	Weight IM B3
		$P_N$ [kW]	$n_N$ [rpm]	$I_N$ [A]	$\cos \varphi$	$\eta$ [%]	$M_N$ [Nm]	$I_A / I_N$	$M_A / M_N$	$M_K / M_N$	$J$ [kgm <sup>2</sup> ]	$m$ [kg]
71K/12	-	0.06	430	0.55	0.58	27.1	1.33	1.40	1.50	1.75	0.00081	6.50
71L/12	-	0.08	415	0.60	0.62	31.0	1.84	1.55	1.50	1.90	0.00101	7.50
80K/12	-	0.12	425	0.85	0.57	35.7	2.70	1.35	1.30	2.90	0.00191	10.00
80L/12	-	0.18	420	1.15	0.58	39.0	4.09	1.75	1.85	2.20	0.00239	11.00
90L/12	-	0.25	400	1.70	0.52	40.8	5.97	1.25	1.55	1.70	0.00416	16.50
100L/12	-	0.37	460	2.00	0.48	55.6	7.68	2.30	1.70	1.85	0.00657	21.50
100L/120	-	0.55	405	2.65	0.62	48.3	13.0	2.30	1.20	1.40	0.00857	24.00
112M/12	-	0.75	470	3.70	0.49	59.7	15.2	2.25	2.10	2.75	0.01580	31.00
132S/12	-	1.10	485	4.70	0.55	61.4	21.7	2.10	1.50	2.15	0.02620	46.00
132M/12	-	1.50	480	5.50	0.66	59.6	29.8	2.20	1.55	2.20	0.03230	52.00
132M/120	-	2.00	450	8.00	0.62	58.2	42.4	2.50	1.50	2.00	0.03840	55.00
160M/12	-	3.00	480	11.80	0.65	56.5	59.7	3.40	1.75	2.70	0.07920	112.00
160L/12	-	3.70	480	14.00	0.65	58.7	73.6	2.70	1.80	2.80	0.10990	135.00
180L/12	-	7.00	480	23.00	0.67	65.6	139.3	3.15	2.00	2.70	0.16450	200.00

Subject to technical amendments

## 12-pole 460V-60Hz IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 600 rpm

Type	Efficiency class	Rated power	Rated speed	Rated current	Power factor	Efficiency	Rated torque	Start-up to rated current	Start-up to rated torque	Breakdown to rated torque	Moment of inertia	Weight (IM B3)
		$P_N$ [kW]	$n_N$ [rpm]	$I_N$ [A]	$\cos \varphi$	$\eta$ [%]	$M_N$ [Nm]	$I_A / I_N$	$M_A / M_N$	$M_K / M_N$	$J$ [kgm <sup>2</sup> ]	$m$ [kg]
	-	0.06	Technical data in preparation									
	-	0.08										
	-	0.12										
	-	0.18										
	-	0.25										
	-	0.37										
	-	0.55										
	-	0.75										
	-	1.10										
	-	1.50										
	-	2.00										
	-	3.00										
	-	3.70										
	-	7.00										

Subject to technical amendments

Date: 02/11/2021

Version: 2.1

## Three-phase motors, **Series R** Standard pole-changing motors

4-2-pole 400V-50Hz Δ/YY IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 1500 rpm / 3000 rpm

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 <sup>2</sup>	kg (approx.)
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, Series R

6-2-pole 400V-50Hz Y/Y IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 1000 rpm / 3000 rpm

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

Subject to technical amendments

## Three-phase motors, Series R

8-2-pole 400V-50Hz Y/Y IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 750 rpm / 3000 rpm

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

Subject to technical amendments

## Three-phase motors, Series R

12-2-pole 400V-50Hz Y/Y IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 500 rpm / 3000 rpm

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 <sup>2</sup>	M kg (approx.)
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, Series R

6-4-pole 400V-50Hz Y/Y IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 1000 rpm / 1500 rpm

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 <sup>2</sup>	M kg (approx.)
71L/6-4	0.12	930	0.70	0.71	1.3	2.0	1.6	2.0	0.00064	6.5
	0.18	1430	0.80	0.79	1.2	3.0	1.4	1.9		
80K/6-4	0.25	930	1.10	0.75	2.6	3.0	1.5	2.6	0.00191	10
	0.30	1420	1.20	0.77	2.0	3.3	1.9	3.7		
80L/6-4	0.30	920	1.20	0.74	3.1	3.1	1.6	3.4	0.00239	11
	0.45	1420	2.00	0.70	3.0	3.3	2.2	3.8		
90S/6-4	0.40	930	1.40	0.74	4.2	3.0	1.4	2.0	0.00193	13.5
	0.60	1450	2.1	0.70	4.1	4.2	1.5	2.3		
90L/6-4	0.60	940	1.90	0.78	6.1	3.5	1.7	2.6	0.00243	16.5
	0.90	1440	2.60	0.80	6.0	4.3	1.6	3.0		
100L/6-4	0.80	950	2.70	0.72	8.0	3.3	1.6	3.5	0.00387	19
	1.20	1450	3.10	0.79	7.9	4.3	1.5	3.5		
100L/6-40	1.20	940	3.60	0.71	12	3.4	2.2	2.5	0.00498	22.5
	1.70	1450	4.60	0.76	11	4.5	2.8	3.4		
112M/6-4	1.70	960	4.60	0.75	17	4.2	2.2	2.9	0.0101	32
	2.50	1470	6.30	0.77	16	5.5	2.0	3.9		
132S/6-4	2.20	970	7.20	0.70	22	4.1	2.9	3.7	0.0210	47
	3.30	1470	8.00	0.80	21	5.2	1.8	3.4		
132M/6-4	3.00	960	10.0	0.65	30	3.5	2.7	3.3	0.0279	64
	4.40	1450	11.0	0.80	29	4.7	1.9	3.1		
160M/6-4	4.50	970	13.0	0.70	44	3.6	2.9	3.2	0.0512	112
	6.00	1470	14.0	0.83	39	4.8	2.1	3.0		
160L/6-4	6.00	970	16.0	0.70	59	4.3	2.7	3.0	0.0667	129
	8.00	1470	17.0	0.84	52	5.2	2.2	3.2		
180M/6-4	8.00	970	19.0	0.74	80	3.8	1.8	1.8	0.1135	177
	12.0	1470	25.0	0.85	80	4.5	1.8	2.0		
180L/6-4	9.50	960	24.0	0.74	94	3.9	2.6	2.6	0.1346	200
	14.0	1470	28.0	0.87	91	4.9	2.5	2.9		

Subject to technical amendments

## Three-phase motors, Series R

8-4-pole 400V-50Hz Δ/YY IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 750 rpm / 1500 rpm

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 <sup>2</sup>	M kg (approx.)
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, Series R

8-6-pole 400V-50Hz Y/Y IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 750 rpm / 1000 rpm

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 <sup>2</sup>	M kg (approx.)
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, Series R

12-6-pole 400V-50Hz Δ/YY IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 500 rpm / 1000 rpm

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 <sup>2</sup>	M kg (approx.)
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

## Three-phase motors, **Series R**

### Standard pole-changing motors, fan drives

#### 4-2-pole 400V-50Hz Y/YY IC 411 fan

Thermal class: F

Operating mode: S1

Synchronous speed: 1500 rpm / 3000 rpm

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

Subject to technical amendments

## Three-phase motors, Series R

6-4-pole 400V-50Hz Y/Y IC 411 fan

Thermal class: F

Operating mode: S1

Synchronous speed: 1000 rpm / 1500 rpm

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 <sup>2</sup>	M kg (approx.)
80K/6-4L	0.12	935	0.80	0.70	1.2	2.2	1.3	4.0	0.00099	10
	0.37	1440	1.40	0.77	2.5	3.2	1.4	3.4		
80L/6-4L	0.18	910	0.90	0.80	1.9	2.1	1.3	4.8	0.00126	11
	0.55	1440	1.90	0.75	3.6	3.4	2.1	3.3		
90S/6-4L	0.25	910	1.00	0.85	2.6	2.4	1.3	3.7	0.00193	13.5
	0.75	1450	2.10	0.77	4.9	4.6	2.2	3.3		
90L/6-4L	0.40	930	1.50	0.80	4.1	3.0	1.4	2.6	0.00243	16.5
	1.20	1450	3.80	0.75	7.9	4.1	2.5	3.6		
100L/6-4L	0.55	920	2.00	0.79	5.7	2.8	1.5	2.7	0.00378	19
	1.50	1450	4.40	0.72	9.9	3.9	1.9	2.9		
100L/6-40L	0.75	960	2.60	0.75	7.5	3.2	1.9	3.3	0.00498	22.5
	2.20	1450	6.10	0.72	14	4.3	2.2	3.3		
112M/6-4L	1.00	950	3.00	0.72	10	3.5	1.5	2.8	0.0101	32
	3.00	1450	7.30	0.78	20	5.5	2.2	3.7		
132S/6-4L	1.50	970	4.50	0.73	15	3.5	2.0	2.9	0.0210	47
	4.20	1470	10.0	0.77	27	5.2	2.4	3.2		
132M/6-4L	2.00	970	5.80	0.75	20	3.9	2.0	2.8	0.0275	57
	6.00	1470	13.5	0.80	39	5.1	2.3	3.3		
160M/6-4L	3.00	970	8.00	0.73	30	4.2	2.4	2.9	0.0512	112
	8.50	1470	18.0	0.82	55	4.6	2.1	3.0		
160L/6-4L	3.80	970	12.0	0.66	37	4.5	2.9	3.6	0.0667	129
	11.0	1470	24.0	0.85	71	5.0	2.8	3.2		
180M/6-4L	4.80	970	13.0	0.76	47	4.1	2.5	2.6	0.1135	169
	14.0	1470	31.0	0.87	91	4.3	2.3	2.5		
180L/6-4L	5.50	980	18.0	0.70	54	5.0	2.9	3.4	0.1346	191
	16.0	1470	35.0	0.85	104	5.5	2.8	3.3		

Subject to technical amendments

## Three-phase motors, Series R

### 8-4-pole 400V-50Hz Y/YY IC 411 fan

Thermal class: F

Operating mode: S1

Synchronous speed: 750 rpm / 1500 rpm

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 <sup>2</sup>	M kg (approx.)
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, Series R

8-6-pole 400V-50Hz Y/Y IC 411 fan

Thermal class: F

Operating mode: S1

Synchronous speed: 750 rpm / 1000 rpm

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 <sup>2</sup>	M kg (approx.)
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, Series R

12-6-pole 400V-50Hz Y/YY IC 411 fan

Thermal class: F

Operating mode: S1

Synchronous speed: 500 rpm / 1000 rpm

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 <sup>2</sup>	M kg (approx.)
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

## Three-phase motors, **Series R**

### Reluctance motors

Reluctance motors combine the characteristics of asynchronous and synchronous motors. The special feature is a rotor with pronounced poles and a damper cage. Because of this, reluctance motor start in asynchronous mode and then switch to synchronous mode. They run at the synchronous speed until the reactive torque (synchronous breakdown torque or pull-out torque) is exceeded.

With these characteristics, reluctance motors are ideal many applications where more complex servo technology or asynchronous motors with encoder systems had to be previously used. This applies primarily to plants which require several drives to run at synchronous speeds or constant speeds under varying loads. A further advantage is the robust and maintenance-free design.

### Mechanical design

Reluctance motors use normal asynchronous motor stators. For this reason, it is generally possible to utilise all mechanical variants as described in the planning section for asynchronous motors. If required, the motors can also be equipped with a mechanical spring-loaded brake. We recommend a noise-reduced brake version (see *Section Brake motors*).

### Electrical design

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



## Three-phase motors, **Series R**

### Reluctance motors with frequency inverters

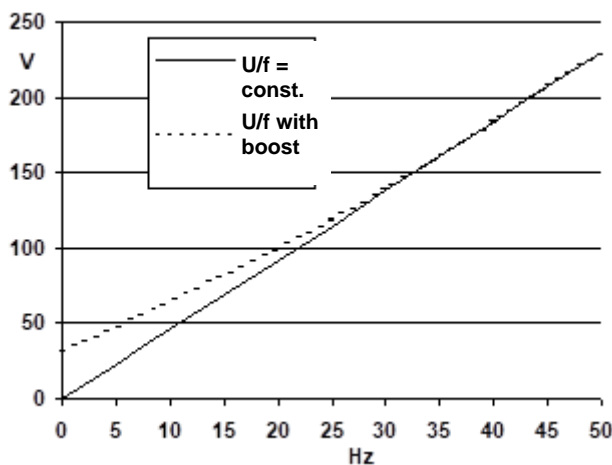
The motor is selected according to the required load torque and the minimum/maximum frequency.

The acceleration torque must be observed for highly dynamic drives.

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

Internally ventilated reluctance motors are dimensioned so that the nominal torques which are stated in the technical data can be output continuously from approx. 20 Hz up to the cut-off frequency. For operation of the motor at the nominal torque and below 20 Hz, only a reduced duty cycle is permissible, or an external fan is necessary.

The voltage must be increased via static boost, as in the lower frequency range with  $U/f = \text{const.}$ , the flux and therefore the torque do not remain constant. The amount of the increase depends on the size, the number of poles and the motor design and must be optimised according to the drive.



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

## Three-phase motors, **Series R**

### 2-pole 400V-50Hz IC 411 reluctance motors

Thermal class: F

Operating mode: S1

Synchronous speed: 3000 rpm

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 <sup>2</sup>	M kg (approx.)
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

## Three-phase motors, **Series R**

### 4-pole 400V-50Hz IC 411 reluctance motors

Thermal class: F

Operating mode: S1

Synchronous speed: 1500 rpm

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 <sup>2</sup>	M kg (approx.)
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

## Three-phase motors, **Series R**

### 6-pole 400V-50Hz IC 411 reluctance motors

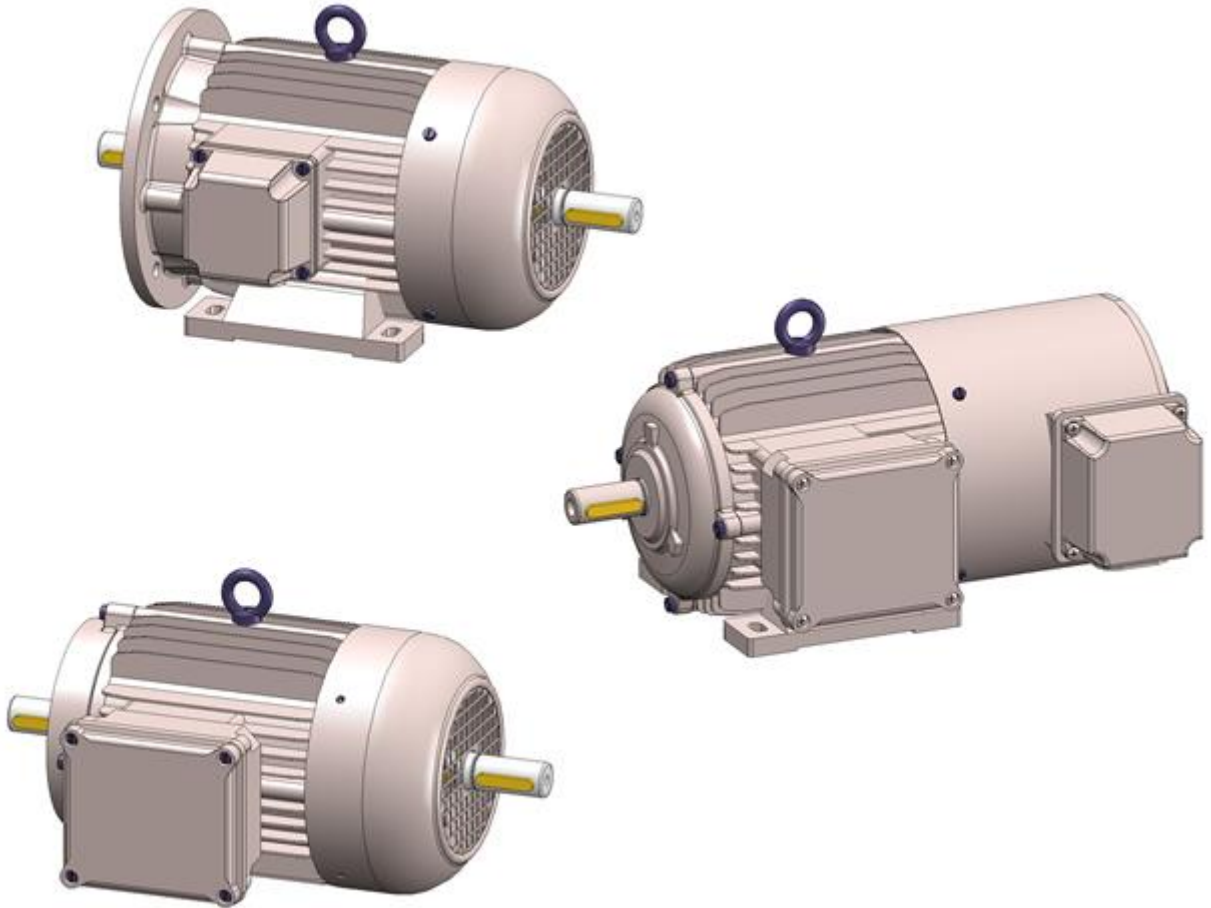
Thermal class: F

Operating mode: S1

Synchronous speed: 1000 rpm

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 <sup>2</sup>	M kg (approx.)
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 motors, **Series R**

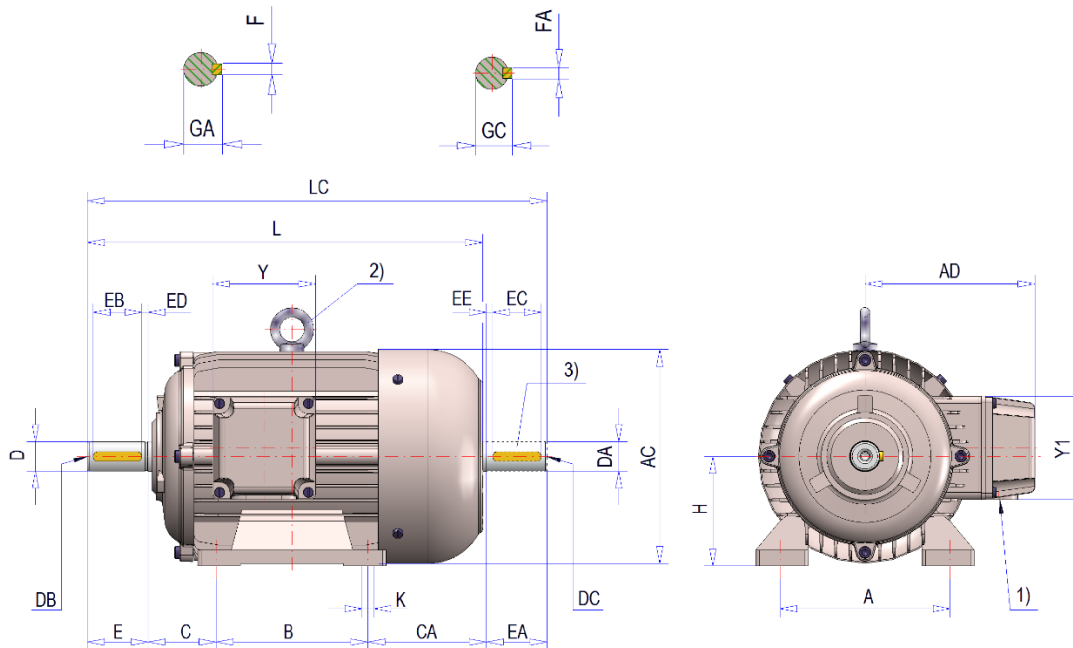
### Fits and tolerances

Excerpt of major fits and tolerances

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

Size: 63 – 180 / Cooling type: IC411 / Protection class: IP 54 – IP 55 /  
Version IM B3



- 1) See planning section (*Section Cable glands in the terminal box*)
  - 2) With lifting eye from size 112 and above
  - 3) 2nd shaft end optional (standard shown – different dimensions possible)
- Fits and tolerances see (*Section Fits and tolerances*)  
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 90V	125	140	10	90	56	24	50	M8	176	140	85	85	27	8	40	5	366	421	140
R 100 L	140	160	11.2	100	63	28	60	M10	194	149	85	85	31	8	50	5	366	431	108
R 100 V	140	160	11.2	100	63	28	60	M10	194	149	85	85	31	8	50	5	416	481	158
R 112 M	140	190	11.2	112	70	28	60	M10	218	161	85	85	31	8	50	5	383	448	118
R 112 V	140	190	11.2	112	70	28	60	M10	218	161	85	85	31	8	50	5	423	488	158
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 132 V	178	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	537	622	195
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 160 V	254	254	14.5	160	108	42	110	M16	310	244	186	186	45	12	90	10	662	777	195
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

\* Version IM B3 / IM 1001, IM B6 / IM 1051, IM B7 / IM 1061, IM B8 / IM 1071, IM V5 / IM 1011, IM V6 / IM 1031 (*Section Designs*).

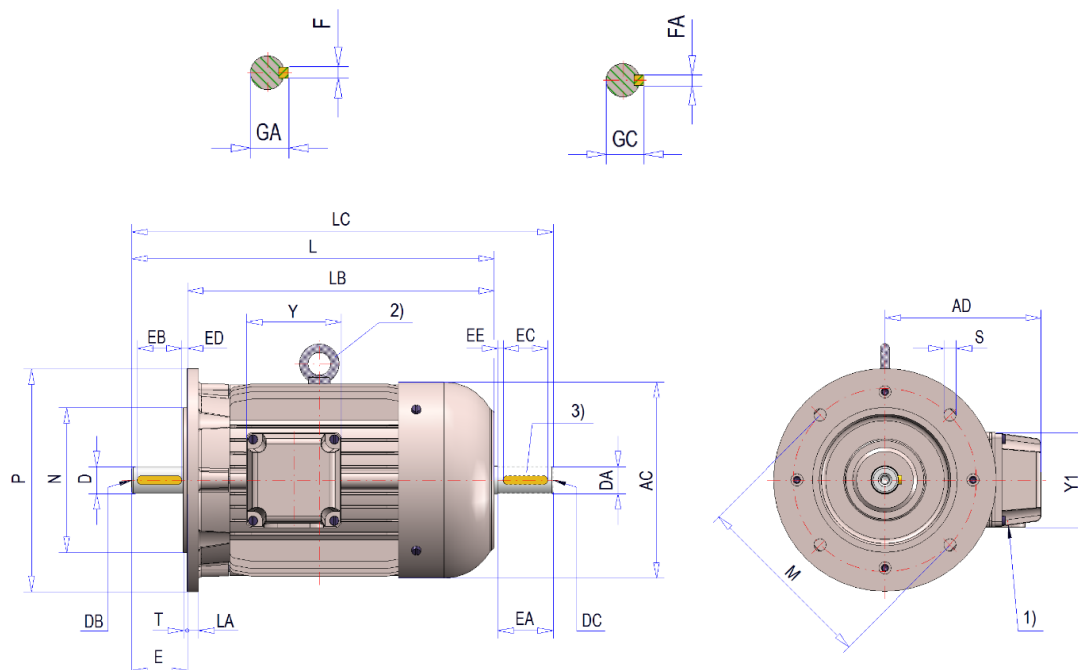
Date: 02/11/2021  
Version: 2.1





## Three-phase motors, **Series R**

Size: 63 – 180 / Cooling type: IC411 / Protection class: IP 54 – IP 55 /  
Version IM B5



- 1) See planning section (Section *Cable glands in the terminal box*)
  - 2) With lifting eye from size 112 and above
  - 3) 2nd shaft end optional (standard shown – different dimensions possible)
- Fits and tolerances see (Section *Fits and tolerances*)  
Subject to technical amendments

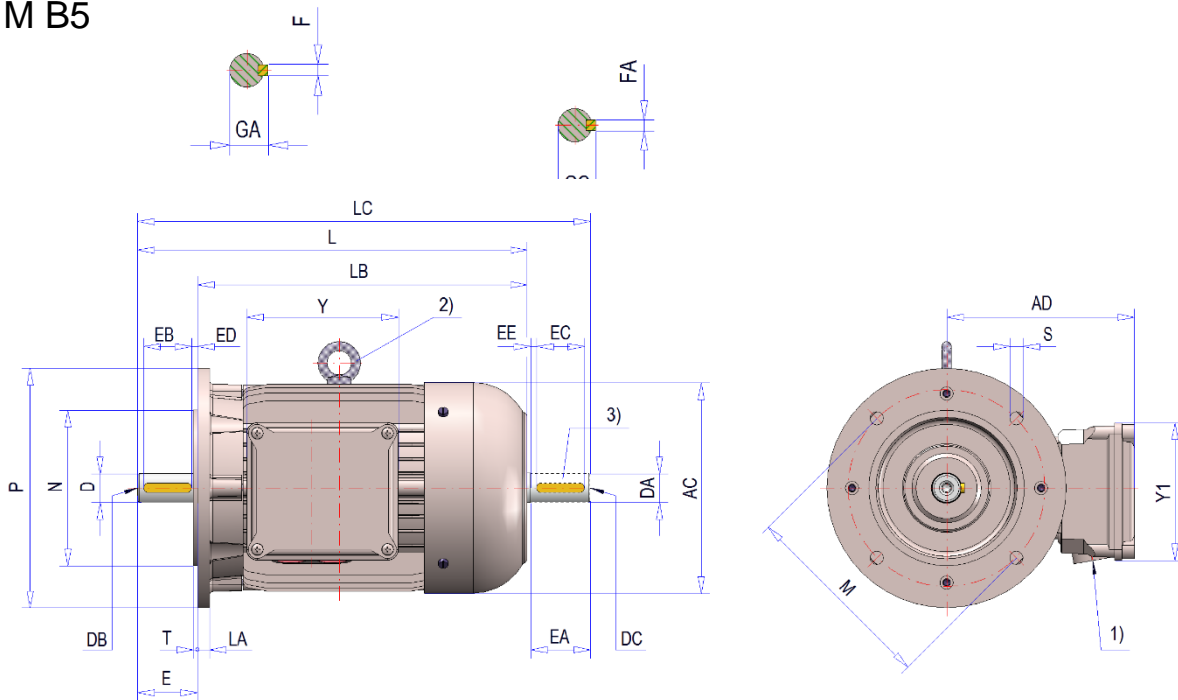
Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	LC	S	M	N	P	T	LA
	DA	EA	DC					GC	FA	EC	EE									
RF 63 K/L	11	23	M4	123	104	70	70	12.5	4	18	2.5	211	188	239	9	115	95	140	3	10
RF 71 K/L	14	30	M5	138	114	70	70	16	5	25	2.5	243	213	278	9	130	110	160	3.5	9.5
RF 80 K/L	19	40	M6	156	134	85	85	21.5	6	32	4	274	234	319	11	165	130	200	3.5	11
RF 90 S	24	50	M8	176	137	85	85	27	8	40	5	301	251	356	11	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	165	130	200	3.5	10.5
RF 90 V	24	50	M8	176	137	85	85	27	8	40	5	366	316	421	11	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 100 V	28	60	M10	194	148	85	85	31	8	50	5	416	356	481	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 112 V	28	60	M10	218	158	85	85	31	8	50	5	423	363	488	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 132 V	38	80	M12	258	197	145	130	41	10	70	5	537	457	622	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 160 V	42	110	M16	310	244	186	186	45	12	90	10	662	552	777	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

\* Versions IM B5 / IM 3001, IM V1 / IM 3011, IM V3 / IM 3031 (Section *Designs*)

Date: 02/11/2021  
Version: 2.1

## Three-phase motors, **Series R**

Size: 63 – 180 / Cooling type: IC411 / Protection class:  $\geq$ IP 56 / Version IM B5



- 1) See planning section (Section *Cable glands in the terminal box*)
  - 2) With lifting eye from size 112 and above
  - 3) 2nd shaft end optional (standard shown – different dimensions possible)
- Fits and tolerances see (*Section Fits and tolerances*)  
 Subject to technical amendments

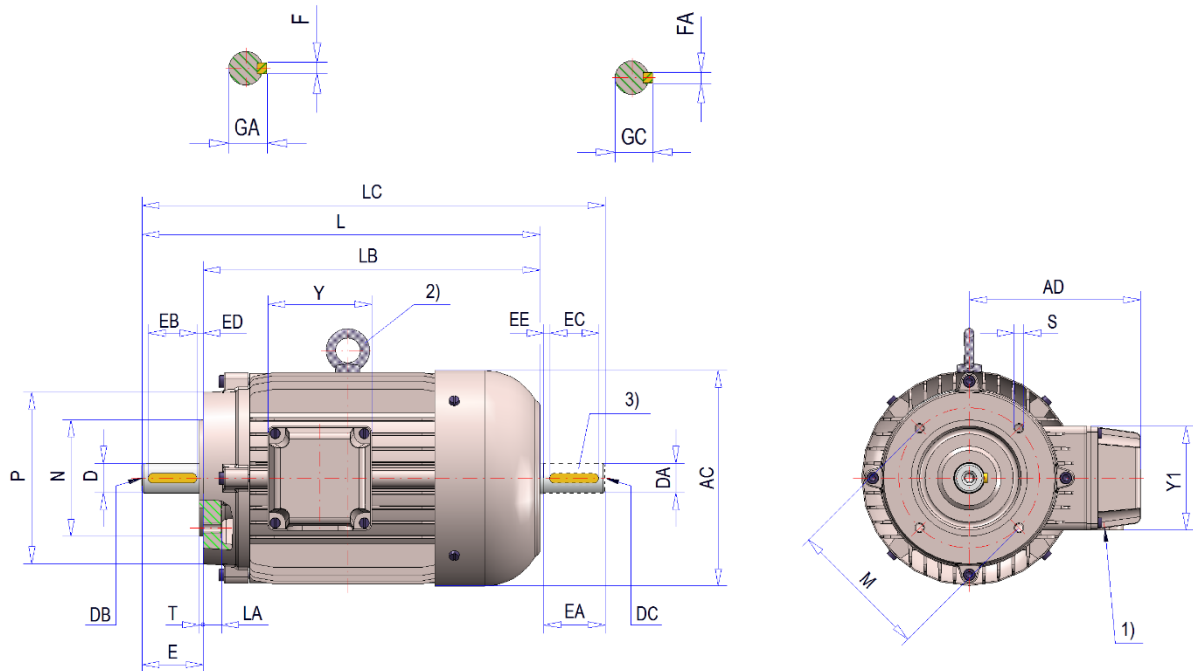
Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	LC	S	M	N	P	T	LA
	DA	EA	DC					GC	FA	EC	EE									
RF 63 K/L	11	23	M4	123	126	117	103	12.5	4	18	2.5	211	188	239	9	115	95	140	3	10
RF 71 K/L	14	30	M5	138	136	117	103	16	5	25	2.5	243	213	278	9	130	110	160	3.5	9.5
RF 80 K/L	19	40	M6	156	150	127	115	21.5	6	32	4	274	234	319	11	165	130	200	3.5	11
RF 90 S	24	50	M8	176	154	127	115	27	8	40	5	301	251	356	11	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	165	130	200	3.5	10.5
RF 90 V	24	50	M8	176	154	127	115	27	8	40	5	366	316	421	11	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 100 V	28	60	M10	194	165	127	115	31	8	50	5	416	356	481	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 112 V	28	60	M10	218	175	127	115	31	8	50	5	423	363	488	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 132 V	38	80	M12	258	197	145	130	41	10	70	5	537	457	622	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 160 V	42	110	M16	310	244	186	186	45	12	90	10	662	552	777	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

\* Versions IM B5 / IM 3001, IM V1 / IM 3011, IM V3 / IM 3031 (*Section Designs*)

Date: 02/11/2021  
 Version: 2.1

## Three-phase motors, **Series R**

Size: 63 – 180 / Cooling type: IC411 / Protection class: IP 54 – IP 55 /  
Version IM B14



- 1) See planning section (Section *Cable glands in the terminal box*)
  - 2) With lifting eye from size 112 and above
  - 3) 2nd shaft end optional (standard shown – different dimensions possible)
- Fits and tolerances see (*Section Fits and tolerances*)  
Subject to technical amendments

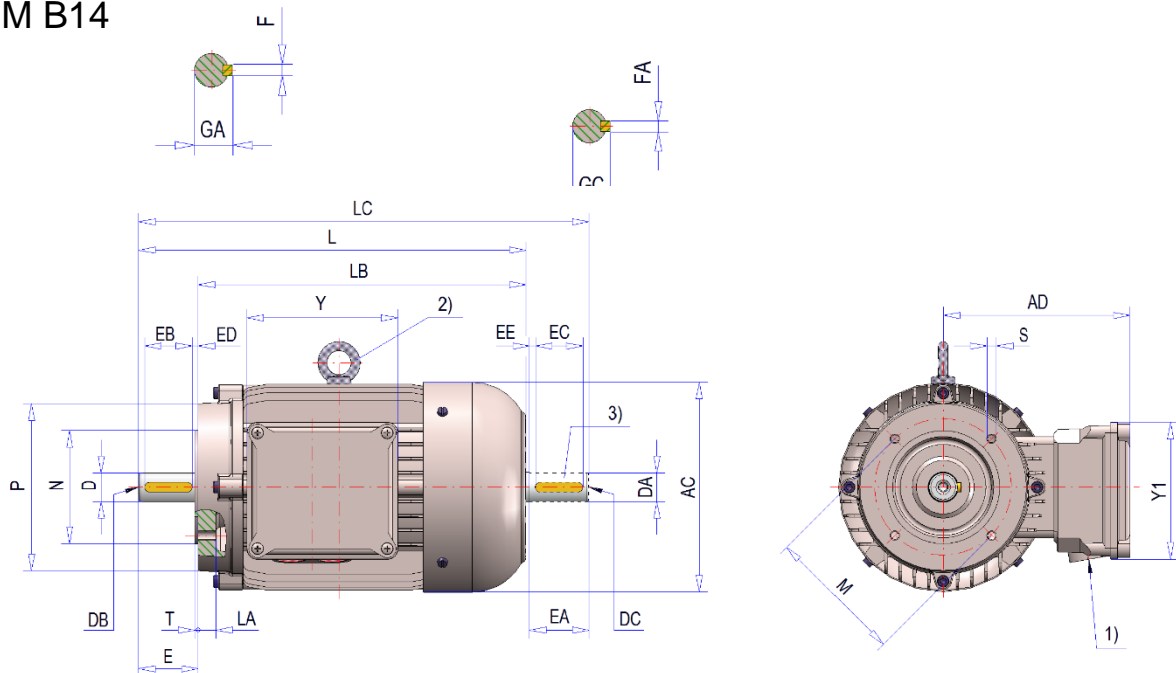
Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	LC	S	M	N	P	T	LA
	DA	EA	DC					GC	FA	EC	EE									
RF 63 K/L	11	23	M4	123	104	70	70	12.5	4	18	2.5	211	188	239	M5	75	60	90	2.5	8
RF 71 K/L	14	30	M5	138	114	70	70	16	5	25	2.5	243	213	278	M6	85	70	105	2.5	10
RF 80 K/L	19	40	M6	156	134	85	85	21.5	6	32	4	274	234	319	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 90 V	24	50	M8	176	137	85	85	27	8	40	5	366	316	421	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 100 V	28	60	M10	194	148	85	85	31	8	50	5	416	356	481	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 112 V	28	60	M10	218	158	85	85	31	8	50	5	423	363	489	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 132 V	38	80	M12	258	197	145	130	41	10	70	5	537	457	622	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 160 V	42	110	M16	310	244	186	186	45	12	90	10	689	579	805	M12	215	180	250	4	14

\* Versions IM B14 / IM 3601, IM V18 / IM 3611, IM V19 / IM 3631 (*Section Designs*)

Date: 02/11/2021  
Version: 2.1

## Three-phase motors, Series R

Size: 63 – 180 / Cooling type: IC411 / Protection class:  $\geq$ IP 56 / Version IM B14



- 1) See planning section (Section *Cable glands in the terminal box*)
  - 2) With lifting eye from size 112 and above
  - 3) 2nd shaft end optional (standard shown – different dimensions possible)
- Fits and tolerances see (Section *Fits and tolerances*)  
 Subject to technical amendments

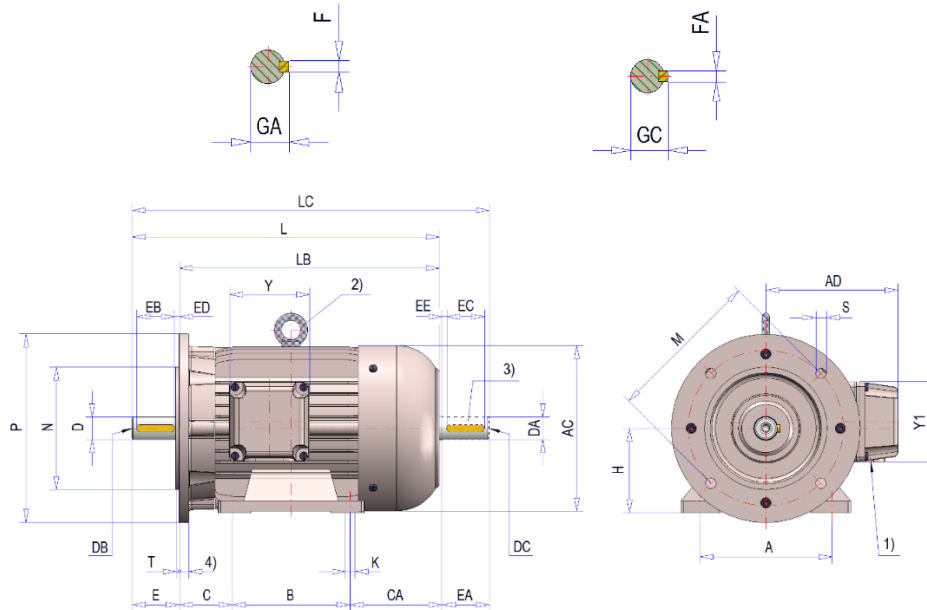
Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	LC	S	M	N	P	T	LA
	DA	EA	DC					GC	FA	EC	EE									
RF 63 K/L	11	23	M4	123	126	117	103	12.5	4	18	2.5	211	188	239	M5	75	60	90	2.5	8
RF 71 K/L	14	30	M5	138	136	117	103	16	5	25	2.5	243	213	278	M6	85	70	105	2.5	10
RF 80 K/L	19	40	M6	156	150	127	115	21.5	6	32	4	274	234	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 90 V	24	50	M8	176	154	127	115	27	8	40	5	366	316	421	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 100 V	28	60	M10	194	165	127	115	31	8	50	5	416	356	481	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 112 V	28	60	M10	218	175	127	115	31	8	50	5	423	363	489	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 132 V	38	80	M12	258	197	145	130	41	10	70	5	537	457	622	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 160 V	42	110	M16	310	244	186	186	45	12	90	10	689	579	805	M12	215	180	250	4	14

\* Versions IM B14 / IM 3601, IM V18 / IM 3611, IM V19 / IM 3631 (Section *Designs*)

Date: 02/11/2021  
 Version: 2.1

## Three-phase motors, Series R

Size: 63 – 180 / Cooling type: IC411 / Protection class: IP 54 – IP 55 /  
Version IM B35



1) See planning section (Section *Cable glands in the terminal box*)

2) With lifting eye from size 112 and above

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

4) Dimensions LA (see dimension sheets Size: 63 – 180 / Cooling type: IC411 / Protection class: IP 54 – IP 55 / Version IM B5)

Fits and tolerances see (*Section Fits and tolerances*)

Subject to technical amendments

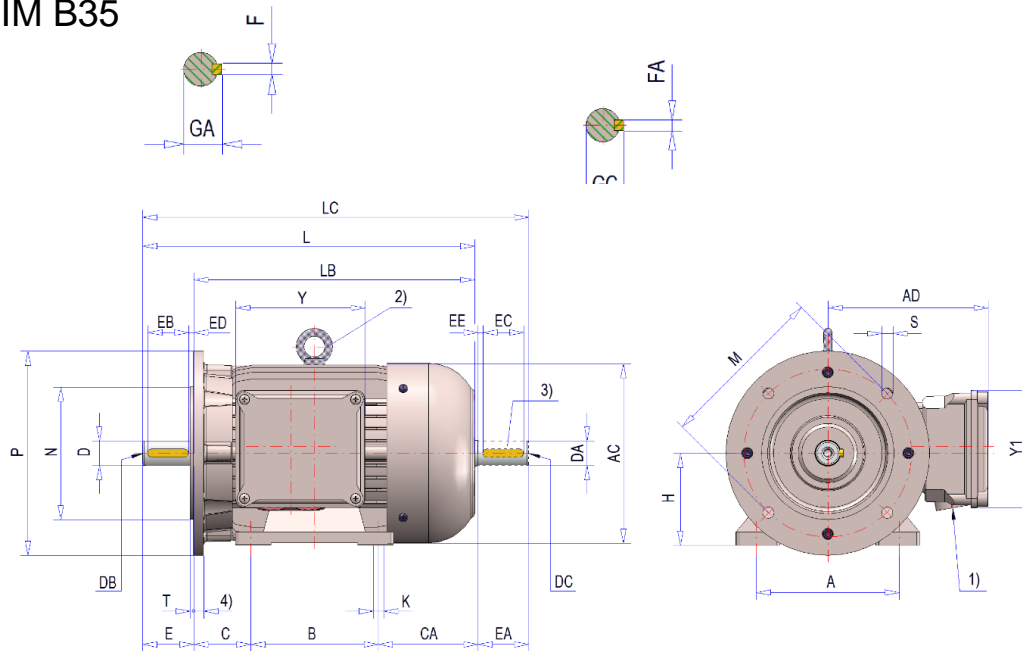
Type	B	A	K	H	C	D	E	DB	AC	AD	Y	Y1	GA		EB	ED	L	LB	LC	S	M	N	P	T	CA
													GC	FA											
R+F 63 K/L	80	100	7	63	40	11	23	M4	123	99	70	70	12.5	4	18	2.5	211	188	239	9	115	95	140	3	73
R+F 71 K/L	90	112	7	71	45	14	30	M5	138	109	70	70	16	5	25	2.5	243	213	278	9	130	110	160	3.5	83
R+F 80 K/L	100	125	9.5	80	50	19	40	M6	156	127	85	85	21.5	6	32	4	274	234	319	11	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	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	165	130	200	3.5	100
R+F 90 V	125	140	10	90	56	24	50	M8	176	140	85	85	27	8	40	5	366	316	421	11	165	130	200	3.5	140
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 100 V	140	160	11.2	100	63	28	60	M10	194	149	85	85	31	8	50	5	416	356	481	14	215	180	250	4	158
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 112 V	140	190	11.2	112	70	28	60	M10	218	161	85	85	31	8	50	5	423	363	488	14	215	180	250	4	158
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 132 V	178	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	537	457	622	14	265	230	300	4	195
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 160 V	254	254	14.5	160	108	42	110	M16	310	244	186	186	45	12	90	10	662	552	777	18	300	250	350	4	195
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

\* Versions IM B35 / IM 2001, IM V15 / IM 2011, IM V35 / IM 2031 (*Section Designs*)

Date: 02/11/2021  
Version: 2.1

## Three-phase motors, Series R

Size: 63 – 180 / Cooling type: IC411 / Protection class: ≥IP 56 / Version IM B35



- 1) See planning section (Section *Cable glands in the terminal box*)
  - 2) With lifting eye from size 112 and above
  - 3) 2nd shaft end optional (standard shown – different dimensions possible)
  - 4) Dimensions LA (see dimension sheets Size: 63 – 180 / Cooling type: IC411 / Protection class: ≥IP 56 / Version IM B5)
- Fits and tolerances see (*Section Fits and tolerances*)  
Subject to technical amendments

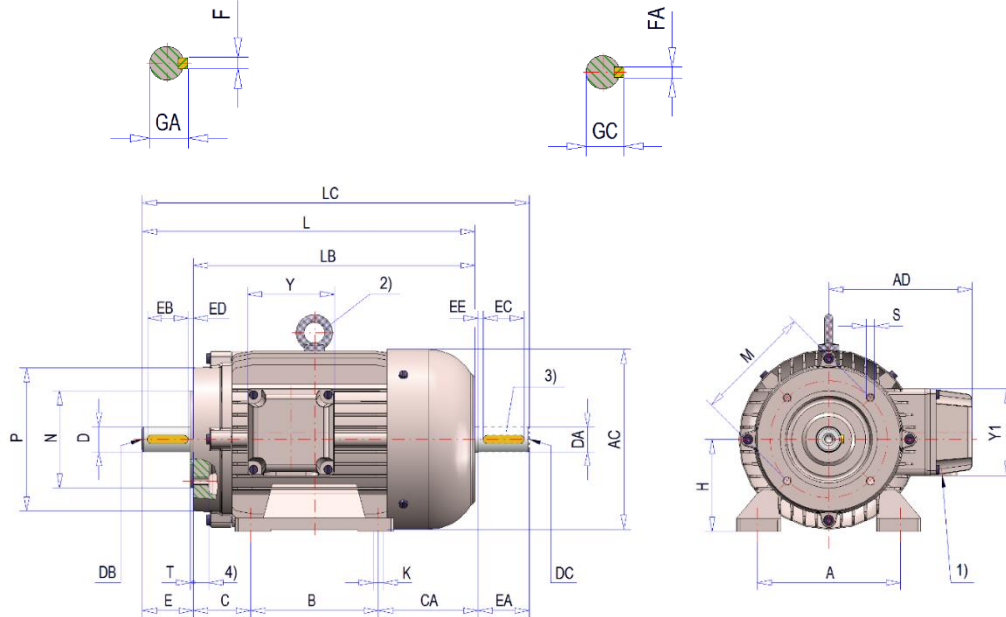
Type	B	A	K	H	C	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	LC	S	M	N	P	T	CA
						DA	EA	DC					GC	FA	EC	EE									
R+F 63 K/L	80	100	7	63	40	11	23	M4	123	126	117	103	12.5	4	18	2.5	211	188	239	9	115	95	140	3	73
R+F 71 K/L	90	112	7	71	45	14	30	M5	138	136	117	103	16	5	25	2.5	243	213	278	9	130	110	160	3.5	83
R+F 80 K/L	100	125	9.5	80	50	19	40	M6	156	150	127	115	21.5	6	32	4	274	234	319	11	165	130	200	3.5	89
R+F 90 S	100	140	10	90	56	24	50	M8	176	154	127	115	27	8	40	5	301	251	356	11	165	130	200	3.5	100
R+F 90 L	125	140	10	90	56	24	50	M8	176	154	127	115	27	8	40	5	326	276	381	11	165	130	200	3.5	100
R+F 90 V	125	140	10	90	56	24	50	M8	176	154	127	115	27	8	40	5	366	316	421	11	165	130	200	3.5	140
R+F 100 L	140	160	11.2	100	63	28	60	M10	194	165	127	115	31	8	50	5	366	306	431	14	215	180	250	4	108
R+F 100 V	140	160	11.2	100	63	28	60	M10	194	165	127	115	31	8	50	5	416	356	481	14	215	180	250	4	158
R+F 112 M	140	190	11.2	112	70	28	60	M10	218	175	127	115	31	8	50	5	383	323	448	14	215	180	250	4	118
R+F 112 V	140	190	11.2	112	70	28	60	M10	218	175	127	115	31	8	50	5	423	363	488	14	215	180	250	4	158
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 132 V	178	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	537	457	622	14	265	230	300	4	195
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 160 V	254	254	14.5	160	108	42	110	M16	310	244	186	186	45	12	90	10	662	552	777	18	300	250	350	4	195
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

\* Versions IM B35 / IM 2001, IM V15 / IM 2011, IM V35 / IM 2031 (*Section Designs*)

Date: 02/11/2021  
Version: 2.1

## Three-phase motors, **Series R**

Size: 63 – 180 / Cooling type: IC411 / Protection class: IP 54 – IP 55 /  
Version IM B34



- 1) See planning section (Section *Cable glands in the terminal box*)
  - 2) With lifting eye from size 112 and above
  - 3) 2nd shaft end optional (standard shown – different dimensions possible)
  - 4) Dimensions LA (see dimension sheets Size: 63 – 180 / Cooling type: IC411 / Protection class: IP 54 – IP 55 / Version IM B14)
- Fits and tolerances see (*Section Fits and tolerances*)  
Subject to technical amendments

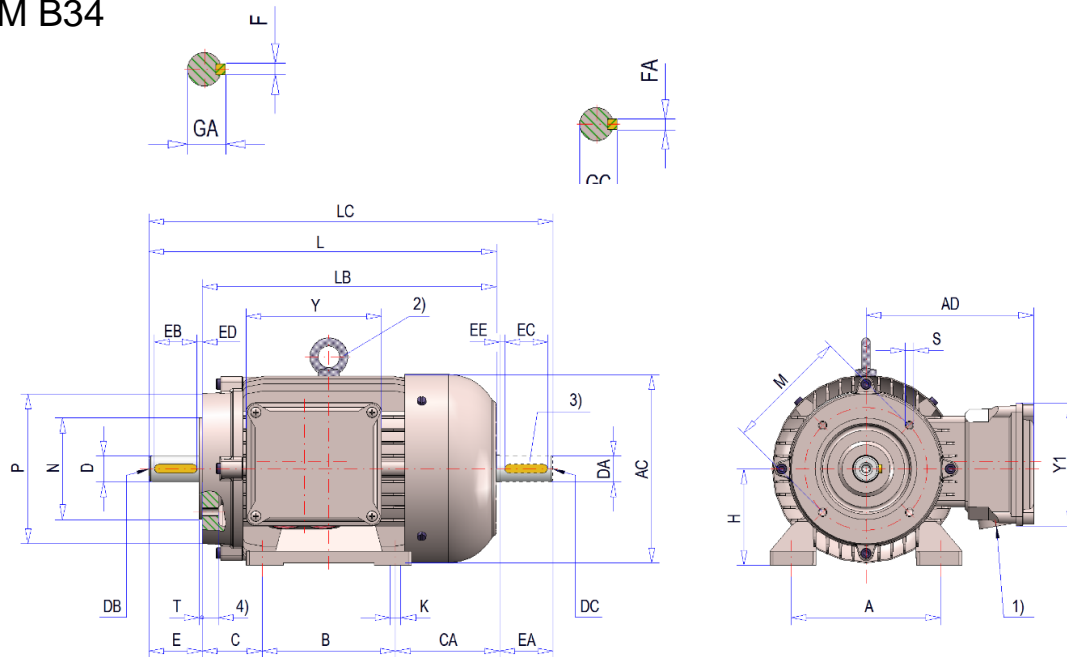
Type	B	A	K	H	C	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	LC	S	M	N	P	T	CA
						DA	EA	DC					GC	FA	EC	EE									
R+F 63 K/L	80	100	7	63	40	11	23	M4	123	99	70	70	12.5	4	18	2.5	211	188	239	M5	75	60	90	2.5	73
R+F 71 K/L	90	112	7	71	45	14	30	M5	138	109	70	70	16	5	25	2.5	243	213	278	M6	85	70	105	2.5	83
R+F 80 K/L	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 90 V	125	140	10	90	56	24	50	M8	176	140	85	85	27	8	40	5	367	316	421	M8	115	95	140	3	140
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 100 V	140	160	11.2	100	63	28	60	M10	194	149	85	85	31	8	50	5	416	356	481	M8	130	110	160	3.5	158
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 112 V	140	190	11.2	112	70	28	60	M10	218	161	85	85	31	8	50	5	423	363	489	M8	130	110	160	3.5	158
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 132 V	178	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	537	457	622	M10	165	130	200	3.5	195
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 160 V	254	254	14.5	160	108	42	110	M16	310	244	186	186	45	12	90	10	689	579	805	M12	215	180	250	4	196

\* Versions IM B34 / IM 2101, IM V17 / IM 2111, IM V37 / IM 2131 (*Section Designs*)

Date: 02/11/2021  
Version: 2.1

## Three-phase motors, Series R

Size: 63 – 180 / Cooling type: IC411 / Protection class: ≥IP 56 / Version IM B34



- 1) See planning section (Section *Cable glands in the terminal box*)
  - 2) With lifting eye from size 112 and above
  - 3) 2nd shaft end optional (standard shown – different dimensions possible)
  - 4) Dimensions LA (see Section Size: 63 – 180 / Cooling type: IC411 / Protection class: ≥IP 56 / Version IM B14)
- Fits and tolerances see (*Section Fits and tolerances*)  
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 90 V	125	140	10	90	56	24	50	M8	176	157	127	115	27	8	40	5	366	316	421	M8	115	95	140	3	140
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 100 V	140	160	11.2	100	63	28	60	M10	194	166	127	115	31	8	50	5	416	356	481	M8	130	110	160	3.5	158
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 112 V	140	190	11.2	112	70	28	60	M10	218	178	127	115	31	8	50	5	423	363	489	M8	130	110	160	3.5	158
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 132 V	178	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	537	457	622	M10	165	130	200	3.5	195
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 160 V	254	254	14.5	160	108	42	110	M16	310	244	186	186	45	12	90	10	689	579	805	M12	215	180	250	4	196

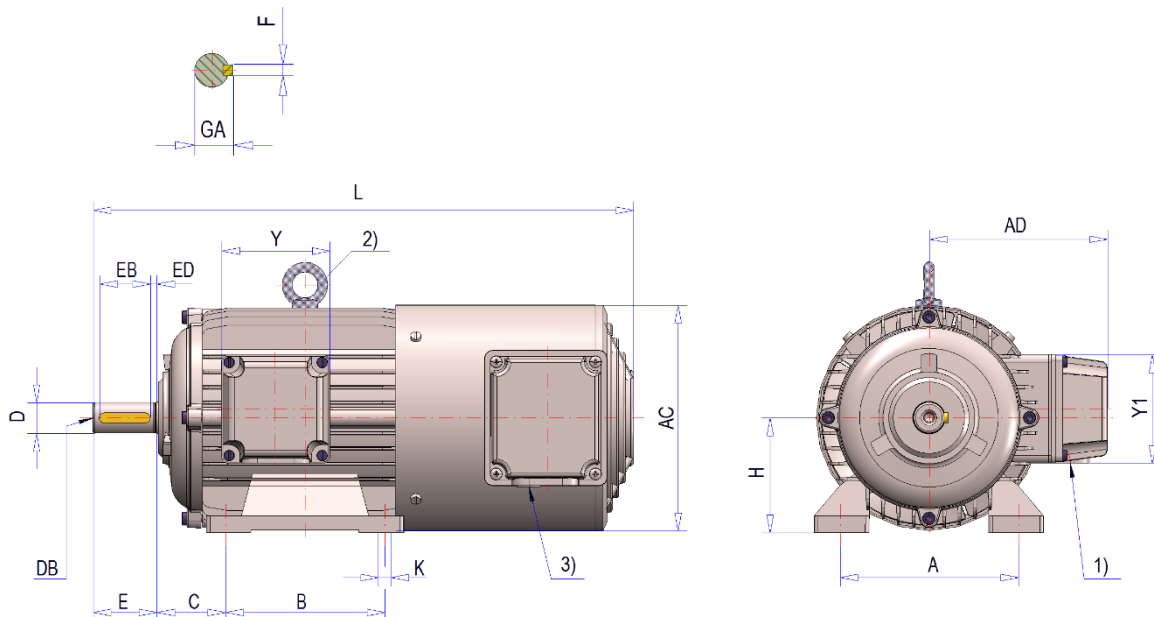
\* Versions IM B34 / IM 2101, IM V17 / IM 2111, IM V37 / IM 2131 (*Section Designs*)

Date: 02/11/2021  
Version: 2.1



## Three-phase motors, **Series R**

Size: 63 – 180 / Cooling type: IC416 / Protection class: IP 54 – IP 55 /  
Version IM B3



1) See planning section (Section *Cable glands in the terminal box*)

2) With lifting eye from size 112 and above

3) 1x M16x1.5

Fits and tolerances see (Section *Fits and tolerances*)

Subject to technical amendments

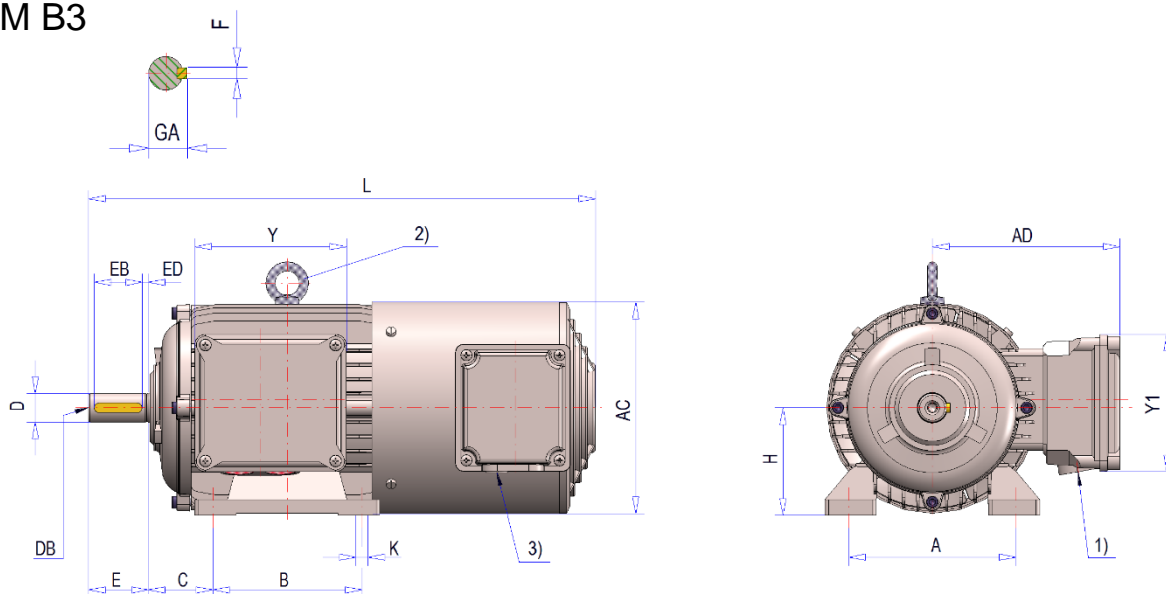
Type	B	A	K	H	C	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L
R 63 K/L	80	100	7	63	40	11	23	M4	124	99	70	70	12.5	4	18	2.5	309
R 71 K/L	90	112	7	71	45	14	30	M5	139	109	70	70	16	5	25	2.5	337
R 80 K/L	100	125	9.5	80	50	19	40	M6	157	127	85	85	21.5	6	32	4	367
R 90 S	100	140	10	90	56	24	50	M8	177	140	85	85	27	8	40	5	402
R 90 L	125	140	10	90	56	24	50	M8	177	140	85	85	27	8	40	5	427
R 90 V	125	140	10	90	56	24	50	M8	177	140	85	85	27	8	40	5	467
R 100 L	140	160	11.2	100	63	28	60	M10	195	149	85	85	31	8	50	5	465
R 100 V	140	160	11.2	100	63	28	60	M10	195	149	85	85	31	8	50	5	515
R 112 M	140	190	11.2	112	70	28	60	M10	218	161	85	85	31	8	50	5	483
R 112 V	140	190	11.2	112	70	28	60	M10	218	161	85	85	31	8	50	5	523
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 132 V	178	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	666
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 160 V	254	254	14.5	160	108	42	110	M16	311	244	186	186	45	12	90	10	811
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

\* Versions IM B3 / IM 1001, IM B6 / IM 1051, IM B7 / IM 1061, IM B8 / IM 1071, IM V5 / IM 1011, IM V6 / IM 1031 (Section *Designs*).

Date: 02/11/2021  
Version: 2.1

## Three-phase motors, **Series R**

Size: 63 – 180 / Cooling type: IC416 / Protection class:  $\geq$ IP 56 / Version IM B3



1) See planning section (Section *Cable glands in the terminal box*)

2) With lifting eye from size 112 and above

3) 1x M16x1.5

Fits and tolerances see (Section *Fits and tolerances*)

Subject to technical amendments

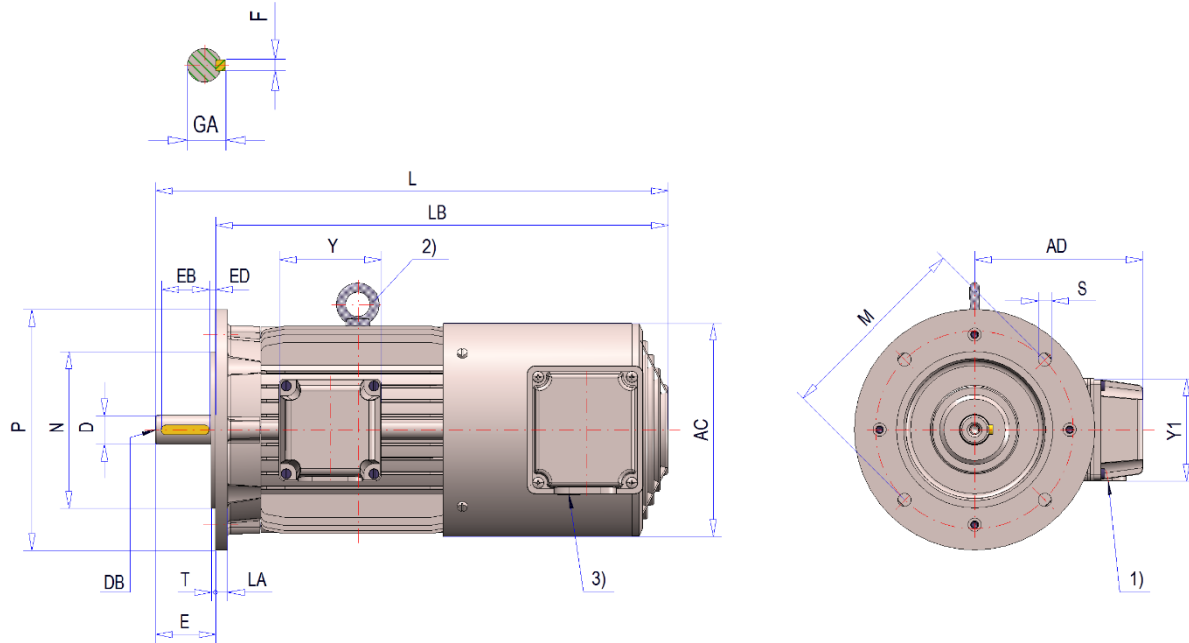
Type	B	A	K	H	C	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L
R 63 K/L	80	100	7	63	40	11	23	M4	124	121	117	103	12.5	4	18	2.5	309
R 71 K/L	90	112	7	71	45	14	30	M5	139	130	117	103	16	5	25	2.5	337
R 80 K/L	100	125	9.5	80	50	19	40	M6	157	144	127	115	21.5	6	32	4	367
R 90 S	100	140	10	90	56	24	50	M8	177	157	127	115	27	8	40	5	402
R 90 L	125	140	10	90	56	24	50	M8	177	157	127	115	27	8	40	5	427
R 90 V	125	140	10	90	56	24	50	M8	177	157	127	115	27	8	40	5	467
R 100 L	140	160	11.2	100	63	28	60	M10	195	166	127	115	31	8	50	5	465
R 100 V	140	160	11.2	100	63	28	60	M10	195	166	127	115	31	8	50	5	515
R 112 M	140	190	11.2	112	70	28	60	M10	218	178	127	115	31	8	50	5	483
R 112 V	140	190	11.2	112	70	28	60	M10	218	178	127	115	31	8	50	5	523
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 132 V	178	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	666
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 160 V	254	254	14.5	160	108	42	110	M16	311	244	186	186	45	12	90	10	811
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

\* Versions IM B3 / IM 1001, IM B6 / IM 1051, IM B7 / IM 1061, IM B8 / IM 1071, IM V5 / IM 1011, IM V6 / IM 1031 (Section *Designs*).

Date: 02/11/2021  
Version: 2.1

## Three-phase motors, **Series R**

Size: 63 – 180 / Cooling type: IC416 / Protection class: IP 54 – IP 55 /  
Version IM B5



1) See planning section (Section *Cable glands in the terminal box*)

2) With lifting eye from size 112 and above

3) 1x M16x1.5

Fits and tolerances see (*Section Fits and tolerances*)

Subject to technical amendments

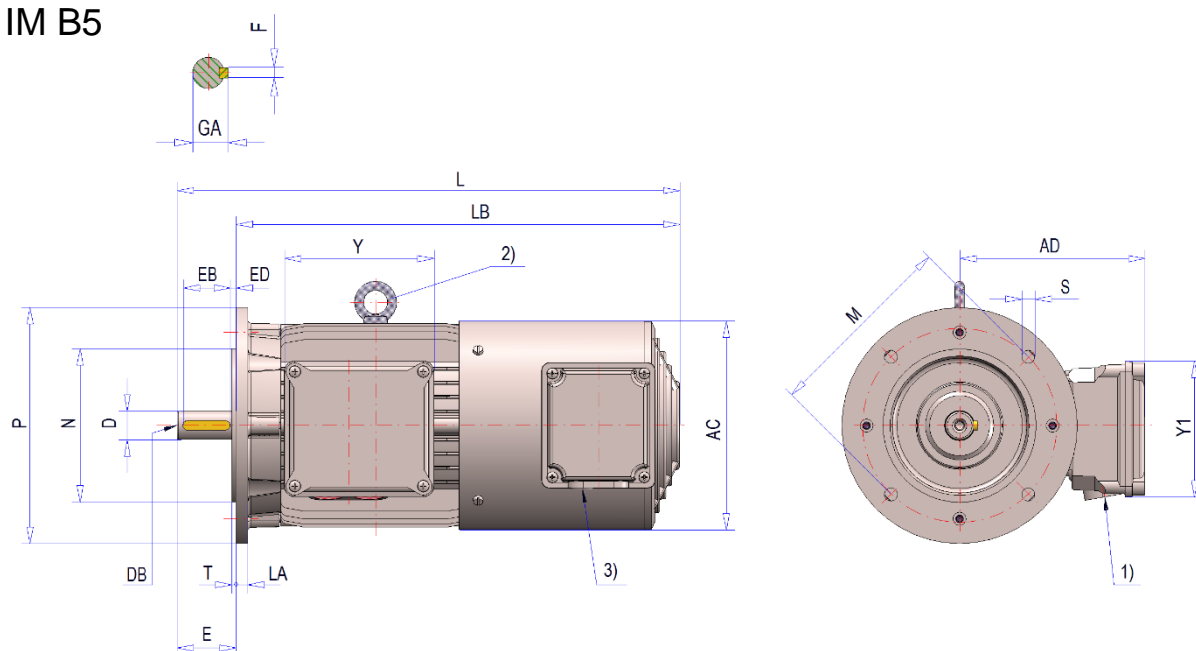
Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
RF 63 K/L	11	23	M4	124	104	70	70	12.5	4	18	2.5	309	286	9	115	95	140	3	10
RF 71 K/L	14	30	M5	139	114	70	70	16	5	25	2.5	337	307	9	130	110	160	3.5	9.5
RF 80 K/L	19	40	M6	157	134	85	85	21.5	6	32	4	367	327	11	165	130	200	3.5	11
RF 90 S	24	50	M8	177	137	85	85	27	8	40	5	402	352	11	165	130	200	3.5	10.5
RF 90 L	24	50	M8	177	137	85	85	27	8	40	5	427	377	11	165	130	200	3.5	10.5
RF 90 V	24	50	M8	177	137	85	85	27	8	40	5	467	417	11	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 100 V	28	60	M10	195	148	85	85	31	8	50	5	515	455	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 112 V	28	60	M10	218	158	85	85	31	8	50	5	523	463	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 132 V	38	80	M12	258	197	145	130	41	10	70	5	666	586	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 160 V	42	110	M16	311	244	186	186	45	12	90	10	811	701	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

\* Versions IM B5 / IM 3001, IM V1 / IM 3011, IM V3 / IM 3031 (*Section Designs*)

Date: 02/11/2021  
Version: 2.1

## Three-phase motors, **Series R**

Size: 63 – 180 / Cooling type: IC416 / Protection class:  $\geq$ IP 56 / Version IM B5



1) See planning section (Section *Cable glands in the terminal box*)

2) With lifting eye from size 112 and above

3) 1x M16x1.5

Fits and tolerances see (Section *Fits and tolerances*)

Subject to technical amendments

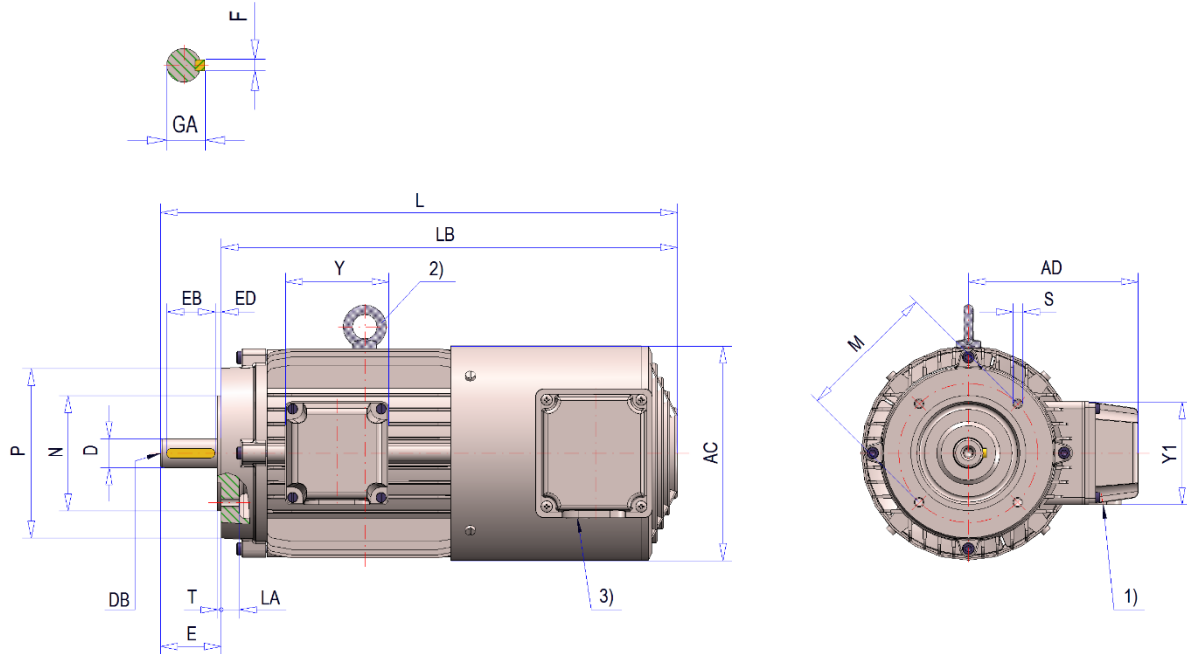
Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
RF 63 K/L	11	23	M4	124	126	117	103	12.5	4	18	2.5	309	286	9	115	95	140	3	10
RF 71 K/L	14	30	M5	139	136	117	103	16	5	25	2.5	337	307	9	130	110	160	3.5	9.5
RF 80 K/L	19	40	M6	157	150	127	115	21.5	6	32	4	367	327	11	165	130	200	3.5	11
RF 90 S	24	50	M8	177	154	127	115	27	8	40	5	402	352	11	165	130	200	3.5	10.5
RF 90 L	24	50	M8	177	154	127	115	27	8	40	5	427	377	11	165	130	200	3.5	10.5
RF 90 V	24	50	M8	177	154	127	115	27	8	40	5	467	417	11	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 100 V	28	60	M10	195	165	127	115	31	8	50	5	515	455	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 112 V	28	60	M10	218	175	127	115	31	8	50	5	523	463	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 132 V	38	80	M12	258	197	145	130	41	10	70	5	666	586	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 160 V	42	110	M16	311	244	186	186	45	12	90	10	811	701	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

\* Versions IM B5 / IM 3001, IM V1 / IM 3011, IM V3 / IM 3031 (Section *Designs*)

Date: 02/11/2021  
Version: 2.1

## Three-phase motors, **Series R**

Size: 63 – 180 / Cooling type: IC416 / Protection class: IP 54 – IP 55 /  
Version IM B14



1) See planning section (Section *Cable glands in the terminal box*)

2) With lifting eye from size 112 and above

3) 1x M16x1.5

Fits and tolerances see (Section *Fits and tolerances*)

Subject to technical amendments

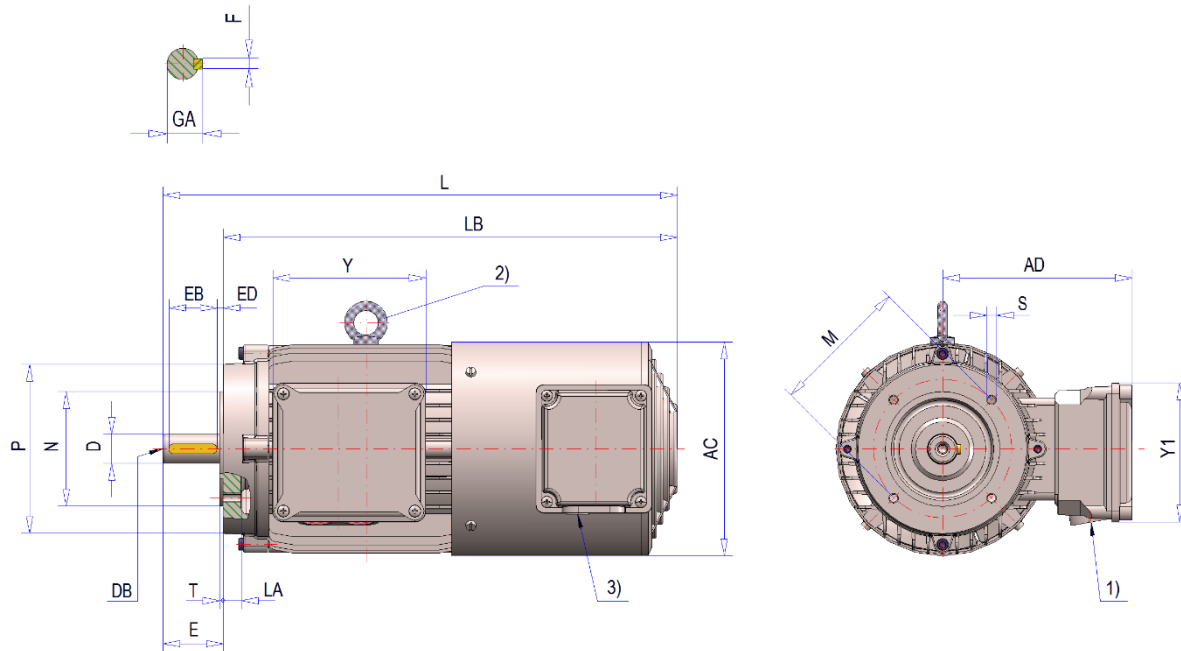
Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
RF 63 K/L	11	23	M4	124	104	70	70	12.5	4	18	2.5	309	286	M5	75	60	90	2.5	9.5
RF 71 K/L	14	30	M5	139	114	70	70	16	5	25	2.5	337	307	M6	85	70	105	2.5	10
RF 80 K/L	19	40	M6	157	134	85	85	21.5	6	32	4	367	327	M6	100	80	120	3	12.5
RF 90 S	24	50	M8	177	137	85	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 90 V	24	50	M8	177	137	85	85	27	8	40	5	467	417	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 100 V	28	60	M10	195	148	85	85	31	8	50	5	515	455	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 112 V	28	60	M10	218	158	85	85	31	8	50	5	533	473	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 132 V	38	80	M12	258	197	145	130	41	10	70	5	690	610	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 160 V	42	110	M16	311	244	186	186	45	12	90	10	838	728	M12	215	180	250	4	14

\* Versions IM B14 / IM 3601, IM V18 / IM 3611, IM V19 / IM 3631 (Section *Designs*)

Date: 02/11/2021  
Version: 2.1

## Three-phase motors, **Series R**

Size: 63 – 180 / Cooling type: IC416 / Protection class:  $\geq$ IP 56 / Version IM B14



1) See planning section (*Section Cable glands in the terminal box*)

2) With lifting eye from size 112 and above

3) 1x M16x1.5

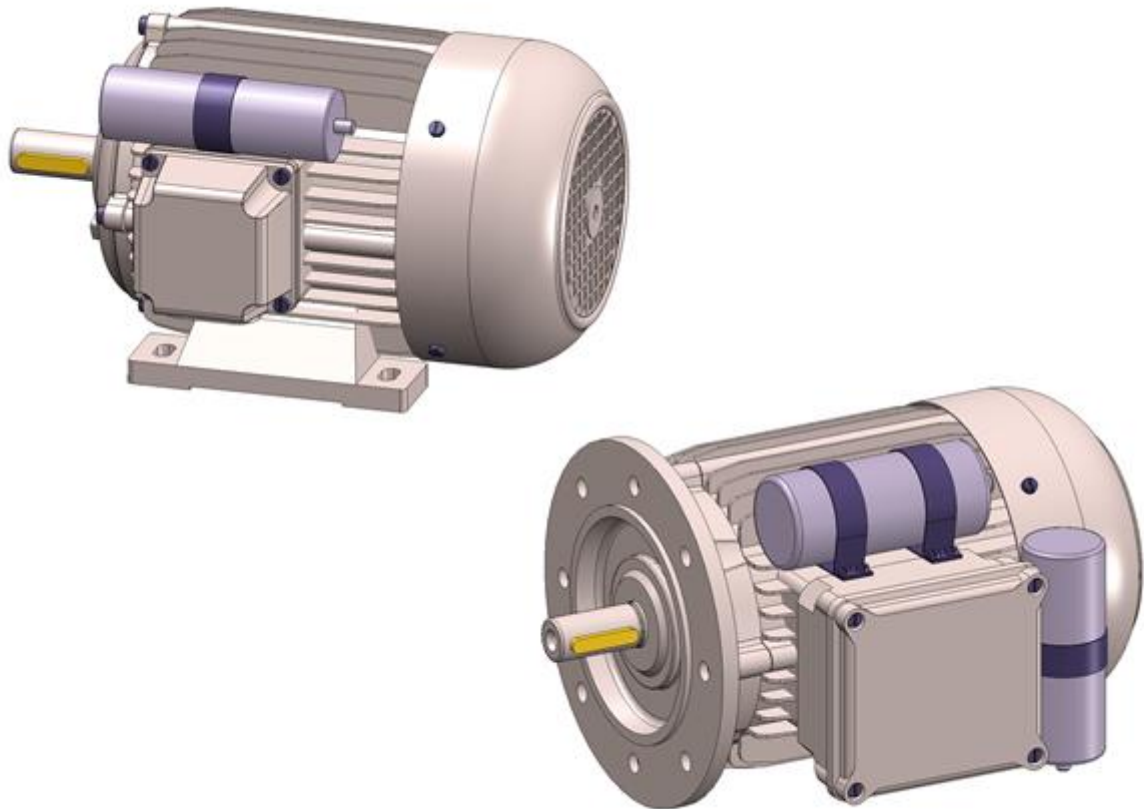
Fits and tolerances see (*Section Fits and tolerances*)

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	M5	75	60	90	2.5	9.5
RF 71 K/L	14	30	M5	139	136	117	103	16	5	25	2.5	337	307	M6	85	70	105	2.5	10
RF 80 K/L	19	40	M6	157	150	127	115	21.5	6	32	4	367	327	M6	100	80	120	3	12.5
RF 90 S	24	50	M8	177	154	127	115	27	8	40	5	402	352	M8	115	95	140	3	15
RF 90 L	24	50	M8	177	154	127	115	27	8	40	5	427	377	M8	115	95	140	3	15
RF 90 V	24	50	M8	177	154	127	115	27	8	40	5	467	417	M8	115	95	140	3	15
RF 100 L	28	60	M10	195	165	127	115	31	8	50	5	465	405	M8	130	110	160	3.5	12.5
RF 100 V	28	60	M10	195	165	127	115	31	8	50	5	515	455	M8	130	110	160	3.5	12.5
RF 112 M	28	60	M10	218	175	127	115	31	8	50	5	483	423	M8	130	110	160	3.5	16
RF 112 V	28	60	M10	218	175	127	115	31	8	50	5	533	473	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 132 V	38	80	M12	258	197	145	130	41	10	70	5	690	610	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 160 V	42	110	M16	311	244	186	186	45	12	90	10	838	728	M12	215	180	250	4	14

\* Versions IM B14 / IM 3601, IM V18 / IM 3611, IM V19 / IM 3631 (*Section Designs*)

Date: 02/11/2021  
Version: 2.1



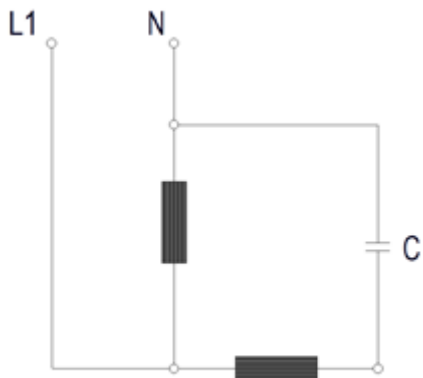
## Single-phase motors

### Single-phase motors

Single-phase motors can be operated on single-phase 230 V mains. Depending on the required start-up torque versions with either an operating capacitor or a starting and operating capacitor may be selected.

### Single-phase motors with operating capacitors, type REBK

For the same size and number of poles these motors have the same power as 3-phase motors but have a relatively low start-up torque (see *Technical Data Single-phase motors with operation capacitor*). Because of this, they are particularly suited for drives where 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 as this could cause the permissible limit temperatures to be exceeded.



### Voltage and frequency

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

### Direction of rotation

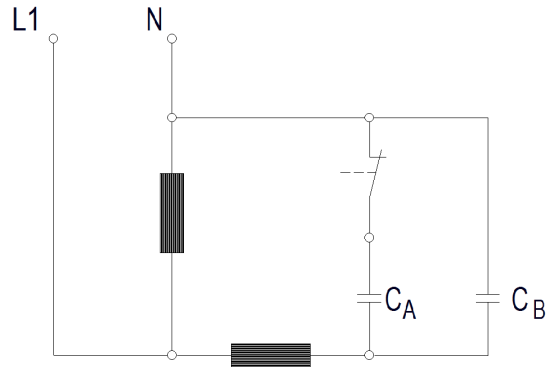
When looking toward drive side shaft end, the motors turn in clockwise direction, i.e. to the right. The direction of rotation can be changed by exchanging the jumpers on the terminal strip as shown in the wiring diagrams.



## Single-phase motors

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

This version combines the high power of the REBK type with a high start-up torque (see *Technical Data Single-phase motors with start-up and operating capacitors*). Once the motor has reached the nominal speed, the start-up capacitor is switched off by means of a start-up relay or centrifugal switch.



## Capacitors

As standard, the motors are equipped with start-up and operating capacitors. The capacitors are also available separately.

Other motor data may result in changed capacitor sizes.

Special versions on request

## Single-phase motors

### Single-phase motors with operation capacitor

#### 2-pole 400V-50Hz IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 3000 rpm

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 $C_B$ <sup>1)</sup> $\mu\text{F}$	Capacitor $C_A$ <sup>1)</sup> $\mu\text{F}$	Moment of inertia J kgm <sup>2</sup>	Weight IM B3 M kg (approx.)
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

<sup>1)</sup> Capacitor voltage: 400 V operation

Subject to technical amendments

#### 4-pole 400V-50Hz IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 1500 rpm

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 $C_B$ <sup>1)</sup> $\mu\text{F}$	Capacitor $C_A$ <sup>1)</sup> $\mu\text{F}$	Moment of inertia J kgm <sup>2</sup>	Weight IM B3 M kg (approx.)
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

<sup>1)</sup> Capacitor voltage: operation 400 V

Subject to technical amendments

## Single-phase motors

### Single-phase motors with start-up and operating capacitors

#### 2-pole 400V-50Hz IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 3000 rpm

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 $C_B^{1)}$ $\mu F$	Capacitor $C_A^{1)}$ $\mu F$	Moment of inertia J kgm <sup>2</sup>	Weight IM B3 M kg (approx.)
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

<sup>1)</sup> Capacitor voltage: start-up 320V, 400V operation

Subject to technical amendments

#### 4-pole 400V-50Hz IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 1500 rpm

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 $C_B^{1)}$ $\mu F$	Capacitor $C_A^{1)}$ $\mu F$	Moment of inertia J kgm <sup>2</sup>	Weight IM B3 M kg (approx.)
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

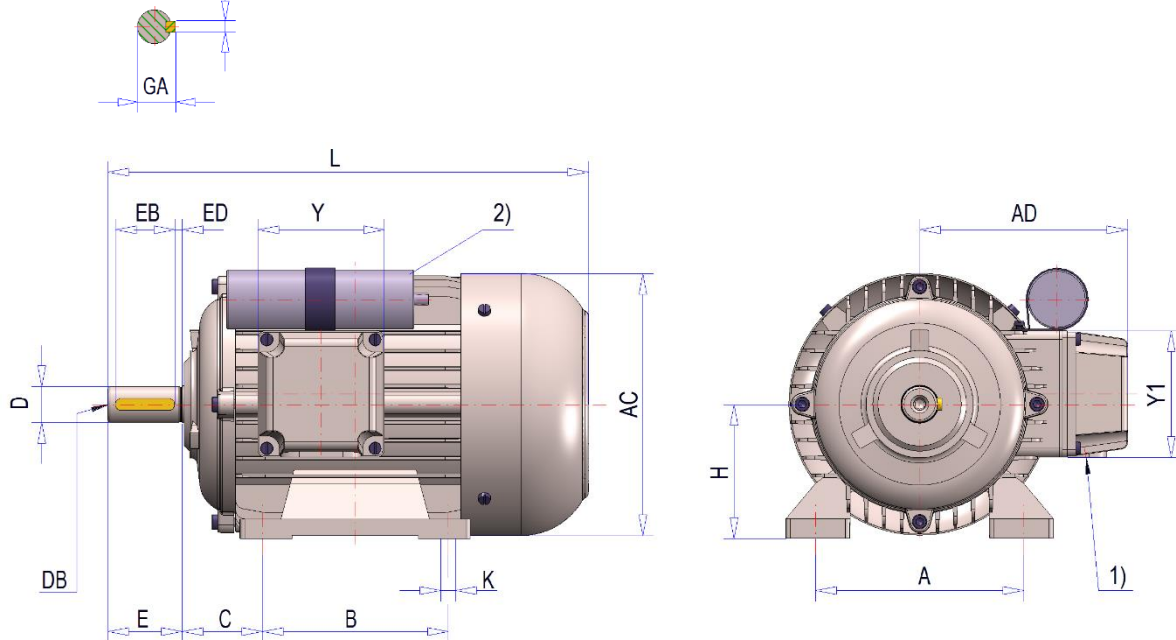
<sup>1)</sup> Capacitor voltage: start-up 320V, 400V operation

Subject to technical amendments

## Single-phase motors

### Dimension sheets for single-phase motors with operating capacitors

Size: 71 – 90 / Cooling type: IC411 / Protection class: IP 54 – IP 55 /  
Version IM B3



1) See planning section (Section *Cable glands in the terminal box*)

2) Capacitor size according to winding version

Fits and tolerances see (Section *Fits and tolerances*)

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

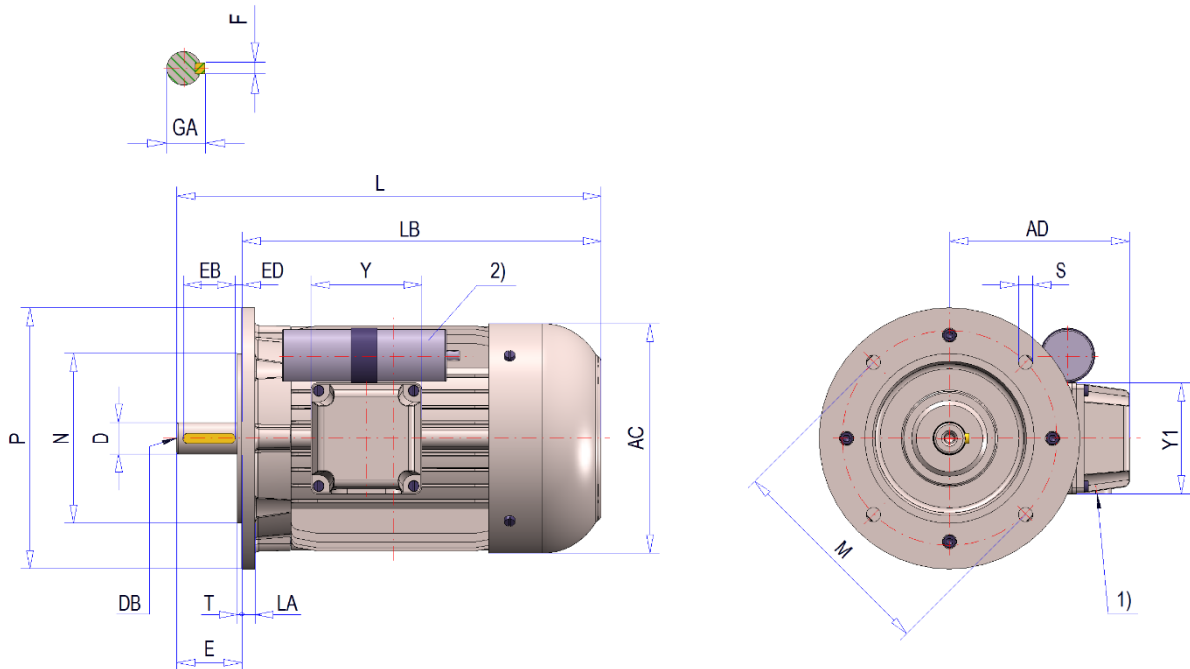
\* Versions IM B3 / IM 1001, IM B6 / IM 1051, IM B7 / IM 1061, IM B8 / IM 1071, IM V5 / IM 1011, IM V6 / IM 1031 (Section *Designs*)

Date: 02/11/2021  
Version: 2.1

## Single-phase motors

Size: 71 – 90 / Cooling type: IC411 / Protection class: IP 54 – IP 55 /

Version IM B5



1) See planning section (Section *Cable glands in the terminal box*)

2) Capacitor size according to winding design

Fits and tolerances see (Section *Fits and tolerances*)

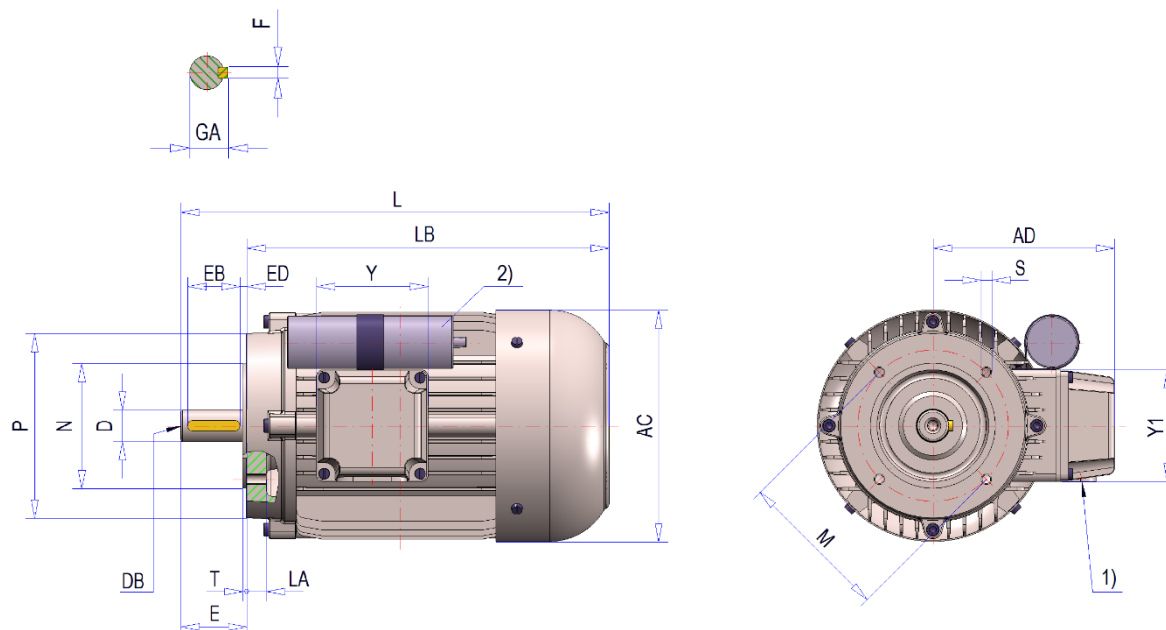
Subject to technical amendments

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	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	165	130	200	3.5	11
REBKF 90 S	24	50	M8	176	137	85	85	27	8	40	5	301	251	11	165	130	200	3.5	10.5
REBKF 90 L	24	50	M8	176	137	85	85	27	8	40	5	326	276	11	165	130	200	3.5	10.5

\* Versions IM B5 / IM 3001, IM V1 / IM 3011, IM V3 / IM 3031 (Section *Designs*)

## Single-phase motors

Size: 71 – 90 / Cooling type: IC411 / Protection class: IP 54 – IP 55 / IM B14 Version



1) See planning section (Section *Cable glands in the terminal box*)

2) Capacitor size according to winding design

Fits and tolerances see (*Section Fits and tolerances*)

Subject to technical amendments

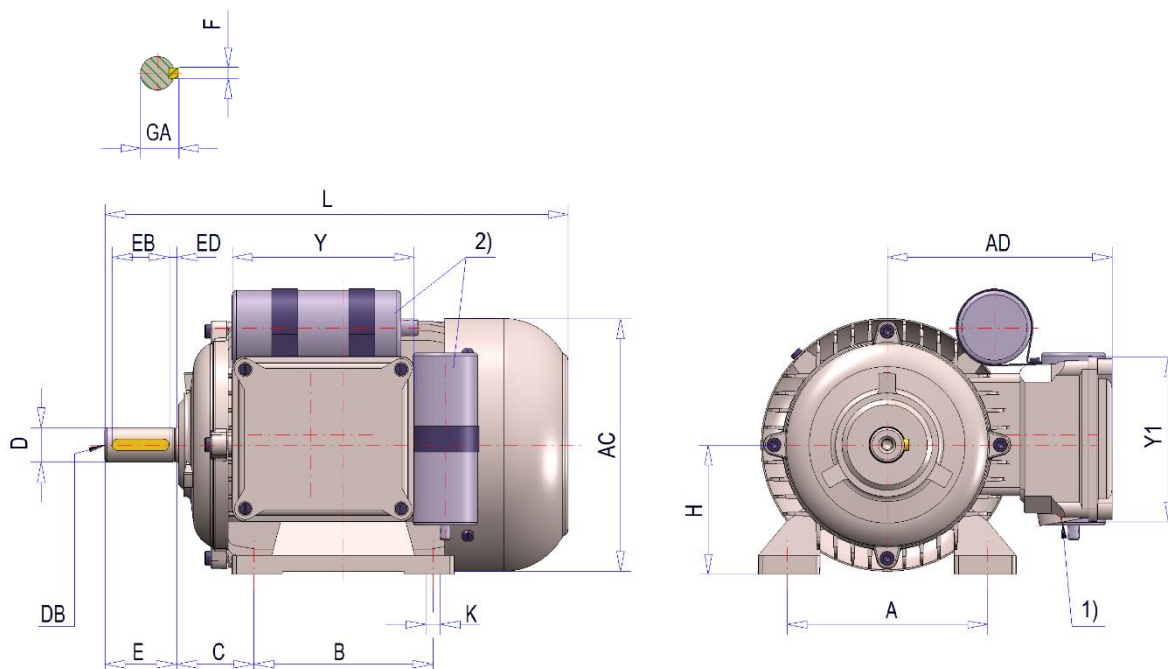
Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
REBKF 71 K/L	14	30	M5	138	114	70	70	16	5	25	2.5	243	213	M6	85	70	105	2.5	10
REBKF 80 K/L	19	40	M6	156	134	85	85	21.5	6	32	4	274	234	M6	100	80	120	3	9.5
REBKF 90 S	24	50	M8	176	137	85	85	27	8	40	5	301	251	M8	115	95	140	3	15
REBKF 90 L	24	50	M8	176	137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

\* Versions IM B14 / IM 3601, IM V18 / IM 3611, IM V19 / IM 3631 (*Section Designs*)

## Single-phase motors

### Dimension sheets for single-phase motors with start-up and operating capacitors

Size: 71 – 90 / Cooling type: IC411 / Protection class: IP 54 – IP 55 /  
Version IM B3



1) See planning section (Section *Cable glands in the terminal box*)

2) Capacitor size according to winding version

Fits and tolerances see (Section *Fits and tolerances*)

Subject to technical amendments

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

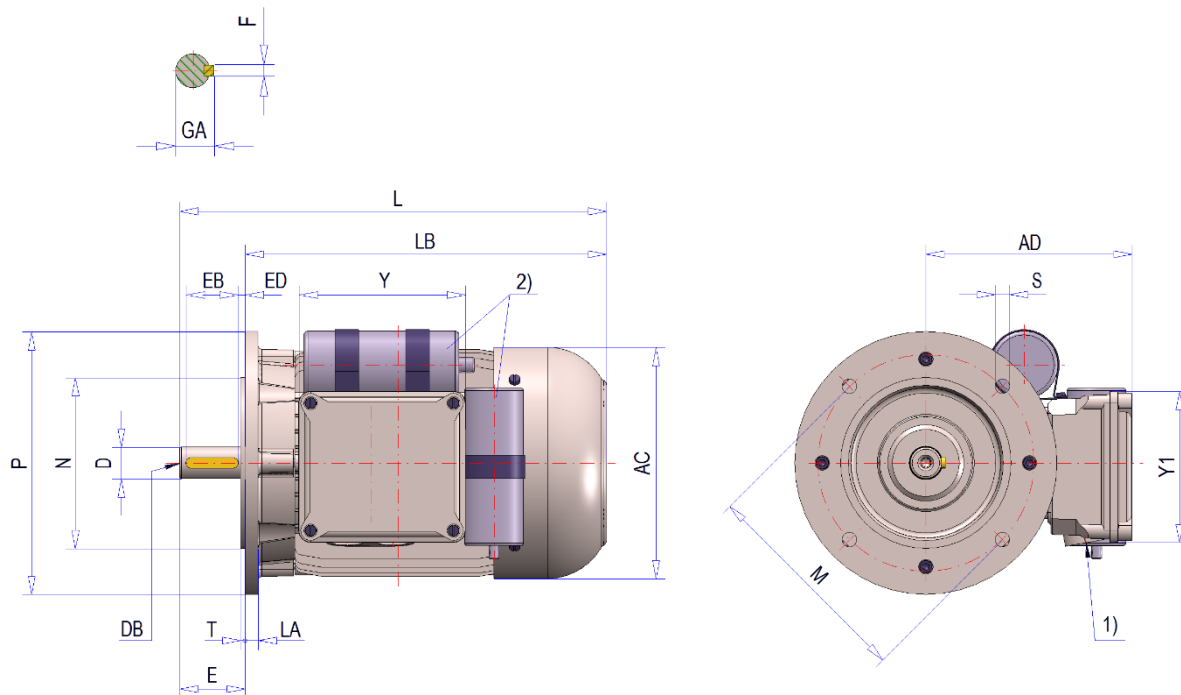
\* Versions IM B3 / IM 1001, IM B6 / IM 1051, IM B7 / IM 1061, IM B8 / IM 1071, IM V5 / IM 1011, IM V6 / IM 1031 (Section *Designs*)

Date: 02/11/2021  
Version: 2.1

## Single-phase motors

Size: 71 – 90 / Cooling type: IC411 / Protection class: IP 54 – IP 55 /

Version IM B5



1) See planning section (Section *Cable glands in the terminal box*)

2) Capacitor size according to winding version

Fits and tolerances see (*Section Fits and tolerances*)

Subject to technical amendments

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

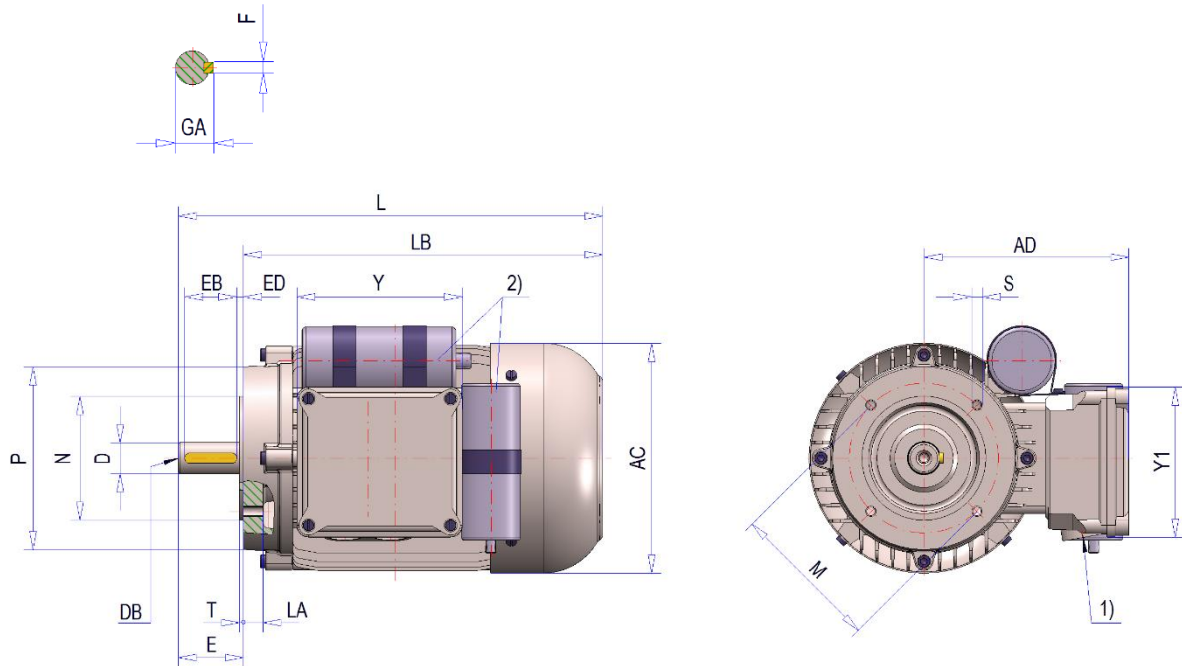
\* Versions IM B5 / IM 3001, IM V1 / IM 3011, IM V3 / IM 3031 (*Section Designs*)



## Single-phase motors

Size: 71 – 90 / Cooling type: IC411 / Protection class: IP 54 – IP 55 /

Version IM B14



1) See planning section (Section *Cable glands in the terminal box*)

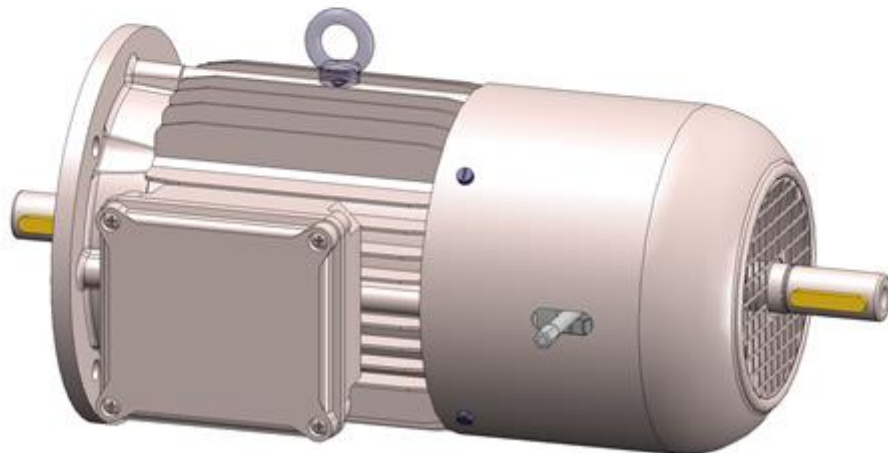
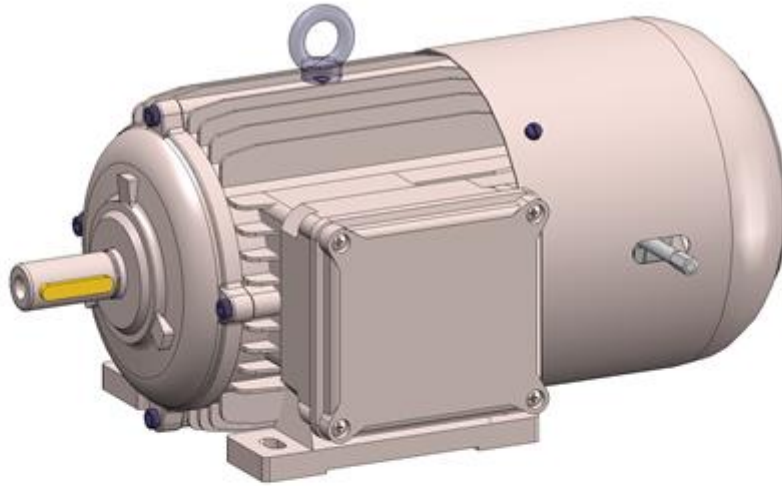
2) Capacitor size according to winding version

Fits and tolerances see (Section *Fits and tolerances*)

Subject to technical amendments

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

\* Versions IM B14 / IM 3601, IM V18 / IM 3611, IM V19 / IM 3631 (Section *Designs*)



## Brake motors

### Brake motors

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

Brake motors are used where moving masses need 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 etc.

Brake motors are characterised by:

- reduction of ancillary times by reduced motor run-down times
- holding brake in case of power failure
- precise approach to a defined position
- increased motor switching frequency
- matching of braking torque to working conditions
- high operational safety due to robust design
- long service life

Brake motors are available with the following brake types:

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

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

## Brake motors

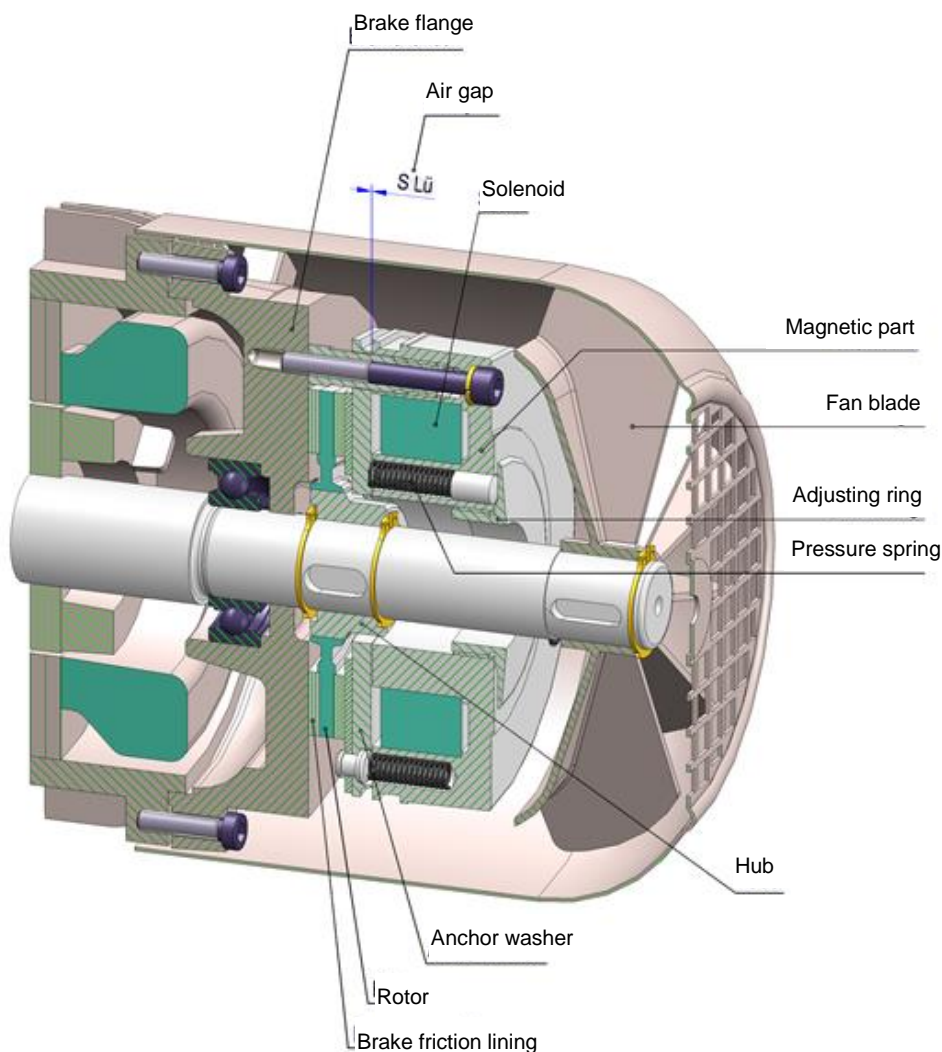
### Electromagnetically released spring-loaded brake type B

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

#### Generating the braking torque

During braking, the pressure springs move the rotor axially on the hub or shaft via the rotor disc so that it presses against the opposing friction surface. When the brake is applied there is an air gap  $S_{Lü}$  between the rotor disc and the magnetic part.

To release the brake, a direct current excites the solenoid of the magnetic part. The resulting magnetic force pulls the rotor disc toward the magnetic part against the spring force. 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 can be adjusted by the customer by means of the adjusting ring.



## Brake motors

### Voltage and circuit type

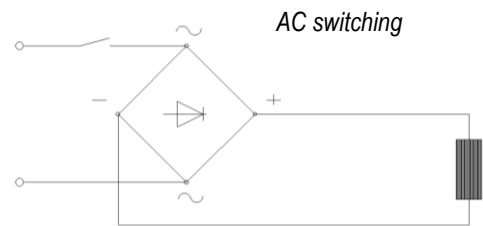
The brakes also available for voltages other than the standard voltages 24 V, 103 V, 180 V, and 205 V [DC]. According to DIN VDE 0580, the permissible voltage change is  $\pm 10\%$  of the nominal voltage.

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

The brake motors are supplied in two basic circuit variants:

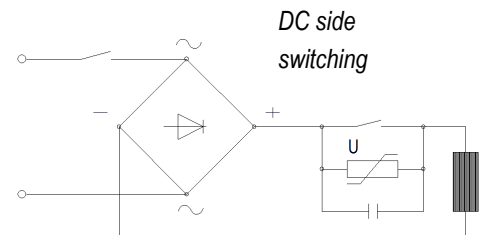
#### AC switching

As standard, 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, so that the brake torque is available faster.



## Brake motors

### Switching times

The transition from the state which is free of braking torque to steady braking torque is subject to a delay. The switching times of the brake depend on the circuit variants described. 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 by use of devices which operate with fast excitation or over-excitation.

The switching times stated in the table (Technical data (for standard brake type B)) apply for DC switching with the nominal release travel  $S_{Re}$  and a warm brake solenoid. The engagement times are approx. 10 times longer in case of AC switching.

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

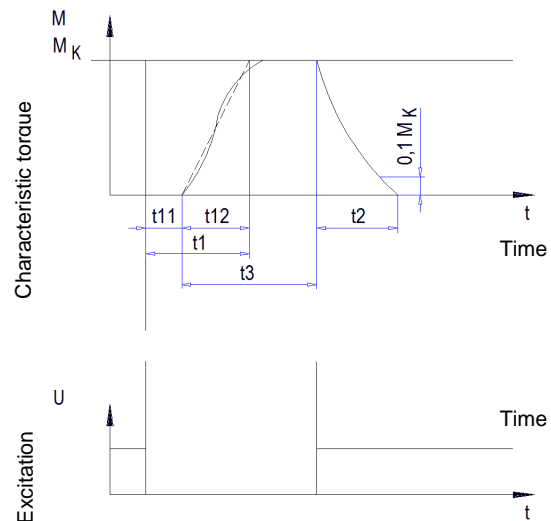
$t_{11}$  = Response delay on engagement

$t_{12}$  = Brake torque rise time

$t_1$  = Engagement time

$t_2$  = Release time

$t_3$  = Slippage time



## Brake motors

### Technical data (for standard brake type B)

Type	Braking torque *	Nominal input power	Max. speed	Release travel	Permissible release travel	Switching times for DC switching		Moment of inertia	Magnetic part weight
	$M_K$ [Nm]	[ $P_{20^\circ C}$ ] [W]	$n_{max.}$ rpm	$S_{Lü}$ [mm]	$S_{Lü max.}$ [mm]	$t_1$ [ms]	$t_2$ [ms]	J [kgm <sup>2</sup> · 10 <sup>-4</sup> ]	[kg]
<b>B4</b>	4	20	6000	0.2	0.5	28	45	0.15	0.75
<b>B8</b>	8	25	5000	0.2	0.5	31	57	0.61	1.2
<b>B16</b>	16	30	4000	0.2	0.5	47	76	2.0	2.1
<b>B32</b>	32	40	3600	0.3	0.75	53	115	4.5	3.5
<b>B60</b>	60	50	3600	0.3	0.75	42	210	6.3	5.2
<b>B80</b>	80	55	3600	0.3	0.75	57	220	15	7.9
<b>B150</b>	150	85	3600	0.4	1.0	78	270	29	12.0
<b>B260</b>	260	100	3600	0.4	1.0	165	340	73	19.3
<b>B400</b>	400	110	3000	0.5	1.25	230	390	200	29.1

\* The brake torque which is actually available reduces in inverse proportion to the speed.

Subject to technical amendments

### Brake motor performance data

Brake size and motor size usually correspond so that the switching frequency to be achieved by the brake motor is not restricted by the brake but rather by the motor temperature. The permissible switching frequency calculated from the moment of inertia, counter torque and load factors can in most cases is also assumed to 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 actions 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							
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

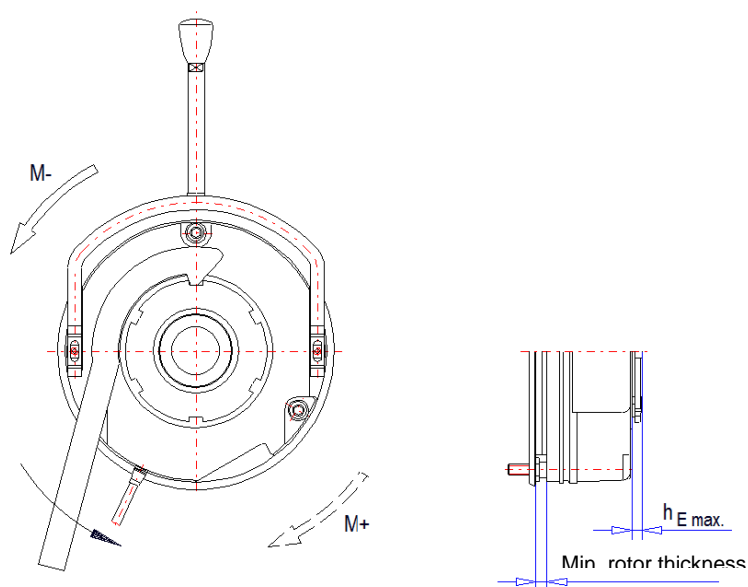
## Brake motors

### Brake torque reduction

For standard type B brakes, the braking torque  $M_k$  can be reduced using the adjustment ring in the magnetic part (using a DIN 1810 Shape A hook wrench). Each notch of the adjusting ring changes the brake torque as specified in the table. The adjusting ring may only be screwed out to the maximum dimension  $h_{E\max}$  as stated in the table below. Please note that engagement and release times change. The torque reduction is independent of the nominal torque which is used.

Braking torque $M_k$	4	8	16	32	60	80	150	260	400
	[Nm]	[Nm]	[Nm]	[Nm]	[Nm]	[Nm]	[Nm]	[Nm]	[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 magnetic part 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 the use of other brake types are possible on request.

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



## Brake motors

### Maintenance

The brakes are virtually maintenance-free. The wear depends on the work of friction that is produced each time the brake is applied. If the maximum release travel  $S_{L\dot{u}max}$  (see Technical data (for standard brake type B)) has been reached, the brake must be set to  $S_{L\dot{u}}$ . The brake can be adjusted at least 5 times, but only so often that the minimum rotor thickness (see table above) is not undershot.

### Control of drives for frequent switching

The drive must be controlled so that the motor does not start if the brake is applied.

In particular, the response times of the motor and brake of large brake motors differ greatly. With high switching frequencies, starting with the brake applied will result in premature wear of the brake lining and, due to the continuously repeated high start-up current, will cause overheating of the windings and motor failure.

The response times of motor and brake can be matched with the following options:

- The motor control voltage can be controlled by a micro switch installed inside the brake. 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 adjustment range 0.05 .to 1s).
- Fast switching can be performed with a fast-acting rectifier. This triggers the brake coil with a higher voltage while the motor is starting. The voltage drops to the nominal value as soon as the brake has been released.

## Brake motors

### 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. By pulling the manual release lever while the brake is de-energised, the brake is released 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 resonance points which can occur in this mode.
  
- Protection class IP 65 brakes
  
- ATEX brakes  
Brakes suited for operation in Zone 22 explosion hazard areas
  
- Corrosion-protected brakes
  
- Brakes with micro-switch or inductive proximity switch  
Micro switches to monitor release travel and 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 smooth starting and stopping of the motor.
  
- Brake motors with external cooling. Brake motors can be equipped with external ventilation to achieve high switching frequencies.
  
- Brake motors with second shaft end (shaft end on request)
  
- Double brakes for stage machinery/theatre version (*see Section Brake motors with double brake for stage machinery*)

## Brake motors

### Technical data for brake motors

2-pole 400V-50Hz IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 3000 rpm

Type	Efficiency class	Rated power	Rated speed	Rated current	Power factor	Efficiency	Rated torque	Start-up to rated current	Start-up to rated torque	Breakdown to rated torque	Braking torque	Moment of inertia	Weight (IM B3)
		$P_N$ [kW]	$n_N$ [rpm]	$I_N$ [A]	$\cos \varphi$	$\eta$ [%]	$M_N$ [Nm]	$I_A / I_N$	$M_A / M_N$	$M_K / M_N$	$M_{Bmax}$ [Nm]	J [kgm <sup>2</sup> ]	m [kg]
63K/2-B4	IE2	0.18	2835	0.50	0.74	60.4	0.61	5.00	3.20	3.55	4.00	0.00016	5.50
63L/2-B4	IE2	0.25	2820	0.60	0.81	64.8	0.85	5.45	3.05	3.35	4.00	0.00021	6.00
71K/2-B4	IE2	0.37	2835	0.85	0.82	69.5	1.25	5.35	2.60	3.05	4.00	0.00036	7.00
71L/2-B4	IE2	0.55	2840	1.20	0.83	74.1	1.85	5.95	3.00	3.30	4.00	0.00043	8.00
80K/2-B8	IE3	0.75	2840	1.65	0.81	80.7	2.52	5.95	3.40	3.60	8.00	0.00070	10.50
80L/2-B8	IE3	1.10	2850	2.35	0.81	82.7	3.69	6.80	4.50	4.00	8.00	0.00085	11.50
90L/2-B16	IE3	1.50	2910	3.05	0.83	84.2	4.92	9.15	4.30	4.70	16.00	0.00175	19.00
90L/2-B16	IE3	2.20	2875	4.50	0.83	85.9	7.31	7.70	3.95	3.90	16.00	0.00175	19.00
100V/2-B32	IE3	3.00	2930	5.70	0.87	87.1	9.78	11.95	5.75	5.50	32.00	0.00400	33.50
112M/20-B60	IE3	4.00	2940	7.75	0.85	88.1	13.0	10.70	3.90	4.80	60.00	0.00617	43.50
132S/20-B80	IE3	5.50	2945	10.1	0.88	89.2	17.8	10.45	3.70	4.60	80.00	0.01300	56.00
132S/200-B80	IE3	7.50	2945	13.8	0.87	90.1	24.3	11.00	4.25	4.95	80.00	0.01550	62.00
160M/20-B150	IE3	11.00	2965	19.7	0.88	91.2	35.4	12.35	5.00	5.30	150.00	0.04060	131.00
160L/2-B150	IE3	15.00	2960	26.2	0.90	91.9	48.4	12.00	5.15	5.05	150.00	0.04710	147.00
160L/20-B150	IE3	18.50	2960	33.7	0.86	92.4	59.7	12.60	3.90	5.60	150.00	0.05760	153.00
180L/20-B260	IE3	22.00	2965	38.0	0.90	92.7	70.9	11.95	3.90	4.70	260.00	0.09000	199.00
-	IE3	30.00	Technical data in preparation										

Subject to technical amendments

## Brake motors

2-pole 460V-60Hz IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 360 rpm

Type	Efficiency class	Rated power	Rated speed	Rated current	Power factor	Efficiency	Rated torque	Start-up to rated current	Start-up to rated torque	Breakdown to rated torque	Braking torque	Moment of inertia	Weight (IM B3)
		$P_N$ [kW]	$n_N$ [rpm]	$I_N$ [A]	$\cos \varphi$	$\eta$ [%]	$M_N$ [Nm]	$I_A / I_N$	$M_A / M_N$	$M_K / M_N$	$M_{Bmax}$ [Nm]	$J$ [kgm <sup>2</sup> ]	$m$ [kg]
-	IE2	0.18	Technical data in preparation										
-	IE2	0.25	Technical data in preparation										
71K/2-B4	IE2	0.37	3410	0.70	0.85	72.0	1.04	5.25	2.25	2.75	4.00	0.00036	7.00
71L/2-B4	IE2	0.55	3440	1.00	0.86	74.0	1.53	7.00	3.30	3.55	4.00	0.00043	8.00
80K/2-B8	IE3	0.75	3455	1.45	0.80	77.0	2.07	7.30	4.45	4.15	8.00	0.00070	10.50
80L/2-B8	IE3	1.10	3470	2.05	0.80	84.0	3.03	8.00	4.55	4.55	8.00	0.00085	11.50
90L/2-B16	IE3	1.50	3515	2.60	0.84	85.5	4.08	10.70	4.35	5.25	16.00	0.00175	19.00
90L/2-B16	IE3	2.20	3500	3.85	0.82	86.5	6.00	9.10	4.00	4.60	16.00	0.00175	19.00
100V/2-B32	IE3	3.00	3530	4.80	0.88	88.5	8.12	13.50	4.80	5.50	32.00	0.00400	33.50
132S/200-B80	IE3	4.00	3560	6.25	0.90	88.5	10.7	12.50	4.35	5.50	80.00	0.01550	62.00
132S/200-B80	IE3	5.50	3555	8.55	0.90	89.5	14.8	11.96	4.15	5.30	80.00	0.01550	62.00
132S/200-B80	IE3	7.50	3550	11.7	0.89	90.2	20.2	11.05	3.85	4.90	80.00	0.01550	62.00
160M/20-B150	IE3	11.00	3565	16.8	0.89	91.0	29.5	12.35	4.50	4.90	150.00	0.04060	131.00
160M/20-B150	IE3	15.00	3560	23.2	0.88	91.0	40.2	11.05	4.05	4.40	150.00	0.04060	131.00
-	IE3	18.50	Technical data in preparation										
-	IE3	22.00	Technical data in preparation										
-	IE3	30.00	Technical data in preparation										

Subject to technical amendments

## Brake motors

### 4-pole 400V-50Hz IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 1500 rpm

Type	Efficiency class	Rated power	Rated speed	Rated current	Power factor	Efficiency	Rated torque	Start-up to rated current	Start-up to rated torque	Breakdown to rated torque	Braking torque	Moment of inertia	Weight (IM B3)
		$P_N$ [kW]	$n_N$ [rpm]	$I_N$ [A]	$\cos \varphi$	$\eta$ [%]	$M_N$ [Nm]	$I_A / I_N$	$M_A / M_N$	$M_K / M_N$	$M_{Bmax}$ [Nm]	$J$ [kgm <sup>2</sup> ]	$m$ [kg]
63K/4-B4	IE2	0.12	1360	0.40	0.71	59.1	0.84	3.10	2.05	2.30	4.00	0.00021	5.50
63L/4-B4	IE2	0.18	1370	0.60	0.63	64.7	1.25	3.40	2.95	2.95	4.00	0.00026	6.00
71K/4-B4	IE2	0.25	1415	0.70	0.70	68.5	1.69	4.35	2.30	2.65	4.00	0.00053	7.50
71L/4-B4	IE2	0.37	1405	0.95	0.76	72.7	2.51	4.55	2.40	2.60	4.00	0.00065	8.50
80K/4-B8	IE2	0.55	1405	1.40	0.74	77.1	3.74	4.65	2.35	2.65	8.00	0.00105	10.50
80L/40-B8	IE3	0.75	1425	1.85	0.72	82.5	5.03	6.00	3.30	3.15	8.00	0.00156	16.00
90L/40-B16	IE3	1.10	1445	2.50	0.75	84.1	7.27	6.85	3.50	4.00	16.00	0.00305	19.00
90V/4-B16	IE3	1.50	1440	3.35	0.76	85.3	9.95	7.20	3.40	4.15	16.00	0.00375	23.00
100L/400-B32	IE3	2.20	1450	4.65	0.79	86.7	14.5	8.10	3.85	4.25	32.00	0.00599	28.50
100V/4-B32	IE3	3.00	1445	6.25	0.80	87.7	19.8	7.95	3.55	4.20	32.00	0.00758	33.50
112V/4-B60	IE3	4.00	1455	8.15	0.80	88.6	26.3	8.80	3.70	4.55	60.00	0.01328	45.50
132M/4-B80	IE3	5.50	1465	11.2	0.79	89.6	35.9	8.35	3.75	4.00	80.00	0.02830	72.00
132V/4-B80	IE3	7.50	1465	15.4	0.78	90.4	48.9	8.85	4.25	4.50	80.00	0.03830	82.00
160L/40-B150	IE3	11.00	1475	21.7	0.80	91.4	71.2	9.60	4.00	3.90	150.00	0.08160	154.00
160V/4-B150	IE3	15.00	1475	29.9	0.79	92.1	97.1	8.95	3.80	3.85	150.00	0.09270	164.00
180L/40-B260	IE3	18.50	1475	34.9	0.83	92.6	119.8	9.25	4.10	3.60	260.00	0.17720	244.00
-	IE3	22.00	Technical data in preparation										

Subject to technical amendments

## Brake motors

4-pole 460V-60Hz IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 1800 rpm

Type	Efficiency class	Rated power	Rated speed	Rated current	Power factor	Efficiency	Rated torque	Start-up to rated current	Start-up to rated torque	Breakdown to rated torque	Braking torque	Moment of inertia	Weight IM B3
		$P_N$ [kW]	$n_N$ [rpm]	$I_N$ [A]	$\cos \varphi$	$\eta$ [%]	$M_N$ [Nm]	$I_A / I_N$	$M_A / M_N$	$M_K / M_N$	$M_{Bmax}$ [Nm]	$J$ [kgm <sup>2</sup> ]	$m$ [kg]
-	IE2	0.12	Technical data in preparation										
63L/4-B4	IE2	0.18	1695	0.55	0.56	68.0	1.01	4.05	3.75	3.75	4.00	0.00026	6.00
71K/4-B4	IE2	0.25	1730	0.65	0.65	70.0	1.38	5.05	2.65	3.15	4.00	0.00053	7.50
71L/4-B4	IE2	0.37	1720	0.80	0.71	72.0	2.05	5.30	2.70	3.00	4.00	0.00650	8.50
80K74-B8	IE2	0.55	1720	1.20	0.71	75.5	3.05	5.50	2.70	3.05	8.00	0.00099	9.00
80L/40-B8	IE3	0.75	1735	1.55	0.71	83.5	4.13	6.70	3.30	3.60	8.00	0.00156	16.00
90V/4-B16	IE3	1.10	1745	2.05	0.77	86.5	6.02	8.40	3.70	4.30	16.00	0.00375	23.00
90V/4-B16	IE3	1.50	1745	2.85	0.77	86.5	8.21	8.10	3.70	4.45	16.00	0.00375	23.00
112M/4-B60	IE3	2.20	1760	3.95	0.78	89.5	11.9	9.75	3.15	4.70	60.00	0.01070	39.50
112V/4-B60	IE3	3.00	1760	5.30	0.79	89.5	16.3	10.60	3.80	5.30	60.00	0.01328	45.50
132M/4-B80	IE3	4.00	1770	7.05	0.79	89.5	21.6	9.95	4.20	4.45	80.00	0.02830	72.00
132V/4-B80	IE3	5.50	1770	9.70	0.78	91.7	29.7	9.85	4.15	5.05	80.00	0.03830	82.00
160L/40-B150	IE3	7.50	1780	12.7	0.81	91.7	40.2	9.40	3.25	3.95	150.00	0.08160	154.00
160V/4-B150	IE3	11.00	1780	18.9	0.79	92.4	59.0	9.15	3.20	4.15	150.00	0.09270	164.00
160V/4-B150	IE3	15.00	1775	25.4	0.80	93.0	80.7	8.25	2.85	3.75	150.00	0.09270	164.00
180L/40-B260	IE3	18.50	1780	30.3	0.82	93.6	99.2	9.10	3.25	4.00	260.00	0.17720	244.00
-	IE3	22.00	Technical data in preparation										

Subject to technical amendments

## Brake motors

### 6-pole 400V-50Hz IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 1000 rpm

Type	Efficiency class	Rated power	Rated speed	Rated current	Power factor	Efficiency	Rated torque	Start-up to rated current	Start-up to rated torque	Breakdown to rated torque	Braking torque	Moment of inertia	Weight (IM B3)
		$P_N$ [kW]	$n_N$ [rpm]	$I_N$ [A]	$\cos \phi$	$\eta$ [%]	$M_N$ [Nm]	$I_A / I_N$	$M_A / M_N$	$M_K / M_N$	$M_{Bmax}$ [Nm]	$J$ [kgm <sup>2</sup> ]	$m$ [kg]
63K/6-B4	-	0.09	870	0.40	0.75	43.3	0.99	2.50	1.70	1.80	4.00	0.00030	5.50
63L/6-B4	IE2	0.12	915	0.55	0.57	50.6	1.25	2.60	2.65	2.75	4.00	0.00043	6.00
71K/6-B4	IE2	0.18	930	0.65	0.65	56.6	1.85	3.05	1.80	2.30	4.00	0.00082	7.50
71L/6-B4	IE2	0.25	925	0.80	0.69	61.6	2.58	3.25	1.75	2.20	4.00	0.00102	8.50
80K/6-B8	IE2	0.37	930	1.10	0.70	67.6	3.80	3.55	2.00	2.35	8.00	0.00197	11.50
80L/6-B8	IE2	0.55	915	1.50	0.74	73.1	5.74	3.80	2.05	2.20	8.00	0.00245	12.50
90L/60-B16	IE3	0.75	945	2.05	0.66	78.9	7.58	5.00	2.95	3.20	16.00	0.00439	20.20
90V/6-B16	IE3	1.10	950	2.85	0.69	81.0	11.1	5.15	2.45	3.05	16.00	0.00669	24.50
100V/6-B32	IE3	1.50	955	3.60	0.73	82.5	15.0	5.80	2.90	3.25	32.00	0.01162	31.50
112V/6-B60	IE3	2.20	965	5.25	0.70	84.3	21.8	7.40	3.70	4.20	60.00	0.02060	48.50
132M/6-B80	IE3	3.00	970	7.50	0.67	85.6	29.5	6.55	3.35	3.40	80.00	0.03310	60.00
132M/600-B80	IE3	4.00	975	10.2	0.65	86.8	39.2	7.50	3.85	3.80	80.00	0.04320	72.00
132V/6-B80	IE3	5.50	970	12.5	0.72	88.0	54.1	7.55	3.60	3.70	80.00	0.05137	83.00
160L/6-B150	IE3	7.50	980	15.5	0.77	89.1	73.1	9.00	3.20	4.35	150.00	0.11110	147.00
180L/6-B260	IE3	11.00	980	23.1	0.76	90.3	107.2	8.70	3.20	4.20	260.00	0.17590	219.00

Subject to technical amendments

## Brake motors

### 6-pole 460V-60Hz IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 1200 rpm

Type	Efficiency class	Rated power	Rated speed	Rated current	Power factor	Efficiency	Rated torque	Start-up to rated current	Start-up to rated torque	Breakdown to rated torque	Braking torque	Moment of inertia	Weight (IM B)
		$P_N$ [kW]	$n_N$ [rpm]	$I_N$ [A]	$\cos \phi$	$\eta$ [%]	$M_N$ [Nm]	$I_A / I_N$	$M_A / M_N$	$M_K / M_N$	$M_{Bmax}$ [Nm]	$J$ [kgm <sup>2</sup> ]	$m$ [kg]
	-	0.09	Technical data in preparation										
	IE2	0.12											
	IE2	0.18											
	IE2	0.25											
	IE2	0.37											
	IE2	0.55											
90V/6-B16	IE3	0.75	1160	1.65	0.68	82.50	6.17	5.75	2.40	3.35	16	0.00669	24.50
	IE3	1.10	Technical data in preparation										
	IE3	1.50											
	IE3	2.20											
	IE3	3.00											
	IE3	4.00											
	IE3	5.50											
	IE3	7.50											
	IE3	11.00											

Subject to technical amendments

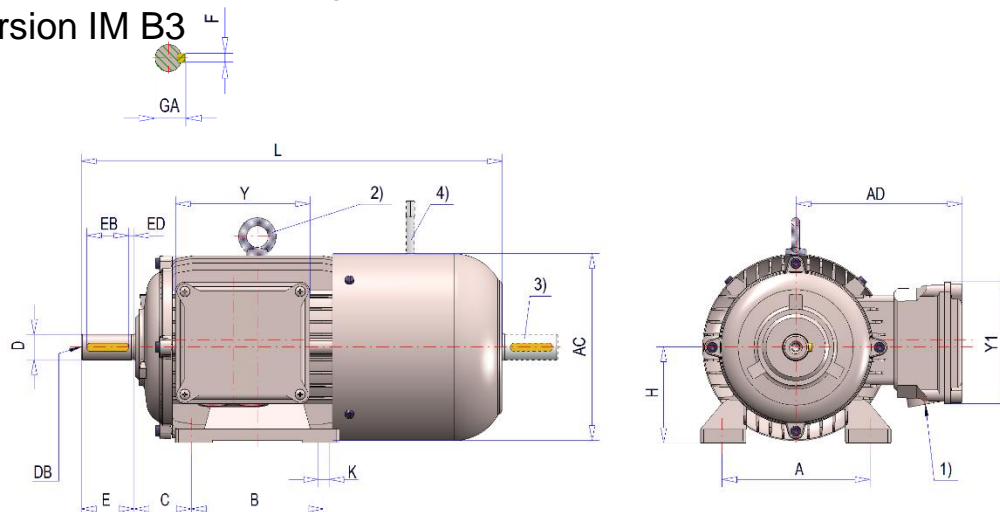


## Brake motors

### Dimension sheets for brake motors

Size: 63 – 180 / Cooling type: IC411 / Protection class: IP 54 – IP 55 /

Version IM B3



1) See planning section (Section *Cable glands* in the terminal box)

2) With lifting eye from size 112 and above

3) 2nd shaft end (dimension on request)

4) Manual release as option (can be ordered in positions 0°/90°/180°/270° see Section Terminal box position)

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 90 V ...B16	125	140	10	90	56	24	50	M8	176	157	127	115	27	8	40	5	434
R 100 L ...B32	140	160	11.2	100	63	28	60	M10	194	166	127	115	31	8	50	5	444
R 100 V ...B32	140	160	11.2	100	63	28	60	M10	194	166	127	115	31	8	50	5	494
R 112 M ...B60	140	190	11.2	112	70	28	60	M10	218	178	127	115	31	8	50	5	464
R 112 V ...B60	140	190	11.2	112	70	28	60	M10	218	178	127	115	31	8	50	5	504
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 132 V ...B80	178	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	625
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 160 V ...B150	254	254	14.5	160	108	42	110	M16	310	244	186	186	45	12	90	10	756
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

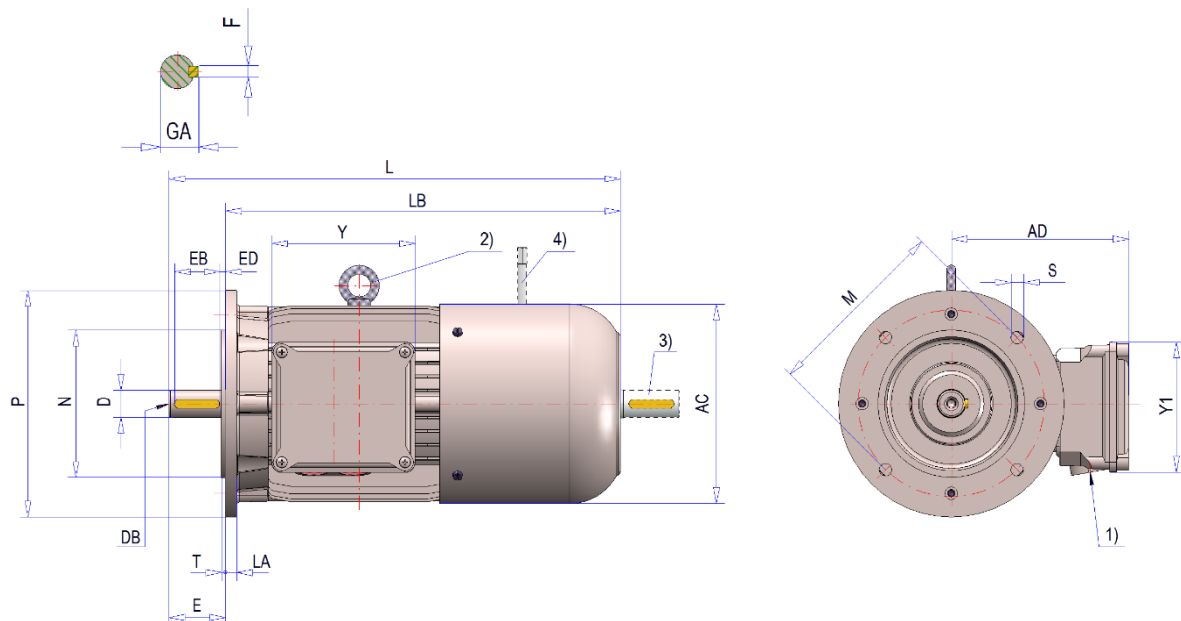
\* Versions IM B3 / IM 1001, IM B6 / IM 1051, IM B7 / IM 1061, IM B8 / IM 1071, IM V5 / IM 1011, IM V6 / IM 1031 (Section Designs)

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

Date: 02/11/2021  
Version: 2.1

## Brake motors

Size: 63 – 180 / Cooling type: IC411 / Protection class: IP 54 – IP 55 /  
Version IM B5



- 1) See planning section (Section *Cable glands in the terminal box*)
  - 2) With lifting eye from size 112 and above
  - 3) 2nd shaft end (dimension on request)
  - 4) Manual release as option (can be ordered in positions 0°/90°/180°/270° see Section *Terminal box position*)
- Fits and tolerances see (*Section Fits and tolerances*)

Subject to technical amendments

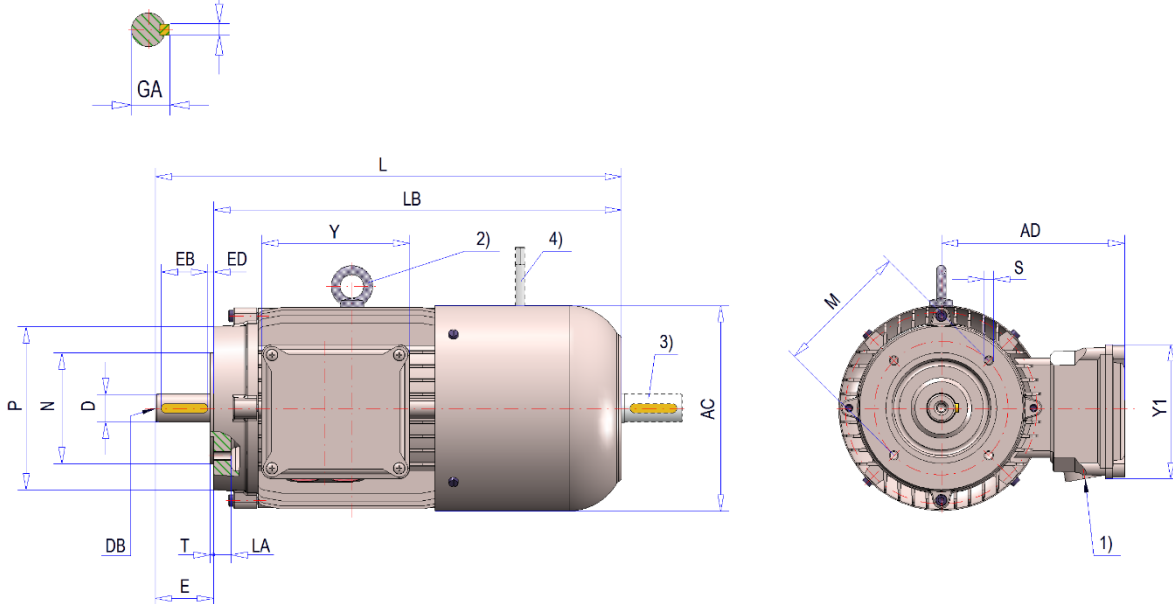
Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
RF 63 K/L ...B4	11	23	M4	123	121	117	103	12.5	4	18	2.5	260	237	9	115	95	140	3	10
RF 71 K/L ...B4	14	30	M5	138	130	117	103	16	5	25	2.5	298	268	9.5	130	110	160	3.5	9.5
RF 80 K/L ...B8	19	40	M6	156	144	127	115	21.5	6	32	4	331	291	11.5	165	130	200	3.5	11
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 90 V ...B16	24	50	M8	176	157	127	115	27	8	40	5	434	384	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 100 V ...B32	28	60	M10	194	166	127	115	31	8	50	5	494	434	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 112 V ...B60	28	60	M10	218	178	127	115	31	8	50	5	504	444	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 132 V ...B80	38	80	M12	258	197	145	130	41	10	70	5	625	545	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 160 V ...B150	42	110	M16	310	244	186	186	45	12	90	10	756	646	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

\* Versions IM B5 / IM 3001, IM V1 / IM 3011, IM V3 / IM 3031 (*Section Designs*)

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

Date: 02/11/2021  
Version: 2.1

Size: 63 – 180 / Cooling type: IC411 / Protection class: IP 54 – IP 55 /  
Version IM B14



1) See planning section (Section *Cable glands in the terminal box*)

2) With lifting eye from size 112 and above

3) 2nd shaft end (dimension on request)

4) Manual release as option (can be ordered in positions 0°/90°/180°/270° see Section Terminal box position)

Fits and tolerances see (Section *Fits and tolerances*)

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 90 V ...B16	24	50	M8	176	157	127	115	27	8	40	5	434	384	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 100 V ...B32	28	60	M10	194	166	127	115	31	8	50	5	494	434	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 112 V ...B60	28	60	M10	218	178	127	115	31	8	50	5	504	444	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 132 V ...B80	38	80	M12	258	197	145	130	41	10	70	5	625	545	M10	165	130	200	3.5	15
RF 160 M ...B150	42	110	M16	310	244	186	186	45	12	90	10	709	599	M12	215	180	250	4	14
RF 160 L ...B150	42	110	M16	310	244	186	186	45	12	90	10	753	643	M12	215	180	250	4	14
RF 160 V ...B150	42	110	M16	310	244	186	186	45	12	90	10	783	673	M12	215	180	250	4	14

\* Versions IM B14 / IM 3601, IM V18 / IM 3611, IM V19 / IM 3631 (*Section Designs*)

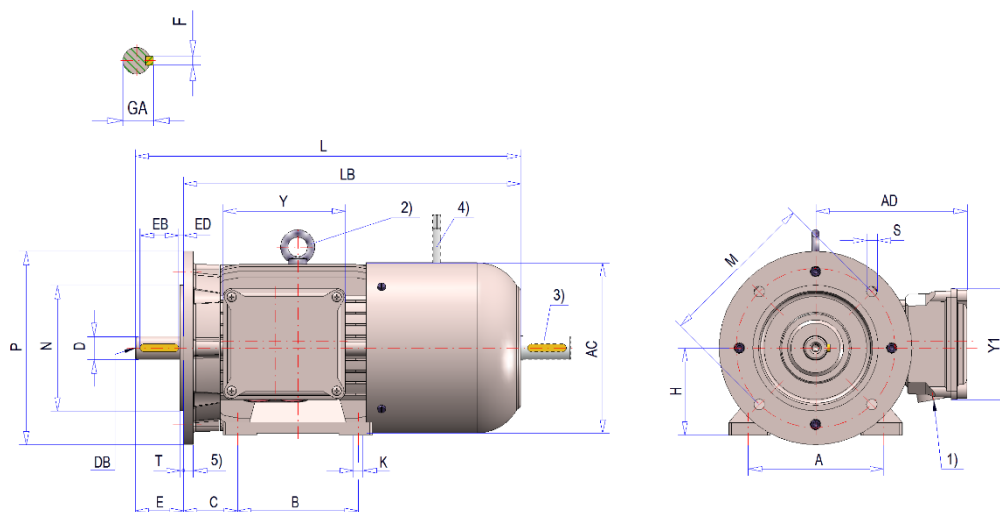
\*\* Lengths "L" and "LB" may differ with protection class ≥ IP56 or with different brake configurations. (dimensions on request)

Date: 02/11/2021

Version: 2.1

## Brake motors

Size: 63 – 180 / Cooling type: IC411 / Protection class: IP 54 – IP 55 /  
Version IM B35



- 1) See planning section (Section *Cable glands in the terminal box*)
- 2) With lifting eye from size 112 and above
- 3) 2nd shaft end (dimension on request)
- 4) Manual release as option (can be ordered in positions 0°/90°/180°/270° see Section Terminal box position)
- 5) Dimensions LA (see Section Size: 63 – 180 / Cooling type: IC411 / Protection class: IP 54 – IP 55 / Version IM B5)

Fits and tolerances see (*Section Fits and tolerances*)

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 90 V ...B16	24	50	M8	176	157	127	115	27	8	40	5	434	384	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 100 V ...B32	28	60	M10	194	166	127	115	31	8	50	5	494	434	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 112 V ...B60	28	60	M10	218	178	127	115	31	8	50	5	504	444	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 132 V ...B80	38	80	M12	258	197	145	130	41	10	70	5	625	545	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 160 V ...B150	42	110	M16	310	244	186	186	45	12	90	10	756	646	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

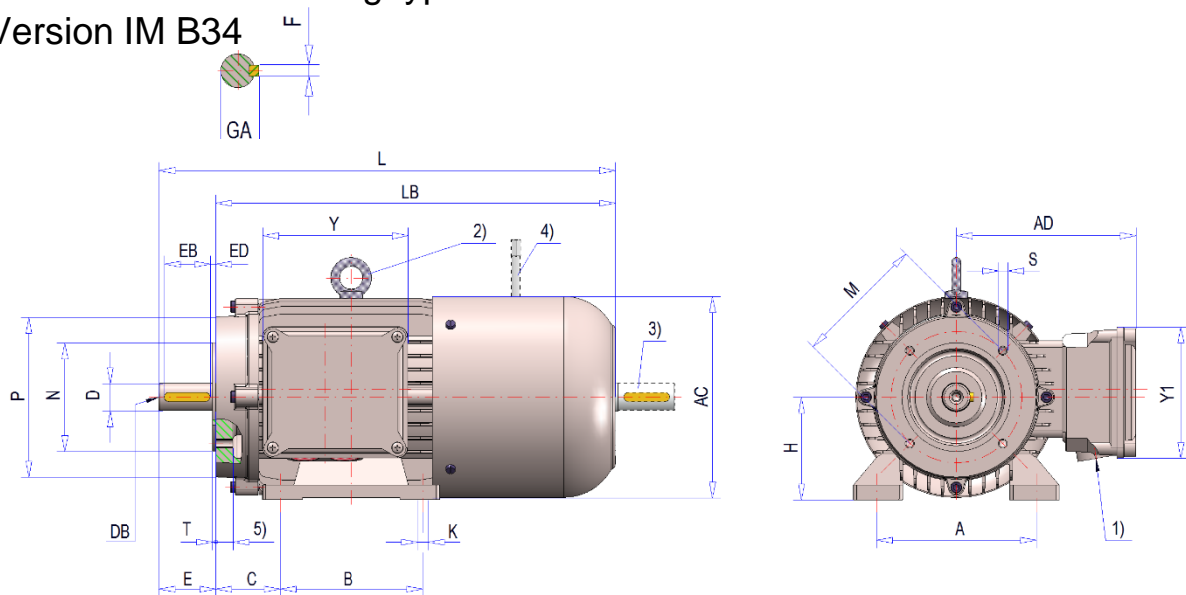
\* Versions IM B35 / IM 2001, IM V15 / IM 2011, IM V35 / IM 2031 (*Section Designs*)

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

Date: 02/11/2021  
Version: 2.1

## Brake motors

Size: 63 – 180 / Cooling type: IC411 / Protection class: IP 54 – IP 55 /  
Version IM B34



- 1) See planning section (Section *Cable glands in the terminal box*)
- 2) With lifting eye from size 112 and above
- 3) 2nd shaft end (dimension on request)
- 4) Manual release as option (can be ordered in positions 0°/90°/180°/270° see Section Terminal box position)
- 5) Dimensions LA (see Section Size: 63 – 180 / Cooling type: IC411 / Protection class: IP 54 – IP 55 / Version IM B14)

Fits and tolerances see (*Section Fits and tolerances*)

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 90 V ...B16	125	140	10	90	56	24	50	M8	176	157	127	115	27	8	40	5	434	384	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 100 V ...B32	140	160	11.2	100	63	28	60	M10	194	166	127	115	31	8	50	5	494	434	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 112 V ...B60	140	190	11.2	112	70	28	60	M10	218	178	127	115	31	8	50	5	504	444	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 132 V ...B80	178	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	625	545	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 160 V ...B150	254	254	14.5	160	135	42	110	M16	310	244	186	186	45	12	90	10	783	673	M12	215	180	250	4

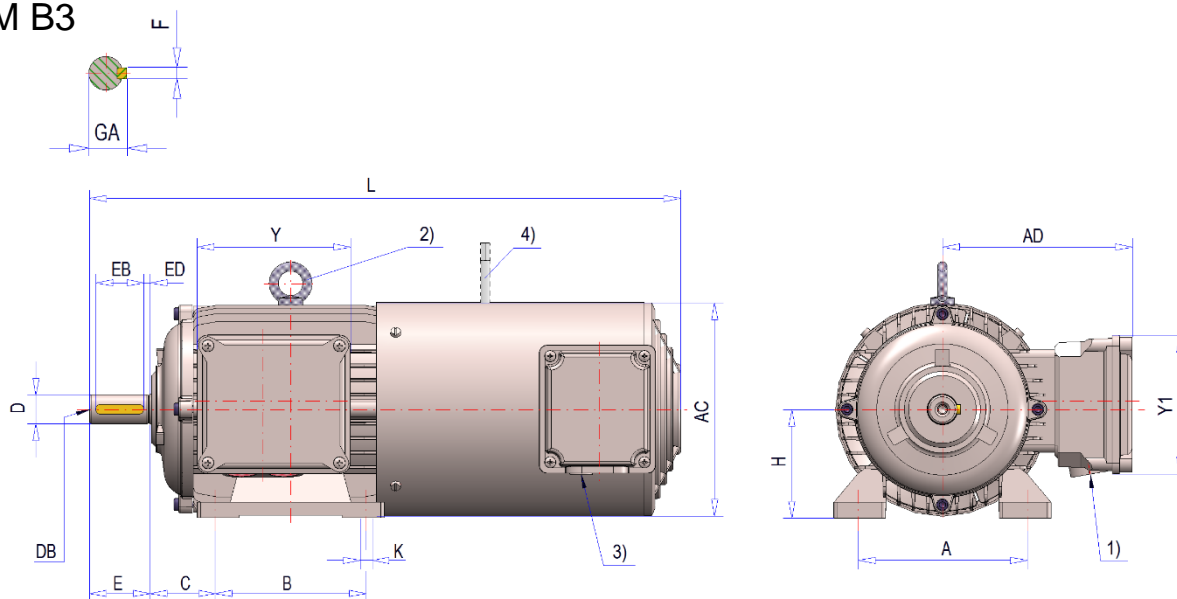
\* Versions IM B34 / IM 2101, IM V17 / IM 2111, IM V37 / IM 2131 (*Section Designs*)

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

Date: 02/11/2021  
Version: 2.1

## Brake motors

Size: 63 – 180 / Cooling type: IC416 / Protection class:  $\geq$ IP 54 / Version IM B3



1) See planning section (Section *Cable glands in the terminal box*)

2) With lifting eye from size 112 and above

3) 1x M16x1.5

4) Manual release as option (can be ordered in positions 0°/90°/180°/270° see Section Terminal box position)

Fits and tolerances see (Section *Fits and tolerances*)

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 90 V ...B16	125	140	10	90	56	24	50	M8	177	157	127	115	27	8	40	5	502
R 100 L ...B32	140	160	11.2	100	63	28	60	M10	195	166	127	115	31	8	50	5	510
R 100 V ...B32	140	160	11.2	100	63	28	60	M10	195	166	127	115	31	8	50	5	560
R 112 M ...B60	140	190	11.2	112	70	28	60	M10	219	178	127	115	31	8	50	5	533
R 112 V ...B60	140	190	11.2	112	70	28	60	M10	219	178	127	115	31	8	50	5	573
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 132 V ...B80	178	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	740
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 160 V ...B150	254	254	14.5	160	108	42	110	M16	311	244	186	186	45	12	90	10	866
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

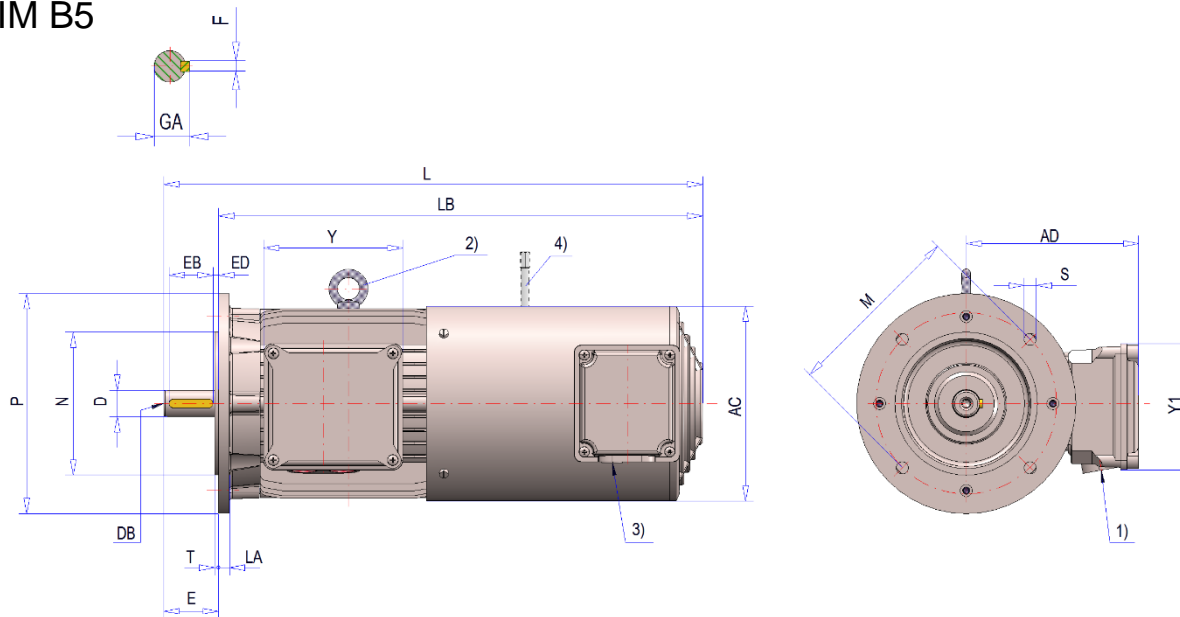
\* Versions IM B3 / IM 1001, IM B6 / IM 1051, IM B7 / IM 1061, IM B8 / IM 1071, IM V5 / IM 1011, IM V6 / IM 1031 (Section *Designs*)

Date: 02/11/2021

Version: 2.1

## Brake motors

Size: 63 – 180 / Cooling type: IC416 / Protection class:  $\geq$ IP 54 / Version IM B5



1) See planning section (Section *Cable glands in the terminal box*)

2) With lifting eye from size 112 and above

3) 1x M16x1.5

4) Manual release as option (can be ordered in positions 0°/90°/180°/270° see Section Terminal box position)

Fits and tolerances see (*Section Fits and tolerances*)

Subject to technical amendments

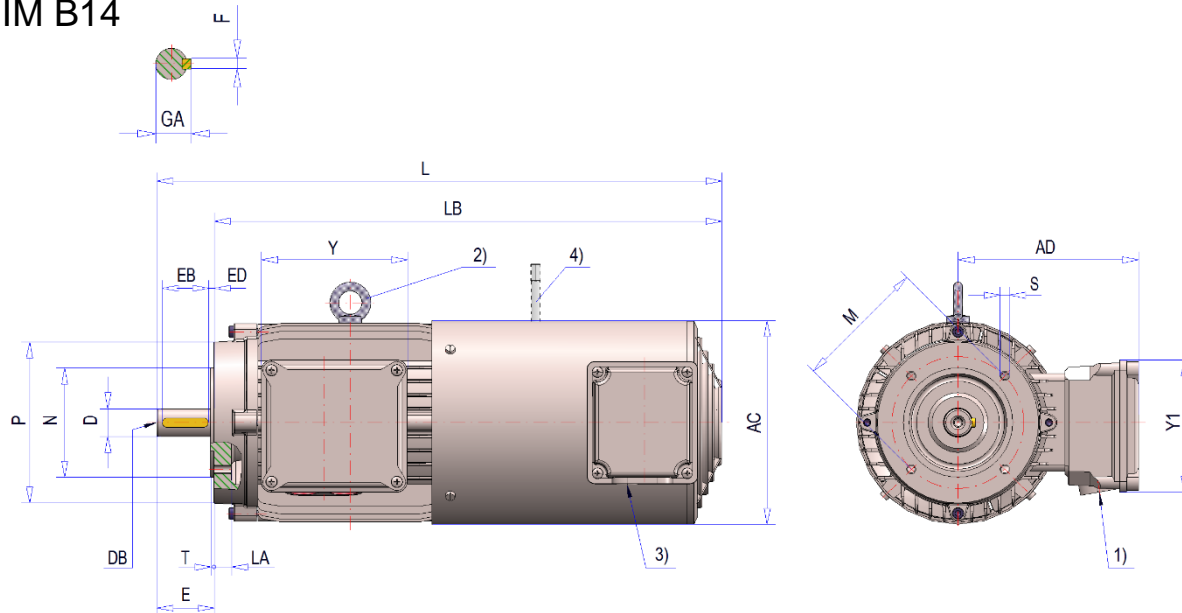
Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
RF 63 K/L ...B4	11	23	M4	124	121	117	103	12.5	4	18	2.5	324	301	9	115	95	140	3	10
RF 71 K/L ...B4	14	30	M5	139	130	117	103	16	5	25	2.5	367	337	9.5	130	110	160	3.5	9.5
RF 80 K/L ...B8	19	40	M6	157	144	127	115	21.5	6	32	4	402	362	11.5	165	130	200	3.5	11
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 90 V ...B16	24	50	M8	177	157	127	115	27	8	40	5	502	416	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 100 V ...B32	28	60	M10	195	166	127	115	31	8	50	5	560	500	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 112 V ...B60	28	60	M10	219	178	127	115	31	8	50	5	577	513	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 132 V ...B80	38	80	M12	258	197	145	130	41	10	70	5	740	660	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 160 V ...B150	42	110	M16	311	244	186	186	45	12	90	10	866	756	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

\* Versions IM B5 / IM 3001, IM V1 / IM 3011, IM V3 / IM 3031 (*Section Designs*)

Date: 02/11/2021  
Version: 2.1

## Brake motors

Size: 63 – 180 / Cooling type: IC416 / Protection class:  $\geq$ IP 54 / Version IM B14



1) See planning section (Section *Cable glands in the terminal box*)

2) With lifting eye from size 112 and above

3) 1x M16x1.5

4) Manual release as option (can be ordered in positions 0°/90°/180°/270° see Section Terminal box position)

Fits and tolerances see (Section *Fits and tolerances*)

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 90 V ...B16	24	50	M8	177	157	127	115	27	8	40	5	502	452	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 100 V ...B32	28	60	M10	195	166	127	115	31	8	50	5	560	500	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 112 V ...B60	28	60	M10	219	178	127	115	31	8	50	5	573	513	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 132 V ...B80	38	80	M12	258	197	145	130	41	10	70	5	740	660	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 160 V ...B150	42	110	M16	311	244	186	186	45	12	90	10	893	783	M12	215	180	250	4	14

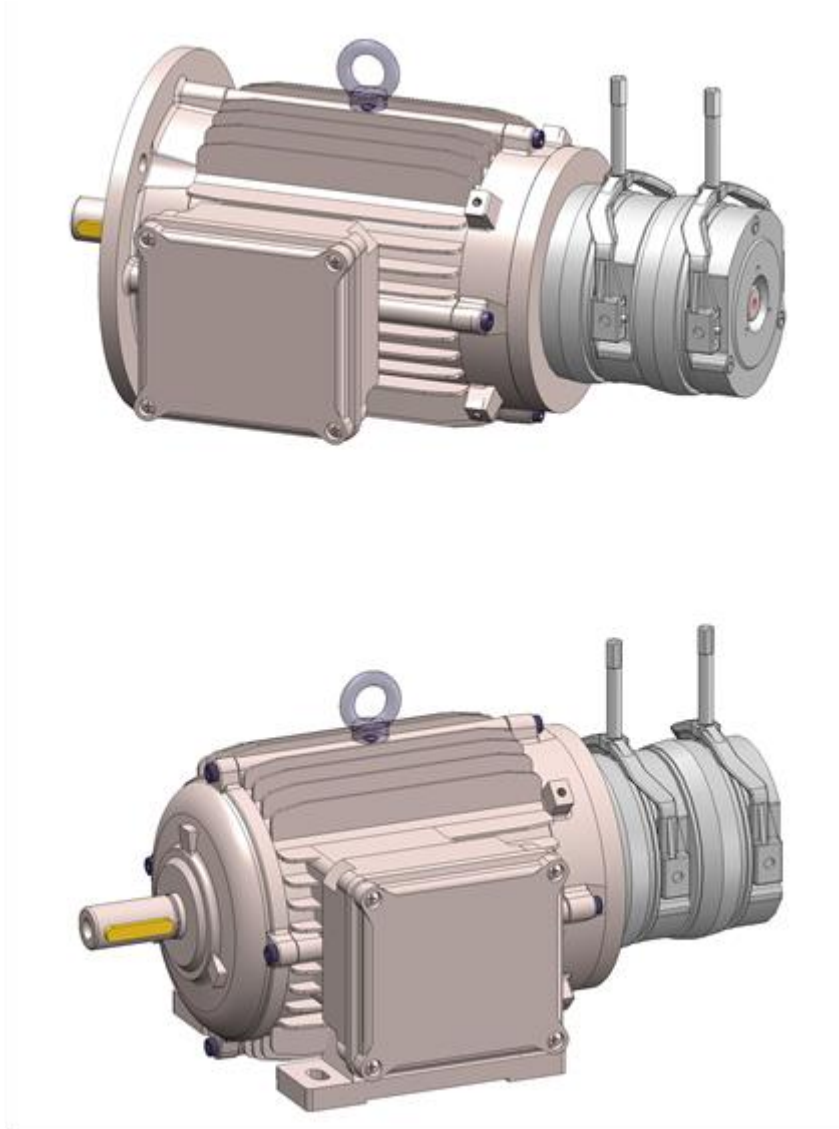
\* Version IM B34 / IM 2101, IM V17 / IM 2111, IM V37 / IM 2131 (Section *Designs*)

Date: 02/11/2021  
Version: 2.1



**Brake motors with double brake for stage machinery**

Brake motors with double brake for stage machinery



## Brake motors with double brake for stage machinery

### 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 power curtains, stages, rotating, lifting or sliding platforms and stage scenery. This is carried out in a way which is not noticed by the audience and without any danger to actors or stage hands.

To meet the specific requirements of stage machinery, HEW supplies brake motors in the range of 0.37 – 30.0 kW in 4-pole version (also a 6-pole option) which can be used in above-stage or below-stage theatre machinery. The motors comply with the stringent requirements of DIN 56950 and BGV C1. This ensures the highest possible working safety for people 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 version features brakes with manual release. When the manual release is actuated while the brake is de-energised, the brake releases mechanically, and the shaft can be moved easily.

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

The drives can be optionally equipped with thermistors (PTC) or thermostatic switches (bi-metal).

Incremental encoders (TTL / HTL / sin-cos), absolute encoders (single-turn or multi-turn, combined encoders), sensor bearings or inductive sensors can be installed as the encoder or feedback system.

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

#### The following objects were equipped with HEW stage machinery motors:

Semperoper Dresden	Germany	
Stadtheater Paderborn	Germany	
Anhaltinische Theater Dessau	Germany	
Stadtheater Saarbrücken	Germany	
Kulturhaus Kornwestheim	Germany	
Royal Opera House Muscat	Oman	
Akademische Opern- und Ballett-Theater	Nowosibirsk	Russia
Landestheater Den Haag	Netherlands	

## Brake motors with double brake for stage machinery

### Technical data for brake motors for stage machinery

4-pole 400V-50Hz IC 410 unventilated S3-40%

Thermal class: F Synchronous speed: 1500 rpm

Size 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	Start-up to nominal current $I_A/I_N$	Start-up to nominal torque $M_A/M_N$	Breakdown to nominal torque $M_K/M_N$	Breaking torque $M_{Bmax}$ NM	Moment of inertia J kgm <sup>2</sup>	Weight IM B3 M kg (approx.)
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

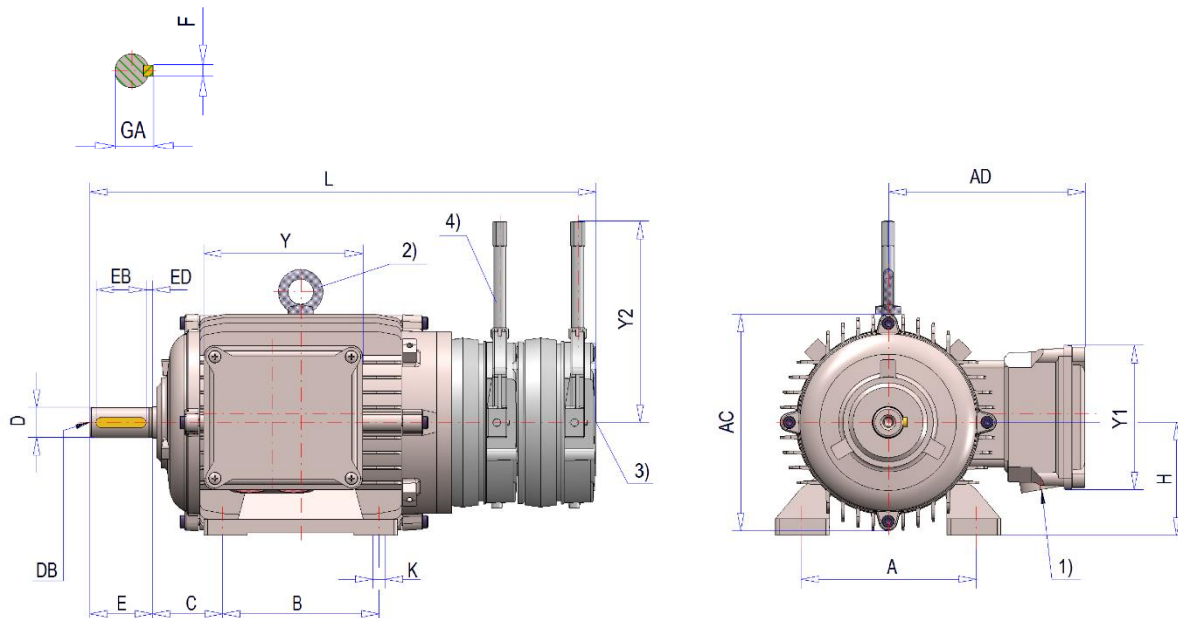
Date: 02/11/2021

Version: 2.1

## Brake motors with double brake for stage machinery

### Dimension sheets for brake motors for stage machinery

Size: 71 – 180 / Cooling type: IC410 unventilated / protection class: IP 54 – IP 55 / Version IM B3



1) See planning section (Section *Cable glands in the terminal box*)

2) With lifting eye from size 112 and above

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

4) Manual release as option (can be ordered in positions 0°/90°/180°/270° see Section Terminal box position)

Fits and tolerances see (*Section Fits and tolerances*)

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 L ....PrDB7	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 S ....PrDB14	100	140	10	90	56	24	50	M8	176	157	127	115	27	8	40	5	381	160
RU 90 L ....PrDB17,5	125	140	10	90	56	24	50	M8	176	157	127	115	27	8	40	5	406	160
RU 100 L ....PrDB28	140	160	11.2	100	63	28	60	M10	194	166	127	115	31	8	50	5	458	200
RU 100 L ....PrDB35	140	160	11.2	100	63	28	60	M10	194	166	127	115	31	8	50	5	458	200
RU 112 M ....PrDB42	140	190	11.2	112	70	28	60	M10	218	178	127	115	31	8	50	5	494	220
RU 132 S ....PrDB70	140	216	11	132	89	38	80	M12	260	197	145	130	41	10	70	5	573	220
RU 132 M ....PrDB89	178	216	11	132	89	38	80	M12	260	197	145	130	41	10	70	5	611	220
RU 160 M ....PrDB107	210	254	14.5	160	108	42	110	M16	305	244	186	186	45	12	90	10	724	250
RU 160 L ....PrDB187	254	254	14.5	160	108	42	110	M16	305	244	186	186	45	12	90	10	768	250
RU 180 M ....PrDB225	241	279	13	180	121	48	110	M16	346	254	175	190	51.5	14	100	5	804	330
RU 180 L ....PrDB300	279	279	13	180	121	48	110	M16	346	254	175	190	51.5	14	100	5	841	330

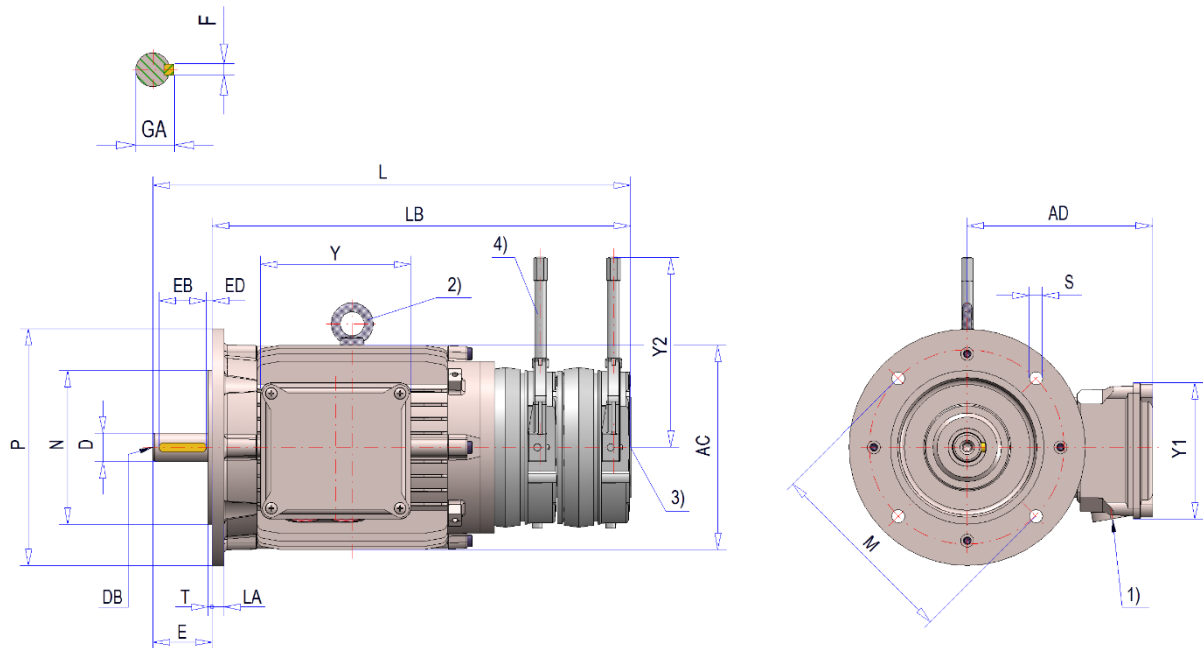
\* Versions IM B3 / IM 1001, IM B6 / IM 1051, IM B7 / IM 1061, IM B8 / IM 1071, IM V5 / IM 1011, IM V6 / IM 1031 (*Section Designs*)

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

Date: 02/11/2021  
Version: 2.1

## Brake motors with double brake for stage machinery

Size: 71 – 180 / Cooling type: IC410 unventilated / protection class: IP 54 – IP 55 / Version IM B5



1) See planning section (Section *Cable glands in the terminal box*)

2) With lifting eye from size 112 and above

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

4) Manual release as option (can be ordered in positions 0°/90°/180°/270° see Section Terminal box position)

Fits and tolerances see (*Section Fits and tolerances*)

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 L ....PrDB7	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 S ....PrDB14	24	50	M8	176	157	127	115	27	8	40	5	381	331	9	165	130	200	3.5	10	160
RUF 90 L ....PrDB17,5	24	50	M8	176	157	127	115	27	8	40	5	406	356	9	165	130	200	3.5	10	160
RUF 100 L ....PrDB28	28	60	M10	194	166	127	115	31	8	50	5	458	398	9	215	180	250	4	14	200
RUF 100 L ....PrDB35	28	60	M10	194	166	127	115	31	8	50	5	458	398	9	215	180	250	4	14	200
RUF 112 M ....PrDB42	28	60	M10	218	178	127	115	31	8	50	5	494	434	11	215	180	250	4	13	220
RUF 132 S ....PrDB70	38	80	M12	260	197	145	130	41	10	70	5	573	493	14	265	230	300	4	11,5	220
RUF 132 M ....PrDB89	38	80	M12	260	197	145	130	41	10	70	5	611	531	14	265	230	300	4	11,5	220
RUF 160 M ....PrDB107	42	110	M16	305	244	186	186	45	12	90	10	725	615	18	300	250	350	5	13,5	250
RUF 160 L ....PrDB187	42	110	M16	305	244	186	186	45	12	90	10	769	659	18	300	250	350	5	13,5	250
RUF 180 M ....PrDB225	48	110	M16	346	254	175	190	51.5	14	100	5	804	694	18	300	250	350	5	14	330
RUF 180 L ....PrDB300	48	110	M16	346	254	175	190	51.5	14	100	5	842	732	18	300	250	350	5	14	330

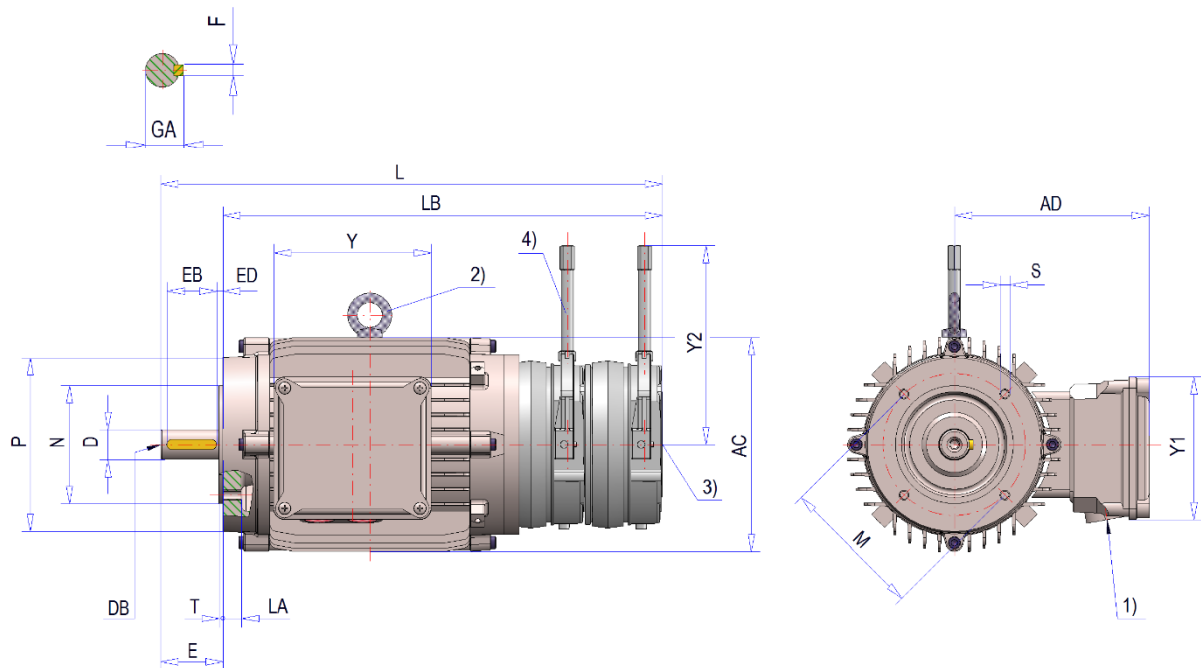
\* Versions IM B5 / IM 3001, IM V1 / IM 3011, IM V3 / IM 3031 (*Section Designs*)

\*\* Lengths “L” and “LB” may differ with protection class ≥ IP56 or with different brake configurations. (dimensions on request)

Date: 02/11/2021  
Version: 2.1

## Brake motors with double brake for stage machinery

Size: 71 – 180 / Cooling type: IC410 unventilated / protection class: IP 54 – IP 55 / Version IM B14



1) See planning section (Section *Cable glands in the terminal box*)

2) With lifting eye from size 112 and above

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

4) Manual release as option (can be ordered in positions 0°/90°/180°/270° see Section Terminal box position)

Fits and tolerances see (*Section Fits and tolerances*)

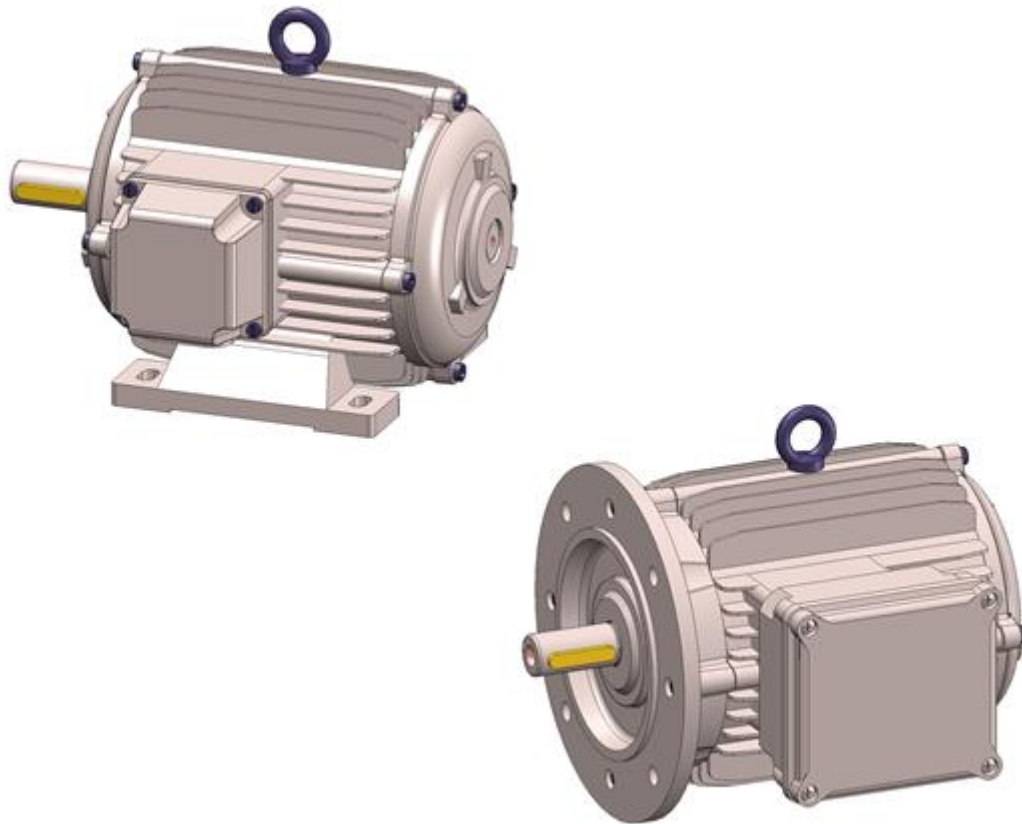
Subject to technical amendments

Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA	Y2
RUF 71 L ....PrDB7	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 S ....PrDB14	24	50	M8	176	157	127	115	27	8	40	5	381	331	M8	115	95	140	3	15	160
RUF 90 L ....PrDB17,5	24	50	M8	176	157	127	115	27	8	40	5	406	356	M8	115	95	140	3	15	160
RUF 100 L ....PrDB28	28	60	M10	194	166	127	115	31	8	50	5	458	398	M8	130	110	160	3.5	12.5	200
RUF 100 L ....PrDB35	28	60	M10	194	166	127	115	31	8	50	5	458	398	M8	130	110	160	3.5	12.5	200
RUF 112 M ....PrDB42	28	60	M10	218	178	127	115	31	8	50	5	494	434	M8	130	110	160	3.5	16	220
RUF 132 S ....PrDB70	38	80	M12	260	197	145	130	41	10	70	5	573	493	M10	165	130	200	3.5	15	220
RUF 132 M ....PrDB89	38	80	M12	260	197	145	130	41	10	70	5	611	531	M10	165	130	200	3.5	15	220
RUF 160 M ....PrDB107	42	110	M16	305	244	186	186	45	12	90	10	725	615	M12	215	180	250	4	14	250
RUF 160 L ....PrDB187	42	110	M16	305	244	186	186	45	12	90	10	769	659	M12	215	180	250	4	14	250

\* Versions IM B14 / IM 3601, IM V18 / IM 3611, IM V19 / IM 3631 (*Section Designs*)

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

Date: 02/11/2021  
Version: 2.1



## Rotating field motors

### 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 rated voltage is applied at standstill.

#### Two variants are available:

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

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

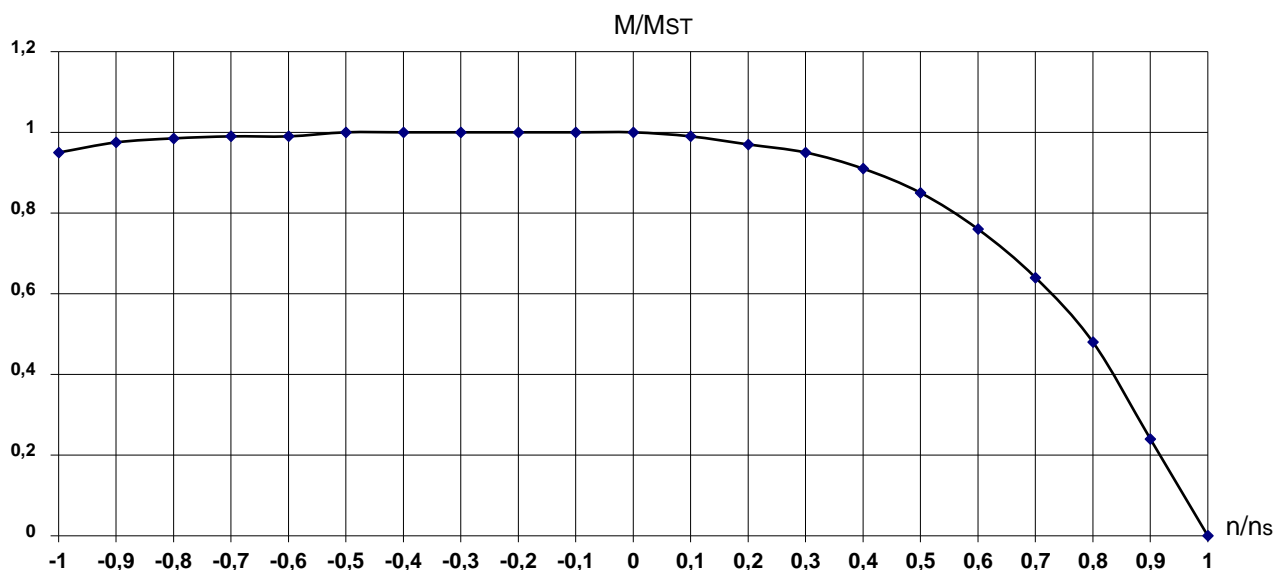
The graph shows the speed/torque curve of rotating field motors.

The obtained speed depends on the counter torque.

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

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

**Graph:** 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 increases to three times this value. In this case, only intermittent operation S3 - 25% is permitted (see *Technical data for rotating field motors*).

The stated standstill torques for intermittent operation S3 - 40% cannot be achieved by simple switchover, but rather require modified windings.

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## Rotating field motors

### Torque change

The specified standstill torques are the maximum torques in relation to the nominal voltage.

Torque reduction is achieved by reducing the voltage ( $M$  proportional to  $U^2$ ).

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

### Special version

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

Other size/torque configurations are available on request.

## Technical data for rotating field motors

### 8-pole 400V-50Hz IC 410 (unventilated) and IC 416 (externally ventilated) torque tolerance $\pm 10\%$

Thermal class: F 750 rpm

Type	Standstill torque $M_{ST}$ (Nm)						$I_k$ at 400V (A)						$J_M$ kgm <sup>2</sup>	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	
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

## Rotating field motors

12-pole 400V-50Hz IC 410 (unventilated) and IC 416 (externally ventilated) torque tolerance  $\pm 10\%$

Thermal class: F 500 rpm

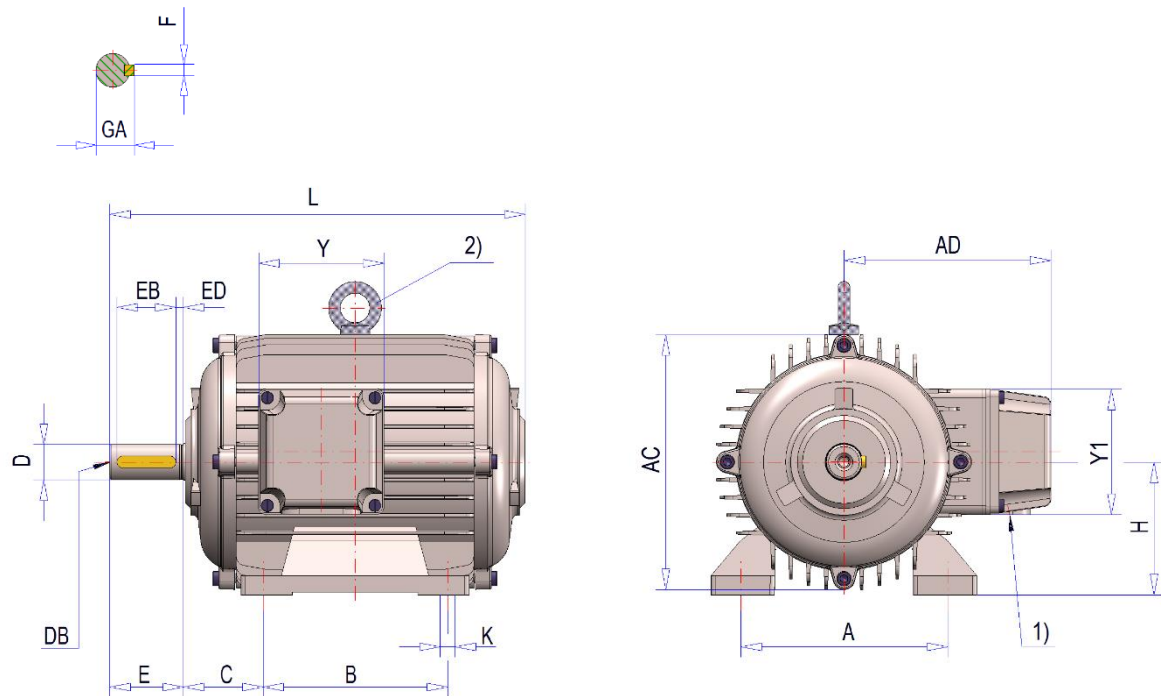
Type	Standstill torque $M_{ST}$ (Nm)						$I_K$ at 400V (A)						$J_M$ kgm <sup>2</sup>	Weight	
	IC 410			IC 416			IC 410			IC 416				IC410	IC416
	S1	S3	S3	S1	S3	S3	S1	S3	S3	S1	S3	S3		approx. kg	
RDM 63L/12	0.6	1.0	1.8	2.0	3.2	6.0	0.2	0.3	0.6	0.6	1.0	1.8	0.00033	5	7
RDM 71K/12	0.85	1.35	2.5	2.4	3.5	7.2	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

### Dimension sheets for rotating field motors

Size: 63 – 132 / Cooling type: IC410 unventilated / protection class: IP 54 – IP 55 / Version IM B3



1) See planning section (Section *Cable glands in the terminal box*) Fits and tolerances see (Section *Fits and tolerances*)

2) With lifting eye from size 112 and above Subject to technical amendments

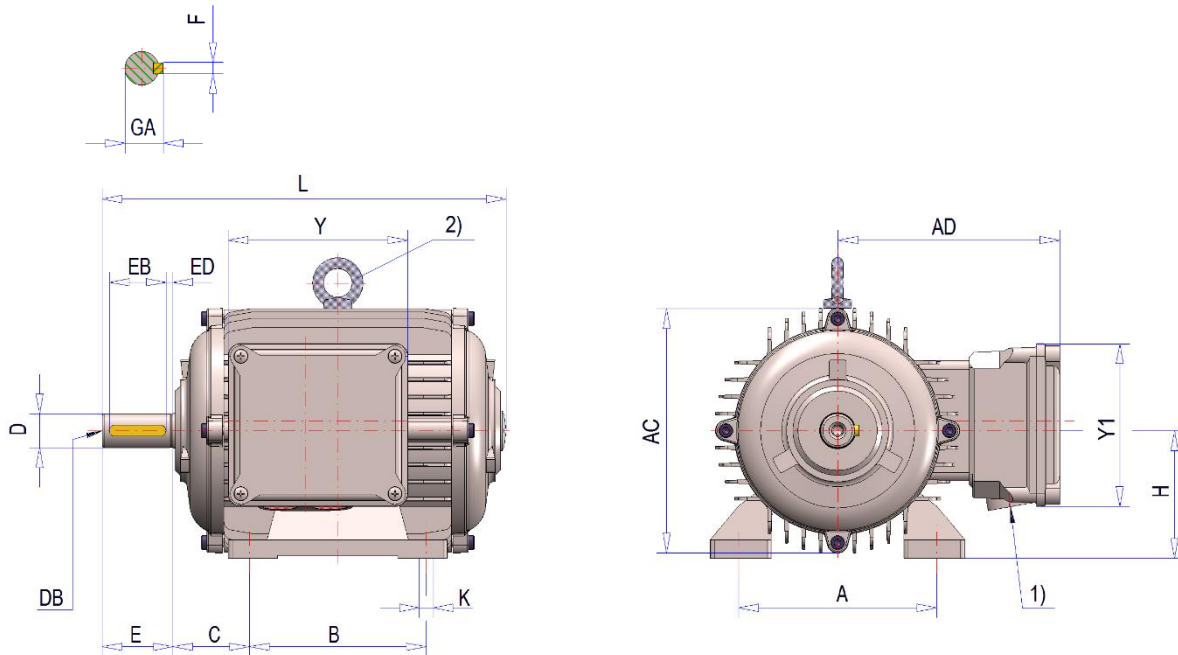
Type	B	A	K	H	C	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L
<b>RDM 63 L</b>	80	100	7	63	40	11	23	M4	121	99	70	70	12.5	4	18	2.5	181
<b>RDM 71 K/L</b>	90	112	7	71	45	14	30	M5	138	109	70	70	16	5	25	2.5	207
<b>RDM 80 K/L</b>	100	125	9.5	80	50	19	40	M6	156	127	85	85	21.5	6	32	4	237
<b>RDM 90 S</b>	100	140	10	90	56	24	50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

\* Versions IM B3 / IM 1001, IM B6 / IM 1051, IM B7 / IM 1061, IM B8 / IM 1071, IM V5 / IM 1011, IM V6 / IM 1031 (Section *Designs*)

Date: 02/11/2021  
Version: 2.1

## Rotating field motors

Size: 63 – 132 / Cooling type: IC410 unventilated / protection class:  $\geq$ IP 56 / Version IM B3



1) See planning section (Section *Cable glands in the terminal box*) Fits and tolerances (Section *Fits and tolerances*)

2) With lifting eye from size 112 and above Subject to technical amendments

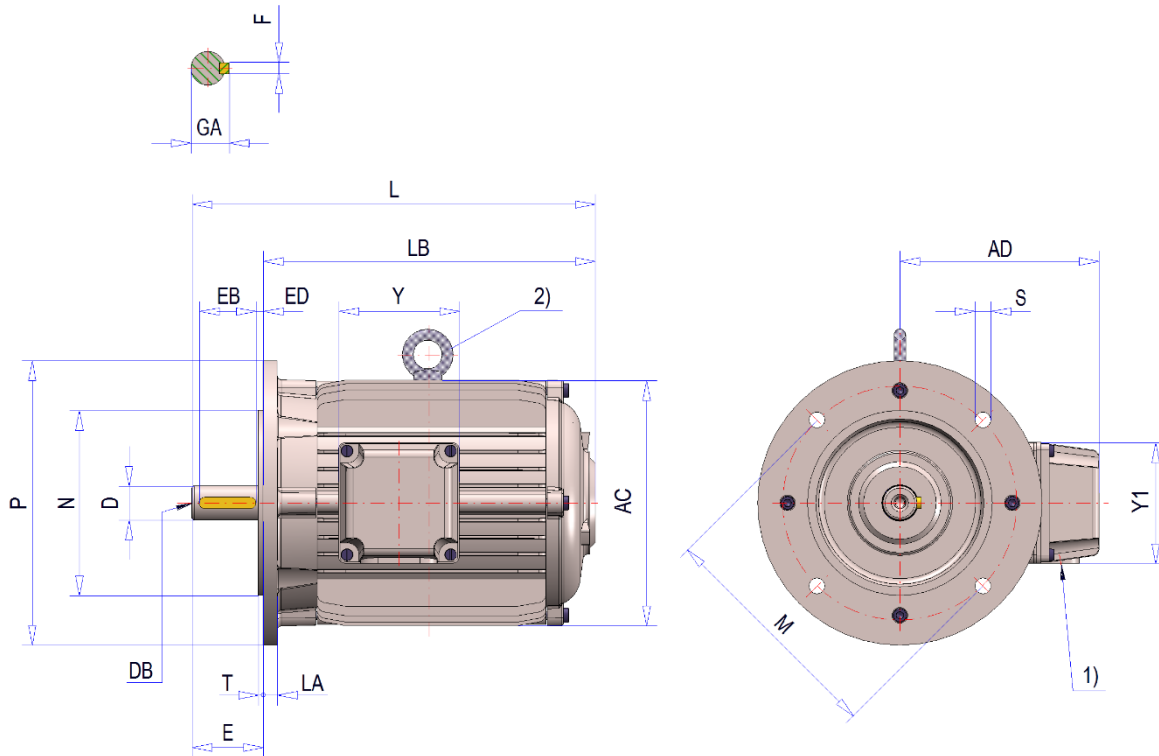
Type	B	A	K	H	C	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L
<b>RDM 63 L</b>	80	100	7	63	40	11	23	M4	121	121	117	103	12.5	4	18	2.5	185
<b>RDM 71 K/L</b>	90	112	7	71	45	14	30	M5	138	130	117	103	16	5	25	2.5	211
<b>RDM 80 K/L</b>	100	125	9.5	80	50	19	40	M6	156	144	127	115	21.5	6	32	4	241
<b>RDM 90 S</b>	100	140	10	90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

\* Versions IM B3 / IM 1001, IM B6 / IM 1051, IM B7 / IM 1061, IM B8 / IM 1071, IM V5 / IM 1011, IM V6 / IM 1031 (Section *Designs*)

Date: 02/11/2021  
Version: 2.1

## Rotating field motors

Size: 63 – 132 / Cooling type: IC410 unventilated / protection class: IP 54 – IP 55 / Version IM B5



1) See planning section (Section *Cable glands in the terminal box*)  
Fits and tolerances (Section *Fits and tolerances*)

2) With lifting eye from size 112 and above

Subject to technical amendments

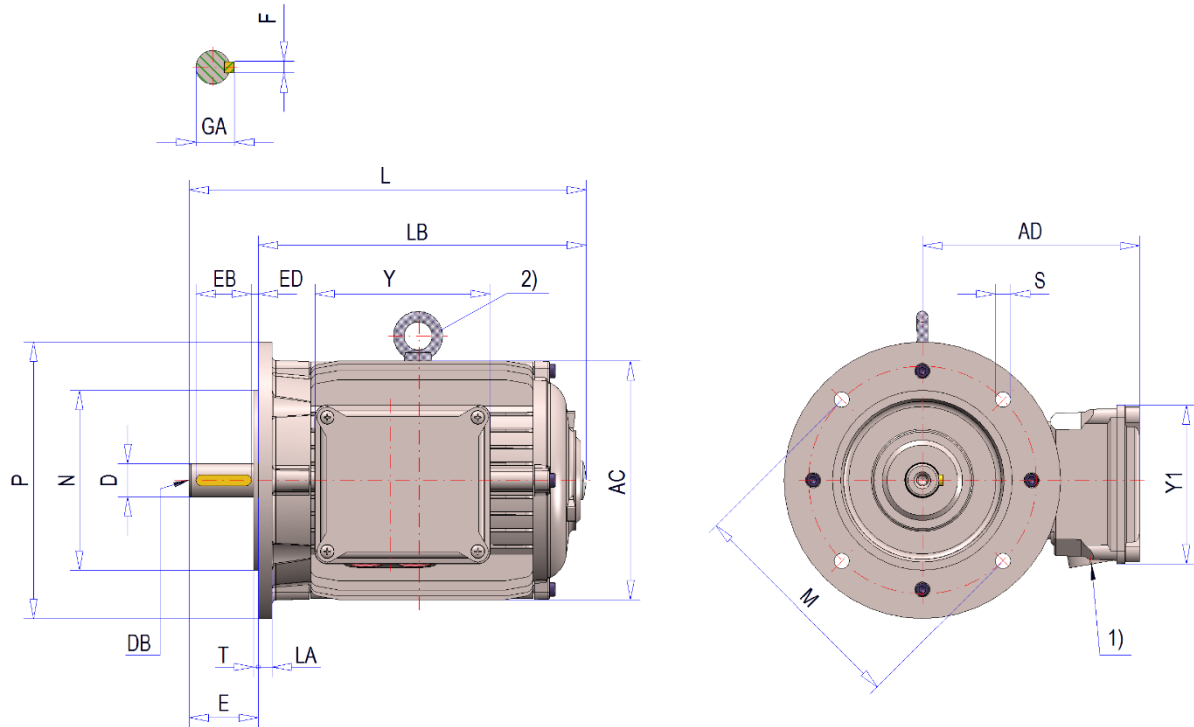
Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
<b>RDMF 63 L</b>	11	23	M4	117	104	70	70	12.5	4	18	2.5	181	156	9	115	95	140	3	10
<b>RDMF 71 K/L</b>	14	30	M5	134	114	70	70	16	5	25	2.5	207	177	9	130	110	160	3.5	10
<b>RDMF 80 K/L</b>	19	40	M6	151	134	85	85	21.5	6	32	4	237	197	11	165	130	200	3.5	10
<b>RDMF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

\* Versions IM B5 / IM 3001, IM V1 / IM 3011, IM V3 / IM 3031 (Section *Designs*)

Date: 02/11/2021  
Version: 2.1

## Rotating field motors

Size: 63 – 132 / Cooling type: IC410 unventilated / protection class: ≥IP 56 / Version IM B5



1) See planning section (Section *Cable glands in the terminal box*)

Fits and tolerances (Section *Fits and tolerances*)

2) With lifting eye from size 112 and above

Subject to technical amendments

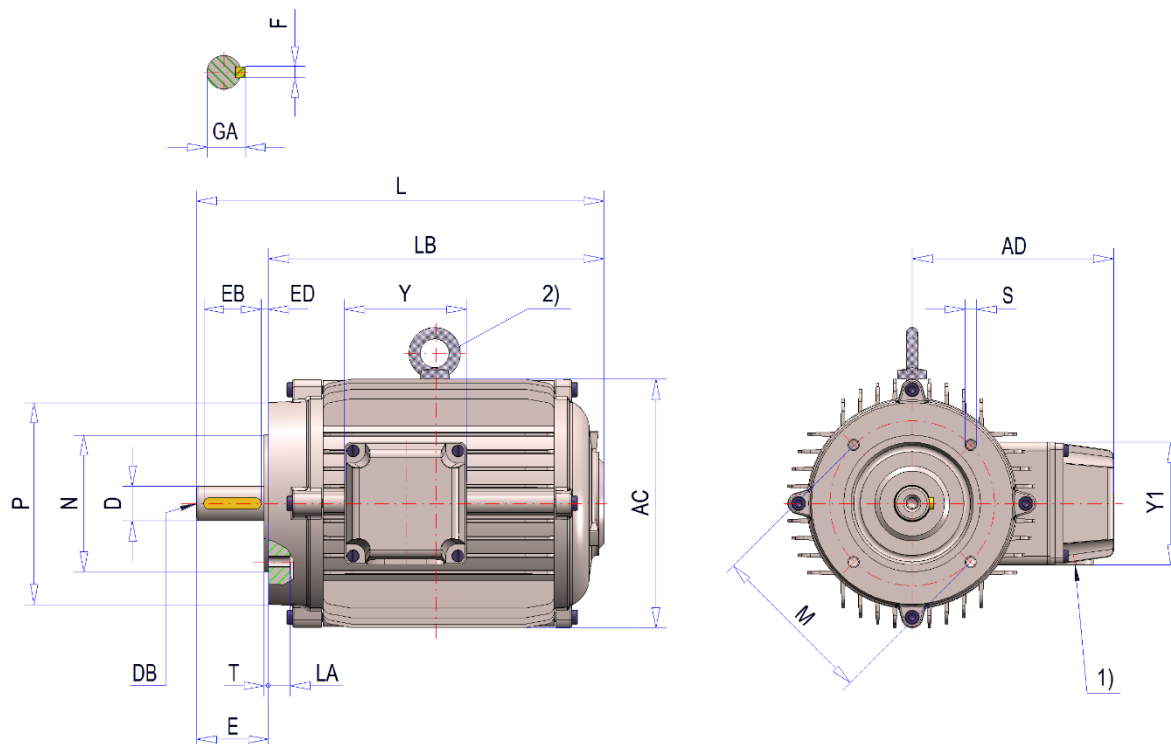
Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
<b>RDMF 63 L</b>	11	23	M4	117	126	117	103	12.5	4	18	2.5	185	160	9	115	95	140	3	10
<b>RDMF 71 K/L</b>	14	30	M5	134	136	117	103	16	5	25	2.5	211	181	9	130	110	160	3.5	10
<b>RDMF 80 K/L</b>	19	40	M6	151	150	127	115	21.5	6	32	4	241	201	11	165	130	200	3.5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

\* Versions IM B5 / IM 3001, IM V1 / IM 3011, IM V3 / IM 3031 (Section *Designs*)

Date: 02/11/2021  
Version: 2.1

## Rotating field motors

Size: 63 – 132 / Cooling type: IC410 unventilated / protection class: IP 54 – IP 55 / Version IM B14



1) See planning section (Section *Cable glands in the terminal box*) Fits and tolerances (Section *Fits and tolerances*)

2) With lifting eye from size 112 and above Subject to technical amendments

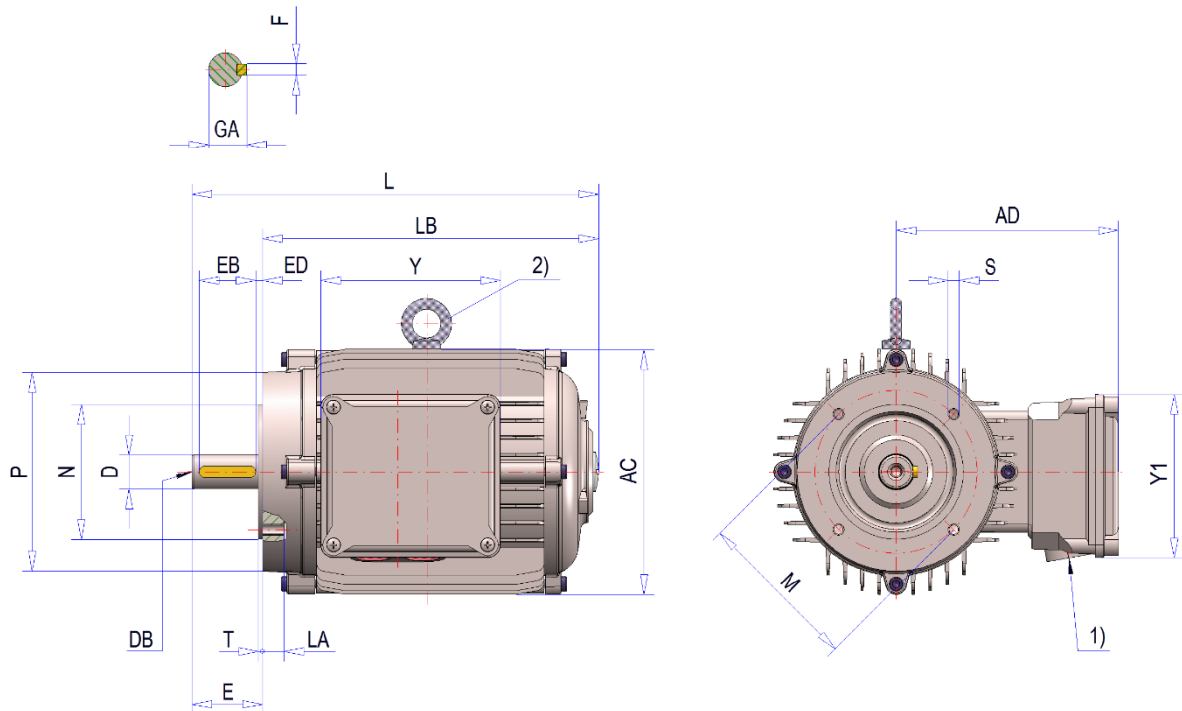
Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
<b>RDMF 63 L</b>	11	23	M4	117	104	70	70	12.5	4	18	2.5	181	156	M5	75	60	90	2.5	9.5
<b>RDMF 71 K/L</b>	14	30	M5	134	114	70	70	16	5	25	2.5	207	177	M6	85	70	105	2.5	10
<b>RDMF 80 K/L</b>	19	40	M6	151	134	85	85	21.5	6	32	4	237	197	M6	100	80	120	3	12.5
<b>RDMF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

\* Versions IM B14 / IM 3601, IM V18 / IM 3611, IM V19 / IM 3631 (Section *Designs*)

Date: 02/11/2021  
Version: 2.1

## Rotating field motors

Size: 63 – 132 / Cooling type: IC410 unventilated / protection class:  $\geq$ IP 56 / Version IM B14



1) See planning section (Section *Cable glands in the terminal box*) Fits and tolerances (Section *Fits and tolerances*)

2) With lifting eye from size 112 and above Subject to technical amendments

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

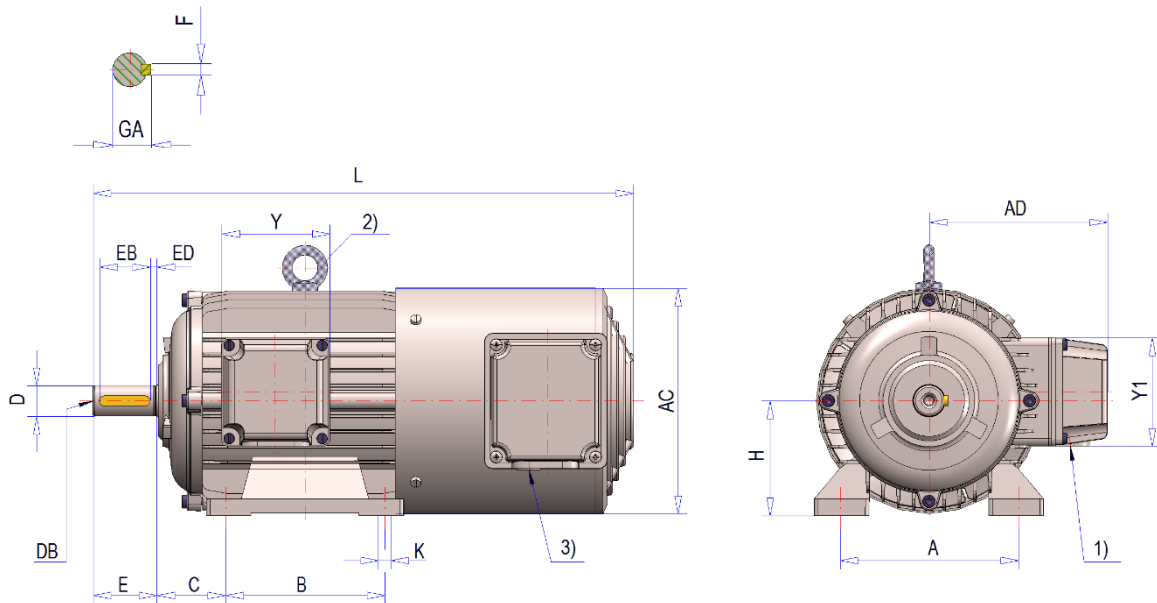
\* Versions IM B14 / IM 3601, IM V18 / IM 3611, IM V19 / IM 3631 (Section *Designs*)

Date: 02/11/2021  
Version: 2.1



## Rotating field motors

Size: 63 – 132 / Cooling type: IC416 externally ventilated / Protection class: IP 54 – IP 55 / Version IM B3



1) See planning section (Section *Cable glands in the terminal box*)

2) With lifting eye from size 112 and above

3) 1x M16x1.5

Fits and tolerances see (*Section Fits and tolerances*)

Subject to technical amendments

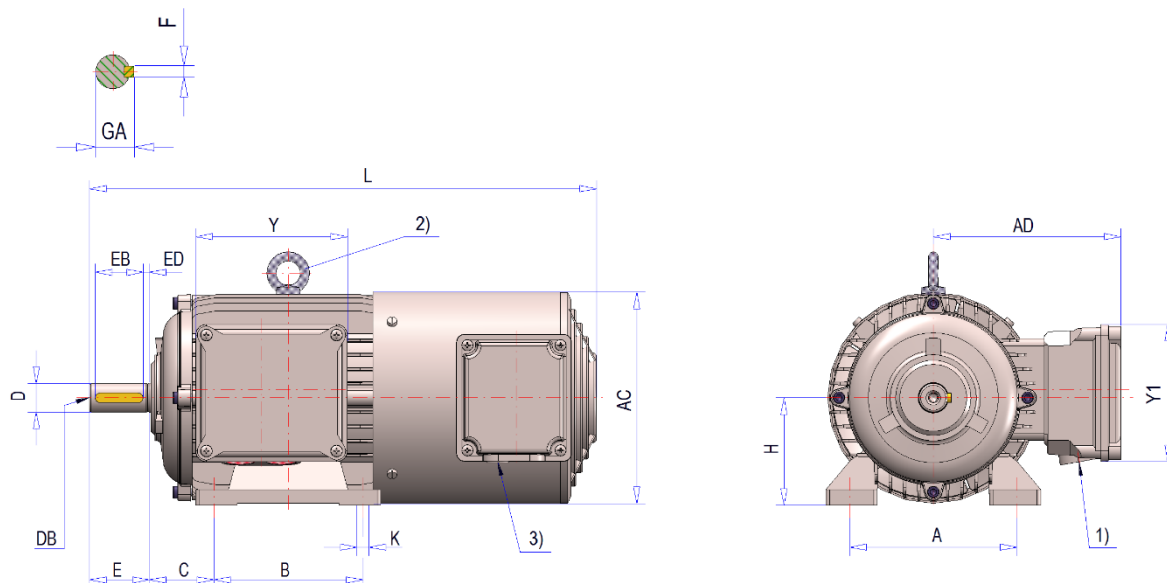
Type	B	A	K	H	C	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L
RDM 63 L	80	100	7	63	40	11	23	M4	124	99	70	70	12.5	4	18	2.5	309
RDM 71 K/L	90	112	7	71	45	14	30	M5	139	109	70	70	16	5	25	2.5	337
RDM 80 K/L	100	125	9.5	80	50	19	40	M6	157	127	85	85	21.5	6	32	4	367
RDM 90 S	100	140	10	90	56	24	50	M8	177	140	85	85	27	8	40	5	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

\* Versions IM B3 / IM 1001, IM B6 / IM 1051, IM B7 / IM 1061, IM B8 / IM 1071, IM V5 / IM 1011, IM V6 / IM 1031 (*Section Designs*)

Date: 02/11/2021  
Version: 2.1

## Rotating field motors

Size: 63 – 132 / Cooling type: IC416 externally ventilated / Protection class:  $\geq$ IP 56 / Version IM B3



1) See planning section (Section *Cable glands in the terminal box*)

2) With lifting eye from size 112 and above

3) 1x M16x1.5

Fits and tolerances see (Section *Fits and tolerances*)

Subject to technical amendments

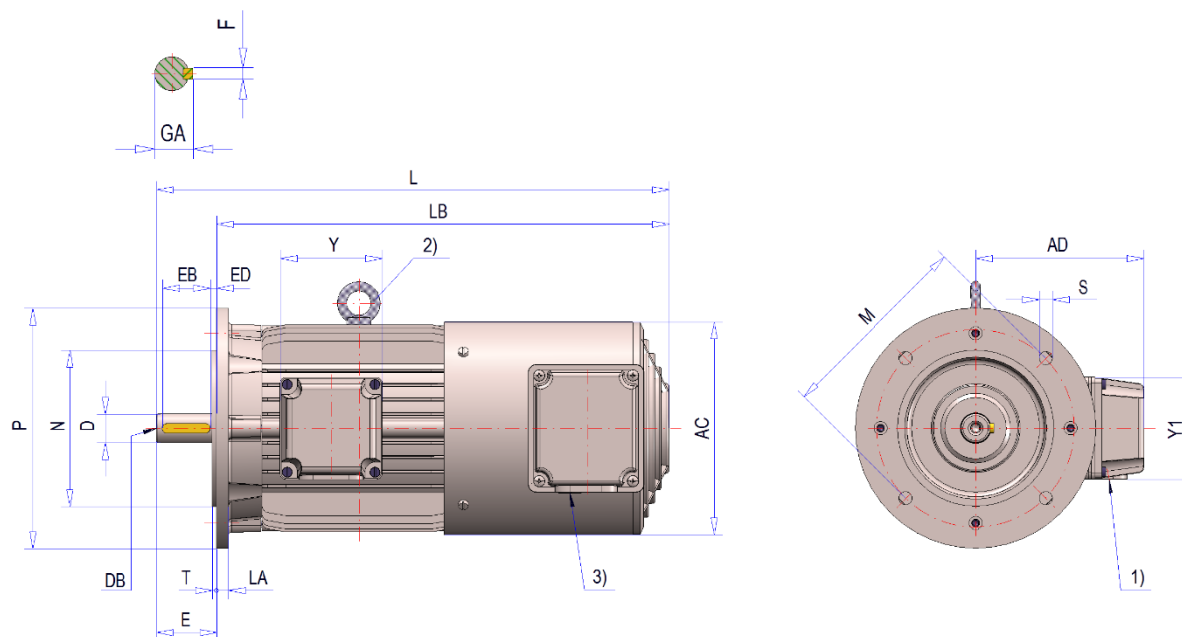
Type	B	A	K	H	C	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L
RDM 63 L	80	100	7	63	40	11	23	M4	124	121	117	103	12.5	4	18	2.5	309
RDM 71 K/L	90	112	7	71	45	14	30	M5	139	130	117	103	16	5	25	2.5	337
RDM 80 K/L	100	125	9.5	80	50	19	40	M6	157	144	127	115	21.5	6	32	4	367
RDM 90 S	100	140	10	90	56	24	50	M8	177	157	127	115	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

\* Versions IM B3 / IM 1001, IM B6 / IM 1051, IM B7 / IM 1061, IM B8 / IM 1071, IM V5 / IM 1011, IM V6 / IM 1031 (Section *Designs*)

Date: 02/11/2021  
Version: 2.1

## Rotating field motors

Size: 63 – 132 / Cooling type: IC416 externally ventilated / Protection class: IP 54 – IP 55 / Version IM B5



1) See planning section (Section *Cable glands in the terminal box*)

2) With lifting eye from size 112 and above

3) 1x M16x1.5

Fits and tolerances see (Section *Fits and tolerances*)

Subject to technical amendments

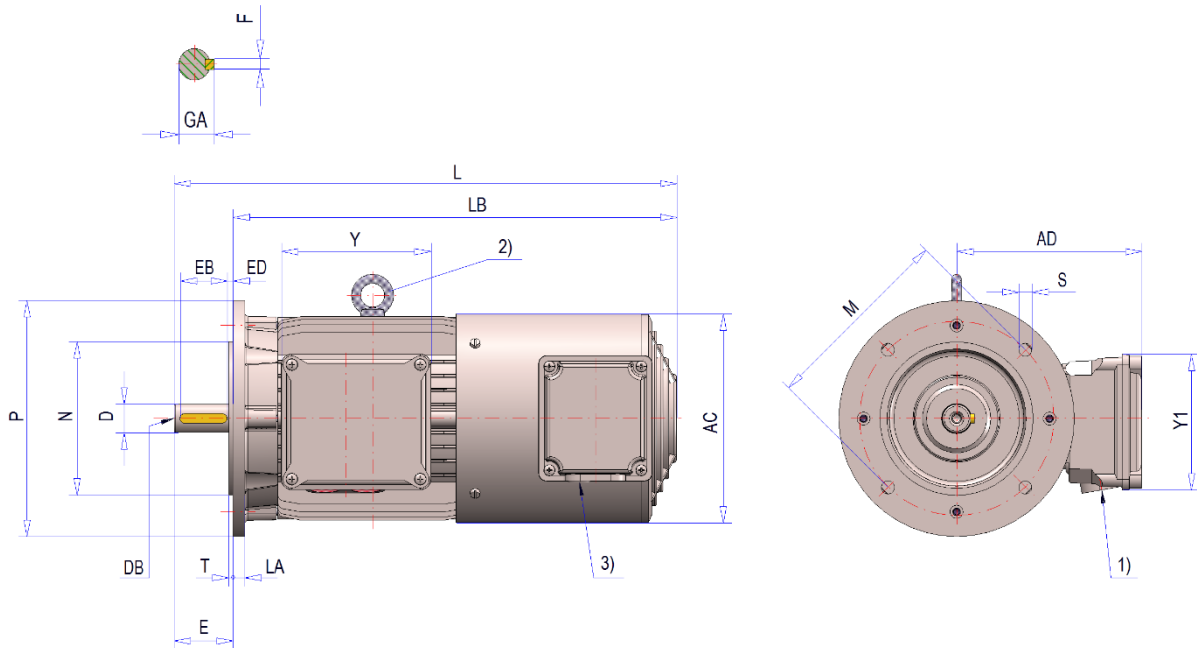
Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
<b>RDMF 63 L</b>	11	23	M4	124	104	70	70	12.5	4	18	2.5	309	286	9	115	95	140	3	10
<b>RDMF 71 K/L</b>	14	30	M5	139	114	70	70	16	5	25	2.5	337	307	9	130	110	160	3.5	9.5
<b>RDMF 80 K/L</b>	19	40	M6	157	134	85	85	21.5	6	32	4	367	327	11	165	130	200	3.5	11
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

\* Versions IM B5 / IM 3001, IM V1 / IM 3011, IM V3 / IM 3031 (Section *Designs*)

Date: 02/11/2021  
Version: 2.1

## Rotating field motors

Size: 63 – 132 / Cooling type: IC416 externally ventilated / Protection class:  $\geq$ IP 56 / Version IM B5



1) See planning section (Section *Cable glands in the terminal box*)

2) With lifting eye from size 112 and above

3) 1x M16x1.5

Fits and tolerances see (Section *Fits and tolerances*)

Subject to technical amendments

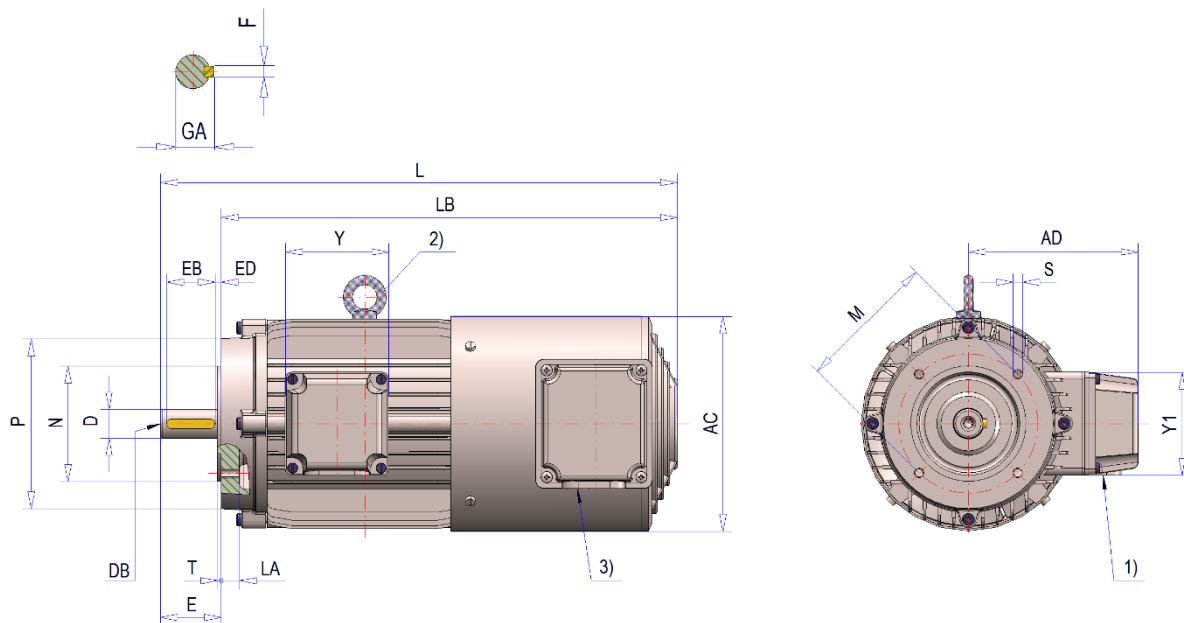
Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
<b>RDMF 63 L</b>	11	23	M4	124	126	117	103	12.5	4	18	2.5	309	286	9	115	95	140	3	10
<b>RDMF 71 K/L</b>	14	30	M5	139	136	117	103	16	5	25	2.5	337	307	9	130	110	160	3.5	9.5
<b>RDMF 80 K/L</b>	19	40	M6	157	150	127	115	21.5	6	32	4	367	327	11	165	130	200	3.5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

\* Versions IM B5 / IM 3001, IM V1 / IM 3011, IM V3 / IM 3031 (Section *Designs*)

Date: 02/11/2021  
Version: 2.1

## Rotating field motors

Size: 63 – 132 / Cooling type: IC416 externally ventilated / Protection class: IP 54 – IP 55 / Version IM B14



1) See planning section (Section *Cable glands in the terminal box*)

2) With lifting eye from size 112 and above

3) 1x M16x1.5

Fits and tolerances see (Section *Fits and tolerances*)

Subject to technical amendments

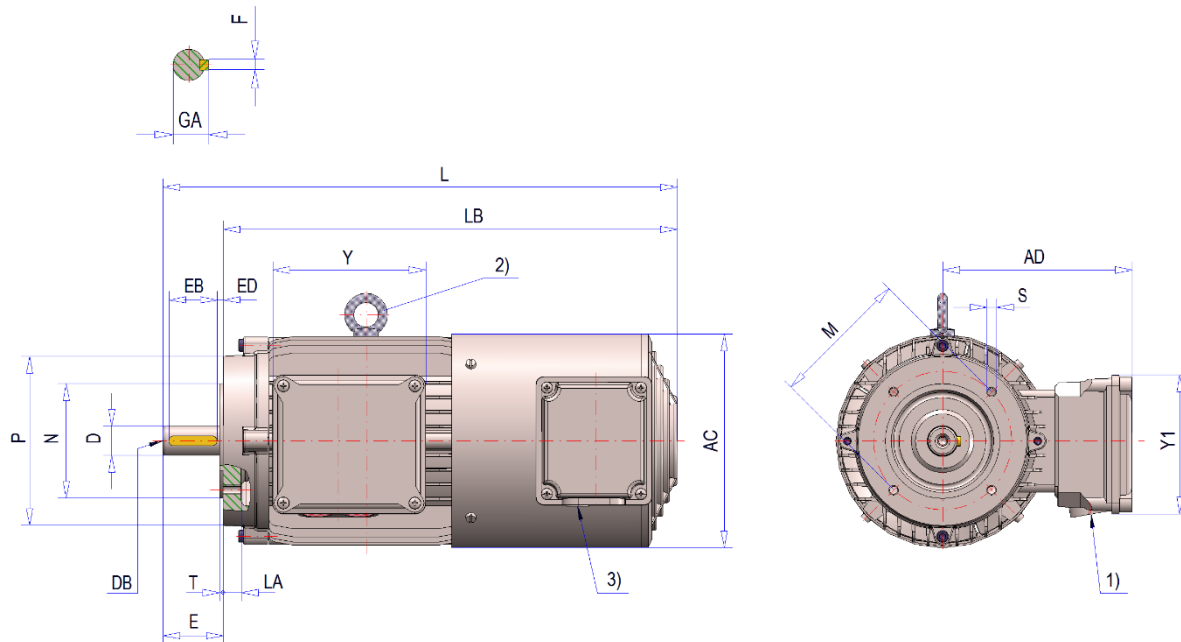
Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
<b>RDMF 63 L</b>	11	23	M4	124	104	70	70	12.5	4	18	2.5	309	286	M5	75	60	90	2.5	9.5
<b>RDMF 71 K/L</b>	14	30	M5	139	114	70	70	16	5	25	2.5	337	307	M6	85	70	105	2.5	10
<b>RDMF 80 K/L</b>	19	40	M6	157	134	85	85	21.5	6	32	4	367	327	M6	100	80	120	3	12.5
<b>RDMF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

\* Versions IM B14 / IM 3601, IM V18 / IM 3611, IM V19 / IM 3631 (Section *Designs*)

Date: 02/11/2021  
Version: 2.1

## Rotating field motors

Size: 63 – 132 / Cooling type: IC416 externally ventilated / Protection class:  $\geq$ IP 56 / Version IM B14



1) See planning section (Section *Cable glands in the terminal box*)

2) With lifting eye from size 112 and above

3) 1x M16x1.5

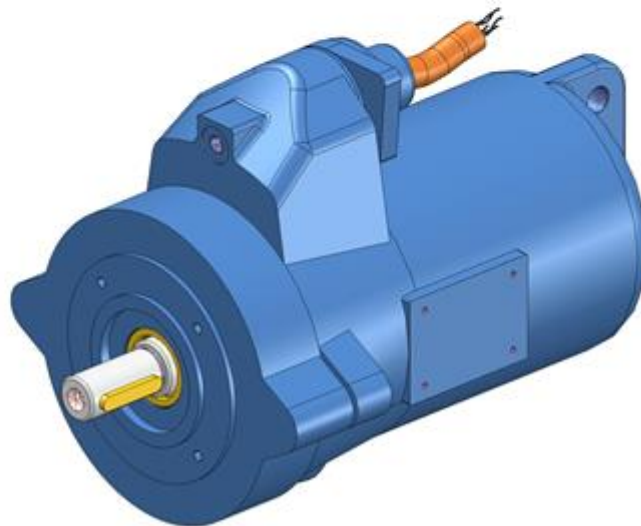
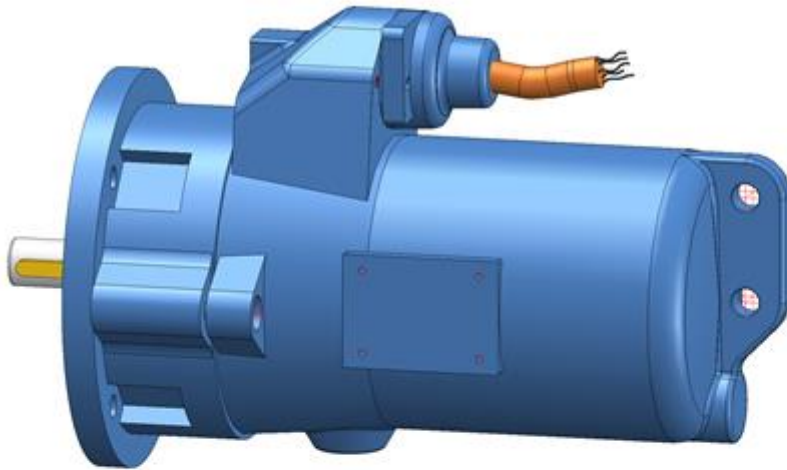
Fits and tolerances see (Section *Fits and tolerances*)

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

\* Versions IM B14 / IM 3601, IM V18 / IM 3611, IM V19 / IM 3631 (Section *Designs*)

Date: 02/11/2021  
Version: 2.1



## Submersible motors

### 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 as well as for mixing and homogenising. The housing is an optimised cast iron motor barrel casing with fewer corners and edges. Due to its robust design, the drive has a very long service life. A pre-assembled power cable is encapsulated to the motor and enables easy installation on site.

Submersible motors are available 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 mounting on the drive (e.g. gear unit, agitator or pump).

All windings are 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 produced as 4-pole variants. Other pole numbers or pole-changing motors are also available on request.

As a special version, the motors are also available with closed brake system or standstill heater. Further special versions are available on request.

## Standards and regulations

The motors comply with the relevant standards and regulations (see Section Standards and regulations)

## 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. Up to a diameter of 50 mm the tolerance of the shaft diameter is k6 (ISO) and m6 (ISO) for diameters in excess of 50 mm. The DS shaft end of all submersible motors has a centre bore acc. to DIN 332-2 shape D. The motor is supplied with parallel keys complying with DIN 6885-1 Shape A.

Standard motors are supplied with a shaft end made of 1.4021 material (corrosion and acid-proof). Other materials may be used if requested by the customer. Motors with special shafts (e.g. for direct mounting to the gear unit) are also available as an option.

## Vibration

All motor rotors are dynamically balanced with half parallel keys in accordance with DIN ISO 21940-32. The vibration characteristics of the motors corresponds to vibration severity level A in accordance with DIN EN 60034-14 (see Section Vibration) 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 retained with springs.





## Submersible motors

### 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 if requested by the customer. The measuring cable leading to the electrodes is integrated into the motor power cable. Evaluation via resistance measuring using appropriate electronic components. The evaluation device is not included in the scope of delivery.

### Electrical design

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

### Rated voltage and frequency

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 60034 Part 1 – Section B

Other rated voltages are available on request by the customer.

### Thermal class

The standard motor version is thermal class F. As an option, motors can also be supplied with 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.

## Submersible motors

### Motor protection

A motor protection switch monitoring the current must be set to the nominal current indicated on the rating plate. Only motor protection which directly measures the temperature is effective for frequent switching, short-term operation, coolant failure (dry running) or large temperature fluctuations. The following options are possible:

- Temperature switch as NC (PTO)

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

Switching capacity: For AC: 250 V 1.6 A.

As standard, the temperature monitoring connections are integrated into the power cable.

Optionally, the motors can also be equipped with PTCs. In this case, a shielded motor cable is mandatory.

### Standstill heating

Standstill heating can be provided for motors whose windings are subject to condensation, e.g. due to large temperature fluctuations.

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

## Submersible motors

### Technical data for rotating submersible motors

#### 4-pole 400V-50Hz IC 410

Thermal class: F      Operating mode: S1      Synchronous speed: 1500 rpm

Coolant temperature max. 40°C      fully submerged

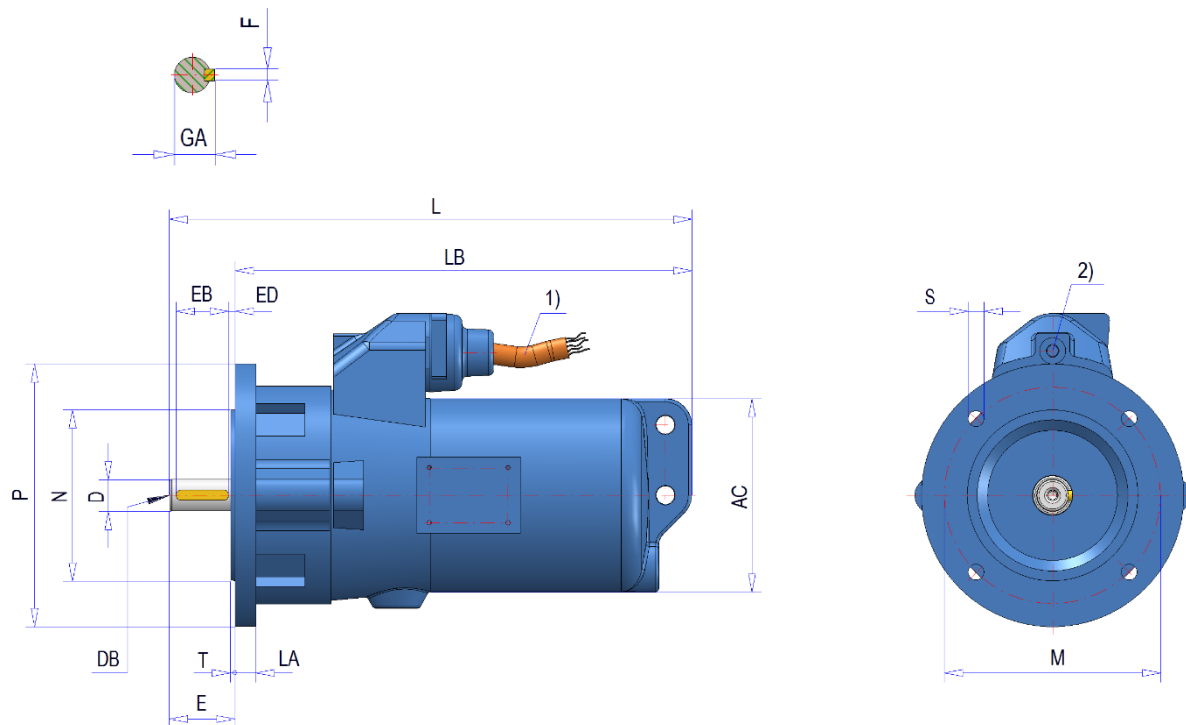
Size Type	Nominal power	Nominal speed	Nominal current	Power factor	Nominal torque	Start-up to nominal current	Start-up to nominal torque	Breakdown to nominal torque	Moment of inertia	Weight IM B5 incl. motor cable
GGUF	$P_N$	$n_N$	$I_N$	$\cos \varphi$	$M_N$	$I_A/I_N$	$M_A/M_N$	$M_k/M_N$	J	M
	kW	rpm	A		Nm				kgm <sup>2</sup>	kg (approx.)
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

### Dimension sheets for submersible motors

Size: 90 – 112 / Cooling type: IC410 unventilated / protection class: IP 68 / Version IM 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 (*Section Fits and tolerances*)

Subject to technical amendments

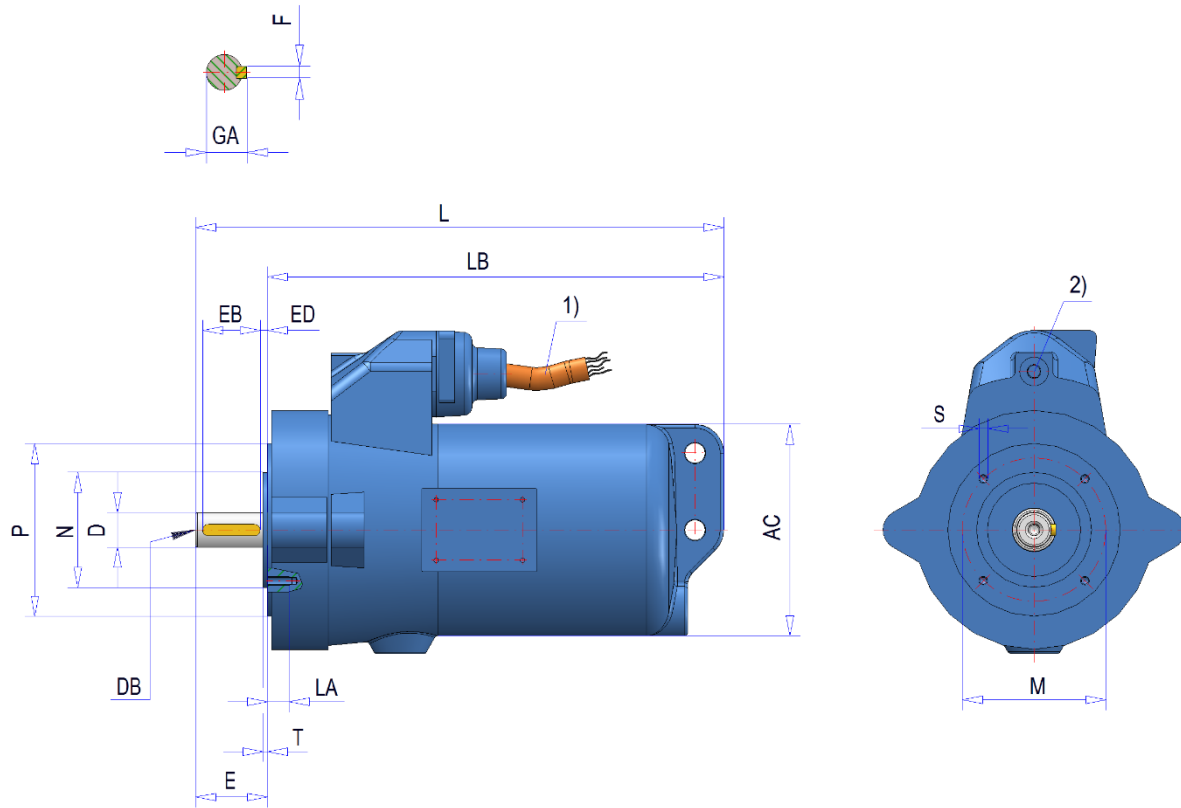
Type	D	E	DB	AC	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
<b>GGUF 90 L</b>	24	50	M8	147	27	8	40	5	398	348	12	165	130	200	3.5	16
<b>GGUF 90 L</b>	28	60	M10	147	31	8	50	5	378	318	14	215	180	250	4	16
<b>GGUF 112 M</b>	28	60	M10	184	31	8	60	5	431	371	14	215	180	250	4	14
<b>GGUF 112 M</b>	38	80	M12	184	41	10	70	5	451	371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

\* Versions IM B5 / IM 3001, IM V1 / IM 3011, IM V3 / IM 3031 (*Section Designs*)

Date: 02/11/2021  
Version: 2.1

## Submersible motors

Size: 90 – 112 / Cooling type: IC410 unventilated / protection class: IP 68 / Version IM 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 (*Section Fits and tolerances*)

Subject to technical amendments

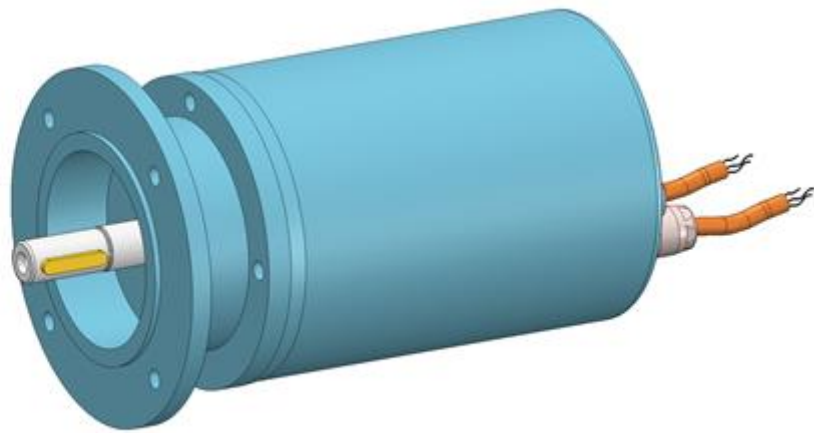
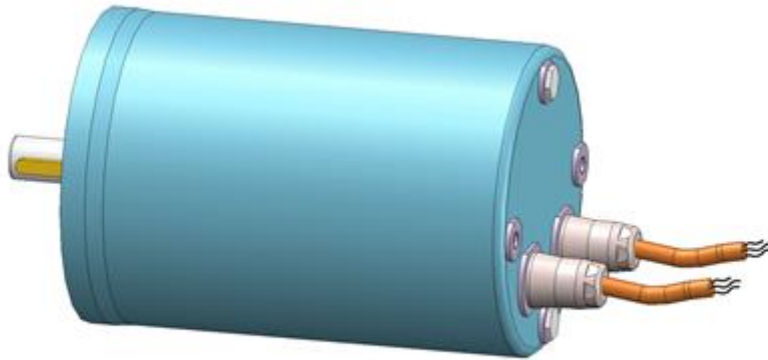
Type	D	E	DB	AC	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
<b>GGUF 90 L</b>	24	50	M8	147	27	8	40	5	368	318	M8	115	95	140	3	16
<b>GGUF 90 L</b>	28	60	M10	147	31	8	50	5	378	318	M8	130	110	160	3	16
<b>GGUF 112 M</b>	28	60	M10	184	31	8	50	5	490	430	M8	130	110	160	3	16
<b>GGUF 112 M</b>	38	80	M12	184	41	10	70	5	510	430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

\* Versions IM B14 / IM 3601, IM V18 / IM 3611, IM V19 / IM 3631 (*Section Designs*)

Date: 02/11/2021  
Version: 2.1



Hygiene motors  
Hygiene motors



Date: 02/11/2021  
Version: 2.1

**General Catalogue Herforder-Elektromotoren-Werke**



## Hygiene motors

### Hygiene motors

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 these production facilities, as 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 pathogens. In addition, cleaning of the production facilities was often made difficult by these features.

HEW hygiene motors now solve these problems. With the new special motors from HEW, the housing is designed as a completely smooth, closed surface, which has no edges, recesses 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 coolant used, please refer to the relevant 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 unit mounting) are available on request

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.

Date: 02/11/2021  
Version: 2.1

## Hygiene motors

### Technical data for hygiene motors

#### 4-pole 400V-50Hz IC 410 (unventilated)

Thermal class: F / Operating mode: S1 / Synchronous speed: 1500 rpm / Housing material V2A

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	$P_N$	$n_N$	$I_N$	$\cos \varphi$	$M_N$	$I_A/I_N$	$M_A/M_N$	$M_K/M_N$	J	M
	kW	rpm	A		Nm				kgm <sup>2</sup>	kg (approx.)
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

Subject to technical amendments

#### 4-pole 400V-50Hz IC 3S7 (liquid cooled)

Thermal class: F / Operating mode: S1 / Synchronous speed: 1500 rpm / Housing material Stainless steel

*In accordance with REGULATION (EU) 2019/1781 OF THE COMMISSION of 1 October 2019, as of 1 July 2021, liquid-cooled hygiene motors with a coolant temperature range between 0°C to 32°C must have the following efficiency classes:*

- IE2: 0.12kW to < 0.75kW
- IE3: 0.75kW to ≤ 1000kW

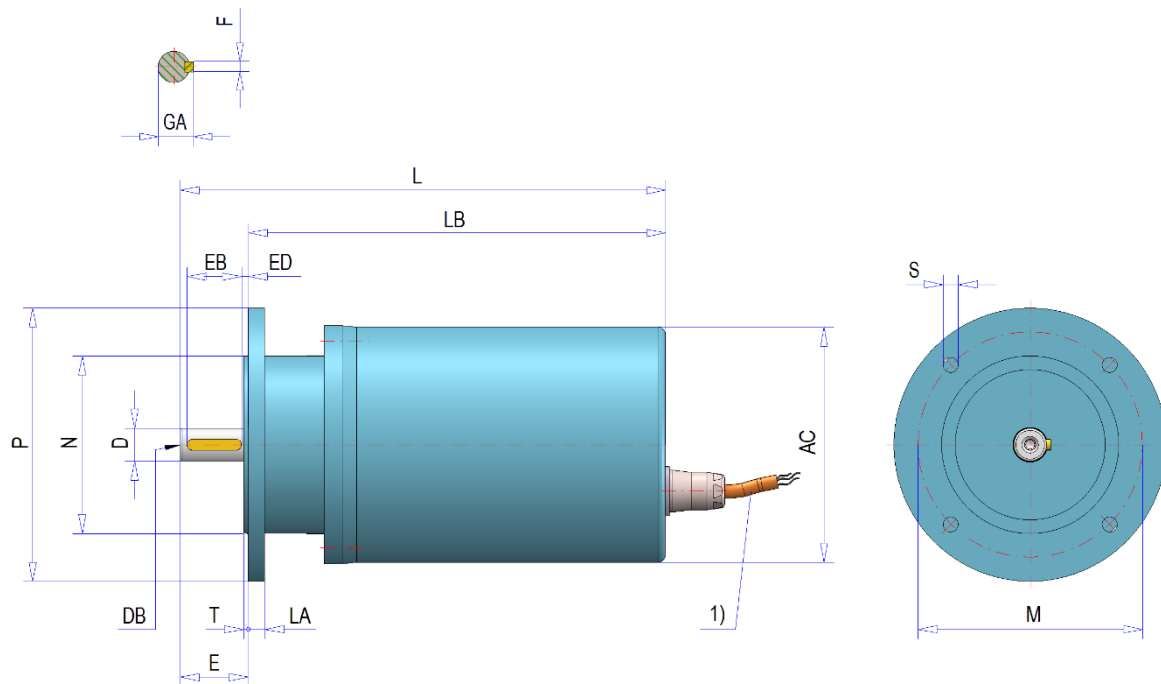
*Please contact us if necessary.*



## Hygiene motors

### Dimension sheets for hygiene motors

Size: 71 – 90 / Cooling type: IC410 unventilated / protection class: IP 66 – IP 68 / Version IM B5



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

Fits and tolerances see (Section Fits and tolerances)

With motor protection (PTC / thermostatic, a 2nd cable of the same length

Subject to technical amendments

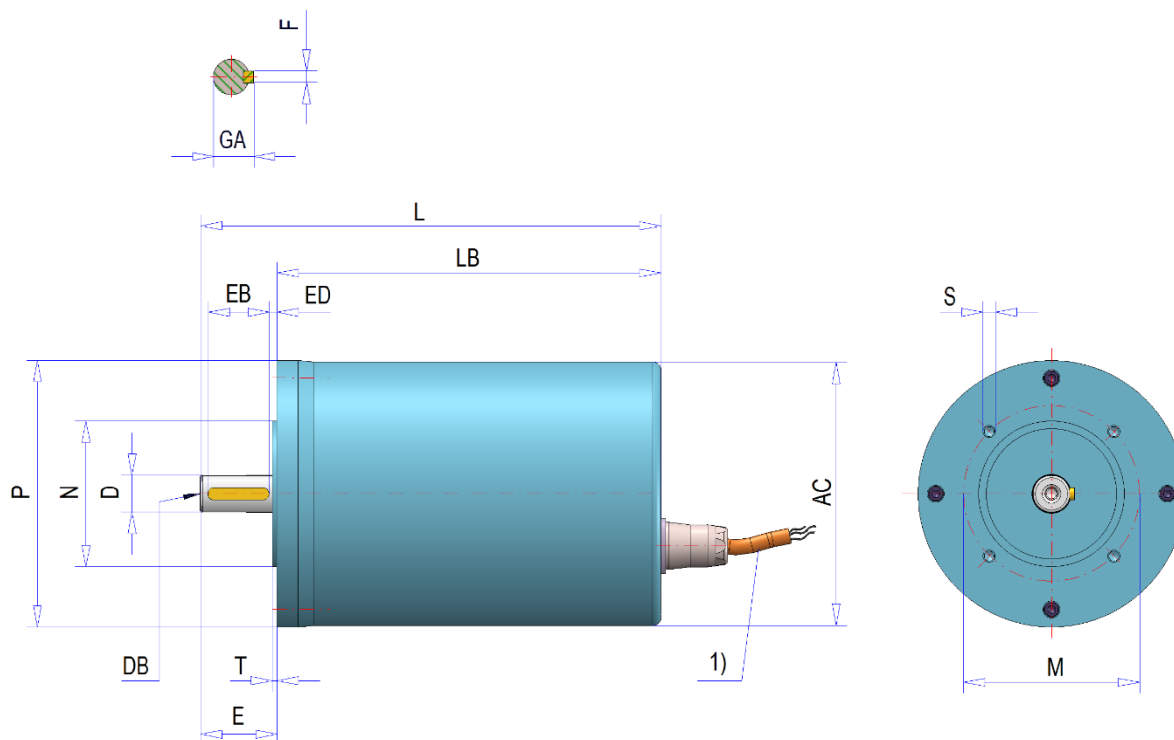
Type	D	E	DB	AC	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
GUF 71K/L	11	23	M4	143	12.5	4	18	2.5	287	264	9	115	95	140	3.5	14
GUF 71K/L	14	30	M5	143	16	5	25	2.5	294	264	9	130	110	160	3.5	14
GUF 71K/L	19	40	M6	143	21.5	6	32	4	304	264	11	165	130	200	3.5	14
GUF 90S/L	11	23	M4	172	12.5	4	18	2.5	329	308	9	115	95	140	3.5	12
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

\* Versions IM B5 / IM 3001, IM V1 / IM 3011, IM V3 / IM 3031 (Section Designs)

Date: 02/11/2021  
Version: 2.1

## Hygiene motors

Size: 71 – 90 / Cooling type: IC410 unventilated / protection class: IP 66  
 – IP 68 / Version IM B14



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

With motor protection (PTC / thermostatic, a 2nd cable of the same length)

Fits and tolerances see (*Section Fits and tolerances*)

Subject to technical amendments

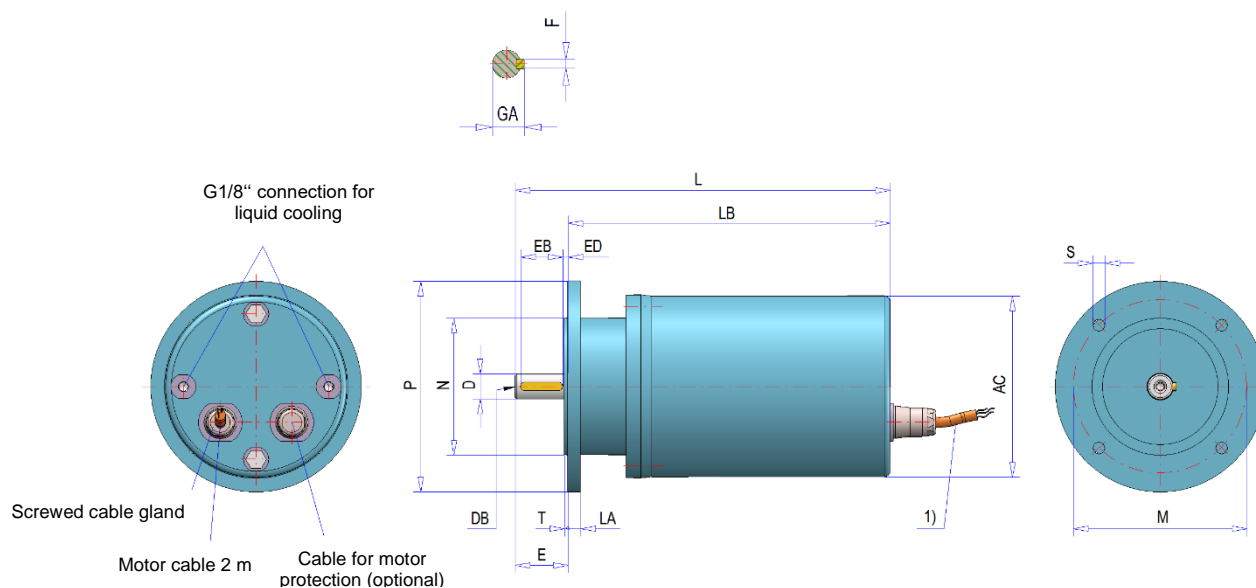
Type	D	E	DB	AC	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
GUF 71 K/L	11	23	M4	143	12.5	4	18	2.5	229	206	M5	75	60	90	3	15
GUF 71 K/L	14	30	M5	143	16	5	25	2.5	236	206	M6	85	70	105	3	15
GUF 71 K/L	19	40	M6	143	21.5	6	32	4	246	206	M6	100	80	120	3	15
GUF 90 S/L	11	23	M4	172	12.5	4	18	2.5	294	271	M5	75	60	90	2.5	15
GUF 90 S/L	14	30	M5	172	16	5	25	2.5	301	271	M6	85	70	105	2.5	15
GUF 90 S/L	19	40	M6	172	21.5	6	32	4	291	251	M6	100	80	120	3	12
GUF 90 S/L	24	50	M8	172	27	8	40	5	301	251	M8	115	95	140	3	15
GUF 90 S/L	28	60	M10	172	31	8	50	5	311	251	M8	130	110	160	3.5	14

\* Versions IM B14 / IM 3601, IM V18 / IM 3611, IM V19 / IM 3631 (*Section Designs*)

Date: 02/11/2021  
 Version: 2.1

## Hygiene motors

Size: 71 – 90 / Cooling type: IC3S7 liquid cooled / Protection class: IP 66 – IP 68 / Version IM B5



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

With motor protection (PTC / thermostatic, a 2nd cable of the same length)

Fits and tolerances see (*Section Fits and tolerances*)

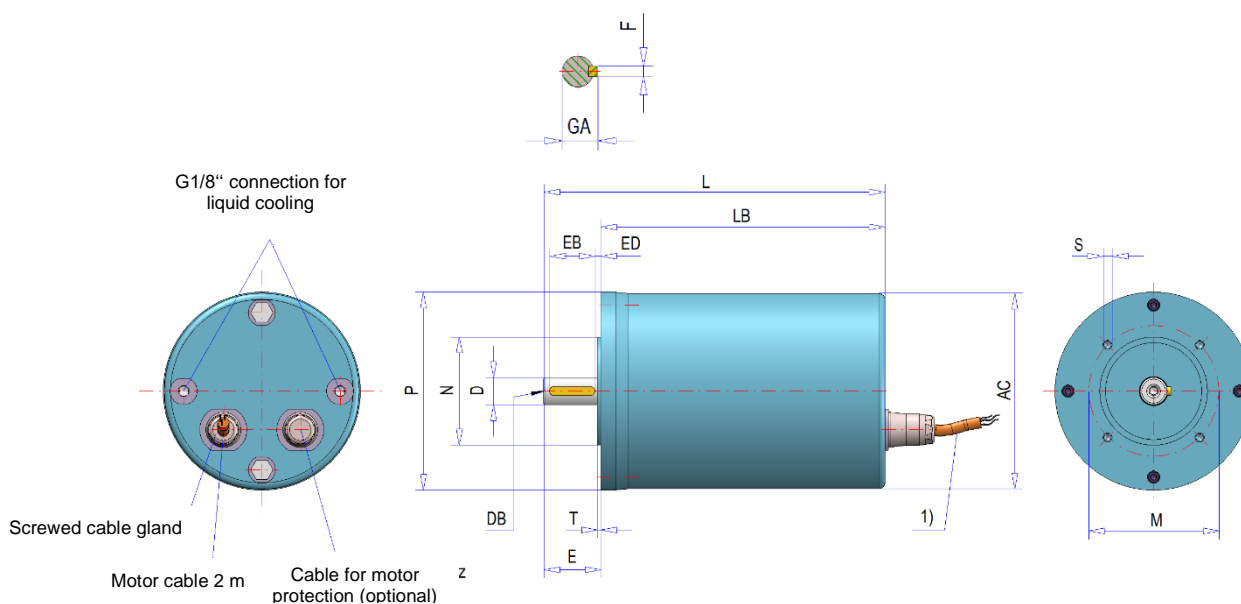
Subject to technical amendments

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

\* Versions IM B5 / IM 3001, IM V1 / IM 3011, IM V3 / IM 3031 (*Section Designs*)

## Hygiene motors

Size: 71 – 90 / Cooling type: IC3S7 liquid cooled / Protection class: IP 66 – IP 68 / Version IM B14



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

With motor protection (PTC / thermostatic, a 2nd cable of the same length)

Fits and tolerances see (*Section Fits and tolerances*)

Subject to technical amendments

Type	D	E	DB	AC	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
GUF 71 K/L	11	23	M4	143	12.5	4	18	2.5	229	206	M5	75	60	90	3	15
GUF 71 K/L	14	30	M5	143	16	5	25	2.5	236	206	M6	85	70	105	3	15
GUF 71 K/L	19	40	M6	143	21.5	6	32	4	246	206	M6	100	80	120	3	15
GUF 90 S/L	11	23	M4	172	12.5	4	18	2.5	294	271	M5	75	60	90	2.5	15
GUF 90 S/L	14	30	M5	172	16	5	25	2.5	301	271	M6	85	70	105	2.5	15
GUF 90 S/L	19	40	M6	172	21.5	6	32	4	291	251	M6	100	80	120	3	12
GUF 90 S/L	24	50	M8	172	27	8	40	5	301	251	M8	115	95	140	3	15
GUF 90 S/L	28	60	M10	172	31	8	50	5	311	251	M8	130	110	160	3.5	14

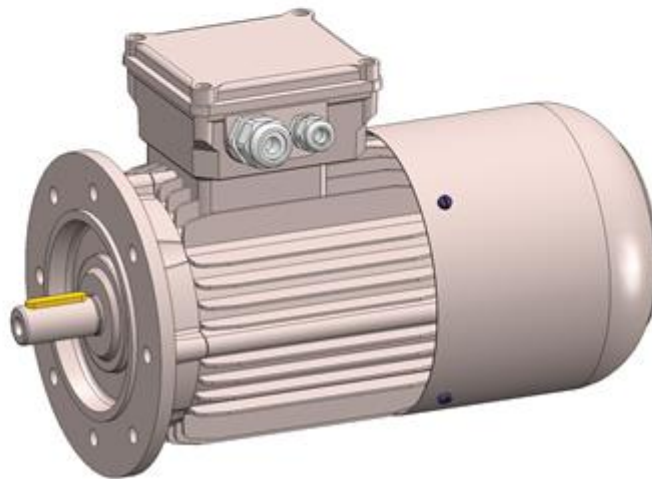
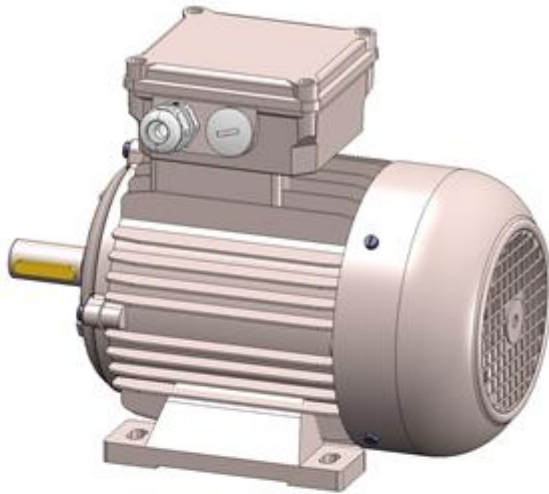
\* Versions IM B14 / IM 3601, IM V18 / IM 3611, IM V19 / IM 3631 (*Section Designs*)

Date: 02/11/2021  
Version: 2.1



Explosion protected motors, Series R3G + R3D

Explosion protected motors, Series R3G + R3D



Date: 02/11/2021  
Version: 2.1

**General Catalogue Herforder-Elektromotoren-Werke**

## Explosion protected motors, Series R3G + R3D

### Explosion protected motors, Series R3G + R3D

HEW series R3D and R3G were specially developed for applications in explosive environments. Motors of ignition protection type II 3G Ex ec IIC T3-T4 Gc (equipment for Zone 2) are exclusively available as stand-alone motor, motors of ignition protection type II 3 D Ex tc IIIB T135°C Dc (equipment for Zone 22) are available as stand-alone and brake motors. 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 their design, the dust-protected brake motors (equipment for Zone 22) match the standard brake motors of Series R (see Brake motors, at least protection class IP55). The magnetic part of the brake has been 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 "ec"	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 must have protection class IP54, which requires more than 30 seconds to drop by 2 mbar at an overpressure of 4 mbar (gas-proof), or housings and terminal boxes are encapsulated against overpressure in a simple manner.	All motor types, e.g.: - squirrel-cage motors - slip ring motors - collector motors etc. with motor protection switch and overpressure monitoring.  prevention of escape of sparks formed during operation. 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 feature protection by housings with restricted surface temperature.

## Explosion protected motors, Series R3G + R3D

### Gas - explosion protection

#### Ignition temperature - temperature class

The ignition temperature depends on many factors such as surface size, shape, type and characteristics. IEC; CENELEC and other standardisation bodies have agreed on a method specified in IEC 60079-20-1 for determining the ignition temperature which closely approximates to the lowest and practically possible value.

Gases and vapours are accordingly categorised into temperature classes. In compliance with these temperature classes, the surface temperatures of electrical equipment and other technical devices are designed so that ignition due to the surface temperature is impossible. The standards differentiate the permissible excesses 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
<b>T1</b>	> + 450 °C	+ 400 °C	+ 410 °C
<b>T2</b>	> + 300...≤ + 450°C	+ 300 °C	+ 260 °C
<b>T3</b>	> + 200...≤ + 300°C	+ 200 °C	+ 160 °C
<b>T4</b>	> + 135...≤ + 200°C	+ 135 °C	+ 95 °C

### Dust - explosion protection

#### Surface temperature - protection class

The IP protection class is a major feature of dust explosion protection. Depending on the ambient conditions, different dust-proofing requirements on the motor are specified. Another key measure for dust explosion protection is restriction of the surface temperature of the motors to a value below the ignition point 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 by the manufacturer	EC Declaration of Conformity by the manufacturer

\* R3D (Zone 22) series motors are not available for group IIIC “conductive dust”.

## Explosion protected motors, Series R3G + R3D

Permissible use of motors according to their labelling depending of zone categorisation

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

\*Not usual for electric motors

### Maintenance of explosion protection

Maintenance of explosion protection during operation:

Electrical machines must 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 for monitoring the motors must comply with the requirements of Directives 2014/34/EC and EN 1127-1.



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

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

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

## Explosion protected motors, Series R3G + R3D

### Technical Data for motors Versions R3G + R3D

2-pole 400V-50Hz IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 3000 rpm

Type	Efficiency class	Rated power	Rated speed	Rated current	Power factor	Efficiency	Rated torque	Start-up to rated current	Start-up to rated torque	Breakdown to rated torque	Moment of inertia	Weight (IM B3)
		$P_N$ [kW]	$n_N$ [rpm]	$I_N$ [A]	$\cos \varphi$	$\eta$ [%]	$M_N$ [Nm]	$I_A / I_N$	$M_A / M_N$	$M_k / M_N$	$J$ [kgm <sup>2</sup> ]	$m$ [kg]
63K/2	IE2	0.18	2835	0.50	0.74	60.4	0.61	5.00	3.20	3.55	0.00014	4.50
63L/2	IE2	0.25	2820	0.60	0.81	64.8	0.85	5.45	3.05	3.35	0.00019	5.00
71K/2	IE2	0.37	2835	0.85	0.82	69.5	1.25	5.35	2.60	3.05	0.00034	6.00
71L/2	IE2	0.55	2840	1.20	0.83	74.1	1.85	5.95	3.00	3.30	0.00042	7.00
80K/2	IE3	0.75	2840	1.65	0.81	80.7	2.52	5.95	3.40	3.60	0.00064	9.00
80L/2	IE3	1.10	2850	2.35	0.81	82.7	3.69	6.80	4.50	4.00	0.00079	10.00
90L/2	IE3	1.50	2910	3.05	0.83	84.2	4.92	9.15	4.30	4.70	0.00155	17.00
90L/2	IE3	2.20	2875	4.50	0.83	85.9	7.31	7.70	3.95	3.90	0.00155	17.00
100V/2	IE3	3.00	2930	5.70	0.87	87.1	9.78	11.95	5.75	5.50	0.00360	30.00
112M/20	IE3	4.00	2940	7.75	0.85	88.1	13.0	10.70	3.90	4.80	0.00557	38.00
132S/20	IE3	5.50	2945	10.1	0.88	89.2	17.8	10.45	3.70	4.60	0.01220	48.00
132S/200	IE3	7.50	2945	13.8	0.87	90.1	24.3	11.00	4.25	4.95	0.01470	54.00
160M/20	IE3	11.00	2965	19.7	0.88	91.2	35.4	12.35	5.00	5.30	0.03940	119.00
160L/2	IE3	15.00	2960	26.2	0.90	91.9	48.4	12.00	5.15	5.05	0.04590	135.00
160L/20	IE3	18.50	2960	33.7	0.86	92.4	59.7	12.60	3.90	5.60	0.05640	141.00
180L/20	IE3	22.00	2965	38.0	0.90	92.7	70.9	11.95	3.90	4.70	0.07910	180.00
-	IE3	30.00	Technical data in preparation									

Subject to technical amendments

## Explosion protected motors, Series R3G + R3D

2-pole 460V-60Hz IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 360 rpm

Type	Efficiency class	Rated power	Rated speed	Rated current	Power factor	Efficiency	Rated torque	Start-up to rated current	Start-up to rated torque	Breakdown to rated torque	Moment of inertia	Weight (IM B3)
		$P_N$ [kW]	$n_N$ [rpm]	$I_N$ [A]	$\cos \varphi$	$\eta$ [%]	$M_N$ [Nm]	$I_A / I_N$	$M_A / M_N$	$M_K / M_N$	$J$ [kgm <sup>2</sup> ]	$m$ [kg]
-	IE2	0.18	Technical data in preparation									
-	IE2	0.25										
71K/2	IE2	0.37	3410	0.70	0.85	72.0	1.04	5.25	2.25	2.75	0.00034	6.00
71L/2	IE2	0.55	3440	1.00	0.86	74.0	1.53	7.00	3.30	3.55	0.00042	7.00
80K/2	IE3	0.75	3455	1.45	0.80	77.0	2.07	7.30	4.45	4.15	0.00064	9.00
80L/2	IE3	1.10	3470	2.05	0.80	84.0	3.03	8.00	4.55	4.55	0.00079	10.00
90L/2	IE3	1.50	3515	2.60	0.84	85.5	4.08	10.70	4.35	5.25	0.00155	17.00
90L/2	IE3	2.20	3500	3.85	0.82	86.5	6.00	9.10	4.00	4.60	0.00155	17.00
100V/2	IE3	3.00	3530	4.80	0.88	88.5	8.12	13.50	4.80	5.50	0.00360	30.00
132S/200	IE3	4.00	3560	6.25	0.90	88.5	10.7	12.50	4.35	5.50	0.01470	54.00
132S/200	IE3	5.50	3555	8.55	0.90	89.5	14.8	11.96	4.15	5.30	0.01470	54.00
132S/200	IE3	7.50	3550	11.7	0.89	90.2	20.2	11.05	3.85	4.90	0.01470	54.00
160M/20	IE3	11.00	3565	16.8	0.89	91.0	29.5	12.35	4.50	4.90	0.03940	119.00
160M/20	IE3	15.00	3560	23.2	0.88	91.0	40.2	11.05	4.05	4.40	0.03940	119.00
-	IE3	18.50	Technical data in preparation									
-	IE3	22.00										
-	IE3	30.00										

Subject to technical amendments

## Explosion protected motors, Series R3G + R3D

4-pole 400V-50Hz IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 1500 rpm

Type	Efficiency class	Rated power	Rated speed	Rated current	Power factor	Efficiency	Rated torque	Start-up to rated current	Start-up to rated torque	Breakdown to rated torque	Moment of inertia	Weight (IM B3)
		$P_N$ [kW]	$n_N$ [rpm]	$I_N$ [A]	$\cos \varphi$	$\eta$ [%]	$M_N$ [Nm]	$I_A/I_N$	$M_A/M_N$	$M_K/M_N$	J [kgm <sup>2</sup> ]	m [kg]
63K/4	IE2	0.12	1360	0.40	0.71	59.1	0.84	3.10	2.05	2.30	0.00020	4.50
63L/4	IE2	0.18	1370	0.60	0.63	64.7	1.25	3.40	2.95	2.95	0.00025	5.00
71K/4	IE2	0.25	1415	0.70	0.70	68.5	1.69	4.35	2.30	2.65	0.00052	6.50
71L/4	IE2	0.37	1405	0.95	0.76	72.7	2.51	4.55	2.40	2.60	0.00064	7.50
80K/4	IE2	0.55	1405	1.40	0.74	77.1	3.74	4.65	2.35	2.65	0.00099	9.00
80L/40	IE3	0.75	1425	1.85	0.72	82.5	5.03	6.00	3.30	3.15	0.00150	14.50
90L/40	IE3	1.10	1445	2.50	0.75	84.1	7.27	6.85	3.50	4.00	0.00285	17.00
90V/4	IE3	1.50	1440	3.35	0.76	85.3	9.95	7.20	3.40	4.15	0.00355	21.00
100L/400	IE3	2.20	1450	4.65	0.79	86.7	14.5	8.10	3.85	4.25	0.00559	25.00
100V/4	IE3	3.00	1445	6.25	0.80	87.7	19.8	7.95	3.55	4.20	0.00718	30.00
112V/4	IE3	4.00	1455	8.15	0.80	88.6	26.3	8.80	3.70	4.55	0.01268	40.00
132M/4	IE3	5.50	1465	11.2	0.79	89.6	35.9	8.35	3.75	4.00	0.02750	64.00
132V/4	IE3	7.50	1465	15.4	0.78	90.4	48.9	8.85	4.25	4.50	0.03750	74.00
160L/40	IE3	11.00	1475	21.7	0.80	91.4	71.2	9.60	4.00	3.90	0.08040	142.00
160V/4	IE3	15.00	1475	29.9	0.79	92.1	97.1	8.95	3.80	3.85	0.09150	152.00
180L/40	IE3	18.50	1475	34.9	0.83	92.6	119.8	9.25	4.10	3.60	0.16630	225.00
-	IE3	22.00	Technical data in preparation									

Subject to technical amendments

## Explosion protected motors, Series R3G + R3D

4-pole 460V-60Hz IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 1800 rpm

Type	Efficiency class	Rated power	Rated speed	Rated current	Power factor	Efficiency	Rated torque	Start-up to rated current	Start-up to rated torque	Breakdown to rated torque	Moment of inertia	Weight (IM B3)
		$P_N$ [kW]	$n_N$ [rpm]	$I_N$ [A]	$\cos \varphi$	$\eta$ [%]	$M_N$ [Nm]	$I_A / I_N$	$M_A / M_N$	$M_K / M_N$	$J$ [kgm <sup>2</sup> ]	$m$ [kg]
-	IE2	0.12	Technical data in preparation									
63L/4	IE2	0.18	1695	0.55	0.56	68.0	1.01	4.05	3.75	3.75	0.00025	5.00
71K/4	IE2	0.25	1730	0.65	0.65	70.0	1.38	5.05	2.65	3.15	0.00052	6.50
71L/4	IE2	0.37	1720	0.80	0.71	72.0	2.05	5.30	2.70	3.00	0.00637	7.50
80K/4	IE2	0.55	1720	1.20	0.71	75.5	3.05	5.50	2.70	3.05	0.00099	9.00
80L/40	IE3	0.75	1735	1.55	0.71	83.5	4.13	6.70	3.30	3.60	0.00150	14.50
90V/4	IE3	1.10	1745	2.05	0.77	86.5	6.02	8.40	3.70	4.30	0.00355	21.00
90V/4	IE3	1.50	1745	2.85	0.77	86.5	8.21	8.10	3.70	4.45	0.00355	21.00
112M/4	IE3	2.20	1760	3.95	0.78	89.5	11.9	9.75	3.15	4.70	0.01010	34.00
112V/4	IE3	3.00	1760	5.30	0.79	89.5	16.3	10.60	3.80	5.30	0.01268	40.00
132M/4	IE3	4.00	1770	7.05	0.79	89.5	21.6	9.95	4.20	4.45	0.02750	64.00
132V/4	IE3	5.50	1770	9.70	0.78	91.7	29.7	9.85	4.15	5.05	0.03750	74.00
160L/40	IE3	7.50	1780	12.7	0.81	91.7	40.2	9.40	3.25	3.95	0.08040	142.00
160V/4	IE3	11.00	1780	18.9	0.79	92.4	59.0	9.15	3.20	4.15	0.09150	152.00
160V/4	IE3	15.00	1775	25.4	0.80	93.0	80.7	8.25	2.85	3.75	0.09150	152.00
180L/40	IE3	18.50	1780	30.3	0.82	93.6	99.2	9.10	3.25	4.00	0.16630	225.00
-	IE3	22.00	Technical data in preparation									

Subject to technical amendments

## Explosion protected motors, Series R3G + R3D

6-pole 400V-50Hz IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 1000 rpm

Type	Efficiency class	Rated power	Rated speed	Rated current	Power factor	Efficiency	Rated torque	Start-up to rated current	Start-up to rated torque	Breakdown to rated torque	Moment of inertia	Weight (IM B3)
		$P_N$ [kW]	$n_N$ [rpm]	$I_N$ [A]	$\cos \varphi$	$\eta$ [%]	$M_N$ [Nm]	$I_A/I_N$	$M_A/M_N$	$M_K/M_N$	J [kgm <sup>2</sup> ]	m [kg]
63K/6	-	0.09	870	0.40	0.75	43.3	0.99	2.50	1.70	1.80	0.00029	4.50
63L/6	IE2	0.12	915	0.55	0.57	50.6	1.25	2.60	2.65	2.75	0.00042	5.00
71K/6	IE2	0.18	930	0.65	0.65	56.6	1.85	3.05	1.80	2.30	0.00081	6.50
71L/6	IE2	0.25	925	0.80	0.69	61.6	2.58	3.25	1.75	2.20	0.00101	7.50
80K/6	IE2	0.37	930	1.10	0.70	67.6	3.80	3.55	2.00	2.35	0.00191	10.00
80L/6	IE2	0.55	915	1.50	0.74	73.1	5.74	3.80	2.05	2.20	0.00239	11.00
90L/60	IE3	0.75	945	2.05	0.66	78.9	7.58	5.00	2.95	3.20	0.00419	18.20
90V/6	IE3	1.10	950	2.85	0.69	81.0	11.1	5.15	2.45	3.05	0.00649	22.50
100V/6	IE3	1.50	955	3.60	0.73	82.5	15.0	5.80	2.90	3.25	0.01122	28.00
112V/6	IE3	2.20	965	5.25	0.70	84.3	21.8	7.40	3.70	4.20	0.02000	43.00
132M/6	IE3	3.00	970	7.50	0.67	85.6	29.5	6.55	3.35	3.40	0.03230	52.00
132M/600	IE3	4.00	975	10.2	0.65	86.8	39.2	7.50	3.85	3.80	0.04240	64.00
132V/6	IE3	5.50	970	12.5	0.72	88.0	54.1	7.55	3.60	3.70	0.05057	75.00
160L/6	IE3	7.50	980	15.5	0.77	89.1	73.1	9.00	3.20	4.35	0.10990	135.00
180L/6	IE3	11.00	980	23.1	0.76	90.3	107.2	8.70	3.20	4.20	0.16500	200.00

Subject to technical amendments

## Explosion protected motors, Series R3G + R3D

6-pole 460V-60Hz IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 1200 rpm

Type	Efficiency class	Rated power	Rated speed	Rated current	Power factor	Efficiency	Rated torque	Start-up to rated current	Start-up to rated torque	Breakdown to rated torque	Moment of inertia	Weight (IM B3)
		$P_N$ [kW]	$n_N$ [rpm]	$I_N$ [A]	$\cos \varphi$	$\eta$ [%]	$M_N$ [Nm]	$I_A / I_N$	$M_A / M_N$	$M_K / M_N$	$J$ [kgm <sup>2</sup> ]	$m$ [kg]
	-	0.09	Technical data in preparation									
	IE2	0.12										
	IE2	0.18										
	IE2	0.25										
	IE2	0.37										
	IE2	0.55										
90V/6	IE3	0.75	1160	1.65	0.68	82.50	6.17	5.75	2.40	3.35	0.00649	22.50
	IE3	1.10	Technical data in preparation									
	IE3	1.50										
	IE3	2.20										
	IE3	3.00										
	IE3	4.00										
	IE3	5.50										
	IE3	7.50										
	IE3	11.00										

Subject to technical amendments

## Explosion protected motors, Series R3G + R3D

2-pole 400V-50Hz IC 411 unventilated S3-40%

Thermal class: F

Operating mode: S1

Synchronous speed: 3000 rpm

Type	Efficiency class	Rated power	Rated speed	Rated current	Power factor	Efficiency	Rated torque	Start-up to rated current	Start-up to rated torque	Breakdown to rated torque	Braking torque	Moment of inertia	Weight (IM B3)
		$P_N$ [kW]	$n_N$ [rpm]	$I_N$ [A]	$\cos \phi$	$\eta$ [%]	$M_N$ [Nm]	$I_A / I_N$	$M_A / M_N$	$M_K / M_N$	$M_{Bmax}$ [Nm]	J [kgm <sup>2</sup> ]	m [kg]
63K/2-B4	IE2	0.18	2835	0.50	0.74	60.4	0.61	5.00	3.20	3.55	4.00	0.00016	5.50
63L/2-B4	IE2	0.25	2820	0.60	0.81	64.8	0.85	5.45	3.05	3.35	4.00	0.00021	6.00
71K/2-B4	IE2	0.37	2835	0.85	0.82	69.5	1.25	5.35	2.60	3.05	4.00	0.00036	7.00
71L/2-B4	IE2	0.55	2840	1.20	0.83	74.1	1.85	5.95	3.00	3.30	4.00	0.00043	8.00
80K/2-B8	IE3	0.75	2840	1.65	0.81	80.7	2.52	5.95	3.40	3.60	8.00	0.00070	10.50
80L/2-B8	IE3	1.10	2850	2.35	0.81	82.7	3.69	6.80	4.50	4.00	8.00	0.00085	11.50
90L/2-B16	IE3	1.50	2910	3.05	0.83	84.2	4.92	9.15	4.30	4.70	16.00	0.00175	19.00
90L/2-B16	IE3	2.20	2875	4.50	0.83	85.9	7.31	7.70	3.95	3.90	16.00	0.00175	19.00
100V/2-B32	IE3	3.00	2930	5.70	0.87	87.1	9.78	11.95	5.75	5.50	32.00	0.00400	33.50
112M/20-B60	IE3	4.00	2940	7.75	0.85	88.1	13.0	10.70	3.90	4.80	60.00	0.00617	43.50
132S/20-B80	IE3	5.50	2945	10.1	0.88	89.2	17.8	10.45	3.70	4.60	80.00	0.01300	56.00
132S/200-B80	IE3	7.50	2945	13.8	0.87	90.1	24.3	11.00	4.25	4.95	80.00	0.01550	62.00
160M/20-B150	IE3	11.00	2965	19.7	0.88	91.2	35.4	12.35	5.00	5.30	150.00	0.04060	131.00
160L/2-B150	IE3	15.00	2960	26.2	0.90	91.9	48.4	12.00	5.15	5.05	150.00	0.04710	147.00
160L/20-B150	IE3	18.50	2960	33.7	0.86	92.4	59.7	12.60	3.90	5.60	150.00	0.05760	153.00
180L/20-B260	IE3	22.00	2965	38.0	0.90	92.7	70.9	11.95	3.90	4.70	260.00	0.09000	199.00
-	IE3	30.00	Technical data in preparation										

Subject to technical amendments



## Explosion protected motors, Series R3G + R3D

2-pole 460V-60Hz IC 411 unventilated S3-40%

Thermal class: F

Operating mode: S1

Synchronous speed: 360 rpm

Type	Efficiency class	Rated power	Rated speed	Rated current	Power factor	Efficiency	Rated torque	Start-up to rated current	Start-up to rated torque	Breakdown to rated torque	Braking torque	Moment of inertia	Weight (IM B3)
		$P_N$ [kW]	$n_N$ [rpm]	$I_N$ [A]	$\cos \phi$	$\eta$ [%]	$M_N$ [Nm]	$I_A / I_N$	$M_A / M_N$	$M_K / M_N$	$M_{Bmax}$ [Nm]	$J$ [kgm <sup>2</sup> ]	$m$ [kg]
-	IE2	0.18	Technical data in preparation										
-	IE2	0.25	Technical data in preparation										
71K/2-B4	IE2	0.37	3410	0.70	0.85	72.0	1.04	5.25	2.25	2.75	4.00	0.00036	7.00
71L/2-B4	IE2	0.55	3440	1.00	0.86	74.0	1.53	7.00	3.30	3.55	4.00	0.00043	8.00
80K/2-B8	IE3	0.75	3455	1.45	0.80	77.0	2.07	7.30	4.45	4.15	8.00	0.00070	10.50
80L/2-B8	IE3	1.10	3470	2.05	0.80	84.0	3.03	8.00	4.55	4.55	8.00	0.00085	11.50
90L/2-B16	IE3	1.50	3515	2.60	0.84	85.5	4.08	10.70	4.35	5.25	16.00	0.00175	19.00
90L/2-B16	IE3	2.20	3500	3.85	0.82	86.5	6.00	9.10	4.00	4.60	16.00	0.00175	19.00
100V/2-B32	IE3	3.00	3530	4.80	0.88	88.5	8.12	13.50	4.80	5.50	32.00	0.00400	33.50
132S/200-B80	IE3	4.00	3560	6.25	0.90	88.5	10.7	12.50	4.35	5.50	80.00	0.01550	62.00
132S/200-B80	IE3	5.50	3555	8.55	0.90	89.5	14.8	11.96	4.15	5.30	80.00	0.01550	62.00
132S/200-B80	IE3	7.50	3550	11.7	0.89	90.2	20.2	11.05	3.85	4.90	80.00	0.01550	62.00
160M/20-B150	IE3	11.00	3565	16.8	0.89	91.0	29.5	12.35	4.50	4.90	150.00	0.04060	131.00
160M/20-B150	IE3	15.00	3560	23.2	0.88	91.0	40.2	11.05	4.05	4.40	150.00	0.04060	131.00
-	IE3	18.50	Technical data in preparation										
-	IE3	22.00	Technical data in preparation										
-	IE3	30.00	Technical data in preparation										

Subject to technical amendments

## Explosion protected motors, Series R3G + R3D

4-pole 400V-50Hz IC 411 unventilated S3-40%

Thermal class: F

Operating mode: S1

Synchronous speed: 1500 rpm

Type	Efficiency class	Rated power	Rated speed	Rated current	Power factor	Efficiency	Rated torque	Start-up to rated current	Start-up to rated torque	Breakdown to rated torque	Braking torque	Moment of inertia	Weight (IM B3)
		$P_N$ [kW]	$n_N$ [rpm]	$I_N$ [A]	$\cos \varphi$	$\eta$ [%]	$M_N$ [Nm]	$I_A / I_N$	$M_A / M_N$	$M_K / M_N$	$M_{Bmax}$ [Nm]	$J$ [kgm <sup>2</sup> ]	$m$ [kg]
63K/4-B4	IE2	0.12	1360	0.40	0.71	59.1	0.84	3.10	2.05	2.30	4.00	0.00021	5.50
63L/4-B4	IE2	0.18	1370	0.60	0.63	64.7	1.25	3.40	2.95	2.95	4.00	0.00026	6.00
71K/4-B4	IE2	0.25	1415	0.70	0.70	68.5	1.69	4.35	2.30	2.65	4.00	0.00053	7.50
71L/4-B4	IE2	0.37	1405	0.95	0.76	72.7	2.51	4.55	2.40	2.60	4.00	0.00065	8.50
80K/4-B8	IE2	0.55	1405	1.40	0.74	77.1	3.74	4.65	2.35	2.65	8.00	0.00105	10.50
80L/40-B8	IE3	0.75	1425	1.85	0.72	82.5	5.03	6.00	3.30	3.15	8.00	0.00156	16.00
90L/40-B16	IE3	1.10	1445	2.50	0.75	84.1	7.27	6.85	3.50	4.00	16.00	0.00305	19.00
90V/4-B16	IE3	1.50	1440	3.35	0.76	85.3	9.95	7.20	3.40	4.15	16.00	0.00375	23.00
100L/400-B32	IE3	2.20	1450	4.65	0.79	86.7	14.5	8.10	3.85	4.25	32.00	0.00599	28.50
100V/4-B32	IE3	3.00	1445	6.25	0.80	87.7	19.8	7.95	3.55	4.20	32.00	0.00758	33.50
112V/4-B60	IE3	4.00	1455	8.15	0.80	88.6	26.3	8.80	3.70	4.55	60.00	0.01328	45.50
132M/4-B80	IE3	5.50	1465	11.2	0.79	89.6	35.9	8.35	3.75	4.00	80.00	0.02830	72.00
132V/4-B80	IE3	7.50	1465	15.4	0.78	90.4	48.9	8.85	4.25	4.50	80.00	0.03830	82.00
160L/40-B150	IE3	11.00	1475	21.7	0.80	91.4	71.2	9.60	4.00	3.90	150.00	0.08160	154.00
160V/4-B150	IE3	15.00	1475	29.9	0.79	92.1	97.1	8.95	3.80	3.85	150.00	0.09270	164.00
180L/40-B260	IE3	18.50	1475	34.9	0.83	92.6	119.8	9.25	4.10	3.60	260.00	0.17720	244.00
-	IE3	22.00	Technical data in preparation										

Subject to technical amendments

## Explosion protected motors, Series R3G + R3D

4-pole 460V-60Hz IC 411 unventilated S3-40%

Thermal class: F

Operating mode: S1

Synchronous speed: 1800 rpm

Type	Efficiency class	Rated power	Rated speed	Rated current	Power factor	Efficiency	Rated torque	Start-up to rated current	Start-up to rated torque	Breakdown to rated torque	Braking torque	Moment of inertia	Weight (IM B3)
		$P_N$ [kW]	$n_N$ [rpm]	$I_N$ [A]	$\cos \varphi$	$\eta$ [%]	$M_N$ [Nm]	$I_A / I_N$	$M_A / M_N$	$M_K / M_N$	$M_{Bmax}$ [Nm]	$J$ [kgm <sup>2</sup> ]	$m$ [kg]
-	IE2	0.12	Technical data in preparation										
63L/4-B4	IE2	0.18	1695	0.55	0.56	68.0	1.01	4.05	3.75	3.75	4.00	0.00026	6.00
71K/4-B4	IE2	0.25	1730	0.65	0.65	70.0	1.38	5.05	2.65	3.15	4.00	0.00053	7.50
71L/4-B4	IE2	0.37	1720	0.80	0.71	72.0	2.05	5.30	2.70	3.00	4.00	0.00650	8.50
80K74-B8	IE2	0.55	1720	1.20	0.71	75.5	3.05	5.50	2.70	3.05	8.00	0.00099	9.00
80L/40-B8	IE3	0.75	1735	1.55	0.71	83.5	4.13	6.70	3.30	3.60	8.00	0.00156	16.00
90V/4-B16	IE3	1.10	1745	2.05	0.77	86.5	6.02	8.40	3.70	4.30	16.00	0.00375	23.00
90V/4-B16	IE3	1.50	1745	2.85	0.77	86.5	8.21	8.10	3.70	4.45	16.00	0.00375	23.00
112M/4-B60	IE3	2.20	1760	3.95	0.78	89.5	11.9	9.75	3.15	4.70	60.00	0.01070	39.50
112V/4-B60	IE3	3.00	1760	5.30	0.79	89.5	16.3	10.60	3.80	5.30	60.00	0.01328	45.50
132M/4-B80	IE3	4.00	1770	7.05	0.79	89.5	21.6	9.95	4.20	4.45	80.00	0.02830	72.00
132V/4-B80	IE3	5.50	1770	9.70	0.78	91.7	29.7	9.85	4.15	5.05	80.00	0.03830	82.00
160L/40-B150	IE3	7.50	1780	12.7	0.81	91.7	40.2	9.40	3.25	3.95	150.00	0.08160	154.00
160V/4-B150	IE3	11.00	1780	18.9	0.79	92.4	59.0	9.15	3.20	4.15	150.00	0.09270	164.00
160V/4-B150	IE3	15.00	1775	25.4	0.80	93.0	80.7	8.25	2.85	3.75	150.00	0.09270	164.00
180L/40-B260	IE3	18.50	1780	30.3	0.82	93.6	99.2	9.10	3.25	4.00	260.00	0.17720	244.00
-	IE3	22.00	Technical data in preparation										

Subject to technical amendments

Date: 02/11/2021  
Version: 2.1

## Explosion protected motors, Series R3G + R3D

6-pole 400V-50Hz IC 411 unventilated S3-40%

Thermal class: F

Operating mode: S1

Synchronous speed: 1000 rpm

Type	Efficiency class	Rated power	Rated speed	Rated current	Power factor	Efficiency	Rated torque	Start-up to rated current	Start-up to rated torque	Breakdown to rated torque	Braking torque	Moment of inertia	Weight (IM B3)
		$P_N$ [kW]	$n_N$ [rpm]	$I_N$ [A]	$\cos \varphi$	$\eta$ [%]	$M_N$ [Nm]	$I_A / I_N$	$M_A / M_N$	$M_K / M_N$	$M_{Bmax}$ [Nm]	$J$ [kgm <sup>2</sup> ]	$m$ [kg]
63K/6-B4	-	0.09	870	0.40	0.75	43.3	0.99	2.50	1.70	1.80	4.00	0.00030	5.50
63L/6-B4	IE2	0.12	915	0.55	0.57	50.6	1.25	2.60	2.65	2.75	4.00	0.00043	6.00
71K/6-B4	IE2	0.18	930	0.65	0.65	56.6	1.85	3.05	1.80	2.30	4.00	0.00082	7.50
71L/6-B4	IE2	0.25	925	0.80	0.69	61.6	2.58	3.25	1.75	2.20	4.00	0.00102	8.50
80K/6-B8	IE2	0.37	930	1.10	0.70	67.6	3.80	3.55	2.00	2.35	8.00	0.00197	11.50
80L/6-B8	IE2	0.55	915	1.50	0.74	73.1	5.74	3.80	2.05	2.20	8.00	0.00245	12.50
90L/60-B16	IE3	0.75	945	2.05	0.66	78.9	7.58	5.00	2.95	3.20	16.00	0.00439	20.20
90V/6-B16	IE3	1.10	950	2.85	0.69	81.0	11.1	5.15	2.45	3.05	16.00	0.00669	24.50
100V/6-B32	IE3	1.50	955	3.60	0.73	82.5	15.0	5.80	2.90	3.25	32.00	0.01162	31.50
112V/6-B60	IE3	2.20	965	5.25	0.70	84.3	21.8	7.40	3.70	4.20	60.00	0.02060	48.50
132M/6-B80	IE3	3.00	970	7.50	0.67	85.6	29.5	6.55	3.35	3.40	80.00	0.03310	60.00
132M/600-B80	IE3	4.00	975	10.2	0.65	86.8	39.2	7.50	3.85	3.80	80.00	0.04320	72.00
132V/6-B80	IE3	5.50	970	12.5	0.72	88.0	54.1	7.55	3.60	3.70	80.00	0.05137	83.00
160L/6-B150	IE3	7.50	980	15.5	0.77	89.1	73.1	9.00	3.20	4.35	150.00	0.11110	147.00
180L/6-B260	IE3	11.00	980	23.1	0.76	90.3	107.2	8.70	3.20	4.20	260.00	0.17590	219.00

Subject to technical amendments

## Explosion protected motors, Series R3G + R3D

6-Pole 460V-60Hz IC 411 unventilated S3-40%

Thermal class: F

Operating mode: S1

Synchronous speed: 1200 rpm

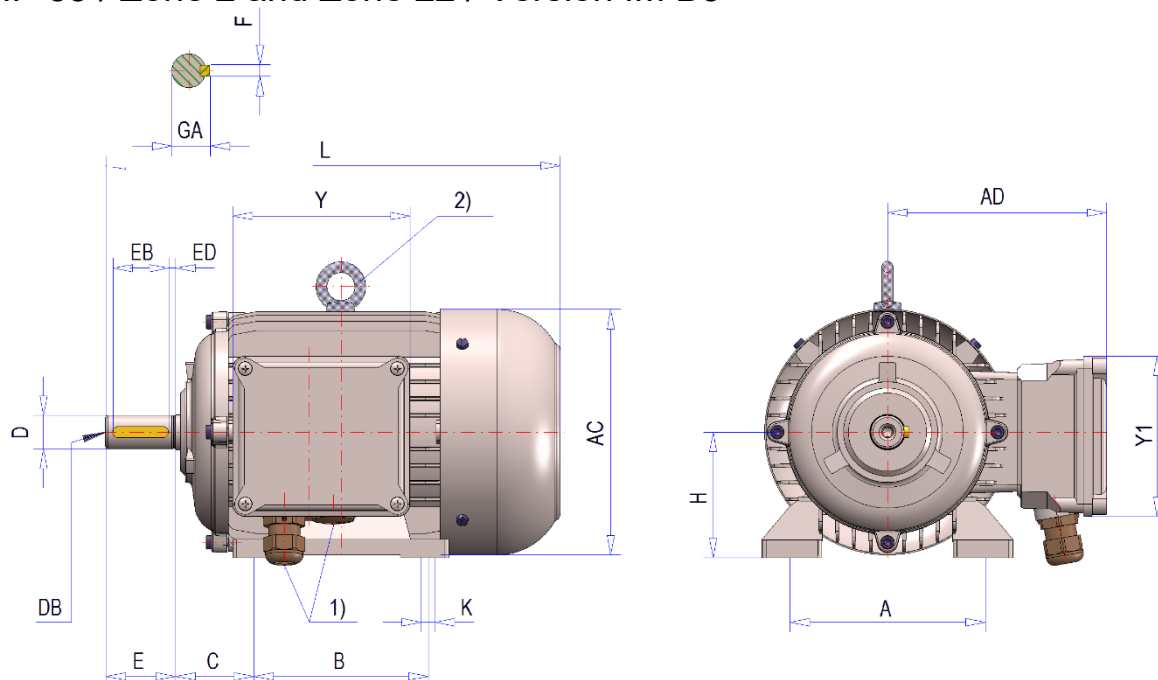
Type	Efficiency class	Rated power	Rated speed	Rated current	Power factor	Efficiency	Rated torque	Start-up to rated current	Start-up to rated torque	Breakdown to rated torque	Braking torque	Moment of inertia	Weight (IM B3)
		$P_N$ [kW]	$n_N$ [rpm]	$I_N$ [A]	$\cos \phi$	$\eta$ [%]	$M_N$ [Nm]	$I_A / I_N$	$M_A / M_N$	$M_K / M_N$	$M_{Bmax}$ [Nm]	$J$ [kgm <sup>2</sup> ]	$m$ [kg]
	-	0.09	Technical data in preparation										
	IE2	0.12											
	IE2	0.18											
	IE2	0.25											
	IE2	0.37											
	IE2	0.55											
90V/6-B16	IE3	0.75	1160	1.65	0.68	82.50	6.17	5.75	2.40	3.35	16	0.00669	24.50
	IE3	1.10	Technical data in preparation										
	IE3	1.50											
	IE3	2.20											
	IE3	3.00											
	IE3	4.00											
	IE3	5.50											
	IE3	7.50											
	IE3	11.00											

Subject to technical amendments

## Explosion protected motors, Series R3G + R3D

### Dimension sheets for motors Series R3G + R3D

Size: 63 – 180 / Cooling type: IC411 self-ventilated / Protection class:  $\geq$ IP 55 / Zone 2 and Zone 22 / Version IM B3



1) See planning section (Section *Cable glands in the terminal box*)

2) With lifting eye from size 112 and above

Fits and tolerances see (*Section Fits and tolerances*)

Subject to technical amendments

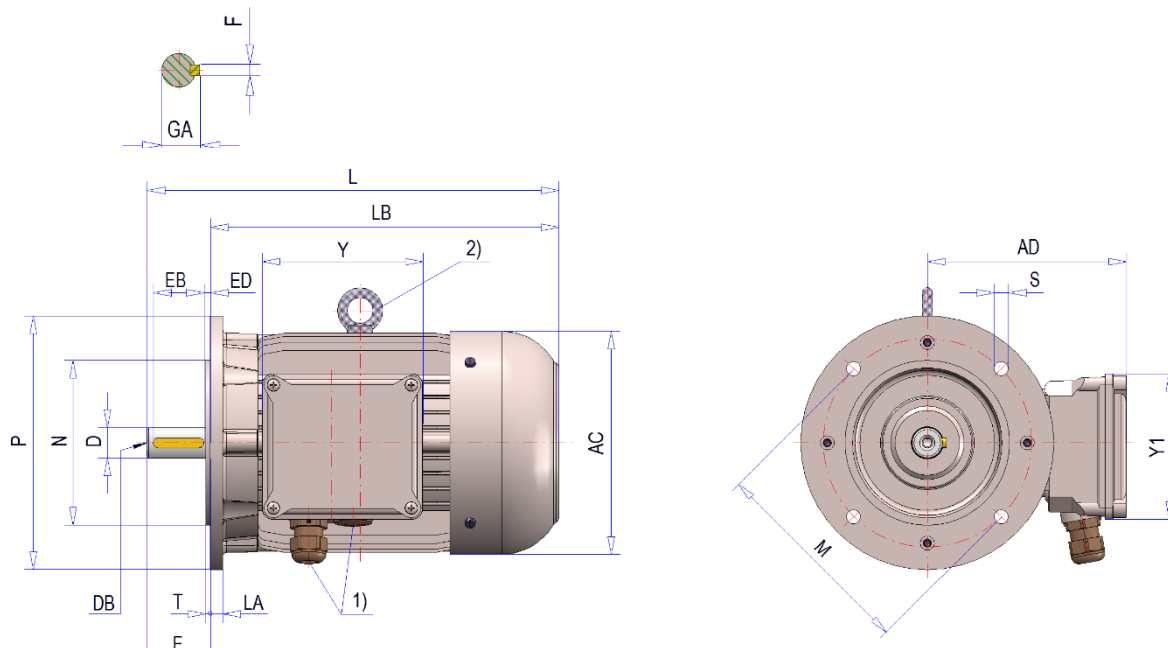
Type	B	A	K	H	C	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L
R3... 63 K/L	80	100	7	63	40	11	23	M4	123	121	117	103	12.5	4	18	2.5	211
R3... 71 K/L	90	112	7	71	45	14	30	M5	138	130	117	103	16	5	25	2.5	243
R3... 80 K/L	100	125	9.5	80	50	19	40	M6	156	144	127	115	21.5	6	32	4	274
R3... 90 S	100	140	10	90	56	24	50	M8	176	157	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... 90 V	125	140	10	90	56	24	50	M8	176	366	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... 100 V	140	160	11.2	100	63	28	60	M10	194	416	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... 112 V	140	190	11.2	112	70	28	60	M10	218	423	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... 132 V	178	216	11	132	89	38	80	M12	258	537	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... 160 V	254	254	14.5	160	108	42	110	M16	310	662	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

\* Versions IM B3 / IM 1001, IM B6 / IM 1051, IM B7 / IM 1061, IM B8 / IM 1071, IM V5 / IM 1011, IM V6 / IM 1031 (*Section Designs*)

Date: 02/11/2021  
Version: 2.1

## Explosion protected motors, Series R3G + R3D

Size: 63 – 180 / Cooling type: IC411 self-ventilated / Protection class:  $\geq$ IP 55 / Zone 2 and Zone 22 / Version IM B5



1) See planning section (Section *Cable glands in the terminal box*)

2) With lifting eye from size 112 and above

Fits and tolerances see (*Section Fits and tolerances*)

Subject to technical amendments

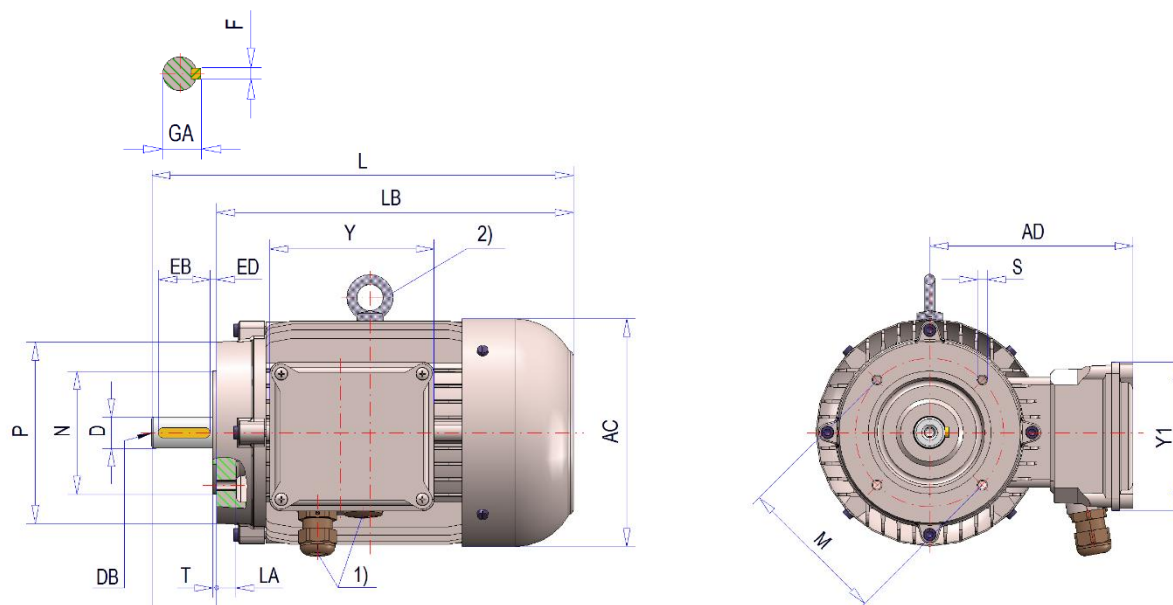
Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
R3...F 63 K/L	11	23	M4	123	121	117	103	12.5	4	18	2.5	211	188	9	115	95	140	3	10
R3...F 71 K/L	14	30	M5	138	130	117	103	16	5	25	2.5	243	213	9	130	110	160	3.5	10
R3...F 80 K/L	19	40	M6	156	144	127	115	21.5	6	32	4	274	234	9	165	130	200	3.5	10
R3...F 90 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 90 V	24	50	M8	176	157	127	115	27	8	40	5	366	316	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 100 V	28	60	M10	194	166	127	115	31	8	50	5	416	356	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 112 V	28	60	M10	218	178	127	115	31	8	50	5	423	363	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 132 V	38	80	M12	258	197	145	130	41	10	70	5	537	457	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 160 V	42	110	M16	310	244	186	186	45	12	90	10	662	552	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

\* Versions IM B5 / IM 3001, IM V1 / IM 3011, IM V3 / IM 3031 (*Section Designs*)

Date: 02/11/2021  
Version: 2.1

## Explosion protected motors, Series R3G + R3D

Size: 63 – 180 / Cooling type: IC411 self-ventilated / Protection class:  $\geq$ IP 55 / Zone 2 and Zone 22 / Version IM B14



1) See planning section (Section *Cable glands in the terminal box*)

2) With lifting eye from size 112 and above

Fits and tolerances see (*Section Fits and tolerances*)

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 90 V	24	50	M8	176	157	127	115	27	8	40	5	366	316	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 100 V	28	60	M10	194	166	127	115	31	8	50	5	416	356	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 112 V	28	60	M10	218	178	127	115	31	8	50	5	423	363	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 132 V	38	80	M12	258	197	145	130	41	10	70	5	537	457	M10	165	130	200	3.5	15
R3...F 160 M	42	110	M16	310	244	186	186	45	12	90	10	615	505	M12	215	180	250	4	14
R3...F 160 L	42	110	M16	310	244	186	186	45	12	90	10	659	549	M12	215	180	250	4	14
R3...F 160 V	42	110	M16	310	244	186	186	45	12	90	10	689	579	M12	215	180	250	4	14

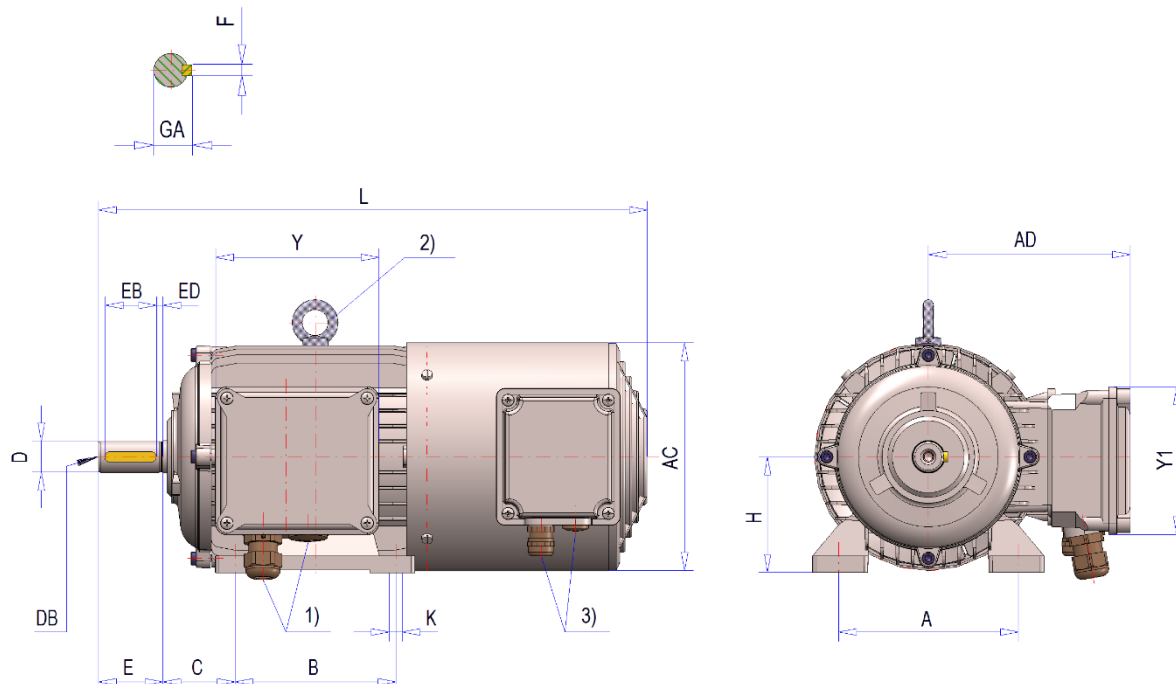
\* Versions IM B14 / IM 3601, IM V18 / IM 3611, IM V19 / IM 3631 (*Section Designs*)

Date: 02/11/2021  
Version: 2.1



## Explosion protected motors, Series R3G + R3D

Size: 63 – 180 / Cooling type: IC416 externally ventilated / Protection class:  $\geq$ IP 55 / Zone 2 and Zone 22 / Version IM B3



1) See planning section (Section *Cable glands in the terminal box*)

2) With lifting eye from size 112 and above

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

Fits and tolerances see (Section *Fits and tolerances*)

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... 90 V	125	140	10	90	56	24	50	M8	177	157	127	115	27	8	40	5	467
R3... 100 L	140	160	11.2	100	63	28	60	M10	195	166	127	115	31	8	50	5	465
R3... 100 V	140	160	11.2	100	63	28	60	M10	195	166	127	115	31	8	50	5	515
R3... 112 M	140	190	11.2	112	70	28	60	M10	218	178	127	115	31	8	50	5	483
R3... 112 V	140	190	11.2	112	70	28	60	M10	218	178	127	115	31	8	50	5	523
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... 132 V	178	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	666
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... 160 V	254	254	14.5	160	108	42	110	M16	311	244	186	186	45	12	90	10	811
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

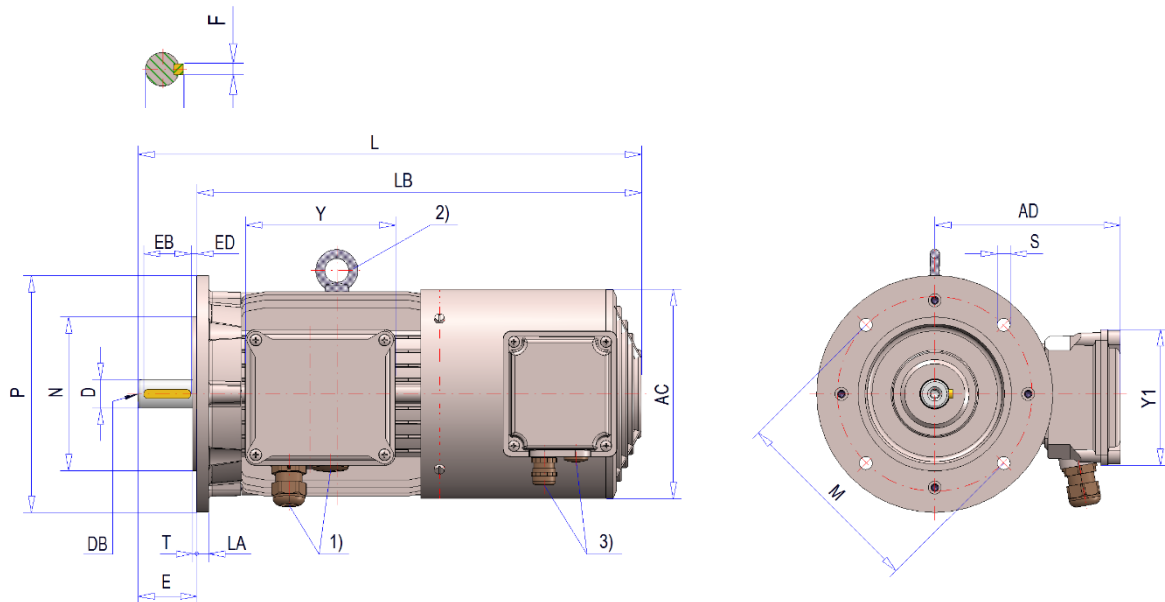
\* Versions IM B3 / IM 1001, IM B6 / IM 1051, IM B7 / IM 1061, IM B8 / IM 1071, IM V5 / IM 1011, IM V6 / IM 1031 (Section *Designs*)

Date: 02/11/2021

Version: 2.1

## Explosion protected motors, Series R3G + R3D

Size: 63 – 180 / Cooling type: IC416 externally ventilated / Protection class:  $\geq$ IP 55 / Zone 2 and Zone 22 / Version IM B5



1) See planning section (Section *Cable glands in the terminal box*)

2) With lifting eye from size 112 and above

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

Fits and tolerances see (*Section Fits and tolerances*)

Subject to technical amendments

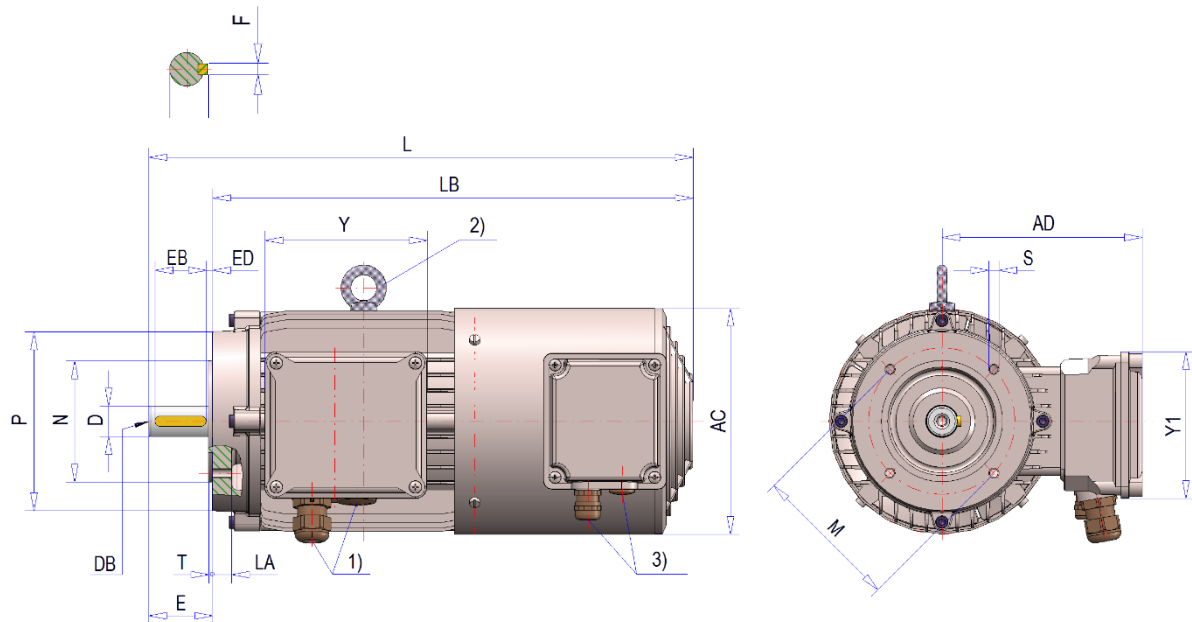
Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
R3...F 63 K/L	11	23	M4	124	121	117	103	12.5	4	18	2.5	309	286	9	115	95	140	3	10
R3...F 71 K/L	14	30	M5	139	130	117	103	16	5	25	2.5	337	307	9	130	110	160	3.5	10
R3...F 80 K/L	19	40	M6	157	144	127	115	21.5	6	32	4	367	327	9	165	130	200	3.5	10
R3...F 90 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 90 V	24	50	M8	177	157	127	115	27	8	40	5	467	417	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 100 V	28	60	M10	195	166	127	115	31	8	50	5	515	455	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 112 V	28	60	M10	218	178	127	115	31	8	50	5	533	473	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 132 V	38	80	M12	258	197	145	130	41	10	70	5	690	610	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 160 V	42	110	M16	311	244	186	186	45	12	90	10	811	701	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

\* Versions IM B5 / IM 3001, IM V1 / IM 3011, IM V3 / IM 3031 (*Section Designs*)

Date: 02/11/2021  
Version: 2.1

## Explosion protected motors, Series R3G + R3D

Size: 63 – 180 / Cooling type: IC416 externally ventilated / Protection class:  $\geq$ IP 55 / Zone 2 and Zone 22 / Version IM B14



1) See planning section (Section *Cable glands in the terminal box*)

2) With lifting eye from size 112 and above

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

Fits and tolerances see (*Section Fits and tolerances*)

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	104	70	70	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	114	70	70	16	5	25	2.5	337	307	M6	85	70	105	2.5	10
R3...F 80 K/L	19	40	M6	157	134	85	85	21.5	6	32	4	367	327	M6	100	80	120	3	12.5
R3...F 90 S	24	50	M8	177	137	85	85	27	8	40	5	402	352	M8	115	95	140	3	15
R3...F 90 L	24	50	M8	177	137	85	85	27	8	40	5	427	377	M8	115	95	140	3	15
R3...F 90 V	24	50	M8	177	137	85	85	27	8	40	5	467	417	M8	115	95	140	3	15
R3...F 100 L	28	60	M10	195	148	85	85	31	8	50	5	465	405	M8	130	110	160	3.5	12.5
R3...F 100 V	28	60	M10	195	148	85	85	31	8	50	5	515	455	M8	130	110	160	3.5	12.5
R3...F 112 M	28	60	M10	218	158	85	85	31	8	50	5	483	423	M8	130	110	160	3.5	16
R3...F 112 V	28	60	M10	218	158	85	85	31	8	50	5	533	473	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 132 V	38	80	M12	258	197	145	130	41	10	70	5	690	610	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 160 V	42	110	M16	311	244	186	186	45	12	90	10	838	728	M12	215	180	250	4	14

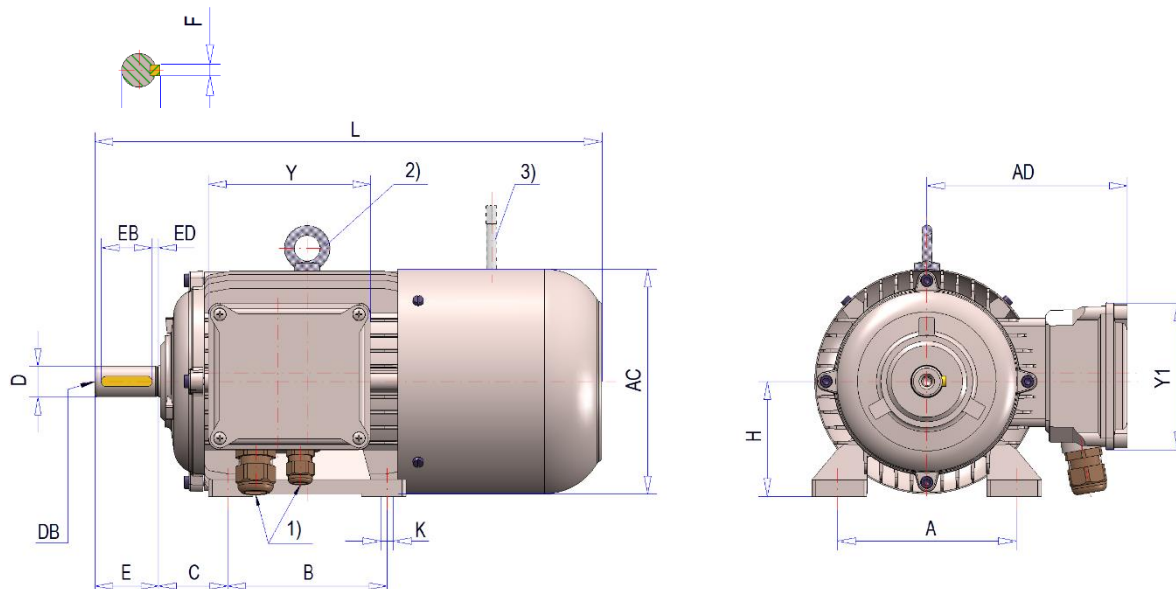
\* Versions IM B14 / IM 3601, IM V18 / IM 3611, IM V19 / IM 3631 (*Section Designs*)

Date: 02/11/2021  
Version: 2.1

## Explosion protected motors, Series R3G + R3D

### Dimension sheets for motors Series R3D

Size: 63 – 180 / Cooling type: IC411 self-ventilated / Protection class:  $\geq$ IP 55 / Zone 22 / Version IM B3



- 1) See planning section (Section *Cable glands in the terminal box*)
  - 2) With lifting eye from size 112 and above
  - 3) Manual release as option (can be ordered in positions 0°/90°/180°/270° see Section Terminal box position)
- Fits and tolerances see (*Section Fits and tolerances*)  
Subject to technical amendments

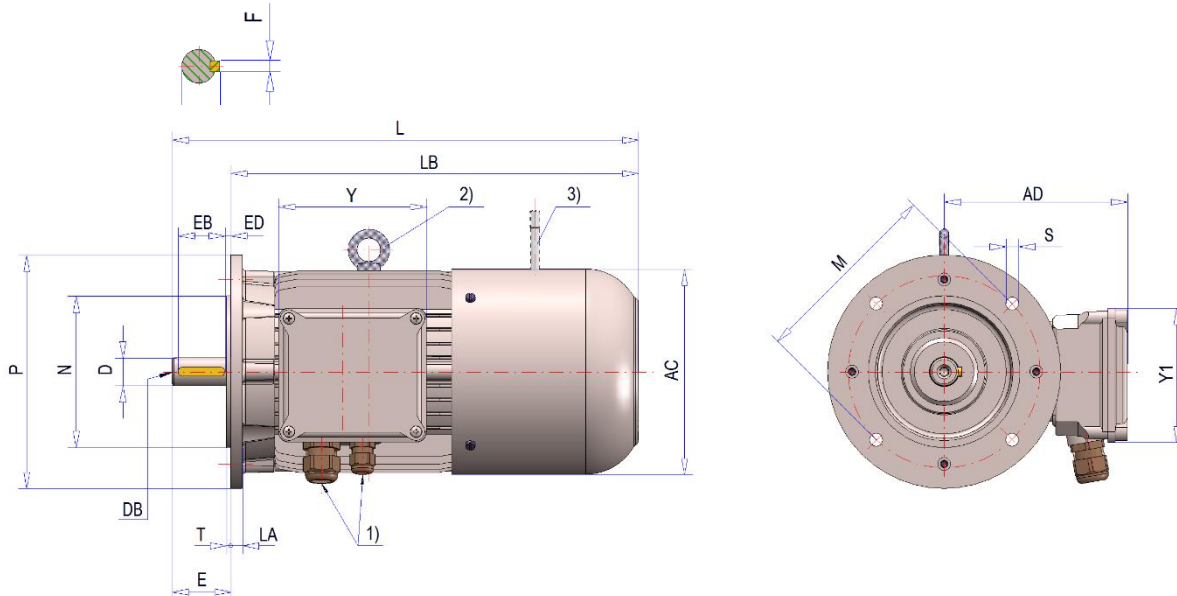
Type	B	A	K	H	C	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L
R3D 63 K/L ...B4	80	100	7	63	40	11	23	M4	123	121	117	103	12.5	4	18	2.5	260
R3D 71 K/L ...B4	90	112	7	71	45	14	30	M5	138	130	117	103	16	5	25	2.5	298
R3D 80 K/L ...B8	100	125	9.5	80	50	19	40	M6	156	144	127	115	21.5	6	32	4	331
R3D 90 S ...B16	100	140	10	90	56	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 90 V ...B16	125	140	10	90	56	24	50	M8	176	157	127	115	27	8	40	5	434
R3D 100 L ...B32	140	160	11.2	100	63	28	60	M10	194	166	127	115	31	8	50	5	444
R3D 100 V ...B32	140	160	11.2	100	63	28	60	M10	194	166	127	115	31	8	50	5	494
R3D 112 M ...B60	140	190	11.2	112	70	28	60	M10	218	178	127	115	31	8	50	5	464
R3D 112 V ...B60	140	190	11.2	112	70	28	60	M10	218	178	127	115	31	8	50	5	504
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 132 V ...B80	178	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	625
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 160 V ...B150	254	254	14.5	160	108	42	110	M16	310	244	186	186	45	12	90	10	756
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

\* Versions IM B3 / IM 1001, IM B6 / IM 1051, IM B7 / IM 1061, IM B8 / IM 1071, IM V5 / IM 1011, IM V6 / IM 1031 (*Section Designs*)

Date: 02/11/2021  
Version: 2.1

## Explosion protected motors, Series R3G + R3D

Size: 63 – 180 / Cooling type: IC411 self-ventilated / Protection class:  $\geq$ IP 55 / Zone 22 / Version IM B5



1) See planning section (Section *Cable glands in the terminal box*)

2) With lifting eye from size 112 and above

3) Manual release as option (can be ordered in positions 0°/90°/180°/270° see Section Terminal box position)

Fits and tolerances see (Section *Fits and tolerances*)

Subject to technical amendments

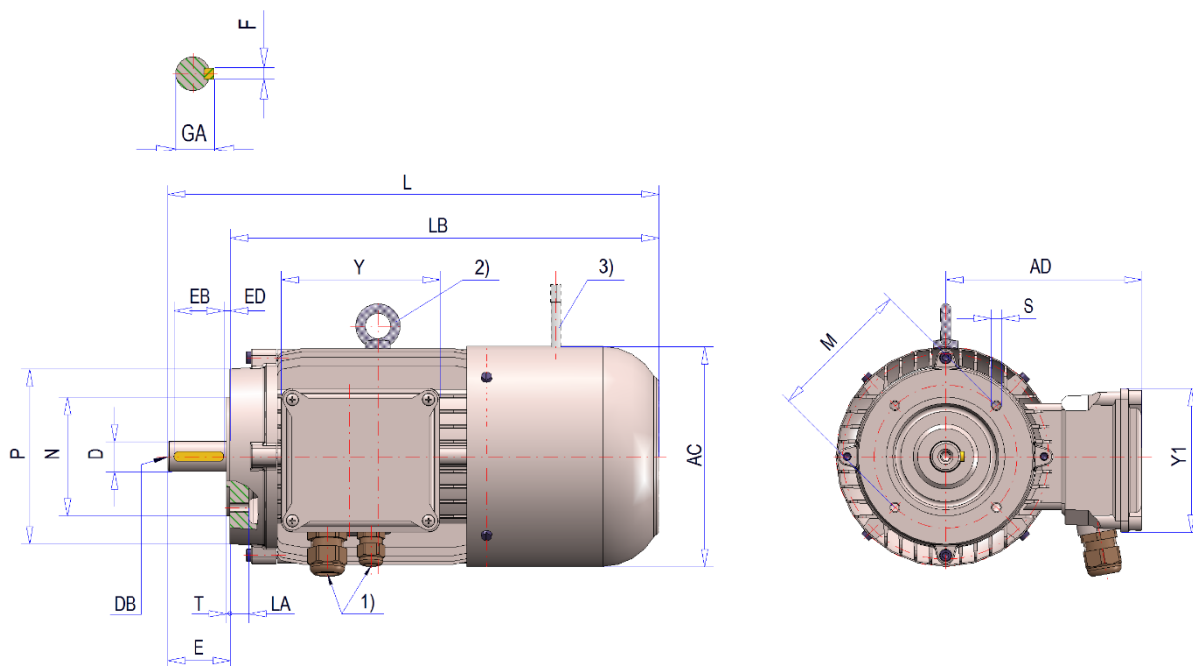
Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
R3DF 63 K/L ...B4	11	23	M4	123	121	117	103	12.5	4	18	2.5	260	237	9	115	95	140	3	10
R3DF 71 K/L ...B4	14	30	M5	138	130	117	103	16	5	25	2.5	298	268	9	130	110	160	3.5	10
R3DF 80 K/L ...B8	19	40	M6	156	144	127	115	21.5	6	32	4	331	291	9	165	130	200	3.5	10
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 90 V ...B16	24	50	M8	176	157	127	115	27	8	40	5	434	384	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 100 V ...B32	28	60	M10	194	166	127	115	31	8	50	5	494	434	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 112 V ...B60	28	60	M10	218	178	127	115	31	8	50	5	504	444	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 132 V ...B80	38	80	M12	258	197	145	130	41	10	70	5	625	545	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 160 V ...B150	42	110	M16	310	244	186	186	45	12	90	10	756	646	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

\* Versions IM B5 / IM 3001, IM V1 / IM 3011, IM V3 / IM 3031 (Section *Designs*)

Date: 02/11/2021  
Version: 2.1

## Explosion protected motors, Series R3G + R3D

Size: 63 – 180 / Cooling type: IC411 self-ventilated / Protection class:  $\geq$ IP 55 / Zone 22 / Version IM B14



1) See planning section (Section *Cable glands in the terminal box*)

2) With lifting eye from size 112 and above

3) Manual release as option (can be ordered in positions 0°/90°/180°/270° see Section Terminal box position)

Fits and tolerances see (Section *Fits and tolerances*)

Subject to technical amendments

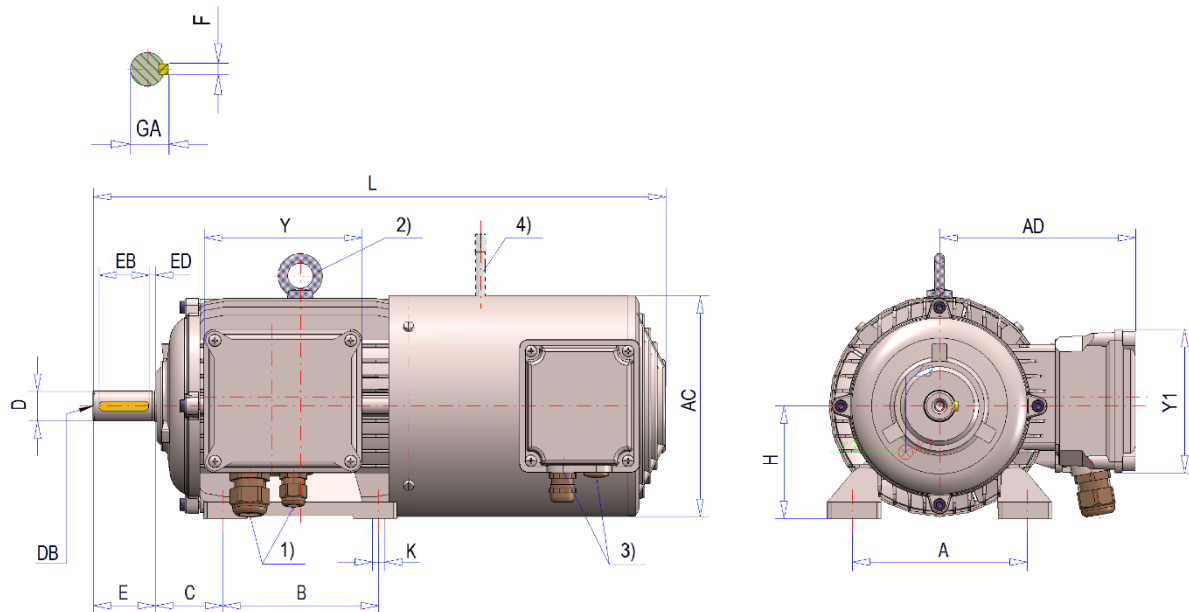
Type	D	E	DB	AC	AD	Y	Y1	GA	F	EB	ED	L	LB	S	M	N	P	T	LA
R3DF 63 K/L ...B4	11	23	M4	123	121	117	103	12.5	4	18	2.5	260	237	M5	75	60	90	2.5	9.5
R3DF 71 K/L ...B4	14	30	M5	138	130	117	103	16	5	25	2.5	298	268	M6	85	70	105	2.5	10
R3DF 80 K/L ...B8	19	40	M6	156	144	127	115	21.5	6	32	4	331	291	M6	100	80	120	3	12.5
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 90 V ...B16	24	50	M8	176	157	127	115	27	8	40	5	434	384	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 100 V ...B32	28	60	M10	194	166	127	115	31	8	50	5	494	434	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 112 V ...B60	28	60	M10	218	178	127	115	31	8	50	5	504	444	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 132 V ...B80	38	80	M12	258	197	145	130	41	10	70	5	625	545	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 160 V ...B150	42	110	M16	310	244	186	186	45	12	90	10	756	646	M12	215	180	250	4	14

\* Versions IM B14 / IM 3601, IM V18 / IM 3611, IM V19 / IM 3631 (Section *Designs*)

Date: 02/11/2021  
Version: 2.1

## Explosion protected motors, Series R3G + R3D

Size: 63 – 180 / Cooling type: IC416 externally ventilated / Protection class:  $\geq$ IP 55 / Zone 22 / Version IM B3



1) See planning section (Section *Cable glands in the terminal box*)

2) With lifting eye from size 112 and above

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

4) Manual release as option (can be ordered in positions 0°/90°/180°/270° see Section Terminal box position)

Fits and tolerances see (Section *Fits and tolerances*)

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 90 V ...B16	125	140	10	90	56	24	50	M8	177	157	127	115	27	8	40	5	502
R3D 100 L ...B32	140	160	11.2	100	63	28	60	M10	195	166	127	115	31	8	50	5	510
R3D 100 V ...B32	140	160	11.2	100	63	28	60	M10	195	166	127	115	31	8	50	5	560
R3D 112 M ...B60	140	190	11.2	112	70	28	60	M10	218	178	127	115	31	8	50	5	533
R3D 112 V ...B60	140	190	11.2	112	70	28	60	M10	218	178	127	115	31	8	50	5	573
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 132 V ...B80	178	216	11	132	89	38	80	M12	258	197	145	130	41	10	70	5	740
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 160 V ...B150	254	254	14.5	160	108	42	110	M16	311	244	186	186	45	12	90	10	866
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

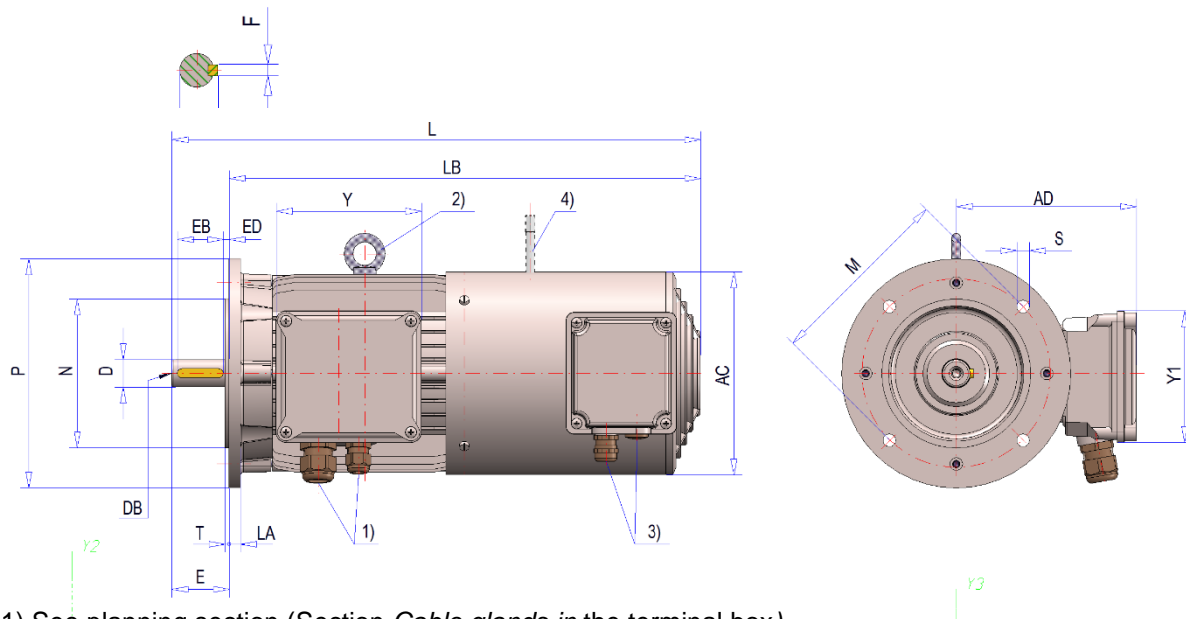
\* Versions IM B3 / IM 1001, IM B6 / IM 1051, IM B7 / IM 1061, IM B8 / IM 1071, IM V5 / IM 1011, IM V6 / IM 1031 (Section *Designs*)

Date: 02/11/2021

Version: 2.1

## Explosion protected motors, Series R3G + R3D

Size: 63 – 180 / Cooling type: IC416 externally ventilated / Protection class:  $\geq$ IP 55 / Zone 22 / Version IM B5



1) See planning section (Section *Cable glands in the terminal box*)

2) With lifting eye from size 112 and above

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

4) Manual release as option (can be ordered in positions 0°/90°/180°/270° see Section Terminal box position)

Fits and tolerances see (Section *Fits and tolerances*)

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 90 V ...B16	24	50	M8	177	157	127	115	27	8	40	5	502	452	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 100 V ...B32	28	60	M10	195	166	127	115	31	8	50	5	560	500	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 112 V ...B60	28	60	M10	219	178	127	115	31	8	50	5	573	513	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 132 V ...B80	38	80	M12	258	197	145	130	41	10	70	5	740	660	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 160 V ...B150	42	110	M16	311	244	186	186	45	12	90	10	866	756	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

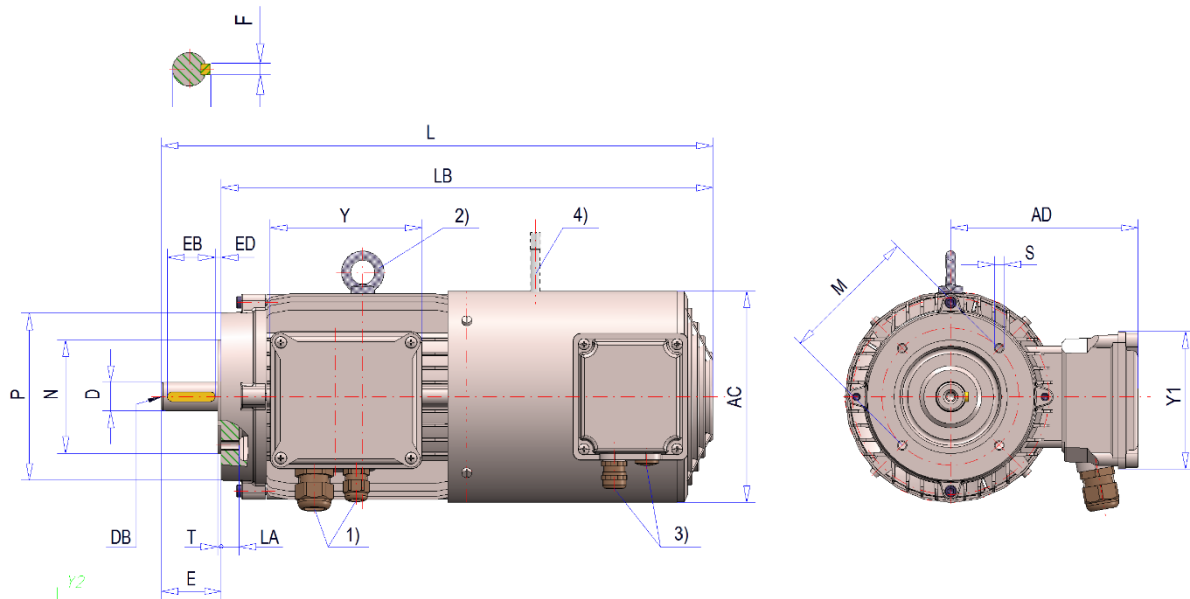
\* Versions IM B5 / IM 3001, IM V1 / IM 3011, IM V3 / IM 3031 (Section *Designs*)

Date: 02/11/2021  
Version: 2.1



## Explosion protected motors, Series R3G + R3D

Size: 63 – 180 / Cooling type: IC416 externally ventilated / Protection class:  $\geq$ IP 55 / Zone 22 / Version IM B14



1) See planning section (Section *Cable glands in the terminal box*)

2) With lifting eye from size 112 and above

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

4) Manual release as option (can be ordered in positions 0°/90°/180°/270° see Section Terminal box position)

Fits and tolerances see (*Section Fits and tolerances*)

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 90 V ...B16	24	50	M8	177	157	127	115	27	8	40	5	502	452	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 100 V ...B32	28	60	M10	195	166	127	115	31	8	50	5	560	500	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 112 V ...B60	28	60	M10	219	178	127	115	31	8	50	5	573	513	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 132 V ...B80	38	80	M12	258	197	145	130	41	10	70	5	740	660	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 160 V ...B150	42	110	M16	311	244	186	186	45	12	90	10	893	783	M12	215	180	250	4	14

\* Versions IM B14 / IM 3601, IM V18 / IM 3611, IM V19 / IM 3631 (*Section Designs*)

Date: 02/11/2021  
Version: 2.1

## Explosion protected **DEx Series motors**

### Explosion protected DEx Series motors

## Contents of planning section explosion protected DEx Series motors

### Overview of production range

HEW has produced asynchronous motors for more than 125 years. Our product line comprises the following variants:

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

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

They are normally manufactured in thermal class F and are equipped 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 optionally be equipped with these encoders.

Standard motors are available in protection class IP 55. Higher protection classes are optionally available (Section IP protection classes).

Versions which comply with other standards or directives (e.g. UL/EAC, VIK or DNV-GL) are available on request.



## Explosion protected **DEx Series** motors

### Primer/paint

HEW motors can be supplied with various coating systems. Motors are preferably painted. Painting is carried out according to a coating system based on corrosivity categories (DIN EN ISO 12944). Standard painting is based on corrosivity category C1. Higher standard corrosivity categories are available on request.

#### **Standard HEW colours:**

- RAL 5010 (gentian blue)
- RAL 7031 (blue-grey)
- RAL 6011 (reseda green)

#### **Preferred RAL colours** can be supplied at short notice:

- RAL 2003 (pastel orange)
- RAL 2004 (pure orange)
- RAL 3020 (traffic red)
- RAL 5003 (sapphire blue)
- RAL 5009 (azure blue)
- RAL 6018 (yellow-green)
- RAL 7035 (light grey)
- RAL 9005 (deep black)

**Special colours** according to various colour schemes are also available after prior examination. Please contact us if necessary.

#### **Gloss values**

Our standard gloss value is **high gloss**.

Our standard textured paint is only available as glossy

Special gloss values are available after prior examination. Please contact us if necessary.

A primed version is optionally available.

## Explosion protected DEx Series motors

### 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 components which could act as ignition sources are contained in a pressure-proof housing which is sealed with 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 difficult start-up conditions and speed-controlled drives
Increased safety "e"	DIN EN 60079-7  Equipment for Zone 1+2	Measures must be taken to safely prevent the formation of sparks, arcs and impermissible heat during normal operation of the equipment as intended.	Only squirrel cage motors with appropriately adjusted motor protection switches. The specified $t_E$ times must be complied with.
Ignition protection type "ec"	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 manner.	All motor types, e.g.: - squirrel cage motors - slip ring motors - collector motors etc. with motor protection switch and overpressure monitoring.  Prevention of the escape of sparks produced during operation. Refer to 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 limitation of the maximum temperature of the housing surface and limitation of dust ingress by using "dust-proof" or "dust protected" housings.	All electrical motors with protection by housings with limited surface temperature.

## Explosion protected DEx Series motors

### 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 bodies agreed on a defined procedure to determine the ignition temperature which is as close as possible to lowest practically value.

Gases and vapours are accordingly categorised into temperature classes. In compliance 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 excesses and mandatory lower deviations from these control values.

Standard motors comply with the highest IIC group and temperature class T4 which includes all lower groups and temperature classes. With regard to size, motors of temperature class T4 have the same power as standard motors which are not protected against explosion. Motors are also available in temperature classes T5 and T6 on request. In this case, the nominal power may need 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
<b>T1</b>	> + 450 °C	+ 400 °C	+ 410 °C
<b>T2</b>	> + 300...≤ + 450°C	+ 300 °C	+ 260 °C
<b>T3</b>	> + 200...≤ + 300°C	+ 200 °C	+ 160 °C
<b>T4</b>	> + 135...≤ + 200°C	+ 135 °C	+ 95 °C
<b>T5</b>	> + 100...≤ + 135°C	+ 100 °C	+ 60 °C
<b>T6</b>	> + 85...≤ + 100°C	+ 85 °C	+ 45 °C

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

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

## Explosion protected **DEx Series** motors

### Dust explosion protection

#### Surface temperature - protection class

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

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

## Explosion protected DEx Series motors

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 Health and Safety]	Certification requirement
<b>For combustible gases, vapours and mists</b>				
II	1G*	0	Zone 0 consists of areas where an explosive atmosphere containing 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 consists of areas where an explosive atmosphere containing a mixture of air and gases, vapours and mists occurs occasionally.	Yes
II	3G	2	Zone 2 consists of areas where an explosive atmosphere containing a mixture of air and gases, vapours and mists is not likely to occur. If this does occur, then in all probability only rarely and for a short period.	No
<b>For inflammable dust</b>				
II	1D*	20	Zone 20 consists of areas where an explosive atmosphere containing a mixture of air and gases is present permanently, for an extended period of time, or frequently.	Yes
II	2D	21	Zone 21 includes areas where an explosive atmosphere containing a mixture of air and gases occasionally occurs.	Yes
II	3D	22	Zone 22 consists of areas where an explosive atmosphere containing swirled dust is not likely to occur. If his does occur, then in all probability only very rarely and for a short period.	No

\*unusual for electric motors

## Explosion protected DEx Series motors

### Maintaining explosion protection

Maintaining the explosion protection during operation:

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

Systems monitoring the motors must comply with the requirements of Directives 2014/34/EC and EN 1127-1.

Operating mode	Motor protection
<b>S1</b>	Motor protection switch according to DIN EN 60034-1; DIN EN 60079-14 Motor protection switch and temperature sensor in the winding as additional protection
<b>S2</b>	Motor protection switch runtime timer and/or temperature sensor in the winding as additional protection.  Master protection device: only temperature sensor in the winding (Only permissible with approved controllers/triggering devices)
<b>S3 – S9</b>	Master protection device: only temperature sensor in the winding (Only permissible 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.).

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

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



## Explosion protected DEx Series motors

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

<b>Title</b> (Rotating electrical machines)	<b>IEC international</b>	<b>EN-CENELEC Europe</b>	<b>DIN Germany</b>
Rating and operating behaviour	IEC 60034-1	EN 60034-1	DIN EN 60034-1
Protection classes due to the general construction of rotating electrical machines (IP code) - Classification	IEC 60034-5	EN 60034-5	DIN EN 60034-5
Classification of cooling methods (IC code)	IEC 60034-6	EN 60034-6	DIN EN 60034-6
Classification of types of construction, installation types 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 characteristics of three-phase cage induction motors, except for 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 - enhanced 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

# Explosion protected **DEx Series** motors

## Mechanical design

### Designs

Overview of the version and IM code (international mounting) for the most frequently used versions according 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				

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## Explosion protected **DEx Series** motors

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

The table in Section Designs shows the symbols and possible configurations of the standard models which we manufacture. 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 large variety of other flange sizes is also available (see Section Flange variants).

Vertical versions with the shaft end at the bottom or top must be protected against dripping water or foreign bodies which could fall into the motor. Versions with the shaft end pointing down are usually protected with a roof. However, this protection is not required if the machine is equipped with such a protective cover.

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

## Explosion protected **DEx Series motors**

### IP protection classes

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

**1. Code number (0 to 6):** Protection levels for protection against contact and foreign objects.

**2. Code number (0 to 8):** protection levels for protection against water.

The motors are available 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 ingress of solid foreign bodies (1st digit)
<b>IP 55 / IP 56</b>	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.
<b>IP 65</b>	Full protection against touching of electrically live and moving internal parts.  Ingress of dust is fully prevented.

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

Other protection classes available on request

## Explosion protected **DEx Series** motors

### Housing designs

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 are self-ventilated (with a fan). Cooling is achieved by the ambient air which the fan blows over the outer ribbed surface (cooling system IC 411 according to DIN EN 60034-6). The motors have cast iron housings.

Size	Stator housing	Bearing covers	Terminal box
63	Cast iron, bolt-on feet (terminal box cast on the stator housing)	Cast iron B 5, B 14 bolted	Cast iron
71			
80			
90			
100			
112			
132			
160	Cast iron, bolt-on feet (separate rotatable terminal box)		
180			
200			
225			
250			
280			
315			

## Explosion protected DEx Series motors

### Flange variants

#### Flange variants

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

#### Available flanges

Size	FF-flange Ø in mm <sup>(1)</sup>										FT-flange Ø in mm <sup>(1)</sup>						
	115	130	165	215	265	300	350	400	500	600	75	85	100	115	130	165	215
	A flanges Ø in mm <sup>(2)</sup>										C flanges Ø in mm <sup>(2)</sup>						
	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

## Explosion protected DEx Series motors

### 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 if the load values specified in the tables are not exceeded.

Only bearings made by brand-name manufacturers are installed. If required by the customer, we can also install other bearing types and sizes in the motors (depending on the particular version).

In the standard version, fixed bearings are used on the D side (drive side) of sizes 63 to 250, and on the N side (non-driven side) of sizes 280 to 315.

### Bearing

Size	Poles	DS bearing	NS bearing	Sealing ring
63	2-8	6201 2Z C3	6201 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 above are available with roller bearings

Motors with insulated bearings are available

## Explosion protected DEx Series motors

### Shaft ends

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

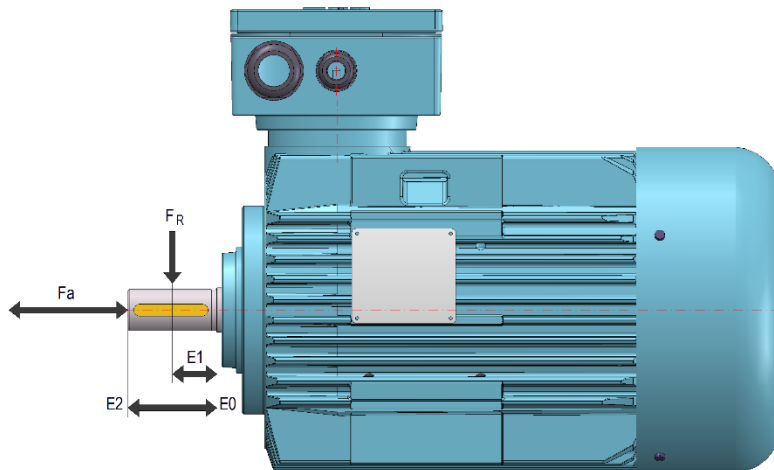
The DS shaft end of all motors has a centre bore according to DIN 332 Part 2 Shape D. The NS shaft end has a centre hole according to DIN 332 Part 1. The motors are always supplied with parallel keys which comply with DIN 6885 Part 1. Versions with a second free shaft end are available on request.

- up to a diameter of 50 mm – ISO k6
- 50 mm and larger – 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 are considered. The service life of the bearings is shorter when a combination of axial and radial loads is present.



# Explosion protected DEx Series motors

## Maximum radial load

Maximum load on free shaft end $F_a$ [kN]												
Device configuration	IM B7 IM B8 IM B14 IM B34				IM V18 IM V19 IM V1 IM V3 IM V5 IM V6							
	IM B3 IM B35 IM B5 IM B6				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
<b>63</b>	0.26	0.26	0.31	0.34	0.27	0.27	0.32	0.35	0.13	0.13	0.15	0.17
<b>71</b>	0.27	0.34	0.39	0.43	0.33	0.43	0.47	0.52	0.35	0.46	0.51	0.55
<b>80</b>	0.36	0.45	0.52	0.57	0.43	0.55	0.62	0.69	0.47	0.60	0.69	0.76
<b>90</b>	0.41	0.51	0.59	0.65	0.48	0.61	0.69	0.77	0.54	0.68	0.79	0.86
<b>100</b>	0.55	0.69	0.79	0.88	0.64	0.81	0.92	1.03	0.75	0.94	1.07	1.11
<b>112</b>	0.55	0.69	0.79	0.88	0.63	0.77	0.89	1.00	0.76	0.98	1.10	1.14
<b>132</b>	0.83	1.04	1.20	1.32	0.92	1.13	1.30	1.48	1.16	1.47	1.67	1.82
<b>160</b>	1.52	1.91	2.19	2.41	1.65	2.10	2.40	2.65	2.13	2.68	3.08	3.31
<b>180</b>	1.77	2.24	2.56	2.82	1.85	2.30	2.71	3.00	2.55	3.26	3.74	4.13
<b>200</b>	2.23	2.94	3.37	3.71	2.39	3.06	3.54	3.89	3.45	4.38	4.91	5.50
<b>225</b>	2.66	3.36	3.85	4.23	2.71	3.30	3.78	4.25	4.03	5.05	5.94	6.28
<b>250</b>	2.98	3.76	4.30	4.73	2.92	3.85	4.07	4.48	4.62	5.55	6.81	7.46
<b>280</b>	3.50	4.41	5.05	5.56	3.18	3.76	4.52	4.82	5.51	7.13	7.94	8.89
<b>315</b>	3.58	4.51	5.17	5.69	2.33	2.31	2.01	2.55	6.09	8.15	9.34	10.05

## Explosion protected DEx Series motors

### Maximum radial load

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

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## Explosion protected DEx Series motors

### Bearing lubrication

Standard version motors are fitted with permanently lubricated bearings.

Any deviation from the nominal operating temperature affects the service life of the motor bearings.

(Observe the manufacturer's recommendations for extreme operating conditions)

Motors with re-greasing device:

Motors of size 160 and above can be fitted with a re-greasing device. The specified re-greasing intervals and grease types must be observed for these motors. After re-greasing, the motor should be run without load to distribute the grease.

The effectiveness of the bearing lubrication should be tested by measuring the bearing cover temperature of the running motor. The re-greasing intervals must be shortened if the measured temperature exceeds + 80 °C. Re-greasing intervals should be halved for every 15 K of temperature rise. If this is not possible, special lubricants for very high operating temperatures should be used.

#### Ball bearing lubrication - 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

#### Roller bearing lubrication - 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

## Explosion protected **DEx Series** motors

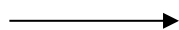
### Terminal box configuration and cable entries

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

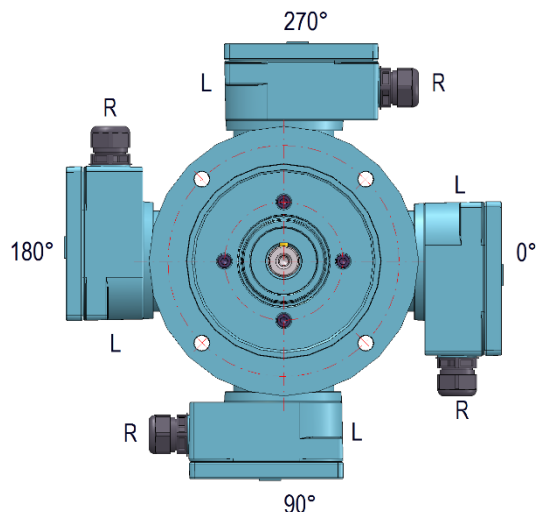
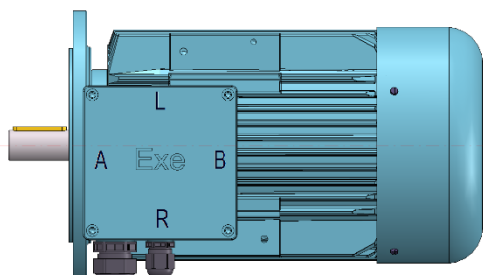
Size	Version	Standard version	Special version	Version	Standard version	Special version
63	Foot	270°B, L, R	on request	Flange	0°B, L, R	on request
71	Foot	270°B, L, R	on request	Flange	0°B, L, R	on request
80	Foot	270°R	270° A, B, L	Flange	0° R	0° A, B, L / 90° A, B, R, L 180° A, B, R, L / 270° A, B, 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

## Explosion protected DEx Series motors

Looking at the shaft face



to determine the position of the terminal box



**Standard terminal box configuration: 0°R**

Ex e type terminal boxes have threaded holes (see table) and are equipped with suitable Ex e cable glands.

As standard, Ex d type terminal boxes are supplied with the threaded holes (as per the table). Cable glands are not included in the scope of delivery (other threads on request).

Terminal boxes and cable glands				
Size	Terminals For connection cables with maximum cross section (mm <sup>2</sup> )	Cable entries for power cables		
		Ex e housing		Ex d housing
		Threaded hole	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 holes for cable glands are available on request.

Special motor versions (e.g. with standstill heating) are supplied with an additional M20 x 1.5 cable entry.

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## Explosion protected DEx Series motors

### Noise

Noise level:

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

Maximum permissible noise level L in dB (distance of one metre from 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

### Vibration

The rotors of the motors are dynamically balanced with fan and half of the parallel key fitted. The vibration amplitude corresponds to level A (normal) according 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

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## Explosion protected **DEx Series** motors

### Electrical design

#### Output, voltage and frequency

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

Voltage fluctuations up to ± 5 % and frequency fluctuations up to ± 2 % are permissible. 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 optimum motor power: required power of the driven machines; operating mode; start-up, braking and reversing mode, torque curve of the driven machine; mains characteristics (FI operation); cooling, coolant temperature; installation altitude.

#### Heating and thermal classes

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

The stator windings of the motors comply with thermal class F. 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 which comply with thermal class H with windings for operation under extreme conditions and frequent switch-on/switch-off cycles and are also available on request.

#### Circuits

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

#### Overload

The motors are designed so that once they have reached their operating temperature, they can be operated with a 1.5x overload for two minutes without damage.

## Explosion protected **DEx Series** motors

### Rotation direction

In general, the motors are suited for both directions of rotation. The winding ends U1, V1, W1 of the motors are designed so that the motor rotates in clockwise direction if they are connected to L1, L2, L3 of the 3-phase mains respectively. Counter clockwise rotation is achieved by exchanging two outer leads (e.g. L1 with L2). The rotation direction applies when looking at the shaft face (DS).

### Earthing and PE connection

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

### Operation on the frequency inverter

#### Operation with frequency inverters

When operated with a frequency inverter, the speed of three-phase asynchronous motors can be set or continuously adjusted by means of the frequency. Careful planning is the prerequisite for optimum matching of the 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 the sole motor protection.

Motor selection primarily depends on the required speed range and the torque curve of the driven machine. During planning, the most critical operation point must be determined. Then, the motor size and the number of poles are selected. The most critical operating 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. However, this may 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 proportional to the frequency. The case where the voltage remains constant and only the frequency increases is referred to as field weakening. The motor torque reduces by  $1/f$  (NB: the breakdown torque reduces according to the square of  $1/f$ ).

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

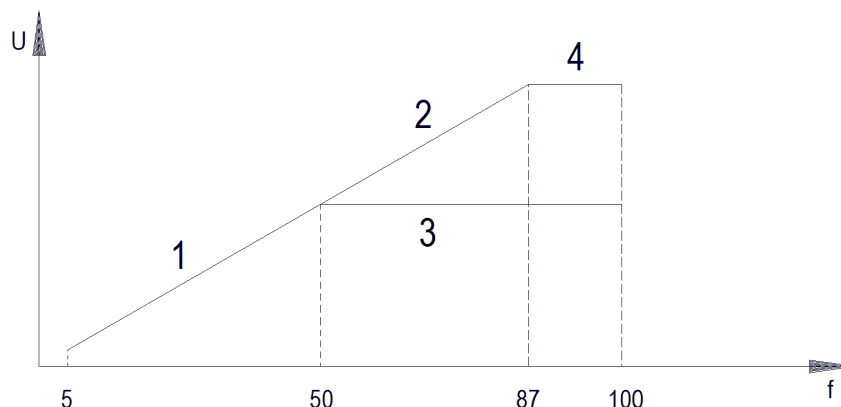
Section **Explosion protected three-phase motors, operation** with frequency inverters shows the permissible torques for the typical speed ranges of motors with 2, 4, 6 and 8 poles. Feasible operation of the motors depends on the voltage version selected (230/400 V or 400/690 V).

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



## Explosion protected DEx Series motors

### Schematic diagram



1	U/f constant up to 50 Hz	Power increases proportional to the speed Motor torque according to tables Explosion protected three-phase motors, operation with frequency inverters
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 must comply with DIN EN 60079-14 and Directive 2014/34/EU. A motor protection switch or equivalent device must protect all poles of the motor against impermissible heating caused by overloading. An equivalent protective device would be a PTC to monitor the winding temperature in conjunction with an approved triggering device as necessary.

Sole protection with temperature sensor is mandatory for all operating modes other than S1, such as frequency 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 are equipped with a PTC. Optionally, the motors can also be equipped with additional temperature sensors such as advance warning or thermostatic switches (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 71 and above can be equipped with an optional external fan in order to increase the effective output or to comply with the temperature class for inverter or switching operation.

All external fans are supplied with a three-phase connection.

## Explosion protected **DEx Series** motors

### Installation altitude and coolant temperature

Power reductions are required in the case of coolant temperatures other than 40°C or or installation altitudes above 1000 m. 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.

## Explosion protected DEx Series motors

### Standstill heating

Standstill heating against condensation:

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

Standstill heating for low temperature operation:

For ambient temperatures of  $< -20^{\circ}\text{C}$ , standstill heating is mandatory (operation permissible down to  $-50^{\circ}\text{C}$ ).

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 ± 10%	63	12.5	230 ± 10%
71	12.5	230 ± 10%	71	12.5	230 ± 10%
80	25	230 ± 10%	80	25	230 ± 10%
90	25	230 ± 10%	90	25	230 ± 10%
100	25	230 ± 10%	100	50	230 ± 10%
112	50	230 ± 10%	112	50	230 ± 10%
132	50	230 ± 10%	132	50	230 ± 10%
160	50	230 ± 10%	160	75	230 ± 10%
180	75	230 ± 10%	180	150	230 ± 10%
200	75	230 ± 10%	200	200	230 ± 10%
225	100	230 ± 10%	225	200	230 ± 10%
250	150	230 ± 10%	250	300	230 ± 10%
280	200	230 ± 10%	280	300	230 ± 10%
315	250	230 ± 10%	315	400	230 ± 10%

\*Special voltage on request

## Explosion protected **DEx Series** motors

### Special versions

#### Motors with encoder

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

	<b>Standard version</b>	<b>Special version</b>
Brand:	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 **Explosion protected three-phase motors, special version** Hollow shaft encoder

#### Motors with motor cable

Optionally the motors can be supplied with a motor cable instead of a terminal box. Connection to the motor occurs with a pressure-proof cable gland on the motor housing. The standard cable length is 1.5 m. Other cable lengths available on request.

Dimension sheets: See **Explosion protected three-phase motors, special version** Cable connection

#### Motors with special shaft and special flange

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

Dimension sheets on request



## Explosion protected DEx Series motors

### 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 A-side	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				•	•	•	•	•	•	•	•	•	•	•
Re-greasing device								•	•	•	•	•	•	•
Motors with brake Type BM		•	•	•	•	•	•							
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	•	•	•	•	•	•	•	•	•	•	•	•	•	
VIK version	•	•	•	•	•	•	•	•	•	•	•	•	•	•
DNV-GL approval	•	•	•	•	•	•	•	•	•	•	•	•	•	•
EAC approval	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Special Paint Specification	•	•	•	•	•	•	•	•	•	•	•	•	•	•

- Option available on request.

Date: 02/11/2021  
Version: 2.1

# Explosion protected DEx Series motors

## Explosion protected three-phase motors (single speed)

2-pole 400V-50Hz IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 3000 rpm

Type D_Ex	Efficiency	Nominal power P <sub>N</sub> kW	Nominal speed n rpm	Efficiency η %	Power factor cos φ	Nominal current (400V) I <sub>N</sub> A	Nominal torque M <sub>N</sub> Nm	Start-up to nominal current I <sub>A</sub> /I <sub>N</sub>	Start-up to nominal torque M <sub>A</sub> /M <sub>N</sub>	Breakdown to nominal torque M <sub>k</sub> /M <sub>N</sub>	Moment of inertia J kgm <sup>2</sup>	Weight IM B3 M kg (approx.)
63KH/2	IE2	0.18	2750	64.5	0.77	0.52	0.62	3.9	3.0	2.9	0.00014	13
63LH/2	IE2	0.25	2765	67.0	0.80	0.67	0.86	4.2	2.7	2.7	0.00019	14
71KH/2	IE2	0.37	2820	67.2	0.81	0.98	1.3	5.4	3.0	3.2	0.00034	15
71LH/2	IE2	0.55	2800	72.7	0.86	1.28	1.9	5.4	2.8	3.1	0.00042	16
80KP/2	IE3	0.75	2845	81.1	0.84	1.59	2.5	6.8	3.0	3.3	0.00104	25
80LP/2	IE3	1.1	2840	83.3	0.84	2.27	3.7	6.5	3.2	3.3	0.00122	26
90SP/2	IE3	1.5	2875	85.1	0.86	2.96	5.0	7.3	2.9	3.4	0.00146	33.5
90VP/2	IE3	2.2	2870	85.9	0.87	4.25	7.3	7.4	2.5	2.7	0.00223	39.5
100VP/2	IE3	3.0	2915	87.1	0.85	5.85	9.9	8.1	2.8	3.4	0.00428	52
112MP/2	IE3	4.0	2925	88.1	0.855	7.65	13.1	9.1	2.9	3.8	0.00655	65
132SAP/2	IE3	5.5	2940	89.8	0.81	10.9	17.9	10.1	3.7	4.7	0.01656	84
132SBP/2	IE3	7.5	2930	90.1	0.865	13.9	24.5	8.8	3.0	3.8	0.01922	95
160MAP/2	IE3	11	2940	91.2	0.868	20.0	35.6	8.26	2.8	3.3	0.02943	148
160MBP/2	IE3	15	2940	92.1	0.898	26.2	48.6	7.6	3.1	3.1	0.03912	166
160LP/2	IE3	18.5	2940	92.7	0.905	31.8	60.1	8.5	3.2	3.2	0.0459	178
180MP/2	IE3	22	2952	93.2	0.92	37.0	71.1	9.4	3.7	3.1	0.08335	244
200LAP/2	IE3	30	2955	93.8	0.912	50.6	96.9	8.1	2.8	3.0	0.13757	310
200VP/2	IE3	37	2960	94.0	0.91	62.2	119.4	8.2	2.8	2.9	0.15739	350
225MP/2	IE3	45	2970	94.1	0.88	78.4	144.7	9.0	3.2	3.3	0.22155	430
250MP/2	IE3	55	2975	94.3	0.87	96.6	177	9.9	3.5	3.3	0.815	630
280SP/2	IE3	75	2980	94.7	0.87	131.4	240	9.7	3.7	3.1	0.96	776
280MP/2	IE3	90	2980	95.0	0.91	150	289	9.5	3.7	2.9	1.1	811
315S/2		110	Technical data in preparation									
315M/2		132										
315M/20		160										
315L/2		200										

Subject to technical amendments

Date: 02/11/2021  
Version: 2.1

## Explosion protected DEx Series motors

4-pole 400V-50Hz IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 1500 rpm

Type D_Ex	Efficiency	Nominal power  P <sub>N</sub> kW	Nominal speed  n rpm	Efficiency  η %	Power factor  cos φ	Nominal current (400V)  I <sub>N</sub> A	Nominal torque  M <sub>N</sub> Nm	Start-up to nominal current  I <sub>A</sub> /I <sub>N</sub>	Start-up to nominal torque  M <sub>A</sub> /M <sub>N</sub>	Breakdown to nominal torque  M <sub>k</sub> /M <sub>N</sub>	Moment of inertia  J kgm <sup>2</sup>	Weight IM B3  M kg (approx.)
63KH/4	IE2	0.12	1345	59.5	0.69	0.42	0.85	2.8	2.2	2.3	0.00021	13
63LH/4	IE2	0.18	1370	65.0	0.65	0.61	1.25	3.2	2.5	2.6	0.00029	14
71KH/4	IE2	0.25	1370	67.0	0.78	0.69	1.7	3.8	2.15	2.2	0.00051	15
71LH/4	IE2	0.37	1385	72.5	0.78	0.95	2.6	4.0	2.15	2.3	0.00063	16
80KH/4	IE2	0.55	1405	80.4	0.76	1.3	3.8	5.2	2.3	2.4	0.0010	24
80VP/4	IE3	0.75	1420	82.6	0.67	1.95	5.0	5.4	3.1	3.4	0.00208	29
90VP/4	IE3	1.1	1440	84.1	0.71	2.65	7.3	5.7	2.9	3.3	0.00351	38.5
90VP/4	IE3	1.5	1445	85.3	0.71	3.55	9.9	6.1	2.9	3.6	0.00426	41
100VP/4	IE3	2.2	1445	86.7	0.77	4.75	14.5	7.7	2.9	3.5	0.00712	53
100VP/4	IE3	3.0	1445	87.7	0.78	6.33	19.8	7.5	3.2	3.9	0.00913	58
112VP/4	IE3	4.0	1460	89.2	0.769	8.4	26.2	10.0	4.1	5.0	0.01578	78
132SP/4	IE3	5.5	1460	90.3	0.79	11.1	36.0	7.1	3.0	3.7	0.02793	96
132VP/4	IE3	7.5	1465	90.6	0.783	15.25	48.8	9.3	4.3	4.3	0.04416	124.5
160MP/4	IE3	11	1474	91.8	0.77	22.45	71.3	9.0	4.1	3.7	0.07116	178
160VP/4	IE3	15	1472	92.2	0.815	28.8	97.3	8.4	3.5	3.1	0.09691	200
180MP/4	IE3	18.5	1475	92.7	0.785	36.7	119.8	8.6	4.1	3.6	0.14922	273
180VP/4	IE3	22	1475	93.1	0.80	42.6	142.4	8.8	4.0	3.5	0.17663	293
200VP/4	IE3	30	1475	93.8	0.87	53.0	194	9.8	4.1	3.7	0.27865	376
225SP/4	IE3	37	1478	94.0	0.86	66.0	239	10.0	4.4	3.5	0.42845	430
225VP/4	IE3	45	1480	94.2	0.85	81.0	290	8.9	4.0	2.9	0.48581	450
250MP/4	IE3	55	1483	94.8	0.86	97.4	354	10.0	4.4	3.5	0.965	617
280SP/4	IE3	75	1485	95.1	0.84	135	482	8.5	3.3	2.7	1.875	800
280MP/4	IE3	90	1485	95.2	0.85	160.5	578	7.9	3.1	2.3	2.25	850
315S/4		110	Technical data in preparation									
315M/4		132										
315M/40		160										
315L/4		200										

Subject to technical amendments

Date: 02/11/2021  
Version: 2.1

## Explosion protected DEx Series motors

6-pole 400V-50Hz IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 1000 rpm

Type D_Ex	Efficiency	Nominal power  P <sub>N</sub> kW	Nominal speed  n rpm	Efficiency  η %	Power factor  cos φ	Nominal current (400V)  I <sub>N</sub> A	Nominal torque  M <sub>N</sub> Nm	Start-up to nominal current  I <sub>A</sub> /I <sub>N</sub>	Start-up to nominal torque  M <sub>A</sub> /M <sub>N</sub>	Breakdown to nominal torque  M <sub>K</sub> /M <sub>N</sub>	Moment of inertia  J kgm <sup>2</sup>	Weight IM B3  M kg (approx.)
63K/6	-	0.09	895	51.0	0.61	0.42	1.0	2.3	2.2	2.3	0.00031	13
63LH/6	IE2	0.12	885	53.4	0.64	0.51	1.29	2.5	2.2	2.2	0.00042	14
71KH/6	IE2	0.18	930	61.9	0.66	0.64	1.85	3.1	2.2	2.5	0.00081	15
71LH/6	IE2	0.25	920	64.8	0.69	0.81	2.59	3.4	2.1	2.3	0.00101	16
80KH/6	IE2	0.37	920	68.0	0.69	1.13	3.84	3.6	2.1	2.3	0.0019	25
80LH/6	IE2	0.55	925	73.1	0.70	1.55	5.68	3.8	1.7	2.1	0.0024	26.5
90SP/6	IE3	0.75	Technical data in preparation									
90VP/6	IE3	1.1										
100VP/6	IE3	1.5										
112VP/6	IE3	2.2										
132SP/6	IE3	3.0										
132MAP/6	IE3	4.0										
132MBP/6	IE3	5.5										
160MP/6	IE3	7.5										
160VP/6	IE3	11.0										
180VP/6	IE3	15.0										
200VP/6	IE3	18.5										
200LBP/6	IE3	22.0										
225MP/6	IE3	30.0										
250MP/6	IE3	37.0										
280SP/6	IE3	45.0										
280MP/6	IE3	55.0										
315S/6		75.0										
315M/6		90.0										
315M/60		110.0										
315L/6		132.0										

Subject to technical amendments

Date: 02/11/2021  
Version: 2.1



## Explosion protected DEx Series motors

8-pole 400V-50Hz IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 750 rpm

Type D_Ex	Efficiency	Nominal power  P <sub>N</sub> kW	Nominal speed  n rpm	Efficiency  η %	Power factor  cos φ	Nominal current (400V)  I <sub>N</sub> A	Nominal torque  M <sub>N</sub> Nm	Start-up to nominal current  I <sub>A</sub> /I <sub>N</sub>	Start-up to nominal torque  M <sub>A</sub> /M <sub>N</sub>	Breakdown to nominal torque  M <sub>K</sub> /M <sub>N</sub>	Moment of inertia  J kgm <sup>2</sup>	Weight IM B3  M kg (approx.)
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	IE2	0.12	680	58.4	0.62	0.48	1.69	2.5	1.7	1.9	0.00101	16
80K/8	IE2	0.18									0.0019	25
80L/8	IE2	0.25									0.0024	26.5
90S/8	IE2	0.37	685	68.2	0.65	1.25	5.16	3.0	1.8	2.1	0.0032	32
90L/8	IE2	0.55	685	70.9	0.64	1.75	7.67	3.1	1.9	2.1	0.0042	35
100VP/8	IE3	0.75	Technical data in preparation									
100VP/8	IE3	1.1										
112VP/8	IE3	1.5										
132VP/8	IE3	2.2										
132VP/8	IE3	3.0										
160VP/8	IE3	4.0										
160VP/8	IE3	5.5										
160LP/8	IE3	7.5										
180VP/8	IE3	11.0										
200VP/8	IE3	15.0										
225VP/8	IE3	18.5										
225VP/8	IE3	22.0										
250MP/8	IE3	30.0										
280SP/8	IE3	37.0										
280MP/8	IE3	45.0										
315S/8		55.0										
315M/8		75.0										
315M/80		90.0										
315L/8		110.0										

Subject to technical amendments

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Version: 2.1



# Explosion protected DEx Series motors

## Explosion protected three-phase motors (pole-switching)

### 4-2-pole 400V-50Hz Δ/YY IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 1500 rpm / 3000 rpm

Type DEx DDEx	Nominal power P <sub>N</sub> kW	Nominal speed n rpm	Nominal current (400V) I <sub>N</sub> A	Nominal torque M <sub>N</sub> Nm	Start-up to nominal current I <sub>s</sub> /I <sub>N</sub>	Breakdown to nominal torque M <sub>k</sub> /M <sub>N</sub>	Moment of inertia J kgm <sup>2</sup>	Weight IM B3 M kg (approx.)																																																																																																																																																																																																																																																																																																																																																																																				
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																																																																																																																																																																																																																																																												
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																																																																																																																																																																																																																																																																											
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

Date: 02/11/2021  
Version: 2.1



## Explosion protected DEx Series motors

6-4-pole 400V-50Hz Y/Y IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 1000 rpm / 1500 rpm

Type DEx DDEx	Nominal power $P_N$ kW	Nominal speed $n$ rpm	Nominal current (400V) $I_N$ A	Nominal torque $M_N$ Nm	Start-up to nominal current $I_a/I_N$	Breakdown to nominal torque $M_k/M_N$	Moment of inertia J kgm <sup>2</sup>	Weight IM B3 M kg (approx.)
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
	0.32	1455	1.05	2.10	4.2	2.1		
80L/6-4	0.26	940	0.94	2.64	3.5	2.2	0.0013	28
	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
	0.66	1450	1.75	4.35	5.3	2.2		
90L/6-4	0.6	960	1.8	5.97	3.6	2.1	0.0026	36
	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
	1.3	1420	3.0	8.74	4.5	1.9		
100 L/6-40	1.1	960	2.8	10.9	4.3	1.8	0.0050	49
	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
	2.4	1450	5.05	15.8	5.4	1.9		
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
	4.5	1460	8.9	29.4	6.3	1.9		
160M/6-4	3.8	965	9.0	37.6	6.0	2.0	0.0542	155
	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
	8	1480	16.8	51.6	7.0	2.0		
180GM/6-4	7.5	980	16.6	73.1	6.3	2.0	0.1129	220
	11	1470	22	71.5	6.5	1.6		
180GL/6-4	9	980	20	87.7	6.5	2.0	0.1339	240
	13	1470	26	84.5	7.0	1.5		
200GL/6-4	13	980	31	126	6.8	2.1	0.213	260
	19	1470	39	123	7.2	2.2		
225GS/6-4	19	980	40	185	6.0	2.0	0.362	320
	23	1470	48	149	6.3	2.2		
225GM/6-4	23	980	48	224	6.0	2.1	0.429	400
	27	1470	56	175	6.5	2.0		
250GM/6-4	27	980	53	263	6.0	2.1	0.875	490
	32	1470	65	207	6.5	2.2		
280S/6-4	32	985	63	310	6.5	2.3	1.88	610
	45	1475	89	291	7.0	2.7		
280M/6-4	37	985	72	358	6.5	2.3	2.25	685
	55	1475	108	356	7.0	2.7		
315S/6-4	45	985	88	436	6.8	2.1	3.5	820
	67	1485	130	430	7.2	2.3		
315M/6-4	55	985	108	533	6.8	2.1	3.9	930
	80	1485	155	514	7.2	2.3		

Subject to technical amendments

Date: 02/11/2021  
Version: 2.1

**General Catalogue Herforder-Elektromotoren-Werke**

## Explosion protected DEx Series motors

8-4-pole 400V-50Hz Δ/YY IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 750 rpm / 1500 rpm

Type DEx	Nominal power P <sub>N</sub> kW	Nominal speed n rpm	Nominal current (400V) I <sub>N</sub> A	Nominal torque M <sub>N</sub> Nm	Start-up to nominal current I <sub>a</sub> /I <sub>N</sub>	Breakdown to nominal torque M <sub>k</sub> /M <sub>N</sub>	Moment of inertia J kgm <sup>2</sup>	Weight IM B3 M kg (approx.)
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

Date: 02/11/2021  
Version: 2.1

## Explosion protected DEx Series motors

8-6-pole 400V-50Hz Y/Y IC 411

Thermal class: F

Operating mode: S1

Synchronous speed: 750 rpm / 1000 rpm

Type DEx	Nominal power $P_N$ kW	Nominal speed $n$ rpm	Nominal current (400V) $I_N$ A	Nominal torque $M_N$ Nm	Start-up to nominal current $I_A/I_N$	Breakdown to nominal torque $M_K/M_N$	Moment of inertia J kgm <sup>2</sup>	Weight IM B3 M kg (approx)
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
	0.8	970	2.15	7.88	4.1	1.8		
100 L/8-60	0.75	710	2.4	10.1	3.1	1.6	0.00857	49
	0.9	970	2.5	8.86	4.7	2.0		
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
	2.0	975	5.5	19.6	6.2	2.4		
132M/8-6	2.2	725	6.8	29.0	3.9	2.1	0.03229	99
	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
	5.0	975	12.0	49.0	6.4	2.1		
160L/8-6	5.0	725	12.0	65.9	5.5	2.4	0.10916	197
	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
	9.5	980	24	92.6	6.2	1.8		
200GL/8-6	10	725	23	131	5.5	2.3	0.24369	260
	13	980	27	126	6.8	2.1		
225GS/8-6	13	725	29	171	5.3	1.7	0.57008	320
	16	975	36	156	6.2	1.6		
225GM/8-6	17	725	42	223	5.4	1.7	0.66117	400
	22	975	54	215	6.5	1.6		
250GM/8-6	22	730	51	287	5.8	1.9	1.125	490
	30	985	65	290	6.5	1.6		
280S/8-6	27	735	63	350	5.8	1.8	2.3	610
	35	985	80	339	6.5	1.6		
280M/8-6	33	735	74	428	6.0	1.8	2.625	685
	41	985	90	397	6.7	1.6		
315S/8-6	40	735	90	519	6.0	1.8	4.625	820
	50	985	102	484	7.0	1.6		
315M/8-6	48	735	103	623	6.0	1.8	5.25	930
	62	985	125	601	7.0	1.6		

Subject to technical amendments

Date: 02/11/2021  
Version: 2.1

## Explosion protected DEx Series motors

### Explosion protected three-phase motors, operation with frequency inverters

#### 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	
Ventilation	IC 411														external ventilation
Torque curve		M ~ n <sup>2</sup>		constant		constant		constant		constant		M ~ 50/f		constant	
Frequency	50 Hz	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	a/Hz	a/Hz	a/Hz	a/Hz	a/Hz	a/Hz	a/Hz	a/Hz	a/Hz	a/Hz	a/Hz	a/Hz	a/Hz	a/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 windings from size 280 and above on request

Subject to technical amendments

Date: 02/11/2021

Version: 2.1

# Explosion protected DEx Series motors

## 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	
Ventilation	IC 411														external ventilation
Torque curve		M ~ n <sup>2</sup>		constant		constant		constant		constant		M ~ 50/f		constant	
Frequency	50 Hz	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	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	a/Hz	a/Hz	a/Hz	a/Hz	a/Hz	a/Hz	a/Hz	a/Hz	a/Hz	a/Hz	a/Hz	a/Hz	a/Hz	a/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 windings from size 280 and above on request

Subject to technical amendments

Date: 02/11/2021  
 Version: 2.1

# Explosion protected DEx Series motors

## Frequency inverter operation: 6-pole motors

Operation	Mains	Frequency inverter operation													
Ventilation	IC 411	IC 411		IC 411		IC 411		IC 411		IC 411		IC 411		IC 416	
															external ventilation
Torque curve		M ~ n <sup>2</sup>		constant		constant		constant		constant		M ~ 50/f		constant	
Frequency	50 Hz	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	a/Hz	a/Hz	a/Hz	a/Hz	a/Hz	a/Hz	a/Hz	a/Hz	a/Hz	a/Hz	a/Hz	a/Hz	a/Hz	a/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 and above on request

Subject to technical amendments

Date: 02/11/2021  
 Version: 2.1



# Explosion protected DEx Series motors

## Frequency inverter operation: 8-pole motors

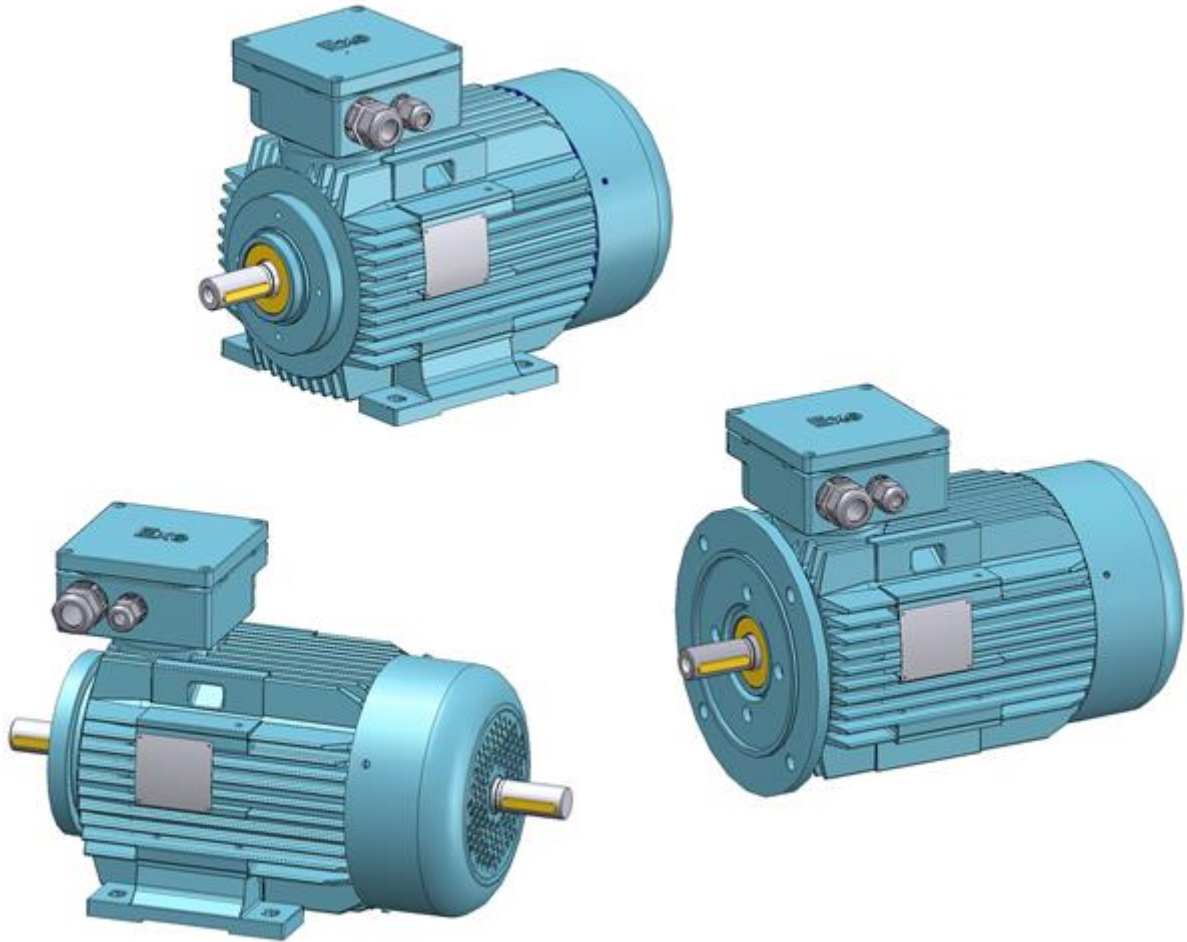
Operation	Mains	Frequency inverter operation													
Ventilation	IC 411	IC 411	IC 411	IC 411	IC 411	IC 411	IC 411	IC 411	IC 411	IC 411	IC 411	IC 411	IC 411	IC 416	external ventilation
Torque curve		M ~ n <sup>2</sup>	constant	constant	constant	constant	constant	constant	constant	constant	M ~ 50/f	constant	constant	constant	constant
Frequency	50 Hz	5-50Hz	20-50Hz	10-50Hz	5-50Hz	50 - 87Hz *	50-87Hz	5-50Hz	50 - 87Hz *	50-87Hz	50-87Hz	50-87Hz	50-87Hz	5-50Hz	5-50Hz
Synchronous speed		75 - 750	300 - 750	150 - 750	75 - 750	750 - 1305	750 - 1305	75 - 750	750 - 1305	750 - 1305	750 - 1305	750 - 1305	750 - 1305	75 - 750	75 - 750
Control range		1 : 10	1 : 2.5	1 : 5	1 : 10	1 : 1.74	1 : 1.74	1 : 10	1 : 1.74	1 : 1.74	1 : 1.74	1 : 1.74	1 : 1.74	1 : 10	1 : 10
Voltage/Frequency		U/f = constant	U/f = constant	U/f = constant	U/f = constant	U/f = constant	U/f = constant	U/f = constant	U/f = constant	U/f = constant	U = constant	U = constant	U = constant	U/f = 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	a/Hz	a/Hz	a/Hz	a/Hz	a/Hz	a/Hz	a/Hz	a/Hz	a/Hz	a/Hz	a/Hz	a/Hz	a/Hz	a/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 windings from size 280 and above on request

Subject to technical amendments

Date: 02/11/2021  
 Version: 2.1

Explosion protected **DEx Series motors**  
Dimension sheets for DEx Series motors

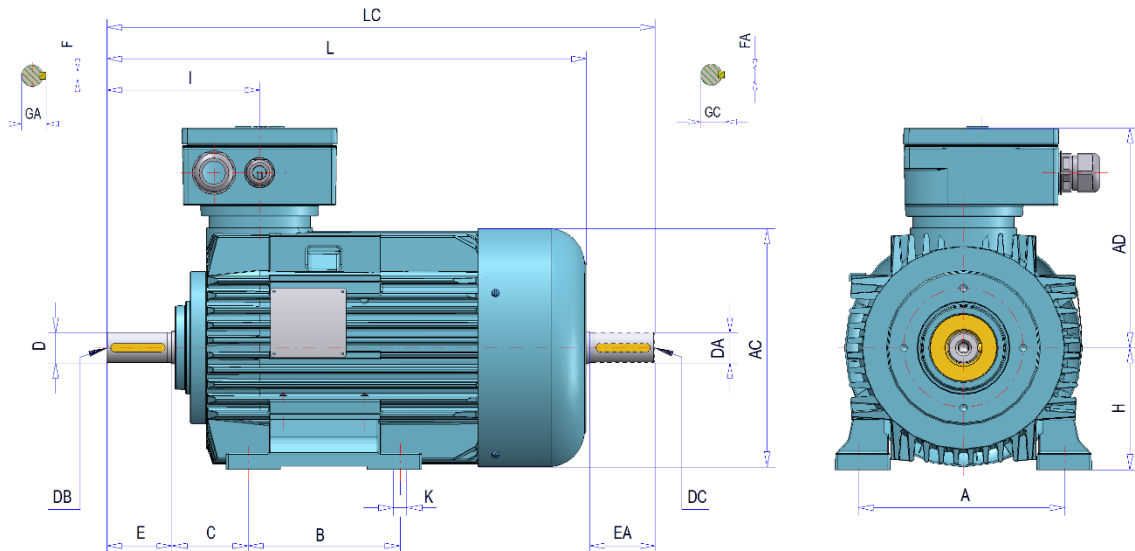


Date: 02/11/2021  
Version: 2.1

## Explosion protected DEx Series motors

Size: 63 – 315 / Cooling type: IC411 / Temperature Class T1 to T4 /

Versions: IM B3 – IM 1001 / IM V5 – IM 1011 / IM V6 – IM 1031



Fits and tolerances see (Section Fits and tolerances)

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
D_Ex 63 K/L	80	100	7	63	40	11	23	M5	125	147	12.5	4	87	238	269
D_Ex 71 K/L	90	112	9	71	45	14	30	M5	139	147	16	5	97	272	307
D_Ex 80 K/L	100	125	10	80	50	19	40	M6	157	169	21.5	6	117	319	362
D_Ex 80 V	100	125	10	80	50	19	40	M6	157	169	21.5	6	117	349	392
D_Ex 90 S	100	140	10	90	56	24	50	M8	177	181	27	8	129	363	415
D_Ex 90 L	125	140	10	90	56	24	50	M8	177	181	27	8	129	363	415
D_Ex 90 V	125	140	10	90	56	24	50	M8	177	181	27	8	129	408	460
D_Ex 100 L	140	160	12	100	63	28	60	M10	195	188	31	8	142	418	483
D_Ex 100 V	140	160	12	100	63	28	60	M10	195	188	31	8	142	487	552
D_Ex 112 M	140	190	12	112	70	28	60	M10	219	199	31	8	142	442	504
D_Ex 112 V	140	190	12	112	70	28	60	M10	219	199	31	8	142	502	564
D_Ex 132 S	140	216	12	132	89	38	80	M12	258	218	41	10	165	536	619
D_Ex 132 M	178	216	12	132	89	38	80	M12	258	218	41	10	165	536	619
D_Ex 132 V	178	216	12	132	89	38	80	M12	258	218	41	10	165	604	687
D_Ex 160 M	210	254	14	160	108	42	110	M16	310	276	45	12	255	669	785
D_Ex 160 L	254	254	14	160	108	42	110	M16	310	276	45	12	255	669	785
D_Ex 160 V	254	254	14	160	108	42	110	M16	310	276	45	12	255	790	849
D_Ex 180 M	241	279	14	180	121	48	110	M16	345	316	51	14	297	707	830
D_Ex 180 L	279	279	14	180	121	48	110	M16	345	316	51	14	297	707	830
D_Ex 180 V	279	279	14	180	121	48	110	M16	345	316	51	14	297	830	953
D_Ex 200 L	305	318	18	200	133	55	110	M20	385	346	59	16	308	790	910
D_Ex 200 V	305	318	18	200	133	55	110	M20	385	346	59	16	308	915	1035
D_Ex 225S	286	356	18	225	149	60	140	M20	435	364	64	18	340	884	1035
D_Ex 225M-2	311	356	18	225	149	55	110	M20	435	364	59	16	310	854	975
D_Ex 225M	311	356	18	225	149	60	140	M20	435	364	64	18	340	884	1035
D_Ex 225V	311	356	18	225	149	60	140	M20	435	364	64	18	340	975	1126
D_Ex 225V-2	311	356	18	225	149	60	140	M20	435	364	64	18	340	945	1066
D_Ex 250M-2	349	406	24	250	168	60	140	M20	491	437	64	18	410	1007	1160
D_Ex 250M	349	406	24	250	168	65	140	M20	491	437	69	18	410	1007	1160
D_Ex 280S-2	368	457	24	280	190	65	140	M20	537	464	69	18	410	1036	1191
D_Ex 280S	368	457	24	280	190	75	140	M20	537	464	79.5	20	410	1036	1191
D_Ex 280M-2	419	457	24	280	190	65	140	M20	537	464	69	18	410	1096	1096
D_Ex 280M	419	457	24	280	190	75	140	M20	537	464	79.5	20	410	1096	1251

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## Explosion protected DEx Series motors

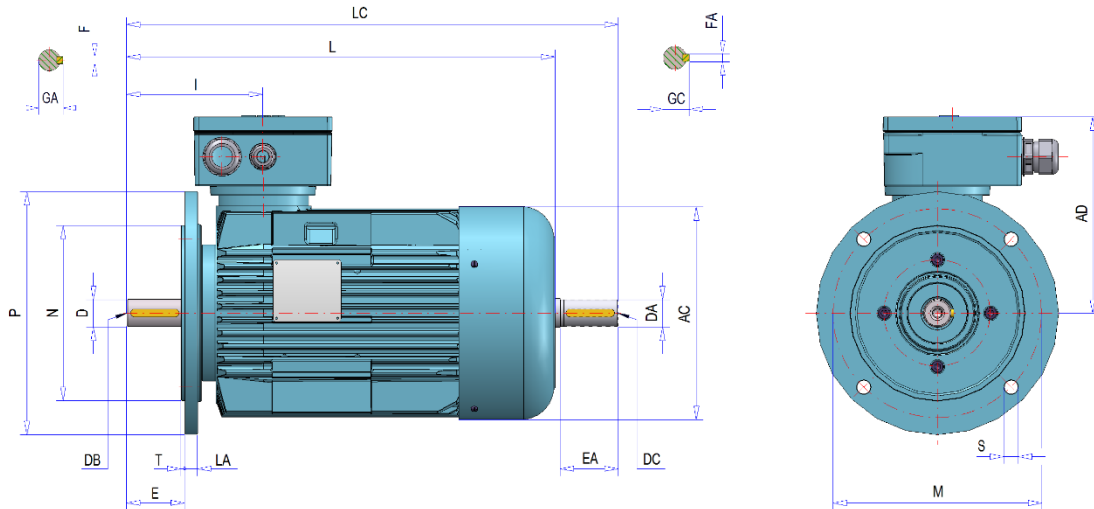
D_Ex 315S-2	406	508	28	315	216	65	140	M20	617	544	69	18	454	1050	1210
D_Ex 315S	406	508	28	315	216	80	170	M20	617	544	85	22	484	1080	1270
D_Ex 315M-2	457	508	28	315	216	65	140	M20	617	544	69	18	454	1220	1380
D_Ex 315M	457	508	28	315	216	80	170	M20	617	544	85	22	484	1250	1440
D_Ex 315M-20	457	508	28	315	216	65	140	M20	617	544	69	18	454	1220	1380
D_Ex 315M0	457	508	28	315	216	80	170	M20	617	544	85	22	484	1250	1440
D_Ex 315L-2	457	508	28	315	216	65	140	M20	617	544	69	18	454	1300	1460
D_Ex 315L	457	508	28	315	216	80	170	M20	617	544	85	22	484	1330	1520

Date: 02/11/2021  
Version: 2.1

## Explosion protected DEx Series motors

Size: 63 – 315 / Cooling type: IC411 / Temperature Class T1 to T4 /

Versions: IM B5 – IM 3001 / IM V1 – IM 3011 / IM V3 – IM 3031



Fits and tolerances see (Section Fits and tolerances)

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
D_Ex 63 K/L	11	23	M5	125	147	12.5	4	87	9	4	115	95	140	3	8	238	269
D_Ex 71 K/L	14	30	M5	139	147	16	5	97	9	4	130	110	160	3.5	10	272	307
D_Ex 80 K/L	19	40	M6	157	169	21.5	6	117	12	4	165	130	200	3.5	10	319	362
D_Ex 80 V	19	40	M6	157	169	21.5	6	117	12	4	165	130	200	3.5	10	349	392
D_Ex 90 S	24	50	M8	177	181	27	8	129	12	4	165	130	200	3.5	10	363	415
D_Ex 90 L	24	50	M8	177	181	27	8	129	14	4	165	130	200	3.5	10	363	415
D_Ex 90 V	24	50	M8	177	181	27	8	129	14	4	165	130	200	3.5	10	408	460
D_Ex 100 L	28	60	M10	195	188	31	8	142	14	4	215	180	250	4	11	418	483
D_Ex 100 V	28	60	M10	195	188	31	8	142	14	4	215	180	250	4	11	487	552
D_Ex 112 M	28	60	M10	219	199	31	8	142	14	4	215	180	250	4	11	442	504
D_Ex 112 V	28	60	M10	219	199	31	8	142	14	4	215	180	250	4	11	502	564
D_Ex 132 S	38	80	M12	258	218	41	10	165	14	4	265	230	300	4	16	536	619
D_Ex 132 M	38	80	M12	258	218	41	10	165	14	4	265	230	300	4	16	536	619
D_Ex 132 V	38	80	M12	258	218	41	10	165	14	4	265	230	300	4	16	604	687
D_Ex 160 M	42	110	M16	310	276	45	12	255	18	4	300	250	350	4	19	669	785
D_Ex 160 L	42	110	M16	310	276	45	12	255	18	4	300	250	350	4	19	669	785
D_Ex 160 V	42	110	M16	310	276	45	12	255	18	4	300	250	350	4	19	790	849
D_Ex 180 M	48	110	M16	345	316	51	14	297	18	4	300	250	350	4	15	707	830
D_Ex 180 L	48	110	M16	345	316	51	14	297	18	4	300	250	350	4	15	707	830
D_Ex 180 V	48	110	M16	345	316	51	14	297	18	4	300	250	350	4	15	830	953
D_Ex 200L	55	110	M20	385	346	59	16	308	18	4	350	300	400	4	18	790	910
D_Ex 200V	55	110	M20	385	346	59	16	308	18	4	350	300	400	4	18	915	1035
D_Ex 225S	60	140	M20	435	364	64	18	340	18	8	400	350	450	8	18	884	1035
D_Ex 225M-2	55	110	M20	435	364	59	16	310	18	8	400	350	450	8	18	854	975
D_Ex 225M	60	140	M20	435	364	64	18	340	18	8	400	350	450	8	18	884	1035
D_Ex 225V	60	140	M20	435	364	64	18	340	18	8	400	350	450	8	18	975	1126
D_Ex 225V-2	60	140	M20	435	364	64	18	340	18	8	400	350	450	8	18	945	1066
D_Ex 250M-2	60	140	M20	491	437	64	18	410	19	8	500	450	550	8	18	1007	1160
D_Ex 250M	65	140	M20	491	437	69	18	410	19	8	500	450	550	8	18	1007	1160
D_Ex 280S-2	65	140	M20	537	464	69	18	410	19	8	500	450	550	8	18	1036	1191
D_Ex 280S	75	140	M20	537	464	79.5	20	410	19	8	500	450	550	8	18	1036	1191
D_Ex 280M-2	65	140	M20	537	464	69	18	410	19	8	500	450	550	8	18	1096	1096
D_Ex 280M	75	140	M20	537	464	79.5	20	410	19	8	500	450	550	8	18	1096	1251

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## Explosion protected DEx Series motors

D_Ex 315S-2	65	140	M20	617	544	69	18	454	24	8	600	550	660	8	18	1050	1210
D_Ex 315S	80	170	M20	617	544	85	22	484	24	8	600	550	660	8	18	1080	1270
D_Ex 315M-2	65	140	M20	617	544	69	18	454	24	8	600	550	660	8	18	1220	1380
D_Ex 315M	80	170	M20	617	544	85	22	484	24	8	600	550	660	8	18	1250	1440
D_Ex 315M-20	65	140	M20	617	544	69	18	454	24	8	600	550	660	8	18	1220	1380
D_Ex 315M0	80	170	M20	617	544	85	22	484	24	8	600	550	660	8	18	1250	1440
D_Ex 315L-2	65	140	M20	617	544	69	18	454	24	8	600	550	660	8	18	1300	1460
D_Ex 315L	80	170	M20	617	544	85	22	484	24	8	600	550	660	8	18	1330	1520

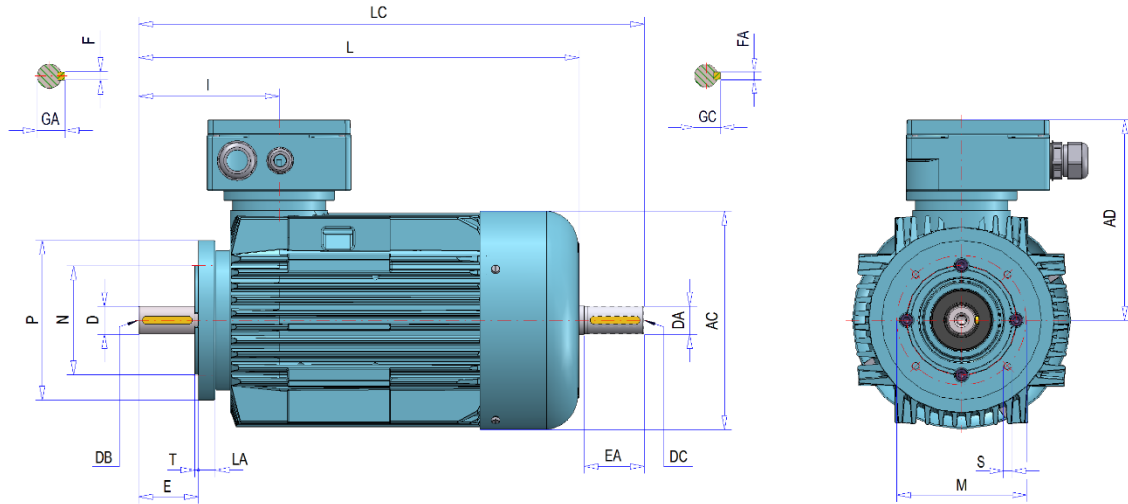
X Number of holes

Date: 02/11/2021  
Version: 2.1

## Explosion protected **DEx Series** motors

Size: 63 – 315 / Cooling type: IC411 / Temperature Class T1 to T4 /

Versions: IM B14 – IM 3601 / IM V18 – IM 3611 / IM V19 – IM 3631



Fits and tolerances see (*Section Fits and tolerances*)

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
D_Ex 63 K/L	11	23	M5	125	147	12.5	4	87	M5	4	75	60	90	2.5	14	238	269
D_Ex 71 K/L	14	30	M5	139	147	16	5	97	M6	4	85	70	105	2.5	20	272	307
D_Ex 80 K/L	19	40	M6	157	169	21.5	6	117	M6	4	100	80	120	3	10	319	362
D_Ex 80 V	19	40	M6	157	169	21.5	6	117	M6	4	100	80	120	3	10	349	392
D_Ex 90 S	24	50	M8	177	181	27	8	129	M8	4	115	95	140	3	10	363	415
D_Ex 90 L	24	50	M8	177	181	27	8	129	M8	4	115	95	140	3	10	363	415
D_Ex 90 V	24	50	M8	177	181	27	8	129	M8	4	115	95	140	3	10	408	460
D_Ex 100 L	28	60	M10	195	188	31	8	142	M8	4	130	110	160	3.5	17	418	483
D_Ex 100 V	28	60	M10	195	188	31	8	142	M8	4	130	110	160	3.5	17	487	552
D_Ex 112 M	28	60	M10	219	199	31	8	142	M8	4	130	110	160	3.5	17	442	504
D_Ex 112 V	28	60	M10	219	199	31	8	142	M8	4	130	110	160	3.5	17	502	564
D_Ex 132 S	38	80	M12	258	218	41	10	165	M10	4	165	130	200	3.5	23	536	619
D_Ex 132 M	38	80	M12	258	218	41	10	165	M10	4	165	130	200	3.5	23	536	619
D_Ex 132 V	38	80	M12	258	218	41	10	165	M10	4	165	130	200	3.5	23	604	687
D_Ex 160 M	42	110	M16	310	276	45	12	255	M12	4	215	180	250	4	17	669	785
D_Ex 160 L	42	110	M16	310	276	45	12	255	M12	4	215	180	250	4	17	669	785
D_Ex 160 V	42	110	M16	310	276	45	12	255	M12	4	215	180	250	4	17	790	849

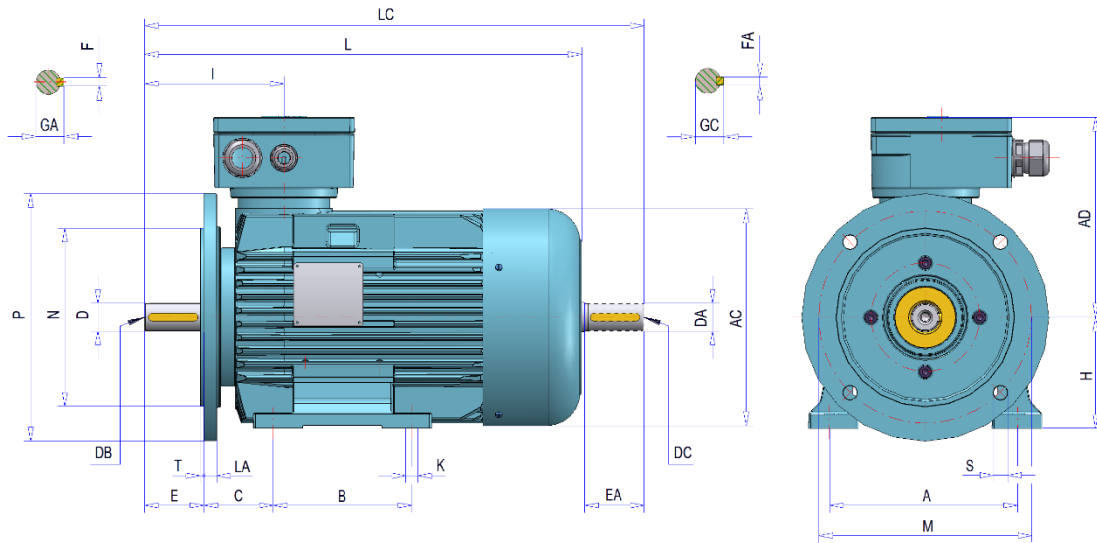
X Number of holes

Date: 02/11/2021  
Version: 2.1

## Explosion protected DEx Series motors

Size: 63 – 315 / Cooling type: IC411 / Temperature Class T1 to T4 /

Versions: IM B35 – IM 2001 / IM V15 – IM 2011 / IM V35 – IM 2031



Fits and tolerances see (Section Fits and tolerances)

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
D_Ex 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
D_Ex 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
D_Ex 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
D_Ex 80 V	100	125	10	80	50	19	40	M6	157	169	21.5	6	117	12	4	165	130	200	3.5	10	349	392
D_Ex 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
D_Ex 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
D_Ex 90 V	125	140	10	90	56	24	50	M8	177	181	27	8	129	14	4	165	130	200	3.5	10	408	460
D_Ex 100 L	140	160	12	100	63	28	60	M10	195	188	31	8	142	14	4	215	180	250	4	11	418	483
D_Ex 100 V	140	160	12	100	63	28	60	M10	195	188	31	8	142	14	4	215	180	250	4	11	487	552
D_Ex 112 M	140	190	12	112	70	28	60	M10	219	199	31	8	142	14	4	215	180	250	4	11	442	504
D_Ex 112 V	140	190	12	112	70	28	60	M10	219	199	31	8	142	14	4	215	180	250	4	11	502	564
D_Ex 132 S	140	216	12	132	89	38	80	M12	258	218	41	10	165	14	4	265	230	300	4	16	536	619
D_Ex 132 M	178	216	12	132	89	38	80	M12	258	218	41	10	165	14	4	265	230	300	4	16	536	619
D_Ex 132 V	178	216	12	132	89	38	80	M12	258	218	41	10	165	14	4	265	230	300	4	16	604	687
D_Ex 160 M	210	254	14	160	108	42	110	M16	310	276	45	12	255	18	4	300	250	350	4	19	669	785
D_Ex 160 L	254	254	14	160	108	42	110	M16	310	276	45	12	255	18	4	300	250	350	4	19	669	785
D_Ex 160 V	254	254	14	160	108	42	110	M16	310	276	45	12	255	18	4	300	250	350	4	19	790	849
D_Ex 180 M	241	279	14	180	121	48	110	M16	345	316	51	14	297	18	4	300	250	350	4	15	707	830
D_Ex 180 L	279	279	14	180	121	48	110	M16	345	316	51	14	297	18	4	300	250	350	4	15	707	830
D_Ex 180 V	279	279	14	180	121	48	110	M16	345	316	51	14	297	18	4	300	250	350	4	15	830	953
D_Ex 200L	305	318	18	200	133	55	110	M20	385	346	59	16	308	18	4	350	300	400	4	18	790	910
D_Ex 200L	305	318	18	200	133	55	110	M20	385	346	59	16	308	18	4	350	300	400	4	18	915	1035
D_Ex 225S	286	356	18	225	149	60	140	M20	435	364	64	18	340	18	8	400	350	450	8	18	884	1035
D_Ex 225M-2	311	356	18	225	149	55	110	M20	435	364	59	16	310	18	8	400	350	450	8	18	854	975
D_Ex 225M	311	356	18	225	149	60	140	M20	435	364	64	18	340	18	8	400	350	450	8	18	884	1035
D_Ex 225V	311	356	18	225	149	60	140	M20	435	364	64	18	340	18	8	400	350	450	8	18	975	1126
D_Ex 225V-2	311	356	18	225	149	60	140	M20	435	364	64	18	340	18	8	400	350	450	8	18	945	1066
D_Ex 250M-2	349	406	24	250	168	60	140	M20	491	437	64	18	410	19	8	500	450	550	8	18	1007	1160
D_Ex 250M	349	406	24	250	168	65	140	M20	491	437	69	18	410	19	8	500	450	550	8	18	1007	1160
D_Ex 280S-2	368	457	24	280	190	65	140	M20	537	464	69	18	410	19	8	500	450	550	8	18	1036	1191
D_Ex 280S	368	457	24	280	190	75	140	M20	537	464	79.5	20	410	19	8	500	450	550	8	18	1036	1191
D_Ex 280M-2	419	457	24	280	190	65	140	M20	537	464	69	18	410	19	8	500	450	550	8	18	1096	1096
D_Ex 280M	419	457	24	280	190	75	140	M20	537	464	79.5	20	410	19	8	500	450	550	8	18	1096	1251

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## Explosion protected DEx Series motors

<b>D_Ex 315S-2</b>	406	508	28	315	216	65	140	M20	617	544	69	18	454	24	8	600	550	660	8	18	1050	1210
<b>D_Ex 315S</b>	406	508	28	315	216	80	170	M20	617	544	85	22	484	24	8	600	550	660	8	18	1080	1270
<b>D_Ex 315M-2</b>	457	508	28	315	216	65	140	M20	617	544	69	18	454	24	8	600	550	660	8	18	1220	1380
<b>D_Ex 315M</b>	457	508	28	315	216	80	170	M20	617	544	85	22	484	24	8	600	550	660	8	18	1250	1440
<b>D_Ex 315M-20</b>	457	508	28	315	216	65	140	M20	617	544	69	18	454	24	8	600	550	660	8	18	1220	1380
<b>D_Ex 315M0</b>	457	508	28	315	216	80	170	M20	617	544	85	22	484	24	8	600	550	660	8	18	1250	1440
<b>D_Ex 315L-2</b>	457	508	28	315	216	65	140	M20	617	544	69	18	454	24	8	600	550	660	8	18	1300	1460
<b>D_Ex 315L</b>	457	508	28	315	216	80	170	M20	617	544	85	22	484	24	8	600	550	660	8	18	1330	1520

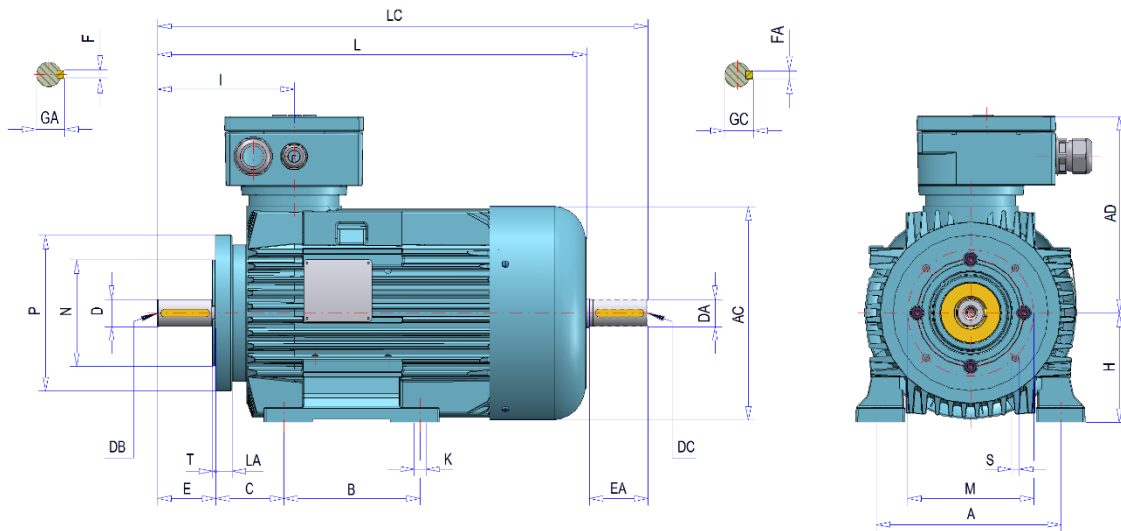
X Number of bores

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## Explosion protected DEx Series motors

Size: 63 – 315 / Cooling type: IC411 / Temperature Class T1 to T4 /

Versions: IM B34 – IM 2101 / IM V17 – IM 2111 / IM V37 – IM 2131



Fits and tolerances see (Section Fits and tolerances)

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
D_Ex 63 K/L	80	100	7	63	40	11	23	M5	125	147	12.5	4	87	M5	4	75	60	90	2.5	14	238	269
D_Ex 71 K/L	90	112	9	71	45	14	30	M5	139	147	16	5	97	M6	4	85	70	105	2.5	20	272	307
D_Ex 80 K/L	100	125	10	80	50	19	40	M6	157	169	21.5	6	117	M6	4	100	80	120	3	10	319	362
D_Ex 80 V	100	125	10	80	50	19	40	M6	157	169	21.5	6	117	M6	4	100	80	120	3	10	349	392
D_Ex 90 S	100	140	10	90	56	24	50	M8	177	181	27	8	129	M8	4	115	95	140	3	10	363	415
D_Ex 90 L	125	140	10	90	56	24	50	M8	177	181	27	8	129	M8	4	115	95	140	3	10	363	415
D_Ex 90 V	125	140	10	90	56	24	50	M8	177	181	27	8	129	M8	4	115	95	140	3	10	408	460
D_Ex 100 L	140	160	12	100	63	28	60	M10	195	188	31	8	142	M8	4	130	110	160	3.5	17	418	483
D_Ex 100 V	140	160	12	100	63	28	60	M10	195	188	31	8	142	M8	4	130	110	160	3.5	17	487	552
D_Ex 112 M	140	190	12	112	70	28	60	M10	219	199	31	8	142	M8	4	130	110	160	3.5	17	442	504
D_Ex 112 V	140	190	12	112	70	28	60	M10	219	199	31	8	142	M8	4	130	110	160	3.5	17	502	564
D_Ex 132 S	140	216	12	132	89	38	80	M12	258	218	41	10	165	M10	4	165	130	200	3.5	23	536	619
D_Ex 132 M	178	216	12	132	89	38	80	M12	258	218	41	10	165	M10	4	165	130	200	3.5	23	536	619
D_Ex 132 V	178	216	12	132	89	38	80	M12	258	218	41	10	165	M10	4	165	130	200	3.5	23	604	687
D_Ex 160 M	210	254	14	160	108	42	110	M16	310	276	45	12	255	M12	4	215	180	250	4	17	669	785
D_Ex 160 L	254	254	14	160	108	42	110	M16	310	276	45	12	255	M12	4	215	180	250	4	17	669	785
D_Ex 160 V	254	254	14	160	108	42	110	M16	310	276	45	12	255	M12	4	215	180	250	4	17	790	849

X Number of holes

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## Explosion protected **DEx Series** motors

### Explosion protected three-phase motors

#### Motors with brake

Brake motors are three-phase asynchronous motors with squirrel cage rotors equipped with a mechanical spring-loaded brake (electrically released). The brakes are supplied 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 run-down times
- locking brake in case of power failure
- precise approach to a certain position
- increased motor switching frequency
- matching of braking torque to work conditions
- high operational safety due to robust design
- long service life

Brake motors are available with the following brake types:

- Motors with integrated brake (size 71 to 132) type BM
- 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

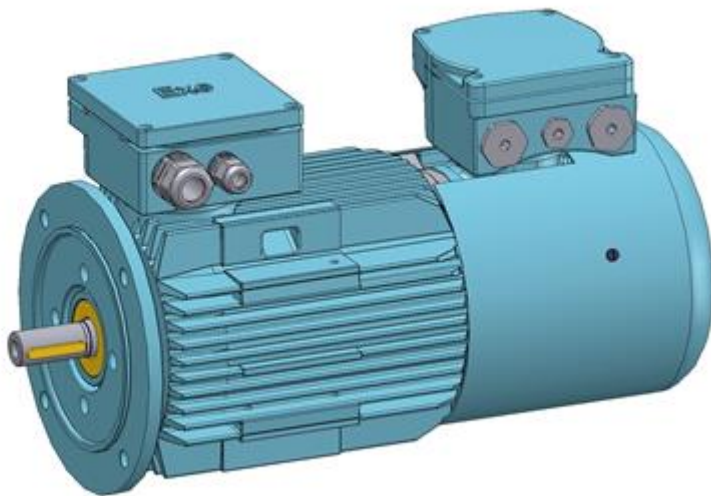
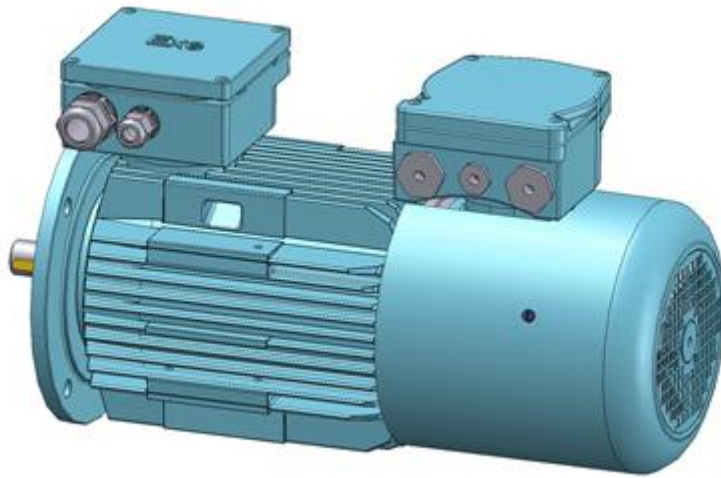
Brakes also available for voltages other than the standard voltages 24 V, 103 V, 180 V, and 205 V. A rectifier is used to connect the brakes to an AC supply. These rectifiers, specially developed for supplying DM solenoids, are protected with a varistor circuit against voltage peaks that occur in association 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 performance 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. In most cases the permissible switching frequency calculated from the moment of inertia, counter torque and load factors can also be assumed to 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 **DEx Series** motors  
Motors with brake/type BM



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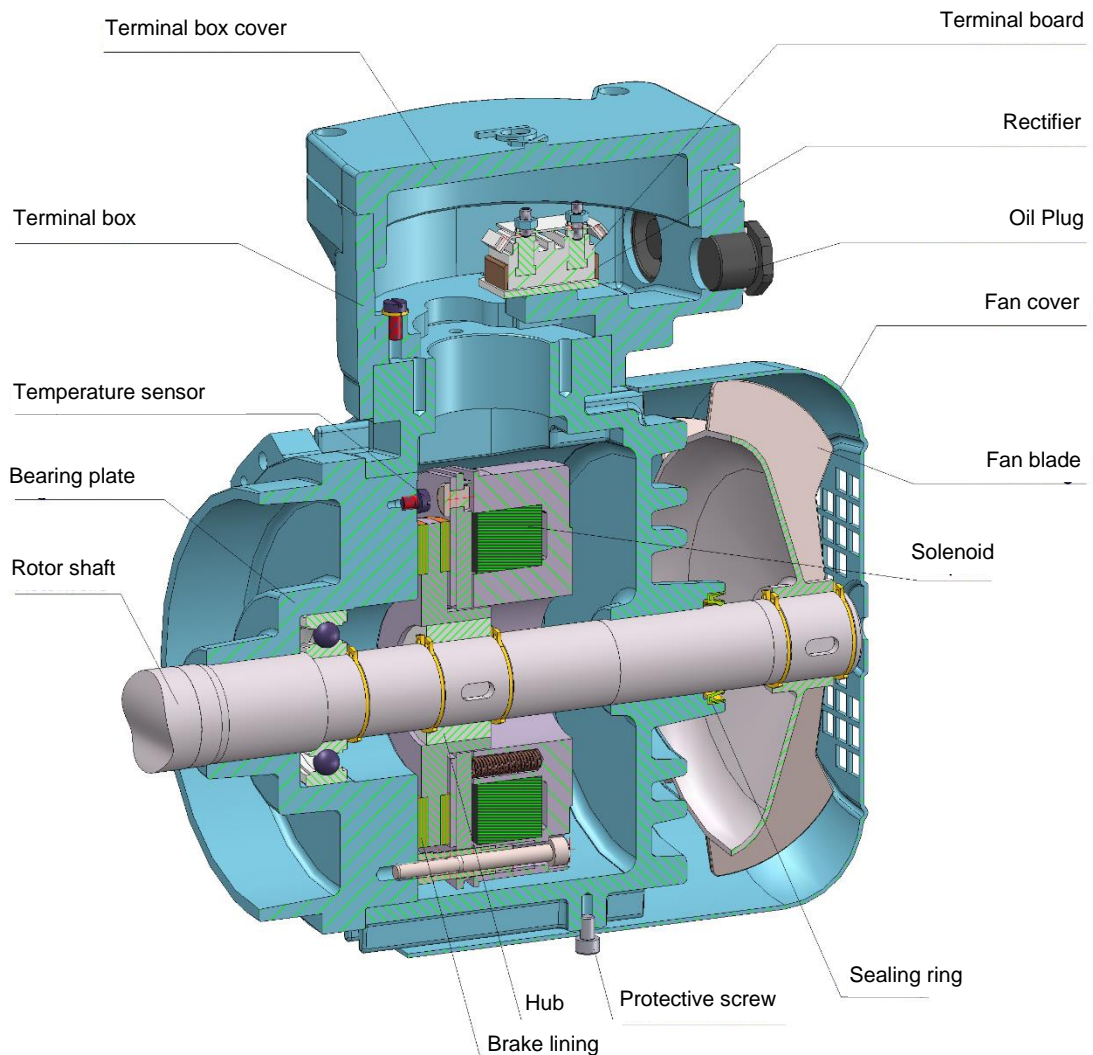
## Explosion protected DEx Series motors

This brake is a single-disc brake with two friction surfaces. In the de-energised 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 magnetic part. The resulting magnetic force pulls the rotor disc against the spring force to the magnetic part. The rotor is no longer subjected to the spring force and can turn freely.

### Generating the braking torque

During braking, the pressure springs move the rotor axially on the hub or shaft via the rotor disc so that it presses against the counter friction surface. When the brake is applied there is an air gap  $S_{li}$  between the rotor disc and the magnet component.



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## Explosion protected **DEx Series** motors

### Technical data for motors with brake / type BM

Size/type	Braking torque [Nm]	Max. speed $n_{max}$ rpm	Nominal input power $P_{20^{\circ}C}$ [W]	Moment of inertia $J_B$ $kgm^2 \cdot 10^{-4}$
D_Ex 71-BM5	5	6000	22	0.13
D_Ex 80-BM10	10	6000	28	0.45
D_Ex 90-BM20	20	6000	34	1.6
D_Ex 100-BM40	40	6000	42	3.6
D_Ex 112-BM60	60	3600	50	4.7
D_Ex 132-BM100	100	3600	64	11.0

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

Brake type BM	BM5	BM10	BM20	BM40	BM60	BM100
Braking torque [Nm]	5	10	20	40	60	100

Size 71	<b>x</b>					
Size 80		<b>x</b>				
Size 90			<b>x</b>			
Size 100				<b>x</b>		
Size 112					<b>x</b>	
Size 132						<b>x</b>

#### Version

The brakes comply with ignition protection types II 2G Ex d IIC Gb and II 2D Ex tb IIIC Db and are therefore approved for application in Zone 1 and Zone 2, as well as Zone 21 and Zone 22. As standard, 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 versions available on request.

## Explosion protected DEx Series motors

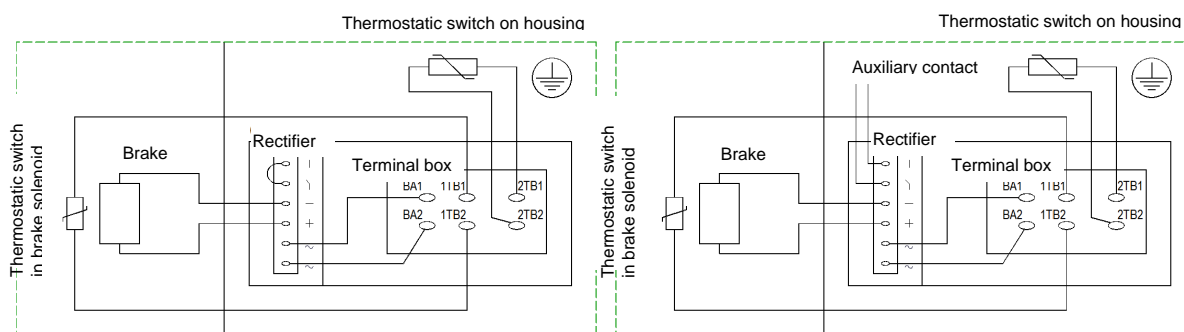
Brake motors of type “integrated brake/type BM” are available in two basic circuit variants:

### AC switching

As standard, 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

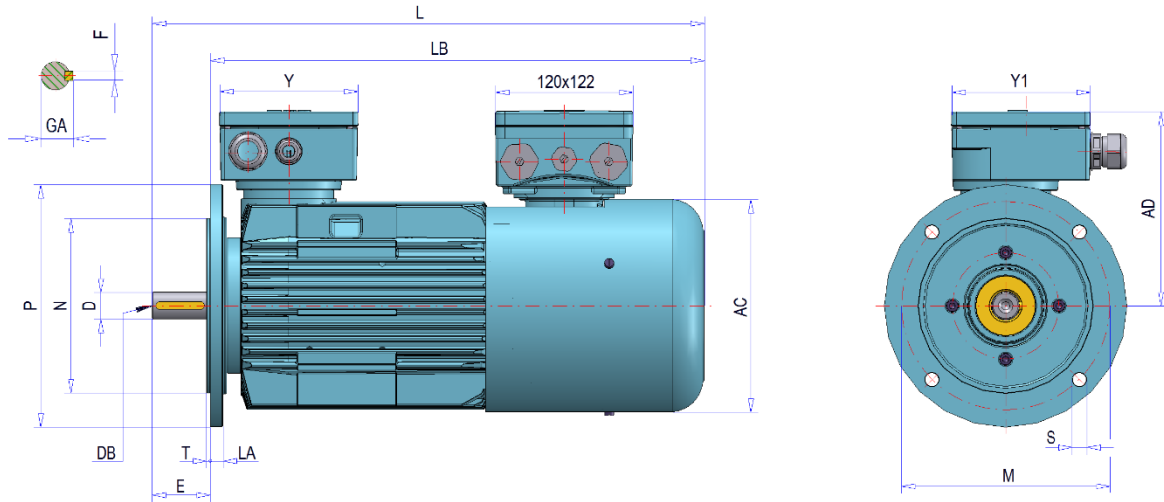
The AC side of the rectifier is connected to the motor terminals. During switch-off, the DC circuit between rectifier and brake solenoid is interrupted with an auxiliary contact of the motor protection switch.



## Explosion protected DEx Series motors

### Dimension sheets for motors with brake / type BM

Size: 71 – 132 / Cooling type: IC411 / Temperature Class T1 to T4 / Versions: IM B5 – IM 3001 / IM V1 – IM 3011 / IM V3 – IM 3031



Fits and tolerances see (Section Fits and tolerances)

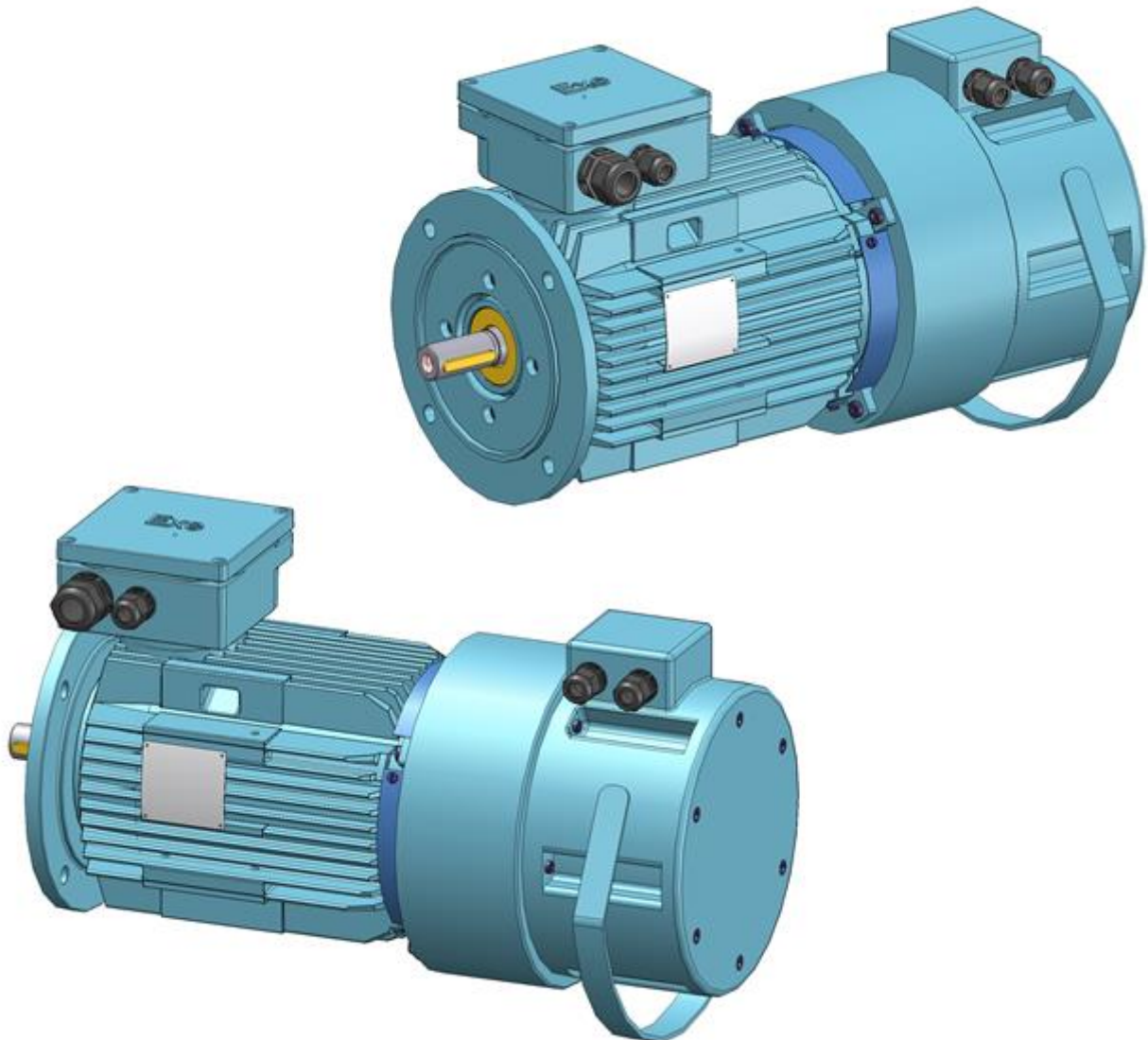
Subject to technical amendments

Type	D	E	DB	AC	AD	Y	Y1	GA	F	L	LB	S	X	M	N	P	T	LA
D_Ex 71 K/L ...BM5	14	30	M5	139	147	124	132	16	5	331	301	9	4	130	110	160	3.5	9
D_Ex 80 K/L ...BM10	19	40	M6	157	169	144	144	21.5	6	363	323	11	4	165	130	200	3.5	10
D_Ex 80 V ...BM10	19	40	M6	157	169	144	144	21.5	6	393	353	11	4	165	130	200	3.5	10
D_Ex 90 S ...BM20	24	50	M8	177	181	144	144	27	8	395	345	11	4	165	130	200	3.5	10
D_Ex 90 L ...BM20	24	50	M8	177	181	144	144	27	8	420	370	11	4	165	130	200	3.5	10
D_Ex 90 V ...BM20	24	50	M8	177	181	144	144	27	8	460	410	11	4	165	130	200	3.5	10
D_Ex 100 L ...BM40	28	60	M10	195	188	144	144	31	8	450	390	13.5	4	215	180	250	4	11
D_Ex 100 V ...BM40	28	60	M10	195	188	144	144	31	8	520	460	13.5	4	215	180	250	4	11
D_Ex 112 M ...BM60	28	60	M10	219	199	144	144	31	8	509	449	13.5	4	215	180	250	4	11
D_Ex 112 V ...BM60	28	60	M10	219	199	144	144	31	8	569	509	13.5	4	215	180	250	4	11
D_Ex 132 S ...BM100	38	80	M12	253	218	144	144	41	10	573	493	13.5	4	265	230	300	4	12
D_Ex 132 M ...BM100	38	80	M12	253	218	144	144	41	10	611	531	13.5	4	265	230	300	4	12
D_Ex 132 V ...BM100	38	80	M12	253	218	144	144	41	10	671	601	13.5	4	265	230	300	4	12

Date: 02/11/2021  
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Explosion protected **DEx Series** motors  
Motors with installed brake / type KB (Kendrion)



## Explosion protected DEx Series motors

### Technical data for motors with installed brake / type KB (Kendrion)

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

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. As standard, 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 de-energised, the brake releases mechanically, and the shaft can be moved easily.

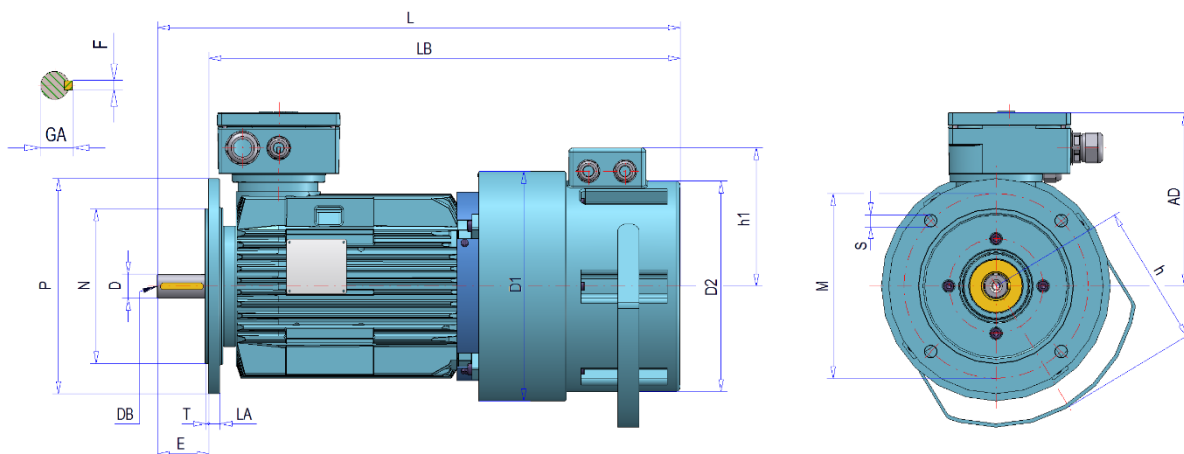
- Temperature monitoring with PTC instead of with thermostatic switch

Date: 02/11/2021  
Version: 2.1

## Explosion protected DEx Series motors

### Dimension sheets for motors with brake / type KB (Kendrion)

Size: 71 – 180 / Cooling type: IC411 / Temperature Class T1 to T4 / Versions: IM B5 – IM 3001 / IM V1 – IM 3011 / IM V3 – IM 3031



Fits and tolerances see (Section Fits and tolerances)

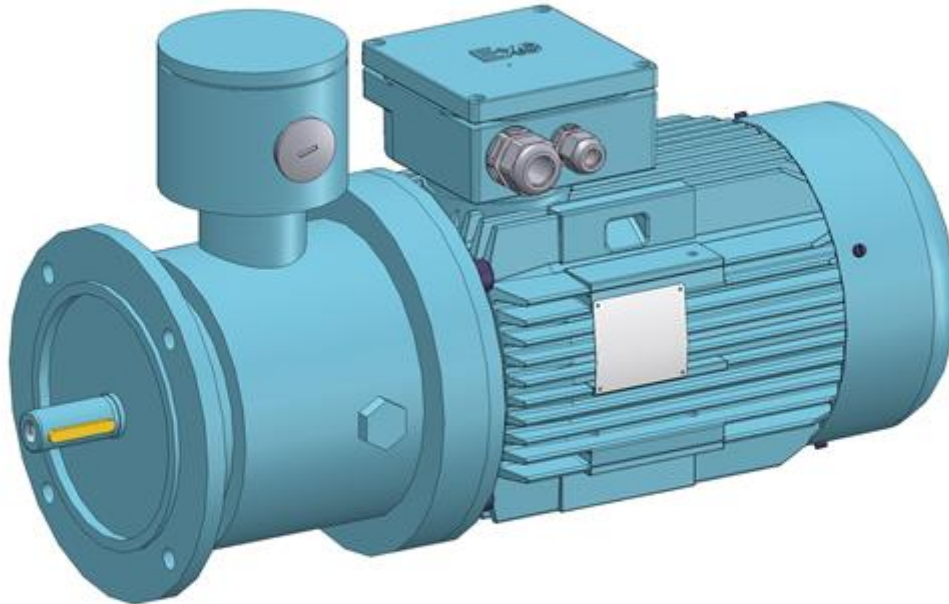
Subject to technical amendments

Type	D	E	DB	D1	D2	AD	h	h1	GA	F	L	LB	S	X	M	N	P	T	LA
D_Ex 71 K/L ...KB10	14	30	M5	192	178	147	134	133	16	5	420	390	9	4	130	110	160	3.5	10
D_Ex 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
D_Ex 80 V ...KB11	19	40	M6	192	178	169	134	133	21.5	6	490	450	12	4	165	130	200	3.5	10
D_Ex 90 S ...KB11	24	50	M8	220	178	181	134	133	27	8	510	460	12	4	165	130	200	3.5	10
D_Ex 90 L ...KB11	24	50	M8	220	178	181	134	133	27	8	510	460	12	4	165	130	200	3.5	10
D_Ex 90 V ...KB11	24	50	M8	220	178	181	134	133	27	8	555	505	12	4	165	130	200	3.5	10
D_Ex 100 L ...KB13	28	60	M10	267	245	188	164	161	31	8	590	530	14	4	215	180	250	4	11
D_Ex 100 V ...KB13	28	60	M10	267	245	188	164	161	31	8	659	599	14	4	215	180	250	4	11
D_Ex 112 M ...KB13	28	60	M10	267	245	199	164	161	31	8	610	550	14	4	215	180	250	4	11
D_Ex 112 V ...KB13	28	60	M10	267	245	199	164	161	31	8	670	610	14	4	215	180	250	4	11
D_Ex 132 S ...KB16	38	80	M12	301	245	218	164	161	41	10	736	656	14	4	265	230	300	4	16
D_Ex 132 M ...KB16	38	80	M12	301	245	218	164	161	41	10	736	656	14	4	265	230	300	4	16
D_Ex 132 V ...KB16	38	80	M12	301	245	218	164	161	41	10	804	724	14	4	265	230	300	4	16
D_Ex 160 M ...KB19	42	110	M16	350	330	276	215	205	45	12	850	740	18	4	300	250	350	5	19
D_Ex 160 L ...KB19	42	110	M16	350	330	276	215	205	45	12	850	740	18	4	300	250	350	5	19
D_Ex 160 V ...KB19	42	110	M16	350	330	276	215	205	45	12	971	861	18	4	300	250	350	5	19
D_Ex 180 M ...KB24	48	110	M16	405	330	302	215	205	51	14	914	804	18	4	300	250	350	5	15
D_Ex 180 L ...KB24	48	110	M16	405	330	302	215	205	51	14	914	804	18	4	300	250	350	5	15
D_Ex 180 V ...KB24	48	110	M16	405	330	302	215	205	51	14	1037	927	18	4	300	250	350	5	15

Date: 02/11/2021  
Version: 2.1



Explosion protected **DEx Series motors**  
Motors with brake / type BD (VIS)



Date: 02/11/2021  
Version: 2.1

## Explosion protected **DEx Series** motors

### Technical data for motors with brake / type BD (VIS)

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) [approx. 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 are therefore approved for application in Zone 1 and Zone 2, as well as Zone 21 and Zone 22. As standard, the brakes are suitable for a temperature range of -50°C to +60°C. The brakes feature a thermostatic switch for temperature monitoring.

Date: 02/11/2021  
Version: 2.1

## Explosion protected **DEx Series** motors

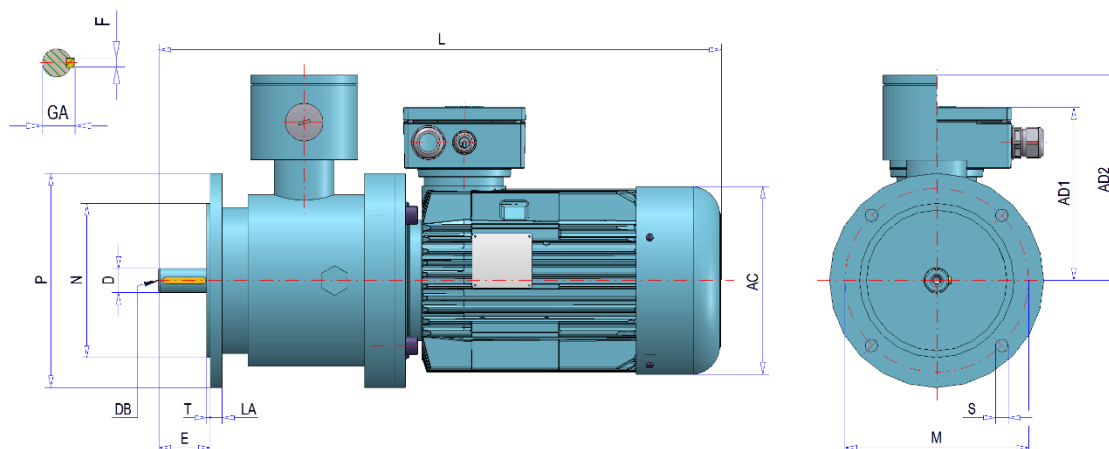
Special designs:

- 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 de-energised, 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

## Explosion protected DEx Series motors

### Motors with brake / type BD (VIS)

Size: 63 – 225 / Cooling type: IC411 / Temperature Class T1 to T4 / Versions: IM B5 – IM 3001 / IM V1 – IM 3011 / IM V3 – IM 3031



Fits and tolerances see (Section Fits and tolerances)

Subject to technical amendments

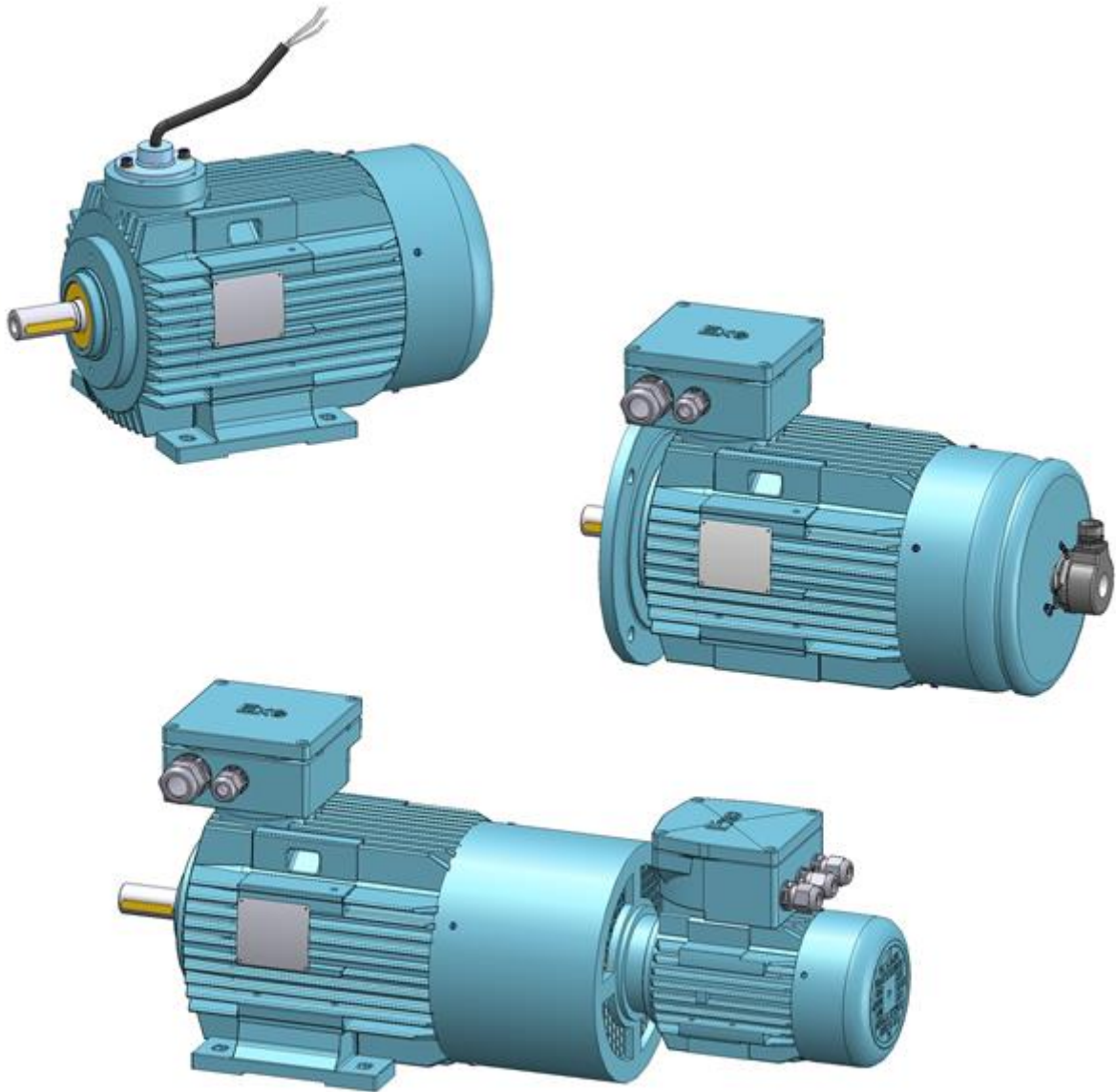
Type		D	E	DB	AC	AD1	AD2	GA	F	S	X	M	N	P	T	LA	L
D_Ex 63 K/L	...BD8	11	23	M5	125	147	169	12.5	4	9	4	115	95	140	3	10	383
D_Ex 71 K/L	...BD8	14	30	M5	139	147	169	16	5	9	4	130	110	160	3.5	10	417
D_Ex 80 K/L	...BD22	19	40	M6	157	169	199	21.5	6	12	4	165	130	200	3.5	12	515
D_Ex 80 V	...BD22	19	40	M6	157	169	199	21.5	6	12	4	165	130	200	3.5	12	545
D_Ex 90 S/L	...BD22	24	50	M8	177	181	199	27	8	12	4	165	130	200	3.5	120	558
D_Ex 90 V	...BD22	24	50	M8	177	181	199	27	8	12	4	165	130	200	3.5	120	603
D_Ex 100 L	...BD40	28	60	M10	195	188	224	31	8	14	4	215	180	250	4	14	632
D_Ex 100 V	...BD40	28	60	M10	195	188	224	31	8	14	4	215	180	250	4	14	701
D_Ex 112 M	...BD60	28	60	M10	219	199	224	31	8	14	4	215	180	250	4	14	654
D_Ex 112 V	...BD60	28	60	M10	219	199	224	31	8	14	4	215	180	250	4	14	714
D_Ex 132 S/M	...BD150	38	80	M12	258	218	249	41	10	14	4	265	230	300	4	18	777
D_Ex 132 V	...BD150	38	80	M12	258	218	249	41	10	14	4	265	230	300	4	18	845
D_Ex 160 M/L	...BD180	42	110	M16	310	276	249	45	12	18	4	300	250	350	4	18	911
D_Ex 160 V	...BD180	42	110	M16	310	276	249	45	12	18	4	300	250	350	4	18	1032
D_Ex 180 M/L	...BD335	48	110	M16	345	316	267	51	14	18	4	300	250	350	4	21	1009
D_Ex 180 V	...BD335	48	110	M16	345	316	267	51	14	18	4	300	250	350	4	21	1132
D_Ex 200L	...BD460	55	110	M20	385	346	267	59	16	18	4	350	300	400	4	21	1098
D_Ex 200V	...BD460	55	110	M20	385	346	267	59	16	18	4	350	300	400	4	21	1223
D_Ex 225S	...BD500	60	140	M20	435	364	267	64	18	18	8	400	350	450	4	21	1154
D_Ex 225M-2	...BD500	55	110	M20	435	364	267	59	16	18	8	400	350	450	4	21	1124
D_Ex 225M	...BD500	60	140	M20	435	364	267	64	18	18	8	400	350	450	4	21	1154
D_Ex 225V	...BD500	60	140	M20	435	364	267	64	18	18	8	400	350	450	4	21	1247
D_Ex 225V-2	...BD500	55	110	M20	435	364	267	59	16	18	8	400	350	450	4	21	1217

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## Explosion protected **DEx Series** motors

Explosion protected three-phase motors, special version



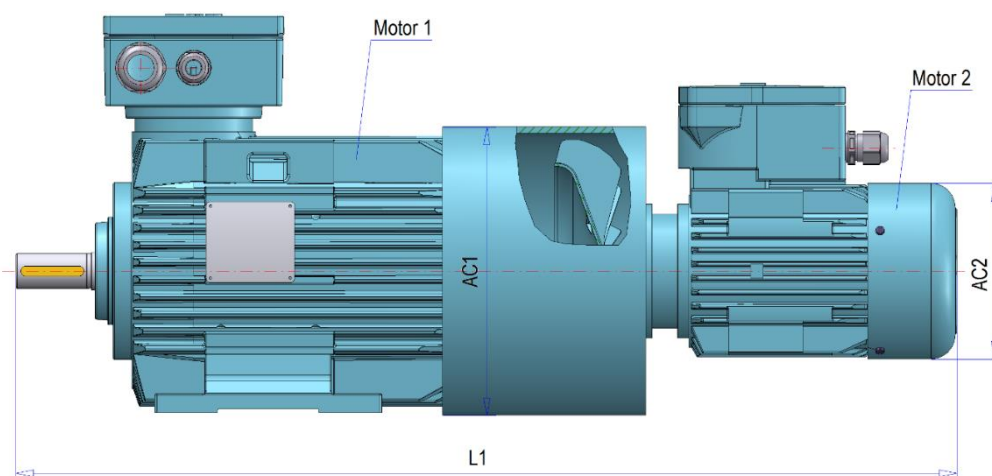
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## Explosion protected DEx Series motors

Explosion protected three-phase motors, special version External fan

Size: 80 – 315 / Cooling type: IC411 / Temperature Class T1 to T4 / The motors can be supplied with an external fan as an option (see Cooling (ventilation))



Subject to technical amendments

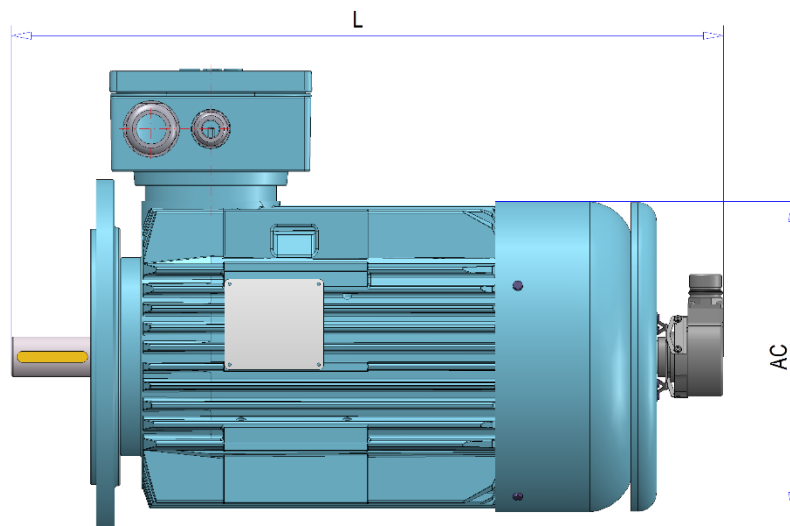
Type (Motor 1)	Motor 2 (Type)	AC1	AC2	L1	Weight (4-pole - B3) [approx. in kg]
D_Ex 80 K/L	71K/2	159	139	614	44 / 46
D_Ex 80 V	71K/2	159	139	644	47
D_Ex 90 S/L	71K/2	180	139	637	52 / 55
D_Ex 90 V	71K/2	180	139	682	61
D_Ex 100 LA/LB	71K/2	198	139	695	63 / 66
D_Ex 100 V	71K/2	198	139	765	78
D_Ex 112 M	71K/2	222	139	726	81
D_Ex 112 V	71K/2	222	139	786	99
D_Ex 132 S/M	71K/2	261	139	822	106 / 116
D_Ex 132 V	71K/2	261	139	890	143
D_Ex 160 M/L	71K/2	317	139	954	188 / 207
D_Ex 160 V	71K/2	317	139	1075	229
D_Ex 180M/L	80K/4	355	157	1026	256 / 277
D_Ex 180V	80K/4	355	157	1149	334
D_Ex 200L	80K/4	391	157	1135	296
D_Ex 200V	80K/4	391	157	1260	372
D_Ex 225S	80K/4	439	157	1218	360
D_Ex 225M-2	80K/4	439	157	1184	425
D_Ex 225M	80K/4	439	157	1218	440
D_Ex 225V	80K/4	439	157	1311	500
D_Ex 250M-2	90L/4	491	177	1380	528
D_Ex 250M	90L/4	491	177	1380	523
D_Ex 280S-2	90L/4	537	177	1422	695
D_Ex 280S	90L/4	537	177	1422	655
D_Ex 280M-2	90L/4	537	177	1482	745
D_Ex 280M	90L/4	537	177	1482	730
DEx 315S-2	90L/4	617	177	1429	867
DEx 315S	90L/4	617	177	1459	867
DEx 315M-2	90L/4	617	177	1599	977
DEx 315M	90L/4	617	177	1629	977
DEx 315M-20	90L/4	617	177	1599	1287
DEx 315M0	90L/4	617	177	1629	1287
DEx 315L-2	90L/4	617	177	1679	1427
DEx 315L	90L/4	617	177	1709	1427

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## Explosion protected DEx Series motors

Explosion protected three-phase motors, special version Hollow shaft encoder

Size: 63 – 315 / Cooling type: IC411 / Temperature Class T1 to T4 / The motors can be supplied with a hollow shaft encoder as an option (see Cooling (ventilation))



Subject to technical amendments

Type (Motor 1)	AC	L	Weight (4-pole - B3) [approx. in kg]
D_Ex 63 K/L	125	353	15 / 16
D_Ex 71 K/L	139	386	17 / 18
D_Ex 80 K/L	157	435	26 / 28
D_Ex 80 V	157	465	31
D_Ex 90 S/L	177	478	34 / 37
D_Ex 90 V	177	523	43
D_Ex 100 LA/LB	195	534	45 / 48
D_Ex 100 V	165	604	60
D_Ex 112 M	219	556	62
D_Ex 112 V	219	616	80
D_Ex 132 S/M	258	640	86 / 96
D_Ex 132 V	258	708	123
D_Ex 160 M/L	310	788	161 / 180
D_Ex 160 V	310	909	202
D_Ex 180M/L	345	828	217 / 238
D_Ex 180V	345	951	295
D_Ex 200L	385	940	252
D_Ex 200V	385	1065	328
D_Ex 225S	435	1025	312
D_Ex 225M-2	435	995	377
D_Ex 225M	435	1025	392
D_Ex 225V	435	1118	452
D_Ex 250M-2	491	On request	487
D_Ex 250M	491	On request	482
D_Ex 280S-2	537	On request	652
D_Ex 280S	537	On request	612
D_Ex 280M-2	537	On request	702
D_Ex 280M	537	On request	687

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## Explosion protected **DEx Series** motors

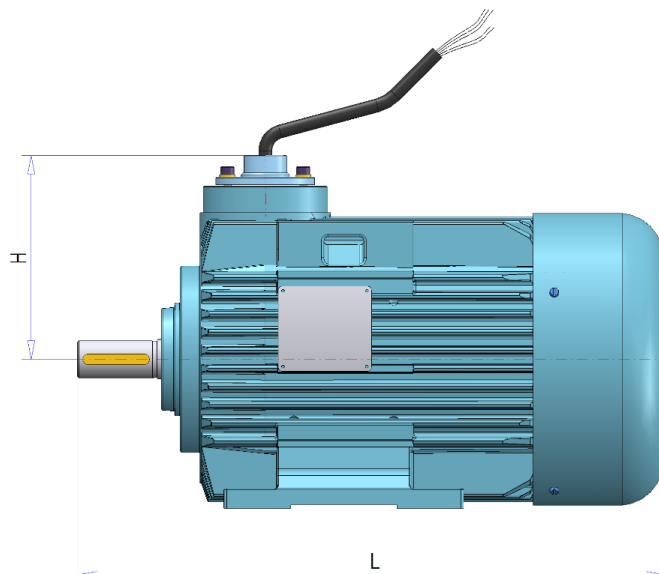
<b>DEx 315S-2</b>	617	On request	822
<b>DEx 315S</b>	617	On request	822
<b>DEx 315M-2</b>	617	On request	932
<b>DEx 315M</b>	617	On request	932
<b>DEx 315M-20</b>	617	On request	1242
<b>DEx 315M0</b>	617	On request	1242
<b>DEx 315L-2</b>	617	On request	1382
<b>DEx 315L</b>	617	On request	1382

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## Explosion protected DEx Series motors

Explosion protected three-phase motors, special version Cable connection

Size: 63 – 225 / Cooling type: IC411 / Temperature Class T1 to T4 / Size 63-225 motors can optionally be supplied with direct cable connection instead of a terminal box (cable length according to customer requirements)



Subject to technical amendments

Type	L	H	Weight (4-pole - B3) [approx. in kg]
D_Ex 63 K/L	238	112	9 / 10
D_Ex 71 K/L	271	112	11 / 12
D_Ex 80 K/L	317	126	20 / 22
D_Ex 80 V	347	126	25
D_Ex 90 S/L	360	135	28 / 31
D_Ex 90 V	405	135	37
D_Ex 100 LA/LB	416	142	38 / 42
D_Ex 100 V	486	142	54
D_Ex 112 M	438	154	56
D_Ex 112 V	498	154	74
D_Ex 132 S/M	534	179	80 / 89
D_Ex 132 V	602	179	116
D_Ex 160 M/L	667	211	147 / 166
D_Ex 160 V	788	211	194
D_Ex 180M/L	704	256	203 / 224
D_Ex 180V	827	256	281
D_Ex 200L	790	288	238
D_Ex 200V	915	288	314
D_Ex 225S	882	308	298
D_Ex 225M-2	852	308	363
D_Ex 225M	852	308	378
D_Ex 225V	975	308	438

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