VANICH GROUP
Industrial Product Company

TECHNICAL CATALOG

EDITION 11/2021

FIMM®

LOW VOLTAGE GENERAL PERFORMANCE MOTORS

IE2-IE3
Three phase asynchronous

FMA and FM Series Motors

SINGLE PHASE
Single phase asynchronous

FMS Series Motors

BRAKE MOTOR
Three phase asynchronous

FMB Series Motors

Table of CONTENTS

General Specification

Cooling and ventilation

The standard cooling method is Totally Enclosed Fan-Cooled (TEFC) in accordance with code IC411 of I EC 60034-6. Standard motors in sizes 63-355 are equipped with radial-flow plastic fans.

Enclosure

The standard degree of protection is IP55. The IP55 enclosure means complete hoseproof and dustproof protection. A higher degree of protection is available.

Voltage and frequency

Standard voltage is 400V/50Hz but can be manufactured for any single voltage in the range 200-600V at a frequency 50 or 60 Hz. The motors will operate satisfactorily with voltage variations of ±10% from the rated voltage.

Connection

Direct on line starting can be used on all frame sizes. Motors up to and including 3kW are star connected and cannot be started with Star/Delt started. Motors 4kW and above can be started with Star/Delta started.

Noise

The permitted noise levels of electrical machines are fixed in IEC60034 - 9 (EN60034-9). The noise level of FIMM motors is well below these limit value. For details, please refer to the performance data tables.

Vibration

Standard motors are designed for vibration class N (normal). Vibration class R (reduced) and vibration class S (special) are available on request.

Quality assurance

Stringent quality procedures are observed from first design to finished products in accordance with IS09001 documented quality systems. Our factories have been assessed to meet these requirements, a further assurance that only the highest possible standards of quality are accepted.

Against solar radiation

High solar radiation will result in undue temperature rise. In these circumstances, motors should be screened from solar radiation by placement of adequate sunshades which do not inhibit air flow.

Degree of protection

Standard levels of enclosure protection for all frame sizes for both motor and the terminal box is IP55, with IP56, IP65 and IP66 available on request. Enclosure designations comply with IEC60529 or AS60529. The enclosure protection required will depend upon the environmental and operational conditions within which the motor is to operate.

IP standards explanation

IP	5	5
	1	2

International protection rating prefix (IEC 60034 - 5)

First numeral

First characteristic numeral

Degree of protection of persons against approach to live parts or contact with live or moving parts (other than smooth rotating shafts and the like) inside the enclosure, and degree of protection of equipment within the enclosure against the ingress of solid foreign bodies.

4. Protected against solid object greater than 1.0 mm: Wires or strips of thickness greater than 1.0 mm, solid objects exceeding 1.0 mm.
5. Dust protected: Ingress of dust is not totally prevented but it does not enter in sufficient quantity to interfere with satisfactory operation of the equipment.
6. Dust tight: No ingress of dust.

Second numeral

Second characteristic numeral

4. Protected against splashing water: Water splashed against the enclosure from any direction shall have no harmful effect.
5. Protected against water jets: Water projected by a nozzle against the enclosure from any direction shall have no harmful effect.
6. Protected against heavy seas: Water from heavy seas or water projected in powerful jets (larger nozzle and higher pressure than second numeral 5) shall not enter the enclosure in harmful quantities.

Shaft

FIMM motors have standard shaft extension lengths which provided with standard key, drilled and tapped hole. Non standard shaft extensions are available upon special order, with shaft design outlined on a detailed drawing. Shaft extension run out, concentricity and perpendicularity to face of standard flange mount motors, comply with normal grade tolerance as specified in IEC 60072-1 and AS1359. Precision grade tolerance is available upon special order.

Finish

Standard FIMM motor color is RAL 7031. Other colors are also available. All castings and steel parts are provided with a prime coat of rust-resistant paint. The finishing coat of enamel paint is sufficient for normal conditions, however special paint systems can be provided to accommodate stringent requirements for motors in corrosive environments. Special coatings are needed to resist such substances as acid, salt water and extreme climatic conditions.

Electrical design

As standard, FIMM motors have the following design and operating parameters. Performance data is based on this standard. Any deviation should be examined and performance values altered in accordance with the information provided in this section.

Three phase, 380-415V/50Hz, 440-480V/60Hz

Ambient cooling air temperature, 40°C

Altitude 1000m

Duty cycle S1 (continuous)

Rotation Clockwise / Counter Clockwise

Connection 230 volt Delta/400 volt Star (3kW and below)
400 volt Delta/690 volt Star (4kW and above)

GENERAL SPECIFICATION

Standards and regulations

FIMM motors are built to comply with the requirements of the following international standards and regulation:

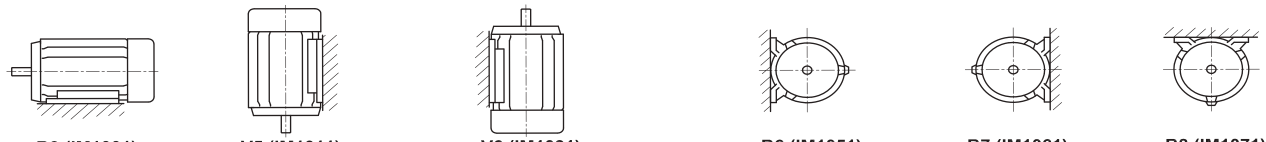
1. International Electrotechnical Commission - IEC 60034 and IEC 60072.
2. The requirements of European CE marking. Low voltage Directive 73/23 (1973), modified by Directive 93/68 (1993) and the EMC -Directive 89/336. These FIMM motors are designed to use with other machinery, and they should only be used if the complete machinery is in conformity with the provisions of the Directive of safety of machinery (89/93/EEC).
3. CEMEP agreement - All motors with standard rating include in this catalog comply with efficiency class IE2 & IE3 and bear the corresponding label on the rating plate.

Standards	IEC
General requirements for electrical machines	60034-1
Methods of determining losses and efficiency	60034-2
Degrees of protection	60034-5
Methods of cooling	60034-6
Mounting arrangements	60034-7
Terminal markings and direction of rotation	60034-8
Noise limits	60034-9
Starting performance	60034-12
Mechanical vibration	60034-14
Standard voltages	60038
Dimensions and output ratings	60072
Mounting dimensions and relationship framesizes-output ratings	60072
Shaft dimensions	60072
Classification of environmental conditions	600721-2-1
Insulation material	60085

*The FIMM motor range corresponds to the new international standard IEC 60034-30

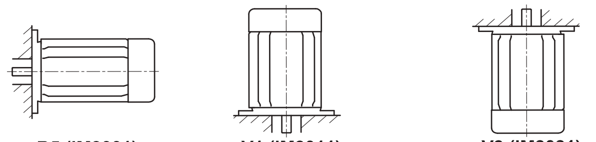
Standards mounting arrangements

Foot mounting



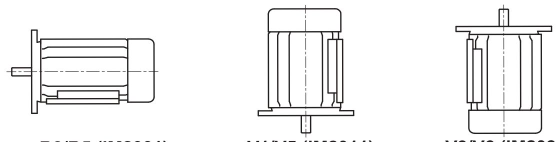
B3 (IM1001) V5 (IM1011) V6 (IM1031) B6 (IM1051) B7 (IM1061) B8 (IM1071)

Large flange



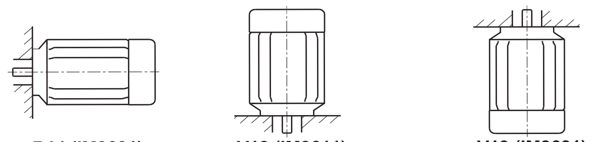
B5 (IM3001) V1 (IM3011) V3 (IM3031)

Large flange and feet



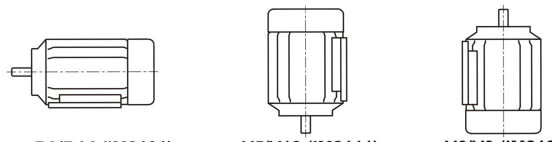
B3/B5 (IM2001) V1/V5 (IM2011) V3/V6 (IM2031)

Small flange (face)



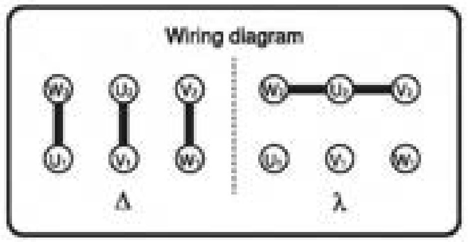
B14 (IM3601) V18 (IM3611) V19 (IM3631)

Small flange (face) and feet

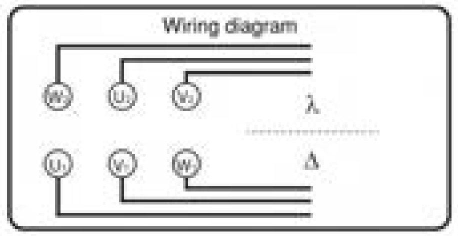


B3/B14 (IM2101) V5/V18 (IM2111) V6/V9 (IM2131)

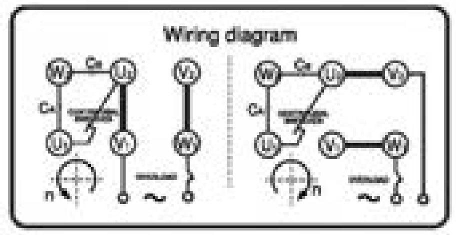
Connection diagram three phase & single phase motor



DELTA CONNECTION STAR CONNECTION



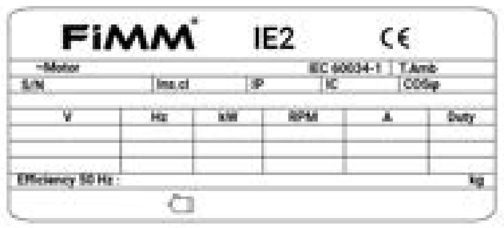
STAR-DELTA CONNECTION



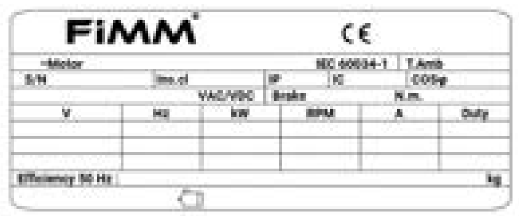
COUNTER CLOCKWISE CLOCKWISE

Rating plates

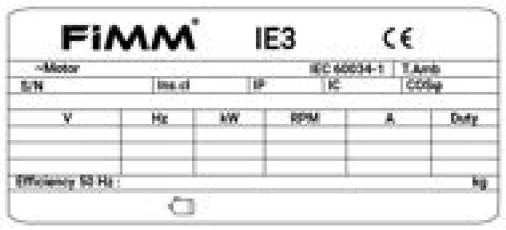
IE 2 Name Plate for 3 Phase



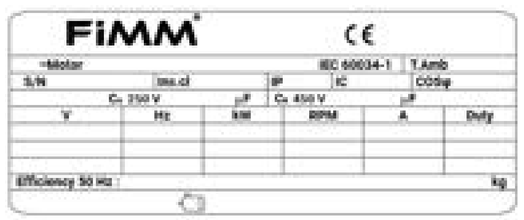
Brake Motor for 3 Phase



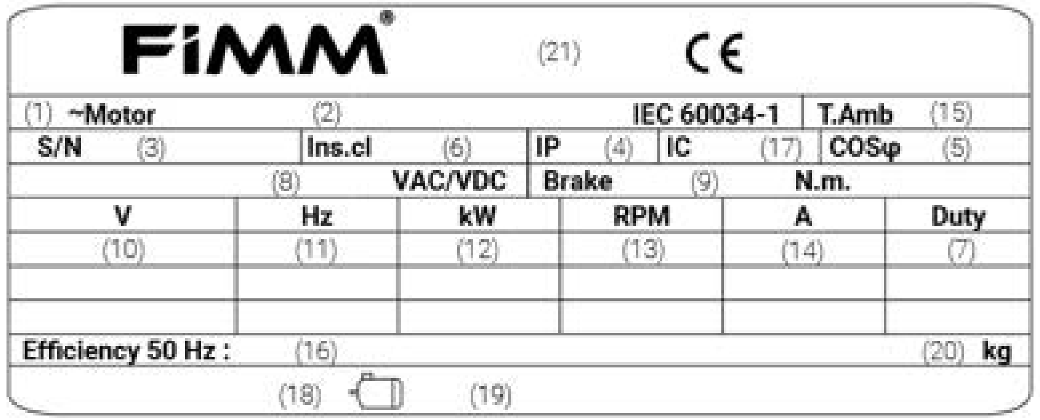
IE 3 Name Plate for 3 Phase

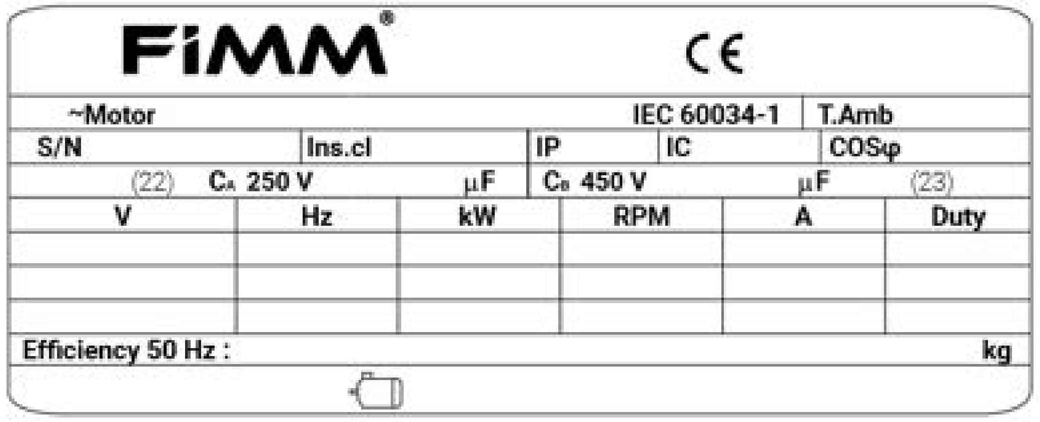


Single Phase



Description of Coding





Electric Motor Identification

1 1

1
11
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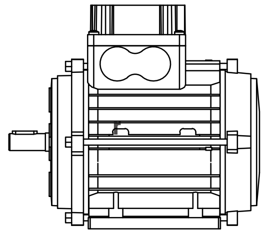
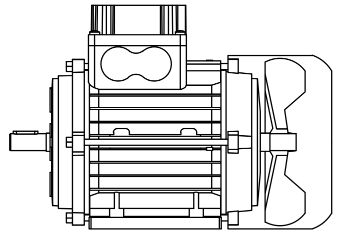
1
1
1
1
1

COOLING SYSTEMS

IC410

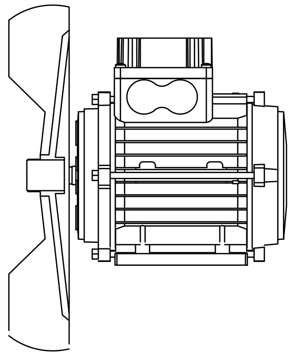


IC411



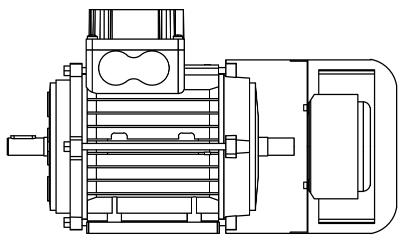
11 11 1

IC418



1 1
11 1
1 1
1
1 1
11

IC416



Forced ventilation

1

Electrical Design

Voltage and frequency

Standard FIMM motors are designed for a power supply of three phase 400V, 50Hz. Motors can be manufactured for any supply between 100V and 1100V and frequencies other than 50Hz. Standard FIMM motors wound for a certain voltage at 50Hz can also operate at other voltages at 50Hz and 60Hz without modification, subject to the changes in their data.

Motor wound for 50Hz at rated voltage	Connected to	Data in percentage of values at 50Hz and rated voltage						
		Output	r/min	I_N	I_L/I_N	T_N	T_L/T_N	T_B/T_N
380V	400V 50Hz	100	100	95	110	100	110	110
	380V 60Hz	100	120	98	83	83	70	85
	400V 60Hz	105	120	98	90	87	80	90
	415V 60Hz	110	120	98	95	91	85	93
	440V 60Hz	115	120	100	100	96	95	98
	460V 60Hz	120	120	100	105	100	100	103
400V	380V 50Hz	100	100	105	91	100	90	90
	415V 50Hz	100	100	96	108	100	108	108
	400V 60Hz	100	120	98	83	83	70	85
	415V 60Hz	104	120	98	89	86	75	88
	440V 60Hz	110	120	98	95	91	85	93
	460V 60Hz	115	120	100	100	96	93	98
	480V 60Hz	120	120	100	105	100	100	103
415V	380V 50Hz*	100	100	109	84	100	84	84
	400V 50Hz	100	100	104	93	100	93	93
	440V 50Hz	100	100	94	112	100	112	112
	415V 60Hz	100	120	98	83	83	70	85
	440V 60Hz	105	120	98	90	87	80	90
	460V 60Hz	110	120	98	95	91	85	94
	480V 60Hz	115	120	100	100	96	95	98
525V	550V 50Hz	100	100	95	110	100	110	110
	525V 60Hz	100	120	98	83	83	70	85
	550V 60Hz	105	120	98	90	87	80	90
	575V 60Hz	110	120	98	95	91	85	94
	600V 60Hz	115	120	100	100	96	95	98

* Not applicable for motors with F class temperature rise.

1) I_N = Full load current T_N = Full load torque
I_L/I_N = Locked rotor current/ full load current
T_L/T_N = Locked rotor torque/ full load torque
T_B/T_N = Breakdown torque/full load torque

Standard torque values for alternative supplies are obtainable only with special windings. For these purpose-built motors the performance data is the same as for 400V motors except for the currents which are calculated with the accompanying formula:

Where:

$$I_x = \frac{400 \times I_N}{U_x}$$

I_x = Current
I_N = Full load current at 400 volt
U_x = Design voltage

Temperature and altitude

Rated power specified in the performance data tables apply for standard ambient conditions of 40°C at 1000m above sea level. Where temperature or altitude differ from the standard, multiplication factors in the table below should be used.

Ambient temperature	Temperature factor
30°C	1.06
35°C	1.03
40°C	1.00
45°C	0.97
50°C	0.93
55°C	0.88
60°C	0.82

Altitude above sea level	Altitude factor
1000m	1.00
1500m	0.98
2000m	0.94
2500m	0.91
3000m	0.87
3500m	0.82
4000m	0.77

$$\text{Effective Power} = \text{Rated Power} \times \text{Temperature Factor} \times \text{Altitude Factor}$$

Example 1:

Effective Power required = 15 kW

Air temperature =50°C (factor 0.93)

Altitude = 2500 metres (factor 0.91)

$$\text{Rated power required} = \frac{15}{0.93 \times 0{,}91} = 17.7\text{kW}$$

The appropriate motor is one with a rated power above the required, being 18.5 kW.

Example 2:

Rated power = 11 kW

Air temperature = 50°C (factor 0.93) Altitude

= 1500 metres (factor 0.98) Effective Power

= 11 x 0.93 x 0.98 = 10.0 kW

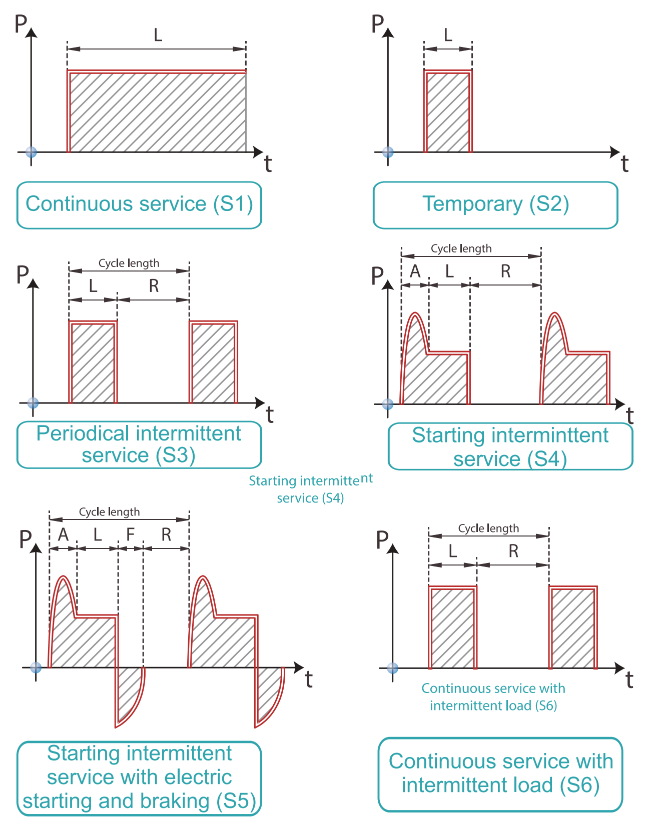
Rotation

For clockwise rotation, viewed from drive end, standard three phase FIMM motor terminal markings coincide with the sequence of the phase line conductors. For counter clockwise rotation, viewed from drive end, two of the line conductors have to be reversed. This is made clear in the table of connection diagrams three phase motors with cage rotor (page 9).

Duty

FIMM motors are supplied suitable for S1 operation (continuous operation under rated load). When the motor is operated under any other type of duty the following information should be supplied to determine the correct motor size:

- Type and frequency of switching cycles as per duty factors S3 to S7 and duty cycle factor.
- Load torque variation during motor acceleration and braking (in graphical form).
- Moment of inertia of the bad on the motor shaft.
- Type of braking (eg mechanical electrical through phase reversal or DC injection)



Explanation

D = Cycle Length

L = Load time R= Resting time

A = Starting time F = Braking time

Intermittent ratio calculation in percentage

S3 = L/(D)*100 S4 = (A+L)/(D)*100

S5 = (A+L+F)/D*100 S6 = L/(D)*100

Permissible output

Apply the factors of the expanding table to the output rating for motors with duty cycles that are not continuous. For other duties (S4, S5, S8 and S7) contact us for appropriate duty cycle factors.

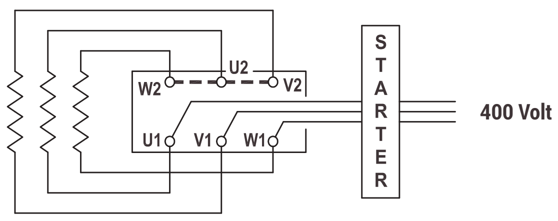
	Poles	Duty cycle factor		
		For frames 80 to 132	For frames 160 to 250	For frames 280 to 355
Short-time duty, S2				
30 min	2	1.05	1.20	1.20
	4 to 8	1.10	1.20	1.20
60 min	2 to 8	1.00	1.10	1.10
Intermittent duty, S3				
15%	2	1.15	1.45	1.40
	4 to 8	1.40	1.40	1.40
25%	2	1.10	1.30	1.30
	4 to 8	1.30	1.25	1.30
40%	2	1.10	1.10	1.20
	4 to 8	1.20	1.08	1.20
60%	2	1.05	1.07	1.10
	4 to 8	1.10	1.05	1.10

Connection

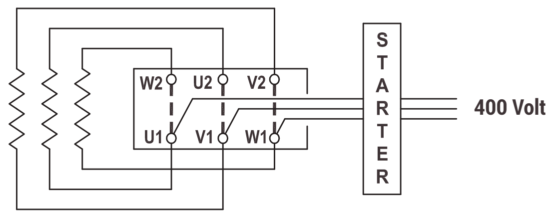
A motor's rated voltage must agree with the power supply line-to-line voltage. It is carefully to ensure the correct connection to the motor terminals.

Internal connections, voltages and VF drive selection

Standard terminal connections for motors 3kW and below is 230V delta / 400V star. These motors are designed for 400V Direct On Line (D.O.L.) starting, when connected in the star configur tion. They are also suitable for operation with 230V three phase variable frequency drives. when connected in the delta configur tion. Standard terminal connections for motors 4kW and above is 400V delta / 690V star. These motors are designed for 400V Direct On Line (D.O.L.) starting, when connected in the delta configur tion. They are also suitable for operation with 400V three phase variable frequency drives . Alternatively they can be operated D.O.L. in the star configur tion from a 690V supply or with a 690V variable frequency drive. In this case the drive must be supplied with an output reactor to protect the winding insulation. These size motors are also suitable for 400V star-delta starting as described below. Motor connected for D.O.L. starting with bridges in place for star connection (3kW and below).



Motor connected for D.O.L starting with bridges in place for delta connection (4kW and above).



Starting

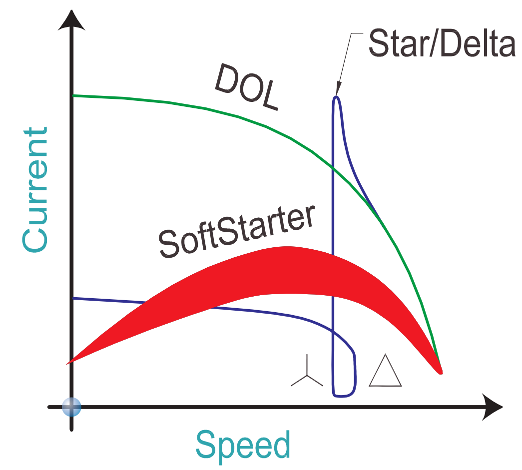
All of the following starter options are available and are the best supplied together with the motor.

D.O.L Starters

When an electric motor is started by direct connection to the power supply (D.O.L.), it draws a high current, called the starting current, which is approximately equal in magnitude to the locked rotor current I_L . As listed in the performance data, locked rotor current can be up to 8 times the rated current I_N of the motor. In circumstances where the motor starts under no load or where high starting torque is not required, it is preferable to reduce the starting current by one of the following means.

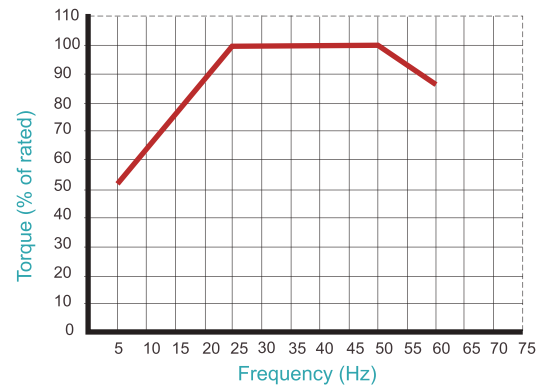
Star - Delta starting

The FIMM motors 4kW and above are suitable for the star-delta starting method. Through the use of a star-delta starter, the motor terminals are connected in the star configuration during starting, and reconnected to the delta configur tion when running. The benefits of this starting method are a significantly lower starting current, to a value about 1/3 of the D.O.L. starting current, and a corresponding starting torque also reduced to about 1/3 of its D.O.L. value. It should be noted that a second current surge occurs on change over to the delta connection. The level of this surge will depend on the speed the motor has reached at the moment of change over.



VVVF Drives

Variable Voltage Variable Frequency drives are primarily recognized for their ability to manipulate power from a constant 3 phase 50/60Hz supply converting it to variable voltage and variable frequency power. This enables the speed of the motor to be matched to its load in a flexible and energy efficient manner. The only way of producing starting torque equal to full load torque with kill load current is by using VVVF drives. The functionally flexible VVVF drive is also commonly used to reduce energy consumption on fans, pumps and compressors and offers a simple and repeatable method of changing speeds or flow rates.



EDM Concerns

Capacitive voltages in the rotor can be generated due to an effect caused by harmonics in the waveform causing voltage discharge to earth through the beatings. This discharge results in etching of the bearing running surfaces. This effect is known as Electrical Discharge Machining (EDM). It can be control with the fitment of appropriate filters to the drive. To further reduce the of EDM, an insulated non drive bearing can be used. FIMM recommends the use of insulated bearings for all motors 315 frame and above.

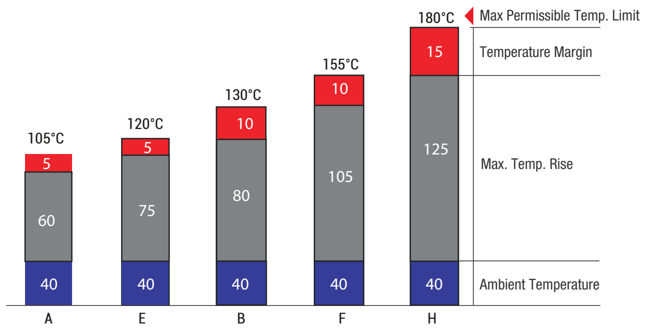
ELECTRICAL DESIGN

Insulation

Our standard motors have insulation class F while the temperature rise is for Class B ensuring longer service life.

Upon the customer's request, H class insulation motors are manufactured.

Under specified measuring conditions in accordance with IEC 60034-1 standard, insulation class F for an electric motor means that at ambient temperature of 40°C the temperature rise of its windings may be max. 105°C with the additional temperature margin of 10°C.



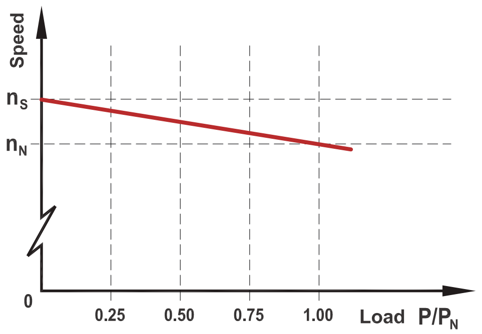
Insulation Class

Thermal protection

Motors can be protected against excessive temperature rise by inserting, at various positions within the windings, thermal probes which can either give a warning signal or cut off the supply to the motor in the event of a temperature abnormality. The units fitted to FIMM motors, frame sizes 160 and above, are PTC thermistors. These thermovariable resistors, with positive temperature co-efficient are fitted one per phase, series connected and are terminated in a terminal strip located in the terminal box. Trip temperature is 155°C (180°C) for FIMM motor class H). Additional 130°C thermistors can be fitted as an option for alarm connection.

Speed at partial loads

The relationship between motor speed and degree of loading on an FIMM motor is approximately linear up to the rated load. This is expressed graphically in the accompanying drawing.



Where:

n_N = full load speed

n_S = asynchronous speed

P/P_N = partial load factor

Current at partial loads

Current at partial loads can be calculated using the following formula:

$$I_x = \frac{Pout_x}{\sqrt{3} \times U_N \times \cos\varphi_x \times \eta_x} \times 10^5$$

Where:

I_x = partial load current (amps)

$Pout_x$ = partial load (kW)

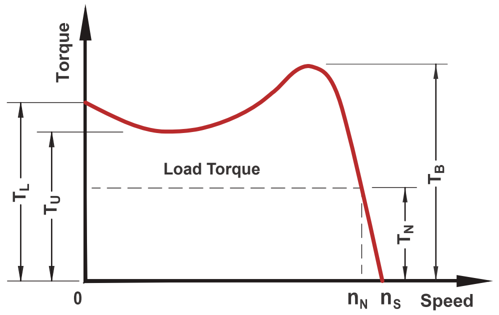
U_N = rated voltage

cos ˜ x = partial load power factor

° x = partial load efficiency (%

Torque characteristics

Typical characteristics of torque behaviour relative to speed are shown in the torque speed curve example below .



Where:

T_N = full load torque

T_L = locked rotor torque

T_U = pull-up torque

T_B = break down torque

n_N = full load speed

n_S = asynchronous speed

FIMM motors all exceed the minimum starting torque requirements for Design N (Normal torque) as specified in IEC60034-12, and in most cases meet the requirements of Design H (High torque). Rated torque can be calculated with the following formula:

$$T_N = \frac{9550 \times P_N}{n_N}$$

Where:

T_N = full load torque (Nm)

P_N = full load output power (kW)

n_N = full load speed (r/min)

Design features

Permissible radial loads on the shaft with standard bearings

The values of radial load calculated considering:
- Frequency: 50Hz.
- Temperature not exceeding 90ºC.
- 30,000 hours of life for 2-pole motors;
- 60,000 hours of life for 4,6,8-pole motors.

For operation at 60Hz, the values have to be reduced by 6% in order to achieve the same useful life.

*The distance fo the point of action of force F_R from the shoulder of ther shaft must not exceed the length of the shaft end.

Forces of belt drive on the shaft tight side when the belt tensionners is calculated by the following formula:

$$F_R = 2\sigma_0 F \sin\frac{\alpha_1}{2}\, z\ (N)$$

Where:

σ_0 : The initial tension. (N) (trapezoid belt, flatbelt

F : The cross-sectional area of the belt (cm^2)

α_1 : Arc of contact small (belt) pulley

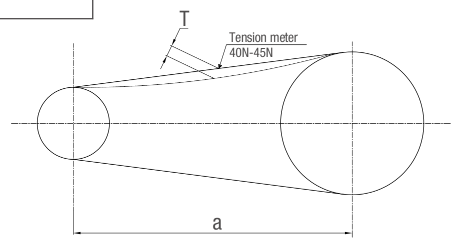
+ $\alpha_1 = 180^o - (d_2 - d_1)\frac{57^o}{a}$ ($\alpha_1 > 120^o$)
+ d_1 : Diameter of small (belt) pulley
+ d_2 : Diameter of large (belt) pulley
+ a : Center distance of 2(belt) pulley

z : Number of belt

Type of belt scales	The cross-sectional area F(cm^2)
A	0.81
B	1.38
C	2.3
D	4.76
E	6.92

Deflection Amount T (mm)

$$T = \frac{a}{64}$$



Example: there is 1 trapezoid belt drive

d_1 = 310mm
d_2 = 460mm
a = 1300mm
z = 8

The angle of the wheel hug small belt

$$\alpha_1 = 180^o - (d_2 - d_1)\frac{57}{a}$$

$$= 180^o - (460 - 310)\times 57/1300 = 173.4^o$$

Forces of belt drive on the shaft tight side when the belt tensioners accordance stretch panel

$$F_R = 2\sigma_0 F \sin\frac{\alpha_1}{2} z\ (N)$$

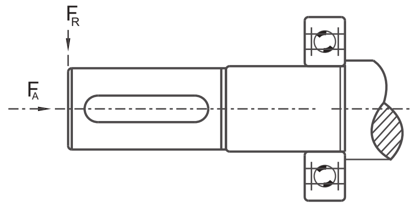
$$= 2 \times 150 \times 2.3 \times 0.998 \times 8 = 5\ 509\ N$$

Frame size	Pole number	Permissible radial load F_R [N]	
		Ball bearings	Roller bearings
63	2	365	---
	4	365	---
	6	410	---
	8	455	---
71	2	455	---
	4	450	---
	6	515	---
	8	565	---
80	2	590	---
	4	590	---
	6	670	---
	8	735	---
90	2	670	---
	4	660	---
	6	750	---
	8	830	---
100	2	1850	---
	4	915	---
	6	1045	---
	8	1150	---
112	2	1360	---
	4	1350	---
	6	1545	---
	8	1700	---
132	2	1955	---
	4	1930	---
	6	2210	---
	8	2240	---
160	2	2500	5460
	4	2480	5617
	6	2820	5722
	8	3115	5775
180	2	3275	6195
	4	3175	6720
	6	3600	7035
	8	4000	7140
200	2	4250	9240
	4	4325	9975
	6	5150	10290
	8	5275	10447
225	2	5075	11340
	4	4925	12180
	6	5575	12600
	8	6050	12810
250	2	5025	13230
	4	5475	15225
	6	5595	15750
	8	5970	15907
280	2	5000	14700
	4	5150	15225
	6	6300	15750
	8	7200	17325
315 S-M	2	5000	13650
	4	5700	26775
	6	6700	27825
	8	7600	28350
315 L	2	6200	13020
	4	6450	23625
	6	7300	26250
	8	8200	29400
355L	2	3250	---
	4	8400	---
	6	8900	---
	8	8900	---

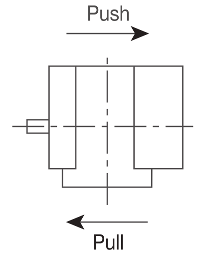
Permissible axial loads on the shaft with standard bearings

If the shaft end is loaded at X_{max} with the permissible radial load F_A, an additional axial load is allowed.

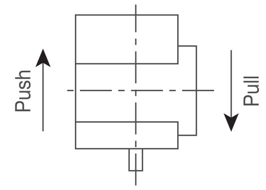
If the permissible radial load is not fully utilized, higher loads are possible in axial direction (Values on request).



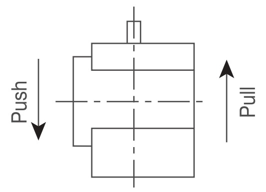
B3



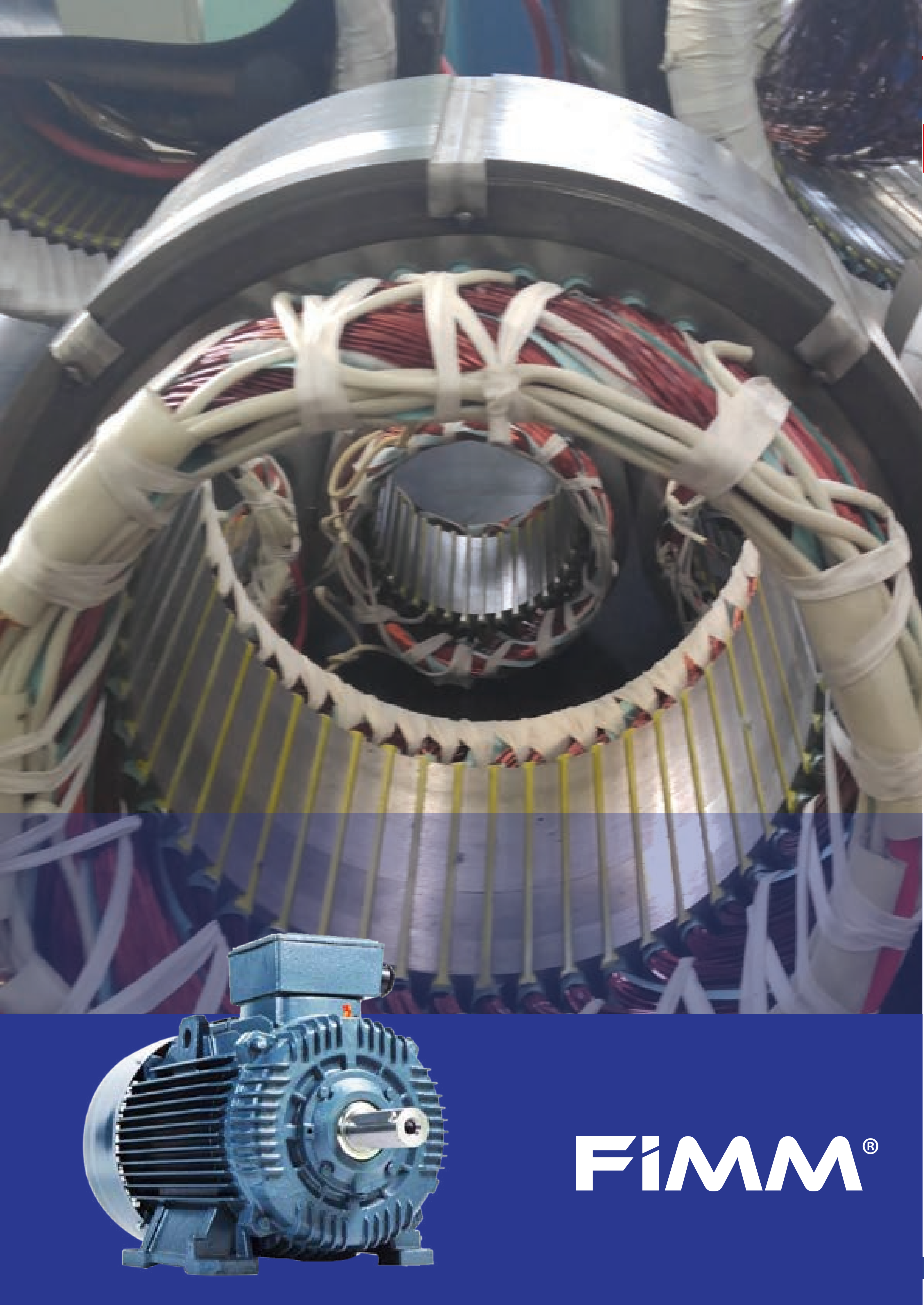
V5



V6



Frame size	Pole number	Limit axial load with F_R at X_{max} - F_A [N]			
		Ball bearings		Roller bearings	
		B3 push/pull	V5/V6 push/pull	B3 push/pull	V5/V6 push/pull
63	2	120	110	---	---
	4	120	110	---	---
	6	140	130	---	---
	8	160	150	---	---
71	2	140	130	---	---
	4	140	120	---	---
	6	170	150	---	---
	8	190	170	---	---
80	2	190	170	---	---
	4	190	160	---	---
	6	220	190	---	---
	8	250	220	---	---
90	2	200	170	---	---
	4	200	160	---	---
	6	240	190	---	---
	8	270	220	---	---
100	2	280	230	---	---
	4	280	220	---	---
	6	330	260	---	---
	8	370	300	---	---
112	2	410	330	---	---
	4	410	320	---	---
	6	480	370	---	---
	8	540	430	---	---
132	2	590	430	---	---
	4	590	380	---	---
	6	690	470	---	---
	8	780	560	---	---
160	2	750	490	1000	700
	4	750	450	1200	840
	6	880	520	1300	910
	8	1000	640	1400	980
180	2	880	950	1000	700
	4	880	1150	1250	875
	6	1030	1350	1350	945
	8	1160	1550	1550	1085
200	2	1160	1100	1100	770
	4	1160	1200	1200	840
	6	1360	1400	1400	980
	8	1520	1600	1600	1120
225	2	1300	1250	1250	875
	4	1300	1350	1350	945
	6	1520	1600	1600	1120
	8	1710	1850	1850	1295
250	2	1460	1300	1300	910
	4	1460	1400	1400	980
	6	1710	1600	1600	1120
	8	1920	1920	1900	1330
280	2	5500	3850	3700	2590
	4	5500	3850	3700	2590
	6	6500	4550	4000	2800
	8	7400	5180	4500	3150
315 S-M	2	5500	3850	3700	2590
	4	5800	4060	3500	2450
	6	6800	4760	4000	2800
	8	7650	5355	4500	3150
315 L	2	2200	1540	3850	2695
	4	2200	1540	3800	2660
	6	2500	1750	4600	3220
	8	3000	2100	5500	3850
355L	2	2000	3690	---	---
	4	6000	1880	---	---
	6	7000	300	---	---
	8	8000	300	---	---
				---	---



Performance Data

Efficiency Classification (%)

Output (kW)	IE1				IE2				IE3			
	2P	4P	6P	8P	2P	4P	6P	8P	2P	4P	6P	8P
1												
		1	1				1					1
								1				
				1	1	1	1	1				
	1			1								
1 1						1	1			1	1	
1					1			1				
		1										1
	1								1			
	1							1	1			
				1								
				1	1				1		1	
1 1									1	1		
1									1	1	1	
1						1					1	1
					1	1		1				
							1					1
	1	1										1
	1	1	1			1						
	1	1	1				1	1				
								1		1		1
					1			1			1	
1 1				1 1								
1				1								
1				1								
					1	1			1			
					1	1			1			
1					1	1			1			

2FMA Series (Aluminium Casing)

2 Pole - 3000 rpm asynchronous speed 50Hz

IE2

Output (kW)	Frame Size	Full lock speed (rpm)	Current: Full load I_N, 50Hz 380V (A)	400V (A)	415V (A)	Locked rotor I_L/I_N	Efficiency % at % full load 100	75	50	Power factor, cos φ at % full load 100	75	50	Torque: Full load T_N (Nm)	Locked rotor T_L/T_N	Break down T_B/T_N	Moment of inertia J=¼GD² (kg x m²)	Noise level at 1 meter dB(A)	Net weight (kg)
	1		1		1	1			1	1		1	1					
	1		1	1 1	1	1	1	1					1					
			1	1	1											1		1
1 1									1			1						11
1							1	1	1		1							1
								1			1							1
	1								1				1					
	11	1											1 1					

6 Pole - 1000 rpm asynchronous speed 50Hz

IE2

Output (kW)	Frame Size	Full lock speed (rpm)	Current: Full load I_N, 50Hz 380V (A)	400V (A)	415V (A)	Locked rotor I_L/I_N	Efficiency % at % full load 100	75	50	Power factor, cos φ at % full load 100	75	50	Torque: Full load T_N (Nm)	Locked rotor T_L/T_N	Break down T_B/T_N	Moment of inertia J=¼GD² (kg x m²)	Noise level at 1 meter dB(A)	Net weight (kg)
			1 1	1 1	1							1		1		1		
			1	1 1	1		1	1	1 1					1	1	1		1
			1		1				1	1					1			1
1 1							1		1				11		1			1
1	1												1		1	1	1	
	11							1							1			

4 Pole - 1500 rpm asynchronous speed 50Hz

IE2

Output (kW)	Frame Size	Full lock speed (rpm)	Current: Full load I_N, 50Hz 380V (A)	400V (A)	415V (A)	Locked rotor I_L/I_N	Efficiency % at % full load 100	75	50	Power factor, cos φ at % full load 100	75	50	Torque: Full load T_N (Nm)	Locked rotor T_L/T_N	Break down T_B/T_N	Moment of inertia J=¼GD² (kg x m²)	Noise level at 1 meter dB(A)	Net weight (kg)
1		1 1									1		1	1				
	1	1		1					1		1		1	1				
	1	1	1						1					1				
		1	1	1	1		1	1								1		
		1	1	1	1													11
1 1		1					1	1										1
1		1									1	1	1 1					1
	1	1						1					1			1		
	1	1								1						1		
	11	1						1		1						1		

8 Pole - 750 rpm asynchronous speed 50Hz

IE2

Output (kW)	Frame Size	Full lock speed (rpm)	Current: Full load I_N, 50Hz 380V (A)	400V (A)	415V (A)	Locked rotor I_L/I_N	Efficiency % at % full load 100	75	50	Power factor, cos φ at % full load 100	75	50	Torque: Full load T_N (Nm)	Locked rotor T_L/T_N	Break down T_B/T_N	Moment of inertia J=¼GD² (kg x m²)	Noise level at 1 meter dB(A)	Net weight (kg)
	1												1	1				
1 1	1				1								1	1		1		
1	11			1			1	1				1		1			1	

2FM Series (Cast Iron Casing)

2 Pole - 3000 rpm asynchronous speed 50Hz

IE2

Output (kW)	Frame Size	Full lock speed (rpm)	Current Full load I_N, 50Hz 380V (A)	400V (A)	415V (A)	Locked rotor I_L/I_N	Efficiency % at % full load 100	75	50	Power factor, cos φ at % full load 100	75	50	Torque Full load T_N (Nm)	Locked rotor T_L/T_N	Break down T_B/T_N	Moment of inertia J=¼GD² (kgxm²)	Noise level at 1 meter dB(A)	Net weight (kg)
			1	1	1											1		1
1 1						1			1			1						1
1					1		1	1	1		1							
								1			1							
	1								1									
	11					1							1					
	1		1	1	1								1 1			1		
	1		1	1	1		1									1		
11	1		1		1											1	1	1
1	1											1					1	1
1	1				1								1				1	1
	1		1 1	1		1	1						1 1			1		1
					1			1								1		
													11			1		
									1				1					1
			1						1				1			1		
			1	1	1									1			1	
			1	1	1 1		1							1			1	
11	1		1	1	1 1									1		1		
1	1				1				1					1		1		
1	1		1			1				1			1	1				1
	1		1		1	1	1			1				1				1
				1		1	1			1			1	1			1	1
1							1			1			1	1			1	1

4 Pole - 1500 rpm asynchronous speed 50Hz

IE2

Output (kW)	Frame Size	Full lock speed (rpm)	Current Full load I_N, 50Hz 380V (A)	400V (A)	415V (A)	Locked rotor I_L/I_N	Efficiency % at % full load 100	75	50	Power factor, cos φ at % full load 100	75	50	Torque Full load T_N (Nm)	Locked rotor T_L/T_N	Break down T_B/T_N	Moment of inertia J=¼GD² (kgxm²)	Noise level at 1 meter dB(A)	Net weight (kg)
		1	1	1	1								1					1
1 1		1					1	1										1
1		1									1	1	1 1					
	1	1						1					1			1		
	1	1								1			1			1		
	11	1						1		1						1		
	1	1	11	11	1								1				1	
	1	1	1	1	1												1	
11	1	1		1									1			1		11
1	1	1														1 1		1
1	1	1					1						1			1		1
	1	1					1	1					1	1		1		1
		1	1			1							1	1				
		1												1				
		1		1 1			1		1									
		1	1						1							1		
		1	1	1	1											1 1		
		1	1	1	1 1				1							1		
11	1	1	1	1	1									1				
1	1	1			1 1									1				
1	1	1										1	1	1				1 1
	1	1			1		1					1	1	1				11
		1		1			1						1					1
1		1		1	1		1						1					1

2FM Series (Cast Iron Casing)

6 Pole - 1000 rpm asynchronous speed 50Hz

IE2

Output (kW)	Frame Size	Full lock speed (rpm)	Current Full load I_N, 50Hz 380V (A)	400V (A)	415V (A)	Locked rotor I_L/I_N	Efficiency % at % full load 100	75	50	Power factor, cos φ at % full load 100	75	50	Torque Full load T_N (Nm)	Locked rotor T_L/T_N	Break down T_B/T_N	Moment of inertia J=¼GD² (kgxm²)	Noise level at 1 meter dB(A)	Net weight (kg)
			1		1				1	1					1			
1 1							1		1				11		1			
1	1												1		1	1	1	1
	11							1					1		1			
	1														1			
	1							1	1		1				1			
	1		1	1	11						1				1			
	1		1	1	1			1			1				1	1 1		11
11	1				1								1		1	1 1		1
1	1		1										1		1			1
1													1 1		1			
				1	1					1			1		1			
							1	1				1			1			
								1	1						1			
									1							1		
			1				1									1		
	1		1	1	1						1							
	1		1 11	1	1											1		
11	1			1	1 1								1 11					1
1	1												1					111
1													1					1
			1										1			11		1
				1									11			1		1 1

8 Pole - 750 rpm asynchronous speed 50Hz

IE2

Output (kW)	Frame Size	Full lock speed (rpm)	Current Full load I_N, 50Hz 380V (A)	400V (A)	415V (A)	Locked rotor I_L/I_N	Efficiency % at % full load 100	75	50	Power factor, cos φ at % full load 100	75	50	Torque Full load T_N (Nm)	Locked rotor T_L/T_N	Break down T_B/T_N	Moment of inertia J=¼GD² (kgxm²)	Noise level at 1 meter dB(A)	Net weight (kg)
	1					1			1				1	1				
1 1	1				1	1							1	1		1		
1	11						1				1	1		1		1	1	
	1	1	1							1	1			1		1		
	1	1			1									1				
	1		1				1	1					1	1				
	1		1	1	1									1				11
	1		1	1	1			1						1		1		1
11	1												1					1
1			1		1								1					
1			1									1		1		1		
			1				1							1				
				1										1				
								1						1		1		
														1		1		
	1		11	1	1		1			1				1				
	1		1	1	1	1	1	1		1				1				
	1		1 1	1	1		1	1					11 1	1				
11	1								1			1	1 1	1				1
1	1		1	1	1								1	1				1
1			1		1				1					1		11		1
														1		1		1

PERFORMANCE DATA IE2

3FM Series (Cast Iron Casing)

2 Pole - 3000 rpm asynchronous speed 50Hz

IE3

Output (kW)	Frame Size	Full lock speed (rpm)	Current Full load I_N, 50Hz 380V (A)	400V (A)	415V (A)	Locked rotor I_L/I_N	Efficiency % at % full load 100	75	50	Power factor , cos φ at % full load 100	75	50	Torque Full load T_N (Nm)	Locked rotor T_L/T_N	Break down T_B/T_N	Moment of inertia J=¼GD² ($kg x m^2$)	Noise level at 1 meter dB(A)	Net weight (kg)

4 Pole - 1500 rpm asynchronous speed 50Hz

IE3

Output (kW)	Frame Size	Full lock speed (rpm)	Current Full load I_N, 50Hz 380V (A)	400V (A)	415V (A)	Locked rotor I_L/I_N	Efficiency % at % full load 100	75	50	Power factor , cos φ at % full load 100	75	50	Torque Full load T_N (Nm)	Locked rotor T_L/T_N	Break down T_B/T_N	Moment of inertia J=¼GD² ($kg x m^2$)	Noise level at 1 meter dB(A)	Net weight (kg)

PERFORMANCE DATA IE3

3FM Series (Cast Iron Casing)

6 Pole - 1000 rpm asynchronous speed 50Hz

IE3

Output	Frame	Full	Current			Locked	Efficiency %			Power factor , cos φ			Torque			Moment	Noise	Net
	Size	lock	Full load I_N, 50Hz			rotor	at % full load			at % full load			Full load	Locked rotor	Break down	of inertia	level	weight
		speed	380V	400V	415V		100	75	50	100	75	50	T_N	T_L/T_N	T_B/T_N	J=¼GD²	at 1 meter	
(kW)		(rpm)	(A)	(A)	(A)	I_L/I_N							(Nm)			(kg xm²)	dB(A)	(kg)
				1	1					1					1			
1 1							1						11		1			
1	1												1		1	1	1	
	11			1					1			1	1		1			
	1											1			1			1
	1											1			1			
	1		1	1	11						1				1			
	1		1	1	1		1				1				1	1		11
11	1		1		1						1		1		1	1		1
1	1						1	1 1		1			1		1	1		1
1							1	1		1			1 1		1			
					1			1		1			1		1			
			1		1				1						1			
			1	1		1			1			1			1	1		
				1					1									
			1	1														
	1		1	1	1 1													
	1		1	1 1	1		1											
11	1			1	1						1		1 1 1			1		
1	1										1		1					11
1				1							1		1	1		1		1
											1		1	1		1		1
					1						1		11	1		1		1

8 Pole - 750 rpm asynchronous speed 50Hz

IE3

Output	Frame	Full	Current			Locked	Efficiency %			Power factor , cos φ			Torque			Moment	Noise	Net
	Size	lock	Full load I_N, 50Hz			rotor	at % full load			at % full load			Full load	Locked rotor	Break down	of inertia	level	weight
		speed	380V	400V	415V		100	75	50	100	75	50	T_N	T_L/T_N	T_B/T_N	J=¼GD²	at 1 meter	
(kW)		(rpm)	(A)	(A)	(A)	I_L/I_N							(Nm)			(kg xm²)	dB(A)	(kg)
	1				1								1	1				
1 1	1		1										1 1	1		1		
1	11		1											1		1	1	
	1	1		1			1	1		1				1		1		
	1	1		1									1	1				
	1													1				1
	1		1 1	1	1			1						1				1
	1		1	1	1									1		1		1
11	1												1					1
1				1							1		1					
1			1				1				1	1		1		1		
														1				
							1	1						1				
					1		1	1						1		1		1
														1		1		
	1		111	1	1 1					1				1				
	1		1 11	1	1		1		1	1			1	1				1
	1		1	1	1								11	1				1
11	1		1		1								1 1 1	1				11
1					1								1 1	1		11		1
1			1		1			1			1		1	1		1		1
					1						1			1		1		1

FMB Series (Aluminium and Cast Iron Casing)

4 Pole - 1500 rpm asynchronous speed 50Hz

BRAKE MOTOR

Output (kW)	Frame Size	Full lock speed (rpm)	Current Full load I_N, 50Hz 380V (A)	Current Full load I_N, 50Hz 400V (A)	Current Full load I_N, 50Hz 415V (A)	Locked rotor I_L/I_N	Efficiency % at % full load 100	Power factor, cos φ at % full load 100	Torque Full load T_N (Nm)	Torque Locked rotor T_L/T_N	Torque Break down T_B/T_N	Moment of inertia J=¼GD² (kg x m²)	Break Torque (Nm)	Noise level at 1 meter dB(A)	Net weight (kg)
	1	1	1 1	1	1					1		1			1
		1	1	1	1		1					1			1
		1		1	1							1			1
1 1		1										1	1	1	
1		1							1				1	1	
	1	1 1	1	1				1	1						
	1	1 1			1										
	11	1													
	1	1	11	11 1	1							1		1	1
	1	1	1	1	1 1									1	
11	1	1		1									1		1
1	1	1	1						1			1	1		1

Note : For Brake Motor

1 11

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FMS Series (Aluminium Casing)

2 Pole - 3000 rpm asynchronous speed 50Hz

SINGLE PHASE

Frame size	Output (kW)	Full load speed (RPM)	Current Full load I_N (A)	Efficiency at 100% full load	Power factor cos φ at 100% full load	Locked rotor I_L/I_N (A)	Torque Full load torque T_N (Nm)	Torque Locked rotor torque T_L/T_N	Torque Break down torque T_B/T_N	Start μF / Run μF	Weight of foot mount motor (kg)
1							1	1	1	1	
								1	1	1	
	1						1	1	1	1	1
			1 1					1	1		1

4 Pole - 1500 rpm asynchronous speed 50Hz

SINGLE PHASE

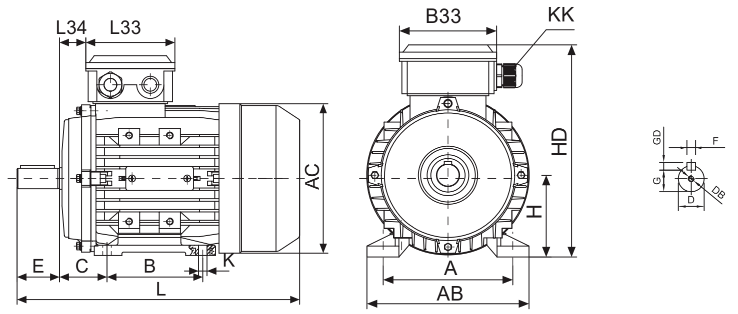
Frame size	Output (kW)	Full load speed (RPM)	Current Full load I_N (A)	Efficiency at 100% full load	Power factor cos φ at 100% full load	Locked rotor I_L/I_N (A)	Torque Full load torque T_N (Nm)	Torque Locked rotor torque T_L/T_N	Torque Break down torque T_B/T_N	Start μF / Run μF	Weight of foot mount motor (kg)
1		1						1	1	1	
		1		1				1	1	1	1
	1	1					1	1	1		1
1		1	1				1	1	1		
11		1						1	1		

FIMM®

Dimensions IE2-IE3

Aluminium Casing Dimension

IMB3



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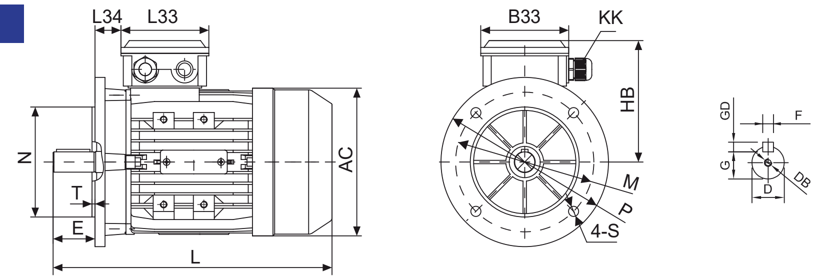

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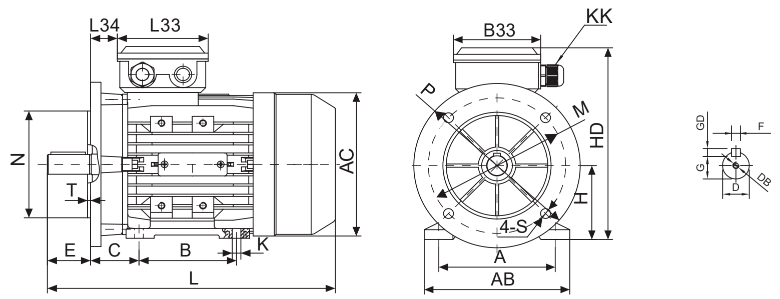

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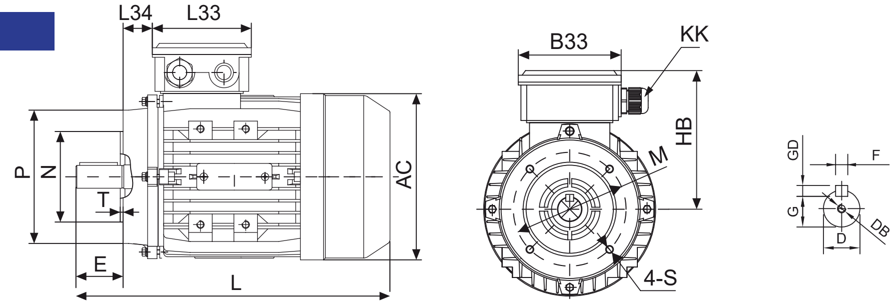

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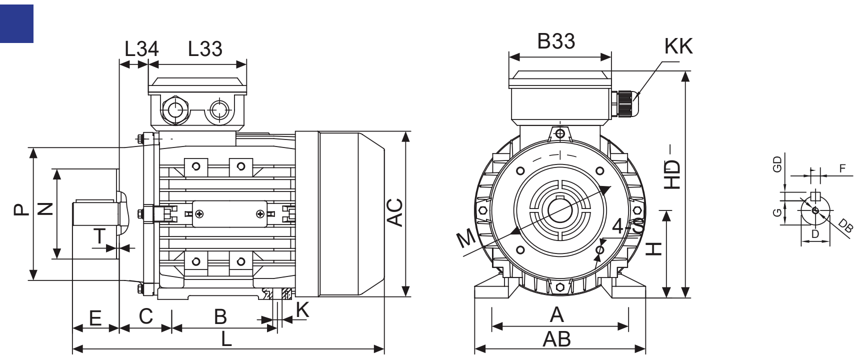


Frame size	General								Feet					
	B3, B5, B34, B35, B14								B3, B34, B35					
	AC	B33	HB	HD	KK	L	L33	L34	A	AB	B	C	H	K
	1		1	1	1			1	1	1				
1	1		11	1	1				11	1			1	
	1	1	1				1		1	1	1			1
	1	1	1				1		1	1	1			1
	1	1	1				1		1	1	1			1
1	1	1	1				1		1		1		1	1
11		11	1				11		1		1		11	1
1		11	1				11		1		1		1	1
1		11	1			1	11		1		1		1	1
1		1				1	1				1	1	1	1
1		1					1					1	1	1

Note : B14C/2

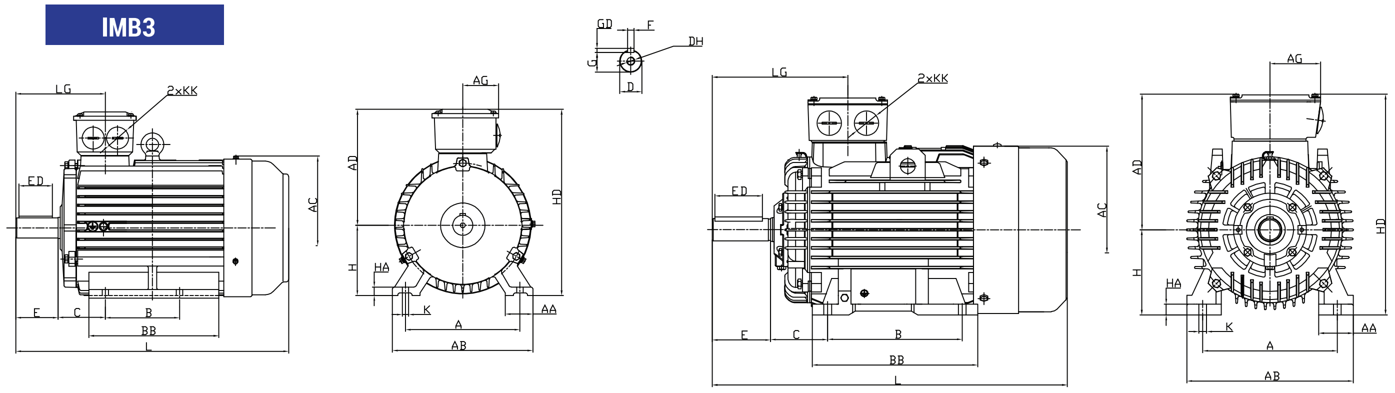
Frame size	Shaft						Flange									
	B3, B5, B34, B35, B14						B5, B35					B14, B34				
	D	DB	E	F	G	GD	M	N	P	S	T	M	N	P	S	T
	11						11		1	1						
1	1				11		1	11	1	1				1		
	1				1		1	1		1		1		1		
							1	1		1		11		1		
							1	1		1		11		1		
1		1					1	1		1		1	11	1		
11		1					1	1		1		1	11	1		
1		1		1						1		1	1		1	
1		1		1						1		1	1		1	
1		1	11	1						1		1	1		1	

Note : B14C/2

DIMENSIONS

Cast Iron Casing Dimension

IMB3



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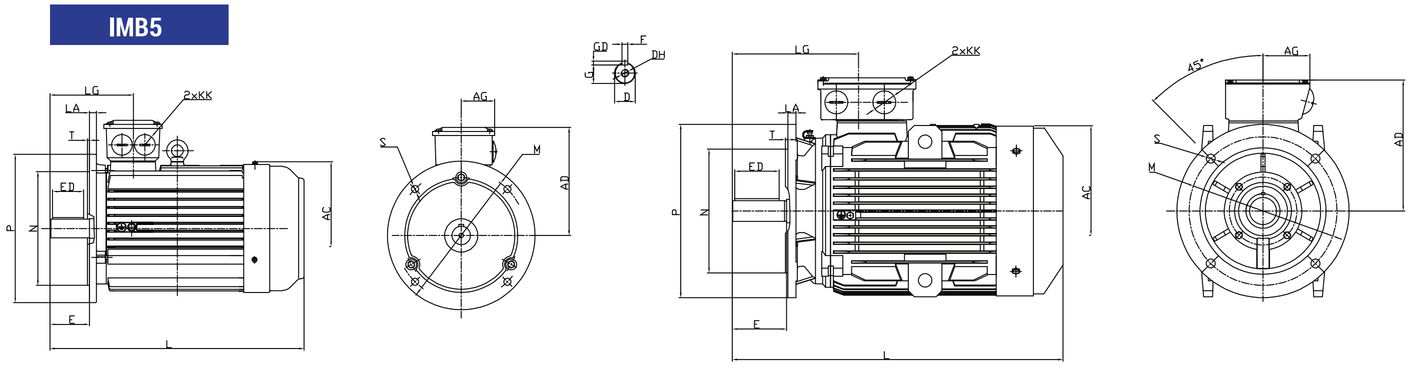
IMB5



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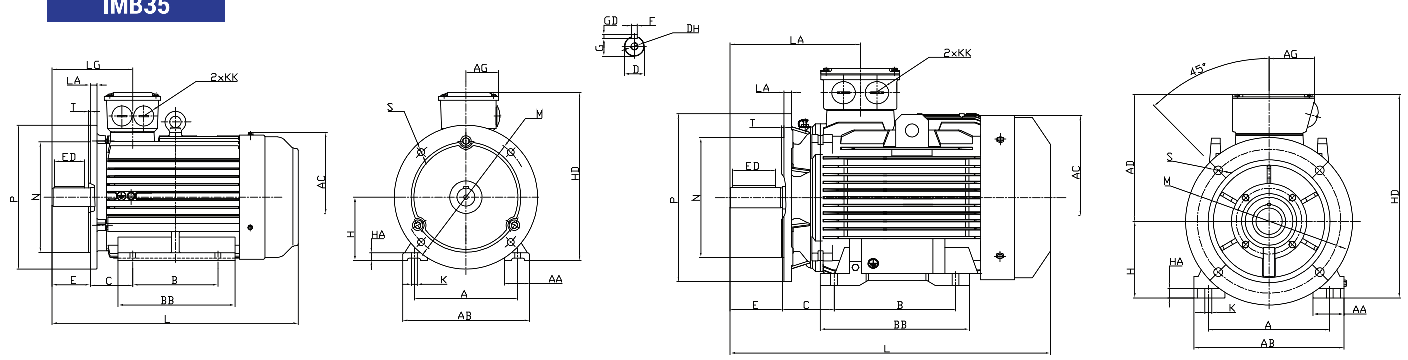

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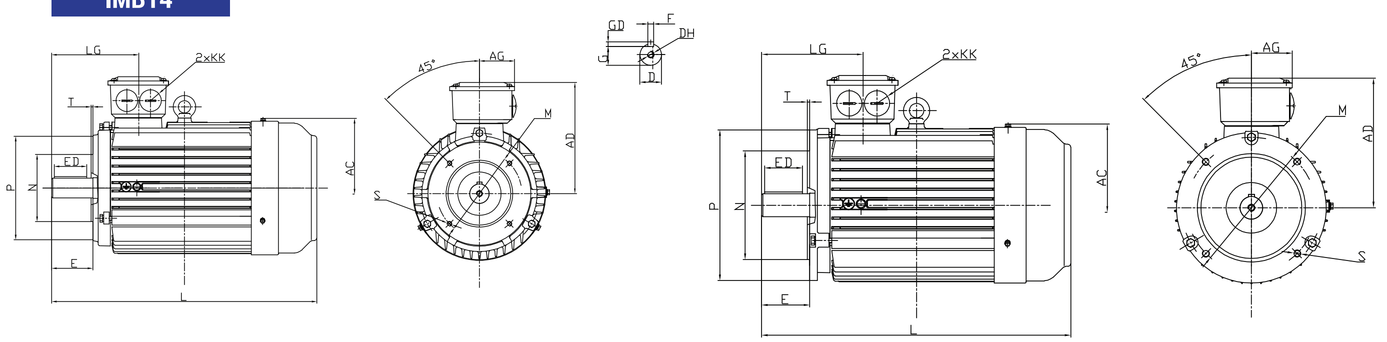

1 1 1 1 1

Frame size	General B3 B5 B35 B14								Feet B3 B35									
	AC (2)	L (2)	AC	L	AD	AG	KK	LG	A	AB	AA	B	BB	C	H	HA	HD	K
	1	1	1		1	1	1	11	1	1		1	1			1		1
			1	1	1		1	1	1	1		1	1			1		1
			1		1		1	1	1	1		1	1			1		1
1	1		1	1	1		1	1	1			1			1	1		1
11		1			1			1	1			1			11	1		1
1								1	1			1			1	1		1
1				1				1	1			1			1	1		1
1				1								1		1	1	1		1
1														1	1	1		1
1		1										1		1 1	1			1
1				1										1 1	1			1
		1		1		1			1					1			1	1
		1		1		1								1				1
1		1		1		1		1				11		1				1
						1						11		1				1
1						1								1				
		1		1		1								1				
1						1					1			1				
						1					1			1				
1		1		1		1					1	1		1				
		1		1		1					1	1		1				
1 1		11		11		1					1		1	1	1			
1 1		1		1		1					1			1	1			
1 1		1		1		1					1			1	1			
1		11		11		1		1			1		1	1	1			
1		1		1		1		1			1			1	1			
1		1		1		1		1			1			1	1			
1		1		1				1	1		1						1	
1		1		1				1	1		1						1	
		1		1					1		1						1	
		1		1					1		1						1	

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DIMENSIONS

DIMENSIONS

DIMENSIONS

Frame size	Shaft B3 B5 B35 B14							Flange dimension B5 B35						B14C/2					B14C/1				
	D	DH	E	ED	F	G	GD	M	N	P	S	T	LA	M	N	P	S	T	M	N	P	S	T
	1	1				1		1	1		1		1	1		1			1	11	1		
		1						1	1		1		1	11		1			1	11	1		
		1						1	1		1		1	11		1			1	11	1		
1		1						1	1		1		1	1	11	1			1	1		1	
11		1						1	1		1		1	1	11	1			1	1		1	
1		1			1						1		1	1	1		1		1	1		1	
1		1			1						1		1	1	1		1		1	1		1	
1		1	11		1						1		1	1	1		1					1	
1		1	11		1						1		1	1	1		1					1	
1		1	11		1						1		1										
1		1	11		1						1		1										
			11		1		1				1		1										
			1	1	1		11				1		1										
[1]			11		1		1				1		1										
			1	1	1		11				1		1										
[1]			1	1	1		11				1												
			1	1	1		11				1												
[1]			1	1	1		11				1												
			1	1			1				1												
[1]			1	1	1		11				1												
			1	1			1				1												
1 [1]			1	1	1		11																
1 [1]			1	1	1		11																
1 [1]			1	1	1		11																
1			1	1		1	1																
1			1	1		1	1																
1			1	1		1	1																
[1]			1	11			1																
[1]			1	11			1																
			1	1			1																
			1	1			1																

1

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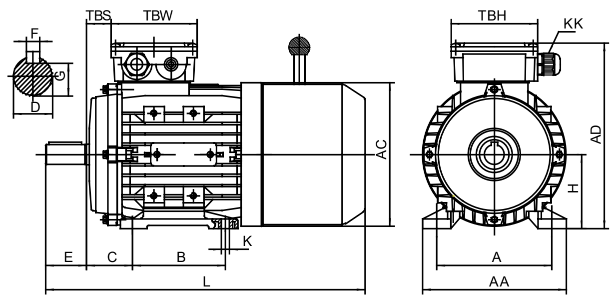
Dimensions
BRAKE MOTOR

Brake Motor Dimension



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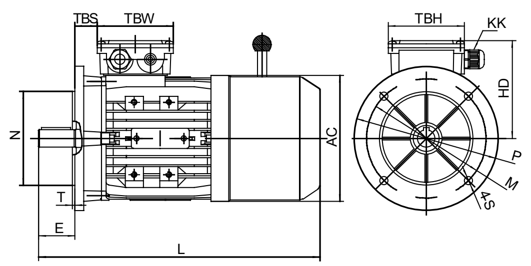
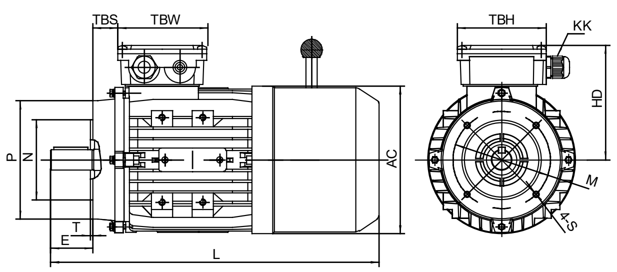
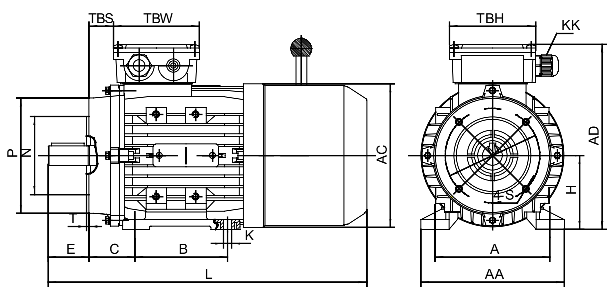


IMB5

FRAME	Foot Mounting																			
																			TBW	
1	1	112	90	45	Φ1	30		11	7*10		12	1	1	1	11	Φ1	301			
		125	100		Φ1	40		15.5	10*13	M6	1	21	1		1	Φ1		27	105	105
90S	90	140	100	56	Φ24				10*13		1		1		1	Φ1		30	105	105
90L	90	140	125	56	Φ24				10*13		1		1		1	Φ1		30	105	105
100	100	160	140		Φ	60		24	12*15	10		30			1	Φ 1		26	105	~~105~~
112	112	190	140	70	Φ	60		24	12*15	10		30	230		1	Φ	1	32	112	112
132S	132	216	140	89	Φ38		10		12*15	12					18	Φ		38	112	112
132M	132	216	178	89	Φ38		10		12*15	12					18	Φ		38	112	112
160M/L	160	254	210/254	108	Φ42	110	12		15*19	16		45				Φ			1	1



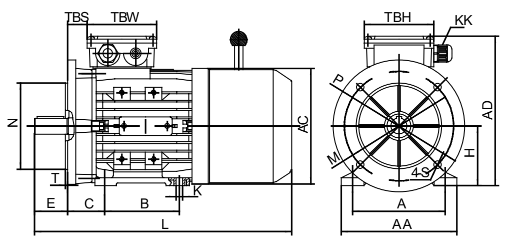
IM B14

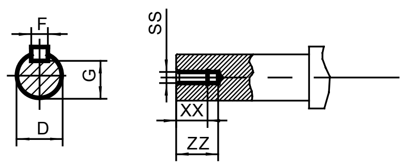


IM B34

DIMENSIONS

FRAME									14C/2					14C/1		
1	1	Φ110	Φ130	Φ160	Φ10	3.5	Φ	Φ	Φ105	M6		Φ95	Φ115	Φ140		
		Φ130	Φ165	Φ	Φ12	3.5	Φ	Φ100	Φ120	M6		Φ110	Φ130	Φ160	3.5	
90		Φ130	Φ165	Φ	Φ12	3.5	Φ95	Φ115	Φ140			Φ110	Φ130	Φ160	3.5	
100		Φ180	Φ215	Φ	Φ15		Φ110	Φ130	Φ160		3.5	Φ130	Φ165	Φ	3.5	M10
112		Φ180	Φ215	Φ	Φ15		Φ110	Φ130	Φ160		3.5	Φ130	Φ165	Φ	3.5	M10
132		Φ230	Φ265	Φ300	Φ15		Φ130	Φ165	Φ	M10	3.5	Φ180	Φ215	Φ		M12
160		Φ	Φ300	Φ350	Φ1		Φ180	Φ215	Φ	M12		Φ	Φ	Φ		1



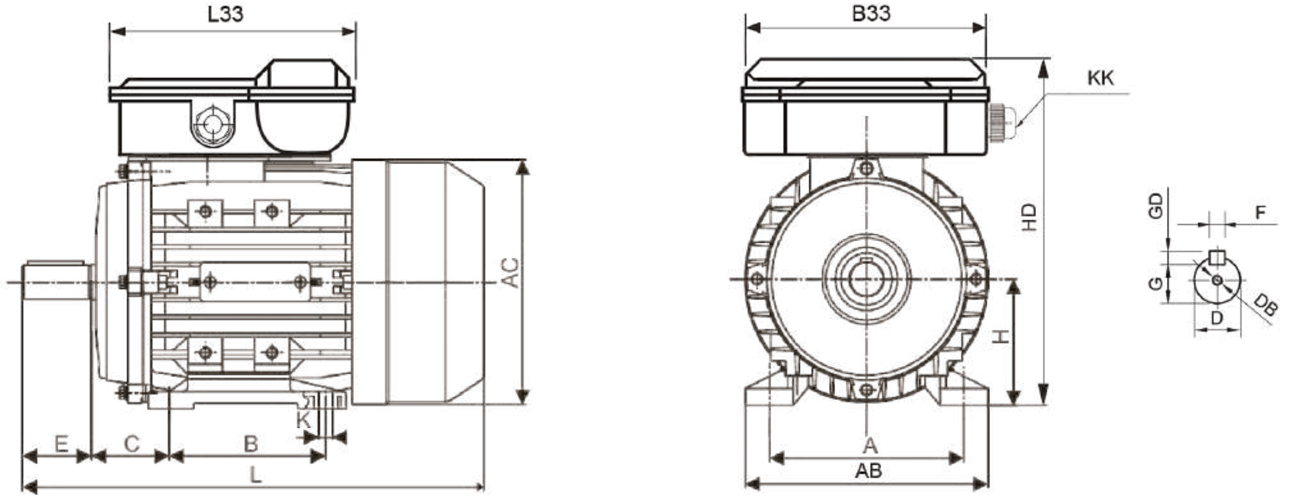


IM B35

Dimensions
SINGLE PHASE

Single Phase Dimension

IMB3



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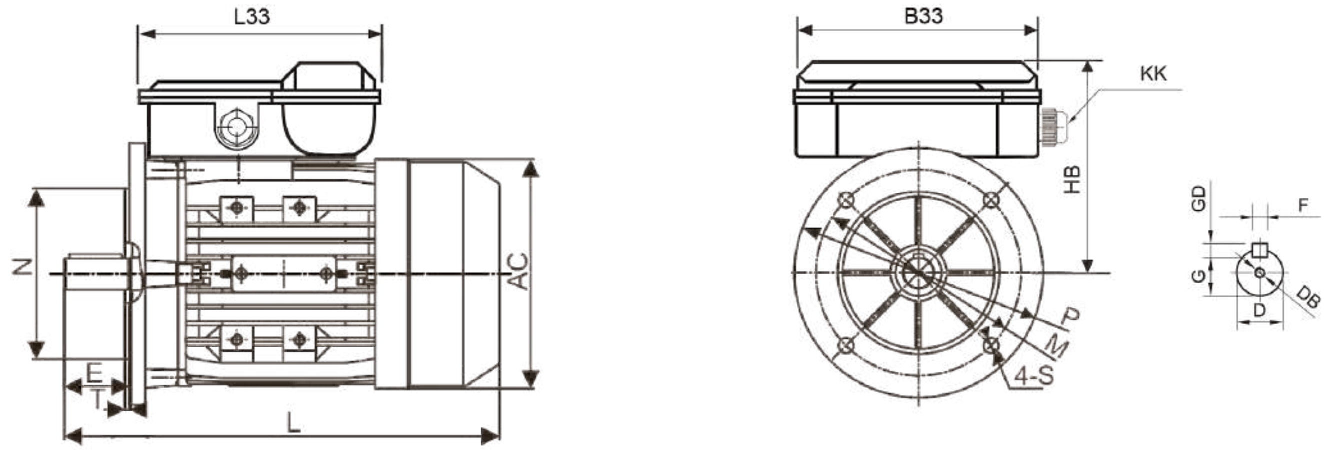

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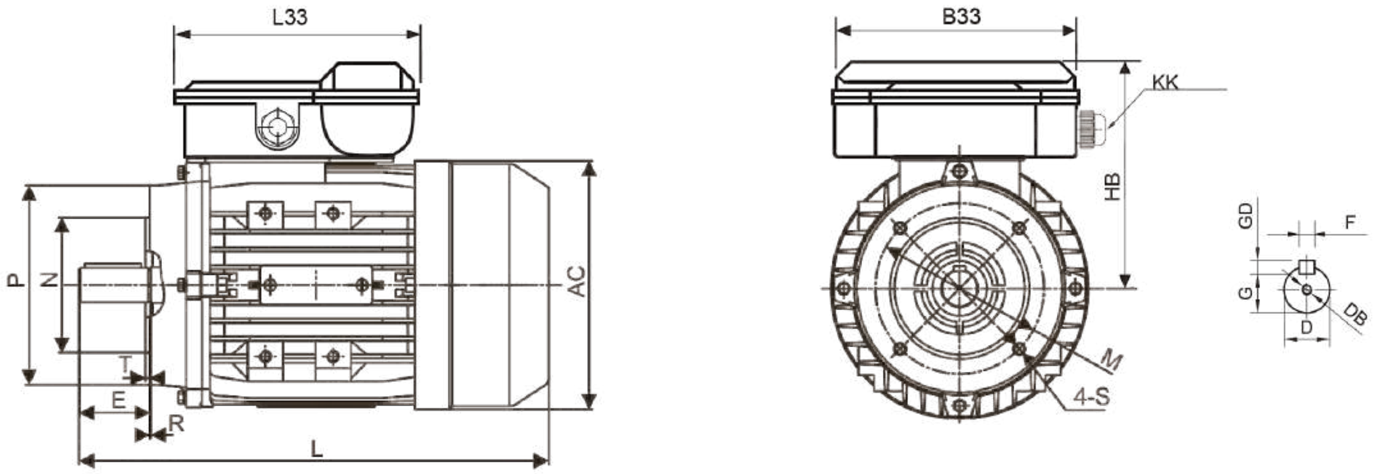


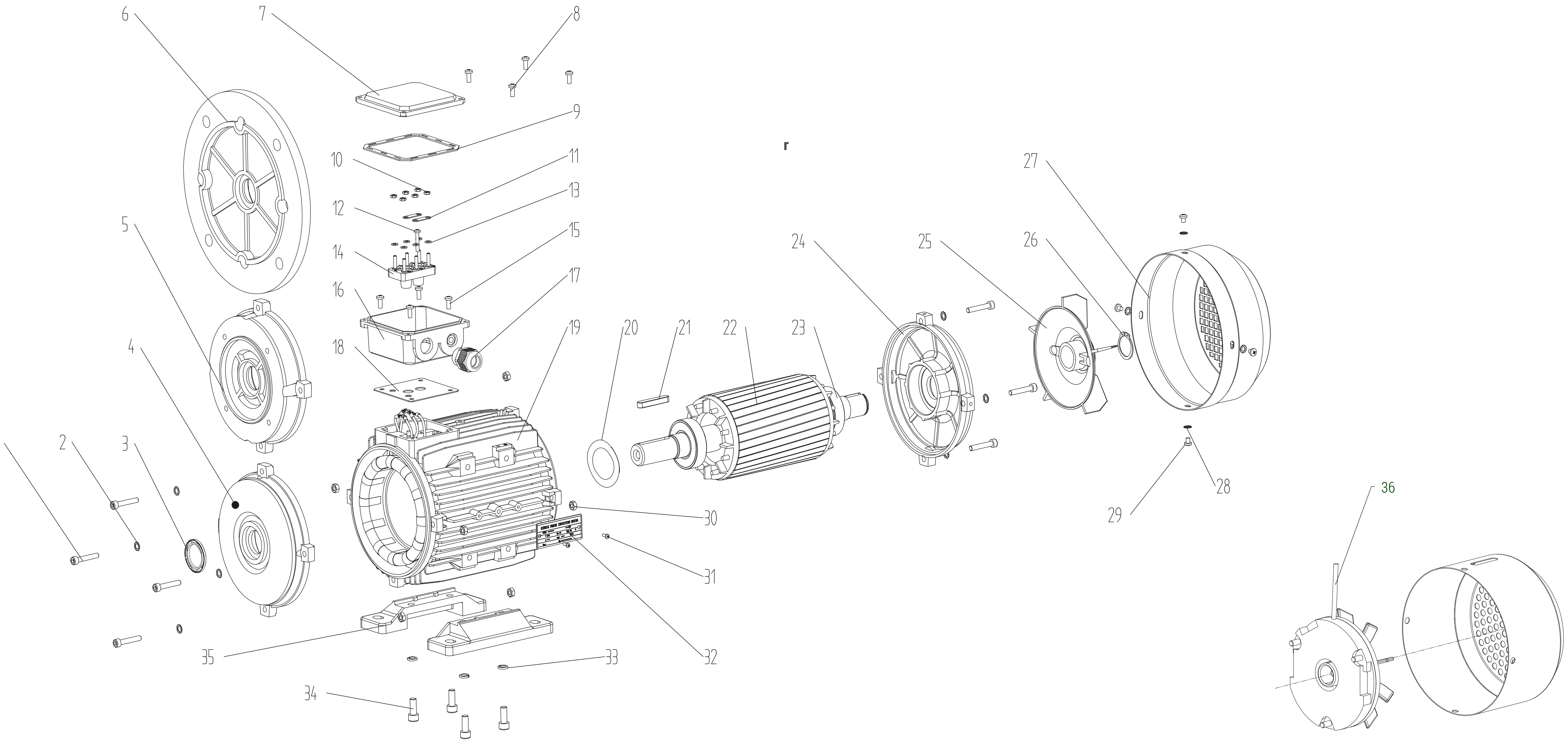
Frame size	General							Feet				
	B3, B5, B14							B3				
	AC	B33	HB	HD	KK	L	L33	A	AB	B	C	H
1	1	1	11	1	1		1	11	1			1
	1	1	1	11	1		1	1	1	1		
	1	1	1		1	1	1	1	1	1		
	1	1	1		1	1	1	1	1	1		
1	1	1	1		1	1		1	1	1		1
11	11	1	1		1	1		1	1	1		11

Frame size	Shaft						Flange									
	B3, B5, B14						B5					B14				
	D	DB	E	F	G	GD	M	N	P	S	T	M	N	P	S	T
1	1				11		1	11	1	1				1		
	1				1		1	1		1		1		1		
							1	1		1		11		1		
							1	1		1		11		1		
1		1					1	1		1		1	11	1		
11		1					1	1		1		1	11	1		

DIMENSIONS

DIMENSIONS

Exploded view (Aluminium), Brake Motor



r

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fi

1 fi

11
1
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1 fi
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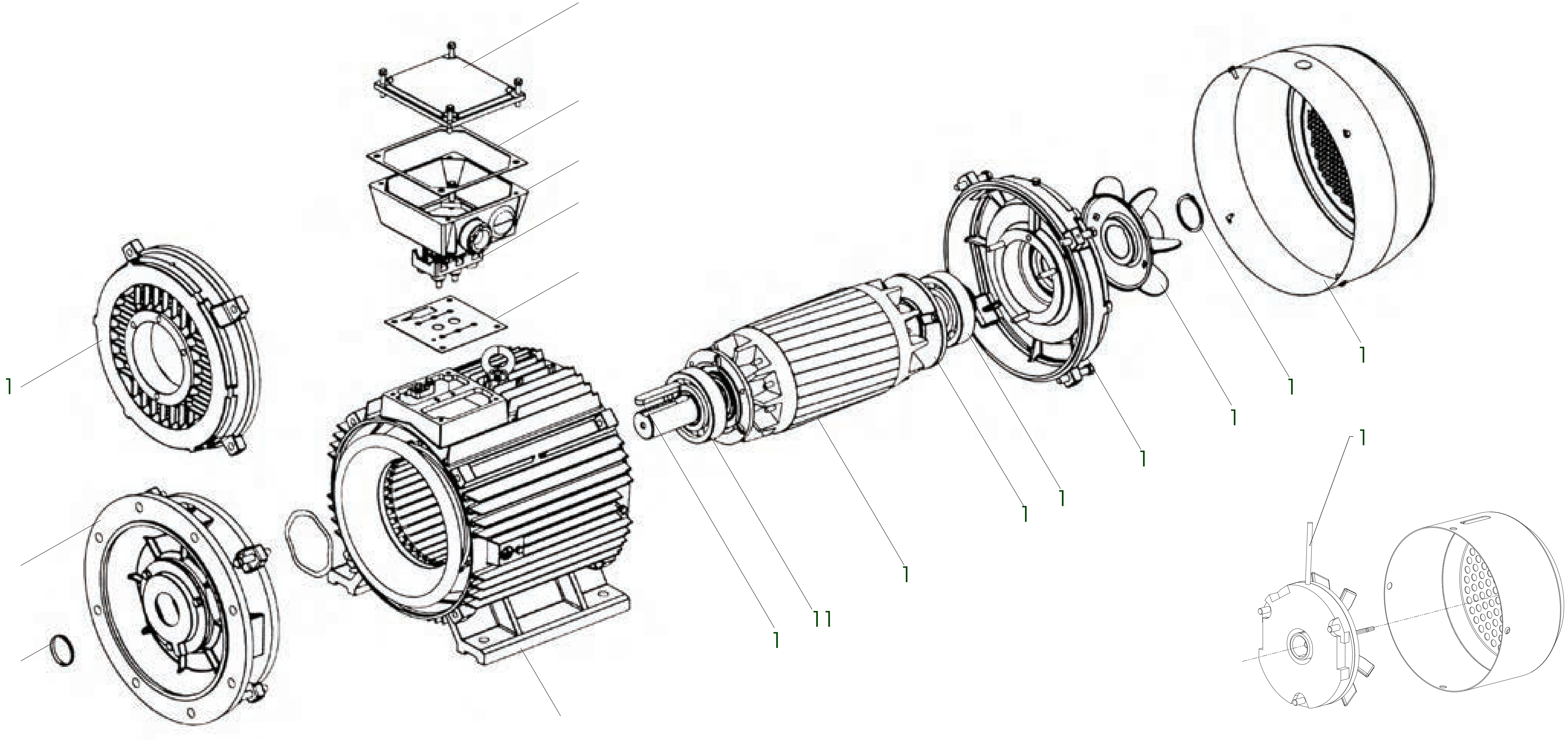
1

1

fi
fi
fi

fi
1
fi
fi

Exploded view (Cast Iron), Brake Motor



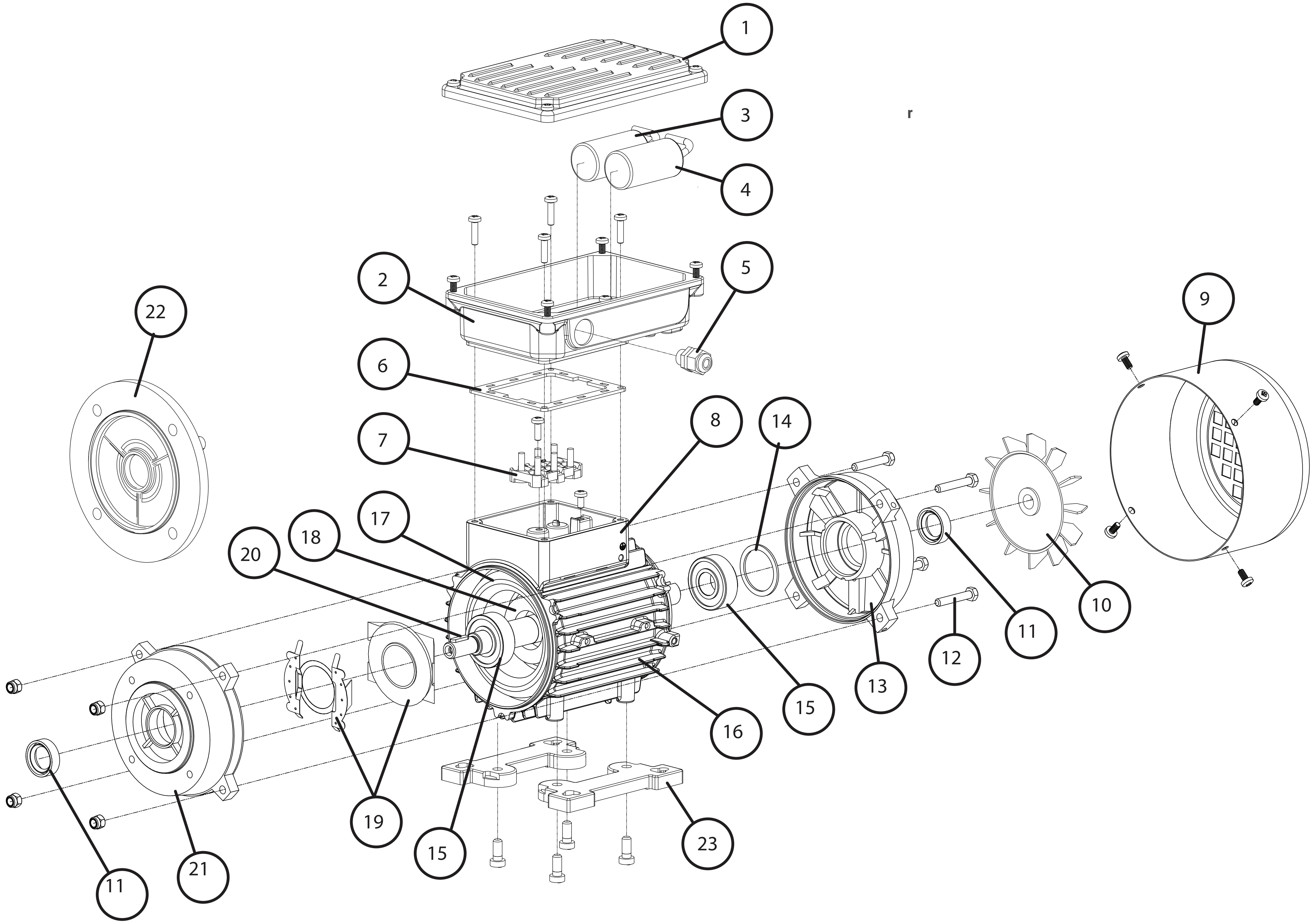
1

1

11
1
1
1

1
1
1
1
1

Exploded view (Single Phase)



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Item	Description
1	
1	
11	
1	
1	
1	
1	
1	
1	
1	
1	
1	

Bearing

		1 2RZC3	6201 2RZC3
1		6202 2RZC3	6202 2RZC3
		2RZ	2RZ
		2RZ	2RZ
1		6 2RZ	6 2RZ
11		3 6 2RZ	3 6 2RZ
1		2RZ	2RZ
1		Z	
1		11	11
		1	1
		1	1
		1	1
		1	1
		1	1
1		1	1
1	1	1	1
		1	1

Bearing lubrication

It should be noted that for motor fitted with Ball and Roller bearing, the lubrication intervals for both bearings should be based on the roller bearing data. The lubrication intervals recommend are calculated on the basis of normal working conditions (operating temperatures up to 70°C). FIMM motors are equipped with bearings from excellent manufactures. We recommend using SKF, FAG or NSK Brand. In general the bearings have C3 clearances. The motor of frame size 80-132 are fitted with life-lubricated bearings. The motor of frame size 160-355 are fitted with open bearings and regreasing device. Depending on the useful life of grease, open bearings must be regreased in good time so that the scheduled bearing service life is reached. We recommend using Shell Gadus S3 V220C-2 and BP Energrease LS2. Angular contact thrust ball bearings should be used for vertical mounting motor.

Frame size	Drive end bearing	Non-drive end bearing	Maximum regreasing period hours for operating temperatures up to 70°C			Quantity of grease in bearing chamber grams
			rpm<3600	rpm<1800	rpm<1200	
1				1	1	1
1	11	11		11	1	1
	1	1			1	
	1	1				
	1	1				
	1	1	1			
	1	1				
1	1	1	1			
1	1 1	1				
	1	1	1			
				1		

1 .

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Operation and Maintenance

OPERATION

• Before running the motor make sure that the terminal box lid is closed and secured with appropriate clearance to live parts.
• Make sure that appropriate earthing is done.
• Make sure that the coupling and/or transmission is adequately guarded for safety.
• Check the mounting bolts and/or flanges are firmly secured.
• Make sure of no loose objects around that may be sucked by the cooling fan on the motor.
• Make sure that the load applied is within the nameplate specification.
• Make sure that the ambient temperature is inside 40°C or nameplate specification, record the figures in the log book for future reference. Note that the current imbalance can be higher, typically 10 times the voltage imbalance if there is an imbalance in supply voltage.

MAINTENANCE SCHEDULE FOR MOTORS

Description	Comments	Maintenance frequency
Motor use/sequencing	Turn off or sequence unnecessary motors.	Weekly
Overall visual inspection	Verify equipment is operating and safety systems are in place.	Weekly
Check bearings and drive belts	Inspect for wear, and adjust, repair, or replace as necessary.	Weekly
Motor alignment	Look for rubber or steel savings under couplings, or listen for odd noises, as these may indicate a problem).	Weekly
Motor condition	Check condition by analyzing temperature or vibration, and compare to baseline values.	Quarterly (or as needed on weekly inspections)
Cleaning	Remove dust and dirt to facilitate cooling.	Quarterly
Check lubrication	Ensure bearings are lubricated as recommended by manufacturer.	Annually (or based on run hours)
Check mountings	Secure any loose mountings.	Annually
Check terminal tightness	Tighten any loose connections.	Annually
Check for balanced three-phase power	Troubleshoot unbalanced motor circuit and fi problems if the voltage imbalance exceeds 1%.	Annually
Check for over- or undervoltage conditions	Troubleshoot motor circuit and fix problems if th supply voltage differs significantly from rated voltages	Annually

VANICH GROUP
Industrial Product Company

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สำนักงานใหญ่ : 32 ถนนพระรามที่ 2 แขวงท่าข้าม เขตบางขุนเทียน กรุงเทพฯ 10150
สาขาหาดใหญ่ : 84/42 หมู่3 ตำบลคลองแห อำเภอหาดใหญ่ สงขลา 90110

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