



English

PRODUCT CATALOGUE

CEG Motori Elettrici - 3<sup>rd</sup> Edition - October 2004



**CEG**  
*motori elettrici*





high efficiency  
solutions



## 1) The Company

- 1.a) Company Profile pag. 5
- 1.b) Company activities and Product range pag. 6

## 2) Products

- 2.a) Approval and compliance with international standards pag. 9
  - 2.a1) Harmonization of international standards pag. 9
  - 2.a2) European standards (CE mark) pag. 9
  - 2.a3) USA standards (UL mark) pag. 12
  - 2.a4) Canadian standards (CSA mark) pag. 12
  - 2.a5) High efficiency pag. 13
  - 2.a6) IRAM Certification pag. 13
- 2.b) General information about asynchronous motors pag. 14
- 2.c) The motor components pag. 22

## 3) Product range

- 3.a) Single-speed three-phase motors (MTSTD) pag. 28
  - 3.a1) Single-speed three-phase motor connection diagrams pag. 32
- 3.b) Two-speed three-phase motors (DPSTD) pag. 33
  - 3.b1) Two-speed three-phase motor connection diagrams pag. 36
  - 3.b2) Single and two-speed three-phase motor overall dimensions (IEC-72) pag. 37
- 3.c) Permanent capacitor single-phase motors (MMSTD) pag. 40
- 3.d) Cap start / cap run single-phase motors (MMDSG) pag. 42
  - 3.d1) Single-phase motor connection diagrams pag. 44
  - 3.d2) Single-phase motors overall dimensions pag. 45
  - 3.d3) Standard three- and single-phase motor exploded view pag. 48
- Brake motors pag. 49
  - 3.e) Gradual DC brake (MTFPC, DPFPC, MMFPC) pag. 50
  - 3.f) High-torque DC brake (MTFHC, DPFHC, MMFHC) pag. 51
  - 3.g) High-torque AC brake (MTFHA, DPFHA) pag. 52
    - 3.g1) Brake motor connection diagrams pag. 58
    - 3.g2) FPC brake motor exploded view pag. 59
    - 3.g3) FHC brake motor exploded view pag. 60
    - 3.g4) FHA brake motor exploded view pag. 61
    - 3.g5) Brake motors overall dimensions pag. 62
- 3.h) High-pressure water pump motors (MTACP, MMACP) pag. 68
  - 3.h1) High-pressure water pump motors overall dimensions pag. 70
- 3.i) Low centre motors (ETSTD, EMSTD) pag. 72

3.l)	Low centre motors with FPC brake (ETFFPC, EMFFPC)	pag. 73
3.l1)	Low centre motor overall dimensions	pag. 75
3.l2)	E48 low centre motor exploded view	pag. 81
3.l3)	E63 low centre motor exploded view	pag. 82
3.l4)	E80 low centre motor exploded view	pag. 83
3.m)	UL-CSA approved motors (MTOML, MMOML)	pag. 84
3.n)	UL-CSA approved low centre motors (ETOML-EMOML)	pag. 87
3.o)	High efficiency three-phase motors (MTEF2)	pag. 89
3.p)	Options for Inverter-duty three-phase motors	pag. 91

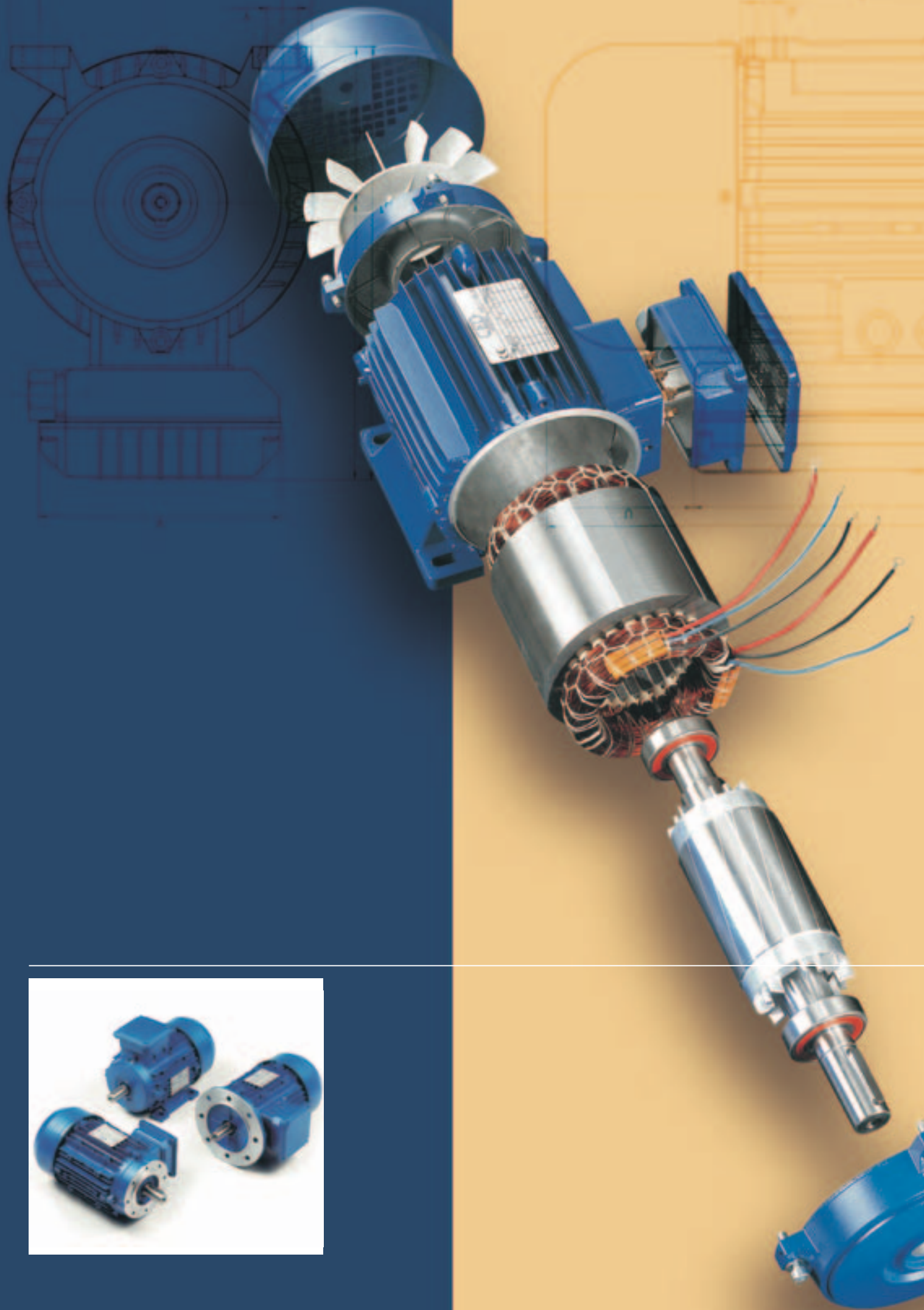
#### **4) Service**

4.a)	Customer care	pag. 94
4.b)	Product selection	pag. 94
4.c)	Reading product code	pag. 95
4.d)	Acknowledgement	pag. 95

#### **List of charts and forms**

•	Product range	pag. 6
•	Harmonization of international standards	pag. 9
•	CE Declaration of Compliance	pag. 11
•	Chart 1: Electrical tolerances (IEC 34-1)	pag. 14
•	Chart 2: Electrical and electromagnetic parameters	pag. 14
•	Chart 3: Voltage and frequency limits	pag. 16
•	Chart 4: Motor vibration levels	pag. 18
•	Chart 5: Protection degrees of electrical machines (IEC 34-5)	pag. 18
•	Chart 6: Mounting arrangements	pag. 19
•	Chart 7: Permissible radial load [N]	pag. 20
•	Chart 8: Additional axial load [N]	pag. 21
•	Chart 9: Casing materials and feet	pag. 22
•	Chart 10: Mechanical tolerances	pag. 22
•	Chart 11: Bearings fitted with CEG motors	pag. 22
•	Chart 12: PG or metric cable glands	pag. 24
•	Customer care	pag. 94
•	Reading product code	pag. 95







17 Founded in 1971 by Giuliano Gobbi, CEG Company started as a family-run electromechanical firm and has grown over the years till reaching its actual industrial dimension, through continuous investments in technology and logistics (5% of turnover invested annually over the last 5 years) and to its young and enthusiastic personnel (average age 29 years).

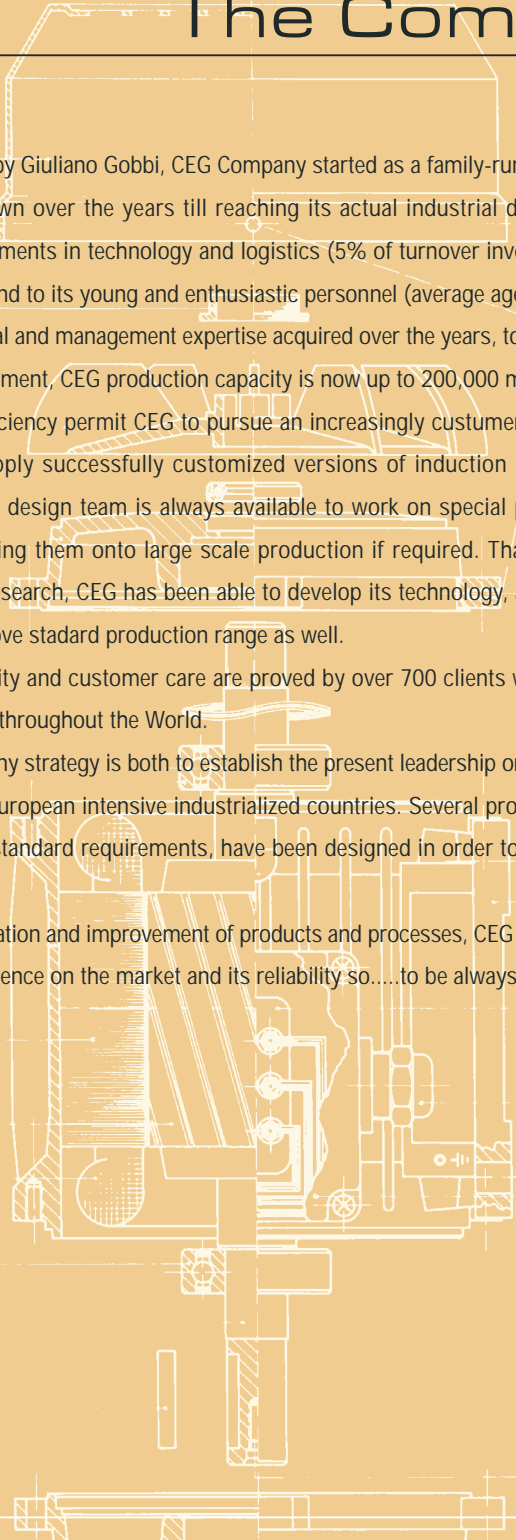
16 Thanks to technical and management expertise acquired over the years, together with the use of advanced equipment, CEG production capacity is now up to 200,000 motors per year.

15 Flexibility and efficiency permit CEG to pursue an increasingly customer-oriented business policy and to supply successfully customized versions of induction motors for special applications. CEG design team is always available to work on special projects, preparing samples and setting them onto large scale production if required. Thanks to this strong commitment to research, CEG has been able to develop its technology, applying innovative solutions to improve standard production range as well.

13 CEG product quality and customer care are proved by over 700 clients who are selling and using our motors throughout the World.

8 The future Company strategy is both to establish the present leadership on the Italian market, and to focus on European intensive industrialized countries. Several product lines, meeting specific national standard requirements, have been designed in order to enter the extra-UE markets.

12 By constant innovation and improvement of products and processes, CEG aims to consolidate its quality, its presence on the market and its reliability so.....to be always a step ahead.



# Company activities and Product range (Product lines)

**CEG manufactures three- and single-phase asynchronous induction motors.**

Production is always based on customer orders, with prompt delivery time, even for non-standard components and/or customized versions. On 5,000 square metres indoor space, there are constantly updated machines to guarantee efficiency and innovation. CEG production facility is divided into separate but perfectly integrated departments. Under a certified quality controlled process and using also components by subcontractors, products are prepared and assembled from raw material to complete motor.

The product range can be divided into the following PRODUCT LINES and TYPES:

product line	type	type code	power range (Kw)	see page	section
<b>SINGLE speed THREE-phase motors MT</b>	standard (1)	MTSTD	0,09 - 200	28	3.a
	with gradual DC brake	MTFPC	0,09 - 15	50	3.e
	with high torque DC brake.	MTFHC	0,09 - 11	51	3.f
	with high torque AC brake	MTFHA	0,09 - 15	52	3.g
	high pressure pump coupling	MTACP	1,1 - 11	68	3.h
	UL-CSA approved	MTOML	0,09 - 30	84	3.m
	according to CEMEP	MTEF2	0,75 - 90	89	3.o
<b>TWO-speed motors THREE-phase DP</b>	standard	DPSTD	0,07 - 18,5	33	3.b
	with gradual DC brake	DPFPC	0,07 - 14	50	3.e
	with high torque DC brake.	DPFHC	0,07 - 8,1	51	3.f
	with high torque AC brake	DPFHA	0,07 - 14	52	3.g
<b>SINGLE speed motors SINGLE-phase MM</b>	standard	MMSTD	0,09 - 2,5	40	3.c
	with gradual DC brake	MMFPC	0,09 - 2,5	50	3.e
	with high torque DC brake	MMFHC	0,09 - 2,5	51	3.f
	with centrifugal switch	MMDSG	0,37 - 2,5	42	3.d
	high pressure pump coupling	MMACP	1,1 - 2,5	68	3.h
	UL-CSA approved	MMOML	0,09 - 2,5	84	3.m
<b>LOW CENTRE SINGLE speed THREE-phase motors ET</b>	standard	ETSTD	0,37 - 7,5	72	3.i
	with gradual DC brake	ETFPC	0,75 - 7,5	73	3.l
	UL-CSA approved	ETOML	0,37 - 7,5	87	3.n
<b>LOW CENTRE SINGLE speed SINGLE-phase motors EM</b>	standard	EMSTD	0,37 - 2,2	72	3.i
	with gradual DC brake	EMFPC	1,1 - 2,2	73	3.l
	UL-CSA approved	EMOML	0,37 - 2,2	87	3.n

(1) For inverter-duty motors see section 3.p on page 91









# Products



2. a) Approval and compliance with international standards2. a 1) Harmonization of international standards

Description	I	D	F	E	GB	EU	
	IEC	CEI/UNEL	DIN/VDE	NFC	DEC	BS	CENELEC
Rating and performance	IEC 34-1	CEI 2-3	VDE 0530-1	NFC 51-100	UNE 201131-95	BS 4999-1	EN 60034-1
Losses and efficiency determination methods	IEC 34-2	CEI 2-6	VDE 0530-2	NFC 51-112	UNE 20116-74	BS 4999-34	HD 53 2
External protection degrees	IEC 34-5	CEI 2-16	VDE 0530-5	NFC 51-115	IR-89 20111-5	BS 4999-20	EN 60034-5
Costruction types and mounting arrangements	IEC 34-7	CEI 2-14	DIN IEC 34-7	NFC 51-117	UNE 20112-1-74 20112-2-74	BS 4999-22	EN 60034-7
Noise limits	IEC 34-9	CEI 2-24	VDE 0530-9	NFC 51-119	UNE 20121-75	BS 4999-51	EN 60034-9
Starting performance of single-speed three-phase motors	IEC 34-12	CEI 2-15	VDE 0530-12		UNE 20162-83	BS 4999-112	EN 60034-12
Mechanical vibration of three-phase motors with shaft heights 56 mm and higher	IEC 34-14	CEI 2-23	DIN ISO 2373	NFC 51-111	UNE 20180-86	BS 4999-50	HD 53.14 S1
Dimensions and output series for three-phase motors in IMB3 mounting	IEC 72	UNEL 13113	DIN 42673	NFC 51-105 NFC 51-120	UNE 20106-2-74 20106-240-80	BS 4999-10	HD 231
Dimensions and output series for three-phase motors in IMB5 and IMB14 mounting	IEC 72	UNEL 13117/8	DIN 42677	NFC 51-105 NFC 51-120	UNE 20106-2-74 20106-2-IC-80	BS 4999-10	HD 231
Cylindrical protrusion of shaft ends	IEC 72	UNEL 13502	DIN 784-3	NFC 51-111	UNE 20106-2-74 20106-2-16-80	BS 4999-10	HD 231

2. a 2) European standards (CE mark)

The European Union (EU) created a set of directives outlining the common European requirements that are based on safety objectives, known as the *Essential Health and Safety Requirements*. So specific European Norm (EN) standards have been developed to support each directive.

Since in the European Union (EU) each member state had its own technical standards, which constituted a barrier to the free movement of goods, the “harmonization” was necessary to produce a single standard which could be accepted by every state as its own. Thus, a manufacturer can concentrate his efforts on complying with a single standard and, if successful, be assured that his product can be sold in any member state of the EU. The CE mark, standing for *Conformité Européenne*, indicates that the product complies with all applicable EU Directives. This is affixed by the manufacturer himself, at the end of the manufacturing process, provided, of course, that the requirements of all applicable standards have been met.

## 2. a)

Three different European directives apply to electric motor design and production. Each directive addresses the mechanical, electromagnetic and electrical risk respectively.

### **89/392/EEC – “Machine Directive”**

Contents: Machine requirement for operator safety and health.

This directive is related to electric motors as basic components of machines that must be then declared compliant by their manufacturers. CEG motors fully comply with this directive that allows manufacturers' industrial products to circulate within the European market.

Following standards are applied:

- UNI EN 292-1: Fundamental concepts, general design principles – terminology, basic methodology
- UNI EN 292-2: Fundamental concepts, general design principles – specifications and technical principles
- UNI EN 292-2/A1: Fundamental concepts, general design principles – specifications and technical principles
- UNI EN 294: Safety distances to prevent danger zones

### **89/336/EEC – “EMC Directive”**

Contents: Equipment requirements for electromagnetic compatibility.

The EMC directive applies to the electric motor as an apparatus liable to cause electromagnetic disturbances or that may have its normal operation affected by such disturbances. The directive gives guidelines for the limitation of generated electromagnetic disturbances and immunity requirements, that means the ability to perform satisfactorily in presence of an electromagnetic disturbance.

The emission and immunity tests carried out on CEG motors have confirmed their compliance with EMC directive.

Following standard are applied:

- UNI EN 50081-1 (emission): Generic emission standard. Residential, commercial and light industry **(1)**
- UNI EN 50082-1 (immunity): Generic emission standard. Residential, commercial and light industry **(1)**
- UNI EN 50081-2 (emission): Generic emission standard. Industrial environment
- UNI EN 50082-2 (immunity): Generic emission standard. Industrial environment
- UNI EN 55011 (art. 3.4 tab 1b)
- UNI EN 61000-3-2: Limits for harmonic current emissions
- UNI EN 61000-3-3: Limitation of voltage fluctuations and flicker in Low-voltage Supply Systems

**(1)** With special reference to FPC brake motors, special low-noise filter is available as option to be specified on order (see exploded view on p. 59 and overall dimension diagrams on p. 62-63-64).

### **73/23/EEC – “Low Voltage Directive”**

Contents: Equipment requirements with regards to electrical shocks, high surface temperatures and flammability.

Directive 73/23/EEC was adopted with the aim of harmonizing the laws of the Member States relating to electrical equipments. In particular, the directive covers the safety of people handling products using voltages in the range of 50VAC to 1000 VAC or 75 VDC to 1550 VDC. This directive applies to the electric motors as components designed for use within this voltage limits.

CEG motors has been manufactured in accordance with the following technical standards so they are conform to the safety objectives of the Low Voltage Directive:

- CEI EN 60034-1: Rotating electrical machines: rating and performance
- CEI EN 60034-2: Rotating electrical machines: methods for determining losses and efficiency using tests
- CEI EN 60034-5: Rotating electrical machines: degrees of protection by the integral design of rotation electrical machine
- CEI EN 60034-6: Rotating electrical machines: methods of cooling
- CEI EN 60034-7: Rotating electrical machines: classifications of types of constructions and mounting arrangements
- CEI EN 60034-8: Rotating electrical machines: terminal markings and direction of rotation
- CEI EN 60034-9: Rotating electrical machines: noise limits
- CEI EN 60034-12: Rotating electrical machines: starting performance of single-speed three-phase cage induction motors

The CE Mark applied to the motor certifies the CEG's declaration of compliance to each of the above described directives. The following page shows the **Declaration of Compliance**, whose copy is available on request.

REMARK: any additional risk coming up from customized motor versions must be analyzed by the manufacturer himself to keep compliance with each relevant directive.



## CE Declaration of Compliance



motori elettrici

### Dichiarazione del fabbricante

I modelli di motore asincrono ad induzione identificati con:

Tipo 1) M, MT, DP, MM, ET, EM

Tipo 2) FPC, FHC

sono conformi alle direttive: 73/23/CE, 98/37/CE, 89/336/CEE e alle seguenti normative: IEC 34 (EN 60034), EN50081-1 (tipo 1), EN50081-2 (tipo 2)

**È fatto divieto di mettere in servizio il motore elettrico prima che l'insieme, in cui sarà incorporato, sia stato dichiarato conforme alle proprie direttive.**

San Mauro Pascoli, 07/01/1995

### Declaration of compliance

The following models of asynchronous induction motors identified by:

Type 1) M, MT, DP, MM, ET, EM

Type 2) FPC, FHC

Are compliant with provisions of directives: 73/23/CE, 98/37/CE, 89/336/CEE and with following standards: IEC 34 (EN 60034), EN50081-1 (type 1), EN50081-2 (type 2)

**It is prohibited to run the electric motor before the machine on which it is fitted has been declared compliant with relative directives.**

San Mauro Pascoli, 07/01/1995

### Konformitätserklärung

Die Modelle von asynchronen Induktionsmotoren mit den folgenden Kennzeichen:

Typ 1) M, MT, DP, MM, ET, EM

Typ 2) FPC, FHC

Konform sind zu den Inhalten der Vorschriften: 73/23/CE, 98/37/CE, 89/336/CEE und der folgenden Vorschriften: IEC 34 (EN 60034), EN50081-1 (Typ 1), EN50081-2 (Typ 2)

**Es ist verboten, den Elektromotor in Dienst zu nehmen, bevor die Maschine, in die er eingebaut wird, für konform mit ihren Vorschriften erklärt worden sind.**

San Mauro Pascoli, 07/01/1995

### Déclaration de conformité

Les modèles de moteurs asynchrone à induction identifiés par:

Type 1) M, MT, DP, MM, ET, EM

Type 2) FPC, FHC

sont conformes aux dispositions des directives: 73/23/CE, 98/37/CE, 89/336/CEE et aux réglementations suivantes: IEC 34 (EN 60034), EN50081-1 (type 1), EN50081-2 (type 2)

**Il est formellement interdit de mettre le moteur électrique en service avant que la machine dans la quelle il sera incorporé ait été déclarée conforme aux dispositions contenues dans ses directives.**

San Mauro Pascoli, 07/01/1995

### Declaration de conformidad

Los modelos del motor asincronico a siguientes:

Tipo 1) M, MT, DP, MM, ET, EM

Tipo 2) FPC, FHC

Son conformes a lo descrito en la directiva: 73/23/CE, 98/37/CE, 89/336/CEE y a la siguiente normativa: IEC 34 (EN 60034), EN50081-1 (tipo 1), EN50081-2 (tipo 2)

**Esta proibido poner en marcha el motor electrico antes de que la maquina a la que se incorpore haya sido declama conforme a la disposicion de ses directivas.**

San Mauro Pascoli, 07/01/1995

Christian Ridolfi

Quality Manager

Giuliano Gobbi

Legal Representative



### 2. a 3) USA standards (UL mark)

Underwrites Laboratories Inc. is an independent organization who has been controlling and certifying product safety for over 100 years. Nowadays UL is still the major body for compliance assessment to safety requirements not only in the United States but all over the world. Every year over 14 billion products are granted the UL mark through five test Laboratories in the United States or many other branches and representatives composing its international network.

The procedure required to get the UL approval of products is complex and highly selective. Being electric motors considered as components of equipments, their compliance to UL safety requirements is highlighted by the UR Recognized Component mark, applied to the motor nameplate. Since UL safety tests have been carried out with positive results, CEG got its own UL file number and report. From time to time and without any prior warning, a UL representative from the competent body comes to our plant to perform follow-up service inspections on the CEG production process and products covered under the UL report.

CEG's UL file number is E176350.

REMARK: the complete and updated list of UL registered motors manufactured by CEG is available in the online Directory of UL-Certified Products at [www.ul.com](http://www.ul.com).

### 2. a 4) Canadian standards (CSA mark)



Established in 1919, CSA International is an independent, no-profit organization engaged in standard development and certification activities that enhance public safety.

The Association offers certification and testing services in support of and as an extension to its standards development activities. To ensure the integrity of its certification process, the Association regularly and continually audits and inspects products that bear CSA mark.

Canadian Standards Association's mark, CSA, is the most widely accepted and recognized Canadian mark, indicating that a product has been tested and approved for use in Canada. In order to get the CSA approval, CEG has submitted appropriate technical documentation and motor prototypes directly to the CSA head office and laboratory in Toronto.

Since CSA safety tests have been carried out with positive results, CEG got its own CSA file number and report. Without any prior warning, the CEG facility is inspected regularly to ensure that production process and products covered under the CSA report continue to comply with the standards. CEG's CSA file number is LR109925-1.

REMARK: the complete and updated list of CSA registered motors manufactured by CEG is available in the online Directory of CSA-Certified Products at [www.csa-international.org](http://www.csa-international.org).

## 2. a)



### 2. a 5) High efficiency



#### Energy Policy Act (EP Act): Public Law 102-486

Published in 1992 in the USA, this law gives guideline to be followed for the improvement of electric motor efficiency, with the same aims as the program being implemented by the European Union (energy saving, less pollution, etc.). Since 1992 the American Department of Energy (DOE) has developed the reference standards to be applied (classification, checking procedures, product marking), and these came into effect in October 1997. The DOE has also accredited the follow agencies and their relatives reference standards:

- **NEMA** (National Electrical Manufacturers Association) - Standard IEEE 112 - 1991
- **CSA** (Canadian Standard Association) - Standard C390 - 33

Meeting already CSA Safety standard requirements, CEG has decided to enlarge its products range, working on the improvement of electrical efficiency too. Particular attention was focused on the single speed three-phase motors, with power from 1 to 200 HP, 2 - 4 - 6 poles, whose minimum nominal efficiency levels have been achieved.

### 2. a 6) IRAM Certification



IRAM is an independent no-profit organization. Since 1935 it is responsible for Standards development in Argentina and for Certification, Qualification and Documentation both of products and processes. IRAM represents its country inside CMN (*Comité Mercosur de Normalizacion*) whose members are Argentina, Brazil, Bolivia, Chile, Paraguay, Uruguay. Since 1998 IRAM Certification has become compulsory for electric motors (see Resolución 92/98). All the CEG products have recently obtained IRAM approval through IMQ, who represents IRAM in Italy and is responsible for periodical inspections.



## 2. b)

# General information about asynchronous motors

## Electrical tolerances

Chart 1: Electrical tolerances (IEC 34-1)

Parameter	Tolerance
Efficiency ( $\eta$ )	-15% of (1- $\eta$ )
Power factor ( $\cos\varphi$ )	-1/6 of (1- $\cos\varphi$ )
Current with locked rotor ( $I_s$ )	+20 % of rated current
Slip ( $\frac{n_0-n}{n_0}$ )	For motors with power < 1 kW $\pm 30\%$ of rated value For motors with power $\geq 1$ kW $\pm 20\%$ of rated value
Torque with locked rotor ( $M_s$ )	-15% +25% of rated torque (value of 25% may be exceeded by agreement with user)
Minimum torque ( $M_{min}$ )	-15% of guaranteed torque
Maximum torque ( $M_m$ )	-10% of rated torque (at least $\geq 1.5$ times nominal torque)
Moment of inertia (J)	$\pm 10\%$ of rated value
Noise emission	+ 3 dB (A)
Vibrations (balancing)	+ 5 % of rated class

## Electrical and electromagnetic parameters: units of measurement

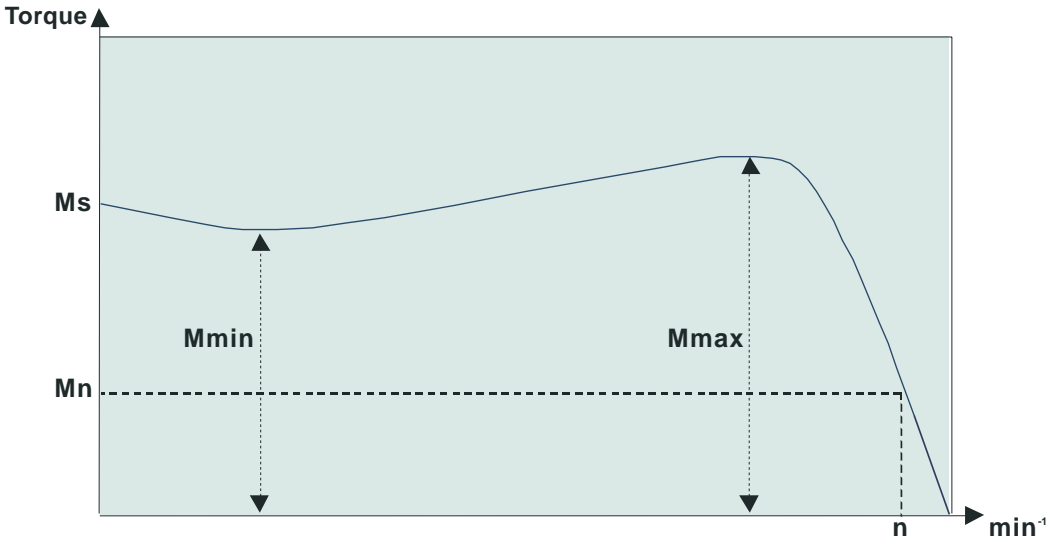
Chart 2: Electrical and electromagnetic parameters

Name	Symbol	Definition	Unit of measurement	Description
Rated speed (rpm)	n		rpm	Speed at the motor's rated power output
Rated power	P <sub>n</sub>	$P_n = M_n \cdot \omega = M_n \cdot n / 9.55$ $1 \text{ Hp} = 0,7457 \text{ kW}$	kW Hp	Full load output power that the motor can produce without reducing its operating life
Input power	P <sub>ass</sub>	$P_{ass} = \sqrt{3} \cdot V_n \cdot I_n \cdot \cos\varphi$ (three-phase) $P_{ass} = V_n \cdot I_n \cdot \cos\varphi$ (single-phase)	kW	Amount of electric power the motor consumes to operate at rated load
Rated voltage	V <sub>n</sub>		V	Electrical supply voltage at which the motor is rated to operate
Rated current	I <sub>n</sub>	$I_n = \frac{P_{ass}}{\sqrt{3} \cdot V_n \cdot \cos\varphi}$ (three-phase)	A	Motor current at full load and rated voltage
Locked-rotor current	I <sub>s</sub>	Indicated in ratio to nominal current ( $I_s / I_n$ )	A	Current from the line at rated voltage and frequency with the rotor locked
Efficiency	$\eta$	$\eta = \frac{P_n}{P_{ass}}$		Ratio of mechanical power output the motor can produce to the electrical power input required by the motor
Power factor	$\cos\varphi$	$\cos\varphi = P_{ass} / P_{app}$		Measure of the relationship between rated voltage and current waveforms
Apparent power	P <sub>app</sub>	$P_{app} = \sqrt{3} \cdot V_n \cdot I_n$	kVA	Calculated by multiplying voltage times amperage
Rated torque	M <sub>n</sub>	$M_n = 9,55 \cdot P_n / n$	Nm	Torque of the motor necessary to produce its rated power at full-load speed
Locked-rotor torque	M <sub>s</sub>	Indicated in ratio to nominal torque ( $M_s / M_n$ )	Nm	Torque available at zero speed (locked rotor) at rated voltage and frequency
Breakdown torque	M <sub>m</sub>	Indicated in ratio to nominal torque ( $M_m / M_n$ )	Nm	Maximum torque that the motor can produce before stalling at nominal voltage and frequency
Pull-up torque	M <sub>min</sub>	Indicated in ratio to nominal torque ( $M_{min} / M_n$ )	Nm	The minimum torque developed by the motor during the period of acceleration from rest to the speed at which breakdown torque occurs
Moment of inertia	J	$J = m \cdot d^2 / 8$	Kgm <sup>2</sup>	Property of matter that causes it to resist any change in its rotational or positional state
Rotor mass	M		Kg	Indicates the mass of rotating unit (rotor + shaft)
Rotor diameter	d		m	Indicates the maximum diameter of the rotating unit (rotor + shaft)

## 2. b)

### The speed-torque curve

The graph below shows the relationship between speed and torque of an induction motor. Starting torque ( $M_s$ ) is also defined as locked rotor torque. As motor picks up speed, torque decreases slightly until it reaches Pull-up torque ( $M_{min}$ ) and then increases until reaching Breakdown torque ( $M_{max}$ ); afterwards torque decreases rapidly until it reaches Full-load torque ( $M_n$ ) at rated speed ( $n$ ).

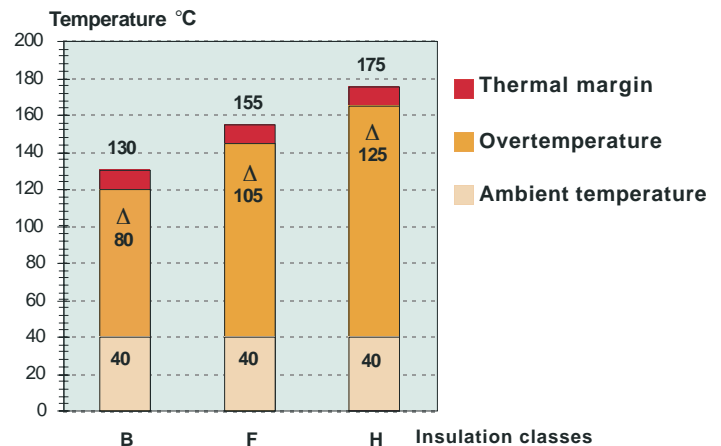


$M_s$  = Locked-rotor torque  
 $M_{min}$  = Pull-up torque  
 $M_{max}$  = Breakdown torque  
 $M_n$  = Rated torque  
 $n$  = Rated speed

### Overtemperature and insulation class (IEC 34-1)

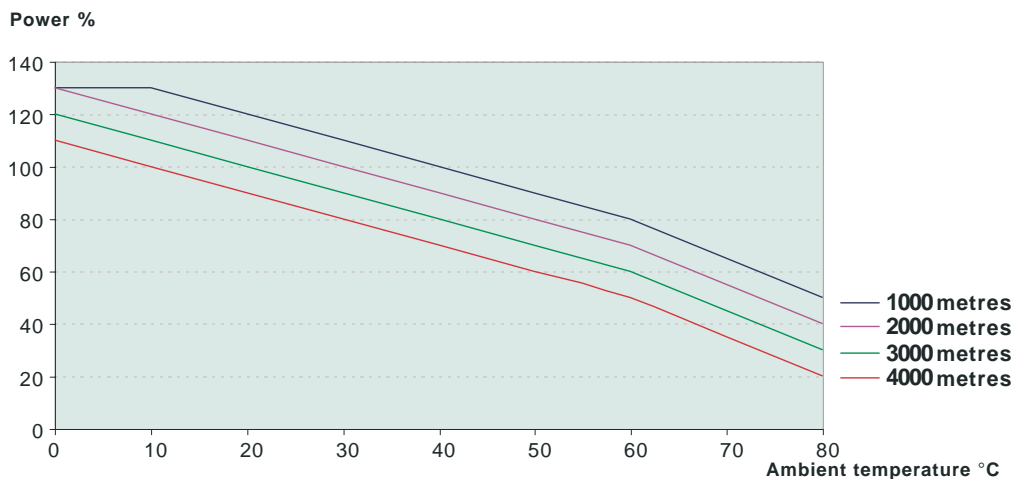
The insulation or thermal class is an indication of the maximum temperature the motor insulation can withstand without reducing its own life. Each insulation class has a specific allowable temperature rise ( $\Delta t$ ). Ambient temperature and allowable temperature rise equals the maximum temperature in a motor. The standard ambient temperature for electrical motors is  $40^\circ\text{C}$ . In addition a thermal margin is allowed which is called the motor's hot spot.

CEG motors designed according to IEC 72-1 are Class F but with temperature rise not higher than Class B ( $80^\circ\text{C}$ ). Class H motors are available on demand.



### Altitude and ambient temperature derating

The motor performance data listed in the catalogue refer to an operating altitude below 1000 meters above sea level and ambient temperature lower than  $40^\circ\text{C}$ . As altitude and ambient temperature increase above those limits, motor power must be derated according to the following chart.



## 2. b)



### Voltage and frequency limits

CEG three-phase motors, matching IEC 72-1 requirements and designed to run at 230/400V, will provide their rated output when 50Hz rated frequency is applied by a voltage that may vary between  $\pm 5\%$ . A further tolerance of  $\pm 5\%$  on extreme values is allowable, but performances within this variation will not necessarily be in accordance with the ones at rated voltage.

They can run at 60Hz too and in this case performances will vary as described in the following table:

**Chart 3: Voltage and frequency limits**

Motors with nominal voltage 230/400 V 50 Hz						
Voltage at 60 Hz	Pn	Mn	Rpm	Is/In	Ms/Mn*	Mm/Mn*
220/380 Volt	1	0,83	1,2	0,83	0,83	0,83
230/400 Volt	1	0,83	1,2	0,83	0,83	0,83
240/415 Volt	1,05	0,87	1,2	0,87	0,87	0,87
255/440 Volt	1,15	0,93	1,2	0,93	0,93	0,93
265/460 Volt	1,15	0,96	1,2	0,96	0,96	0,96
280/480 Volt	1,2	1	1,2	1	1	1

(\*) Ratio referred to rated torque at 60Hz

Voltages not shown are available on request.

### Operating conditions (IEC 34 - 1)

#### Duty

Duty represents the relationship between the operating and rest times or the repeatable operation at different loads, including starting, electrical braking and no-load running.

Basic duty type for motors designed according to IEC 72-1 is the S1 continuous.

- **S1: Continuous Duty:** continuous operation at load over sufficient time for thermal equilibrium to be reached.
- **S2: Short Time Duty:** allows a sufficient rest period between constant load operations for the motor to cool down at medium temperature.
- **S3: Intermittent Periodic Duty\*:** sequence of identical duty cycles, each including a period of constant load operation and a rest period. Starting current doesn't effect the temperature rise. Maximum operating time to be specified.
- **S4: Intermittent Periodic Duty\* with starting:** sequence of identical duty cycles at constant load, each including a significant starting period.
- **S5: Intermittent Periodic Duty\* with influence of running-up periodic and electrical braking:** sequence of identical duty cycles at constant load, each including a significant starting period and a period of rapid electric braking.
- **S6: Continuous Operation Periodic Duty\*:** sequence of identical duty cycles each consisting of a period of operation at constant load and a period of no-load operation without no rest and de-energized intervals.
- **S7: Continuous Operation Periodic Duty\* with starting and electrical braking:** sequence of identical duty cycles each consisting of a period of operation at constant load including starting and electrical braking intervals.
- **S8: Continuous Operation Periodic Duty\* with related Load/Speed variations:** sequence of identical duty cycles at constant load and frequently changing speeds (double pole motors).
- **S9: Continuous Operation Duty with Non-Periodic Load and Speed variations:** duty in which the load and the speed vary non-periodically within the permissible range. This duty includes frequently overloads that may exceed the full load.
- **S10: Duty with discrete constant loads:** sequence of no more than four different load values each applied for enough time to let thermal equilibrium to be reached. Minimum no-load value can be included.

(\*) No thermal equilibrium reached during the load time.



## 2. b)

### Motor Nameplate



According to international standard requirements, the basic performances and mounting parameters of each motor are displayed on its nameplate to give a basic definition of its main features.

Together with CEG's name and address, all nameplates have the CE logo and/or additional third-party certification mark (UL and/or CSA).



A serial number is also given so that the production time and line can be traced.

Three-phase and single-phase motors have respectively following nameplate layouts:

Three-phase, multi-voltage plate

										
MOT. 3 ~ IEC 34										N.
Tipo										N.
<input type="radio"/> Serv. S <input type="radio"/> IP <input type="radio"/> CL <input type="radio"/> MV01										
kW	Hz	$\Delta$	V	$\Delta$	A	$\Delta$	min <sup>-1</sup>	Cos.φ		
CEG S.r.l. - www.ceg.it - Made in Italy										

Single-phase plate

			
MOT. 1 ~ IEC 34			N.
M.			min <sup>-1</sup>
<input type="radio"/>			SM01 <input type="radio"/>
kW	Hp	Hz	
V	A		
Cond. μF.		VL	
Cos. φ		IP	CL Ser.S
CEG S.r.l. - www.ceg.it - Made in Italy			



## 2. b)



### Balancing (IEC 34–14)

Each die cast aluminium rotor assembly, made up of the shaft and rotor core, is dynamically balanced to R-vibration level as standard.

Balancing to S-vibration level is available on request.

**Chart 4: Motor vibration levels**

Vibration level	Speed Rpm	Vibration speed (mm/s)		
		56 < H < 132	132 < H < 225	225 < H < 400
N normal	600 < n ≤ 3600	1.8	2.8	4.5
R reduced	600 < n < 1800	0.71	1.12	1.8
	1800 < n < 3600	1.12	1.8	2.5
S special	600 < n < 1800	0.45	0.71	1.12
	1800 < n < 3600	0.71	1.12	1.8

### Protection degree of motor enclosures

As defined by IEC, the enclosures protection degree consists of the letters IP followed by two numbers:

1<sup>st</sup> number = degree of protection with respect to persons and solid objects entering the enclosure

2<sup>nd</sup> number = degree of protection against the ingress of water

**Chart 5: Protection degrees of electrical machines (IEC 34 - 5)**

1 <sup>st</sup> number	Protection against solid objects	2 <sup>nd</sup> number	Protection against water
0	No protection	0	No protection
1	Protection against solid bodies of over 50 mm	1	Protection against vertically dripping water
2	Protection against solid bodies of over 12 mm	2	Protection against water dripping up to 15° from the vertical
3	Protection against solid bodies of over 2.5 mm	3	Protection against rain falling at up to 60° from the vertical
4	Protection against solid bodies of over 1 mm	4	Protection against water splashes from all directions
5	Protection against dust	5	Protection against water jets from all directions
		6	Protection against water jets comparable to heavy seas
		7	Protection against the effects of immersion to depth of between 0.15 and 1m
		8	Protection against the effects of prolonged submersion at depth

Standard CEG motor protection degree is IP55: by request IP56 can be supplied (with surcharge).

## 2. b)

### Frame size and mechanical dimensions (IEC 72-1)

The IEC 72-1 standard gives fixing dimensions and output series for the electric motor design. The most significant dimension to define motor frame is the distance from the centre-line of the shaft to the bottom of the feet, named H. All CEG motor casings are designated, in the catalogue, through the suffix "M" followed by H basic dimension. For example M80 stands for a casing with 80 mm H dimension.

Even if the Low Centre Motors are not included into IEC 72-1, they are defined, in the same way, by the suffix "E" (instead of "M") followed by H dimension (see section 3.11).

### Mounting arrangements

Mounting arrangements for electric motors are designated according to IEC 34-7.

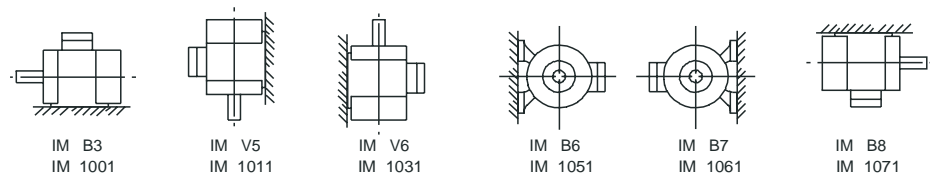
All CEG aluminium frame motors (except for size M56) are equipped with removable feet that allow easy change of mounting arrangement.

The motors listed in this catalogue are produced in "IM B3" or "IM 1001" as standard arrangement.

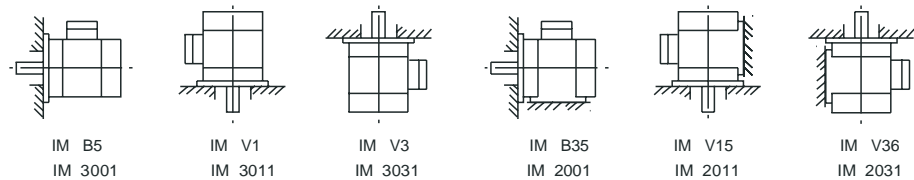
Depending on motor coupling to the machine and frame size, following mounting arrangements are also available:

**Chart 6: Mounting arrangements**

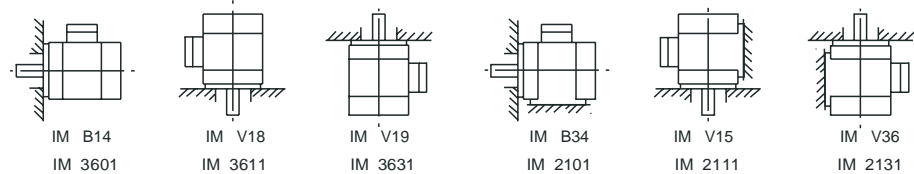
#### Foot mounting



#### Flange mounting with through holes



#### Flange mounting with threaded holes



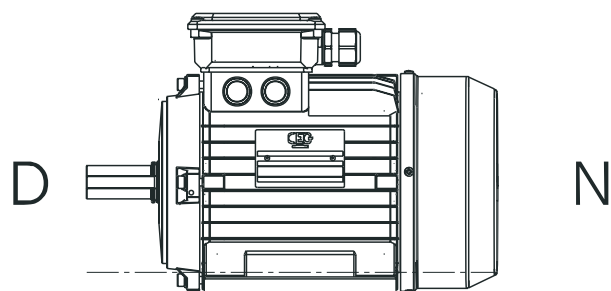
The position of the terminal box in standard design is on top, looking at shaft end; right or left side are also possible when ordering. Thanks to removable feet casing, terminal box position and mounting arrangement can be easily modified by the customer as well.

IEC 34-7 standard also gives outlines to define motor-ends as described below:

- **"D" End:** the motor side where the shaft-end is accommodated
- **"ND" End:** the motor side opposite to the Drive End

The standard CEG motors direction of rotation is CLOCKWISE as seen on the D-end, when connecting the motor terminals U, V, W to the mains phase sequence L1, L2 and L3.

ANTICLOCKWISE direction of rotation is also available on request.



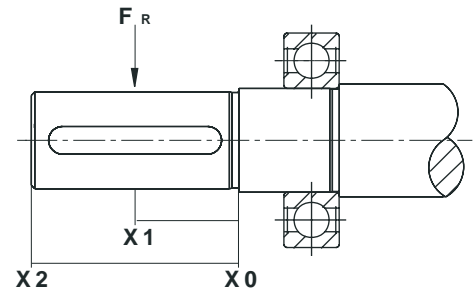


## 2. b)

### Permissible radial load

Chart No. 7, here below, shows the permissible radial load ( $F_R$ ) that can be applied to three different positions (X0, X1 or X2) on the shaft-end, supposing motors running at 50Hz and bearings life time at least 20,000 hours for 2 poles motors and 40,000 hours for 4-6-8 poles. For service on 60Hz reduce values by 7%. Take the higher speed as reference for double pole motors.

For Belt drive applications the maximum radial load  $F_R$  is given by:



$$F_R = \text{maximum radial load [N]} = (P + F) \quad \text{where:}$$

- $P$  = pulley weight [N]

- $F = \text{belt tension [N]} = \frac{(2 \cdot K \cdot M)}{D}$  where:

- $K$  = belt tension factor, varying with the type of belt, assumed to be approximately:

- $K = 3$  for normal flat belt without idler pulley

- $K = 2,2$  for V-belt

- $K = 2$  for normal flat belt with idler pulley

- $D$  = pulley diameter [m]

- $M = \text{torque [Nm]} = \frac{9550 \cdot P}{n}$  where:

- $P$  = output [kW]

- $n$  = speed in  $\text{min}^{-1}$

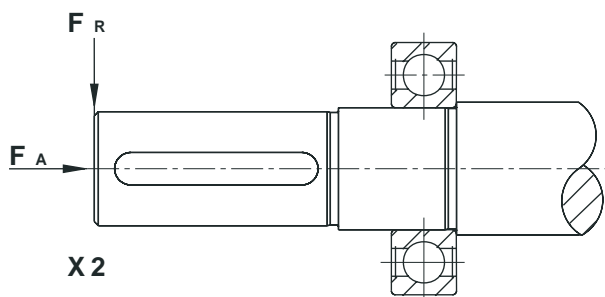
Chart 7: Permissible radial load [N]

Motor size	2 poles			4 poles			6 poles			8 poles		
	X0	X1	X2	X0	X1	X2	X0	X1	X2	X0	X1	X2
M56	360	330	310	360	330	310	ND	ND	ND	ND	ND	ND
M63	400	370	350	400	370	350	460	430	400	ND	ND	ND
M71	500	450	420	490	450	420	570	520	480	620	570	530
M80	660	600	540	660	590	540	760	680	620	830	750	680
M90S	730	640	580	720	640	570	830	730	660	920	810	730
M90L	730	660	600	730	650	590	840	750	680	930	830	750
M100L	1030	920	830	1020	910	820	1170	1050	940	1300	1160	1040
M112M	1420	1280	1160	1410	1260	1140	1620	1450	1310	1790	1600	1450
M132S	1520	1340	1190	1500	1320	1180	1730	1520	1360	1920	1680	1500
M132M	1530	1360	1230	1500	1340	1210	1740	1550	1400	1920	1710	1540
M160M	2760	2420	2160	2750	2410	2150	3140	2760	2460	3440	3020	2690
M160L	2760	2450	2200	2760	2450	2210	3120	2780	2500	3460	3070	2760
M180M	4130	3750	3430	4090	3710	3400	4700	4270	3910	5190	4720	4320
M180L	4120	3740	3420	4070	3700	3380	4690	4260	3900	5180	4700	4310
M200La	4110	3660	3290	4030	3590	3230	4650	4130	3720	5140	4570	4120
M200Lb	4720	4090	3920	4600	4170	3820	5320	4820	4410	5890	5340	4880
M225S	4910	4550	4240	4850	4490	4180	5600	5180	4830	6190	5730	5340
M225M	4910	4550	4230	4760	4410	4110	5510	5100	4750	6100	5650	5260
M250M	5490	5120	4790	5280	4920	4610	6120	5700	5340	6790	6330	5920
M280S	6990	6550	6160	6810	6380	6000	7880	7390	6950	8740	8190	7710
M280M	6950	6520	6130	6740	6320	5940	7820	7330	6890	8670	8130	7650
M315S	11010	10260	9610	10630	9910	9280	12310	11480	10750	13650	12730	11930
M315M	11000	10300	9680	10530	9860	10290	12220	11440	10750	13570	12700	11940
M315L	13090	12270	11550	12640	11860	11160	14690	13770	12960	16310	15290	14400

## 2. b)

### Maximum permissible axial load with additional radial load applied on X2

Chart No. 8, here below, lists the additional axial load ( $F_A$ ) allowable if the maximum radial load ( $F_R$ ) is applied on X2.



The lower is radial load, the bigger is allowable axial load. Heavy axial load bearings are available on request. Axial load calculations have been carried out in three different foot mounting operating conditions: horizontal (B3), vertical shaft-down (V5) and vertical shaft-up (V6), supposing the case of thrust **S** or pull **T** force.

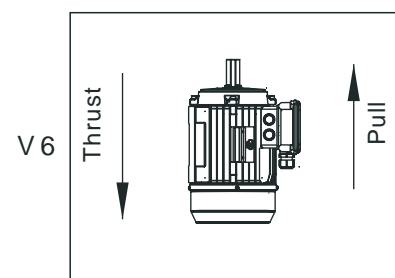
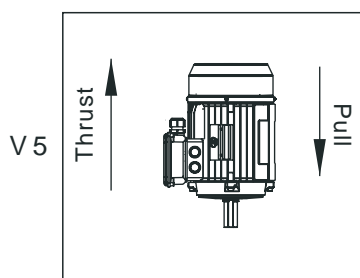
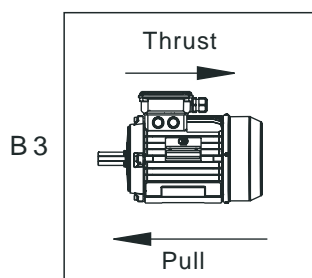


Chart 8: Additional axial load [N]

Motor size	B3								V5								V6							
	2 poles		4 poles		6 poles		8 poles		2 poles		4 poles		6 poles		8 poles		2 poles		4 poles		6 poles		8 poles	
	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T		
M56	230	100	230	100	N D				240	90	240	90	N D				220	110	220	110	N D			
M63	250	120	250	120	290	130	N D		260	110	260	110	300	120	N D		240	130	240	130	280	140	N D	
M71	310	150	310	140	360	170	390	180	330	130	330	120	380	150	410	160	290	170	290	160	340	190	370	200
M80	410	200	410	190	470	220	520	250	440	170	450	150	510	180	560	210	380	230	370	230	430	260	480	290
M90S	440	210	440	220	510	240	560	270	470	180	480	180	550	200	600	230	410	240	400	260	470	280	520	310
M90L	450	210	450	210	520	250	570	270	490	170	500	160	570	200	620	220	410	250	400	260	470	300	520	320
M100L	630	300	620	300	720	340	790	380	690	240	700	220	800	260	870	300	570	360	540	380	640	420	710	460
M112M	870	410	860	410	990	470	1090	510	950	330	970	300	1100	360	1200	400	790	490	750	520	880	580	980	620
M132S	920	450	920	440	1050	510	1160	560	1060	310	1090	270	1220	340	1330	390	780	590	750	610	880	680	990	730
M132M	930	440	930	440	1060	510	1180	560	1090	280	1140	230	1270	300	1390	350	770	600	720	650	850	720	970	770
M160M	1690	810	1680	810	1930	930	2130	1020	1950	550	1980	510	2230	630	2430	720	1430	1070	1380	1110	1630	1230	1740	1380
M160L	1710	810	1690	810	1940	930	2150	1020	2000	520	2100	400	2350	520	2560	610	1420	1100	1400	1110	1530	1340	1740	1430
M180M	2620	1250	2610	1250	2990	1430	3300	1580	2920	950	3020	840	3400	1020	3710	1170	2320	1550	2200	1660	2580	1840	2890	1990
M180L	2620	1250	2600	1250	2990	1430	3290	1570	2950	920	3040	810	3430	990	3730	1130	2290	1580	2160	1690	2550	1870	2850	2010
M200La	2570	1250	2550	1250	2930	1430	3230	1580	2910	910	3080	720	3460	900	3760	1050	2230	1590	2020	1780	2400	1960	2700	2110
M200Lb	2970	1410	2940	1410	3380	1620	3730	1780	3440	940	3680	670	4120	880	4470	1040	2500	1880	2200	2150	2640	2360	2990	2520
M225S	3090	2800	3070	2780	3530	3200	3890	3530	3600	2290	3710	2140	4710	2560	4530	2890	2580	3310	2430	3420	2890	3840	3250	4170
M225M	3090	2800	3040	2760	3500	3170	3860	3500	3600	2290	3870	1930	4330	2340	4690	2670	2580	3310	2210	3590	2670	4000	3030	4330
M250M	3480	3160	3420	3100	3930	3570	4350	3940	4140	2500	4530	1990	5040	2460	5460	2830	2820	3820	2310	4210	2820	4680	3240	5050
M280S	4470	4050	4410	4000	5080	4600	5610	5080	5430	3100	5750	2660	6420	3260	6950	3740	3520	5010	3070	5340	3740	5940	4270	6420
M280M	4450	4040	4390	3980	5050	4580	5590	5060	5490	3010	5870	2500	6530	3100	7070	3580	3420	5080	2910	5460	3570	6060	4110	6540
M315S	4020	3640	3900	3540	4510	4090	5000	4530	5390	2270	6090	1350	6700	1900	7190	2340	2650	5010	1710	5730	2320	6280	2810	6720
M315M	4040	3660	3810	3450	4510	4090	5000	4530	5530	2170	6310	950	7010	1590	7500	2030	2550	5150	1310	5950	2101	6590	2500	7030
M315L	4480	4060	4340	3930	5030	4560	5590	5060	6700	1840	7530	740	8220	1370	8780	1870	2260	6280	1150	7120	1840	7750	2400	8250

Dimensions and tolerances of motor casings, end-shields, flanges and shaft are standardized in accordance with IEC 72-1 (see Chart No. 10 for details).

### Casings

CEG casings are made of aluminium or cast iron depending on motor frame size; M63-M160 aluminium range has removable feet, as summed up in the Chart No. 9 at side.

M112-M315 casings are equipped with eyebolts.

### End-shields and Flanges

CEG motor end-shields made of die-cast aluminium alloy are available for range M56-M160; cast iron end-shields are supplied starting from size M180. Bearing seats are fitted with a sintered steel ring from size M112-M160. This is also available in smaller sizes on special request.

Flanges made of die-cast aluminium alloy are available from M56-M132; cast iron flanges are supplied starting from size M160.

### Shafts

CEG motor shafts made of C43 steel are supplied as standard. Customized dimensions and alloy steel or stainless steel materials are available on demand as well.

### Bearings

The CEG motor bearings are of famous brands and suitable for electric motor application. Standard motors up to frame size M200 are equipped with deep groove ball bearings, type "CM" or "C3", IP44, with permanent lithium grease lubrication. They have maintenance-free life and operating temperature limits -40°C and +130°C. To reduce vibrations and noise, all deep groove ball bearings are spring preloaded.

Cylindrical roller bearings type "C3" can be fitted on demand.

From frame size M225 upwards, bearing sets are equipped with lubricating nipples on top of motor D and ND end. For regreasing interval and required quantity of grease (both depending on motor speed and operating time) please observe the operating instructions.

Chart 9: Casing materials and feet

	M56	M63-M132	M160	M180-M315
ALUMINIUM ALLOY	U	R	R	
CAST IRON			U	U

U = unremovable feet  
R = removable feet

Chart 10: Mechanical tolerances

### ISO tolerances in accordance with DIN 748, DIN 7160, DIN 7161 and DIN 42948.

Shaft end diameter (dimension <b>D</b> )	Up to 28 mm	j 6
	From 38 to 50 mm	k 6
	Over 50 mm	m 6
Centring of flange (dimension <b>N</b> )	Up to 230 mm	j 6
	Over 230 mm	h 6
Shaft height (dimension <b>H</b> )	Up to 250 mm	0 ÷ - 0,5 mm
	Over 250 mm	0 ÷ - 1,00 mm

Chart 11: Bearings fitted with CEG motors

Motor size	Drive end bearing - D -	Non drive end bearing - N -	Motor size	Drive end bearing - D -	Non drive end bearing - N -
2/8 Poles					
M56	6201 CM ZZ	6201 CM ZZ	M200Lb	6313 C3	6213 C3
M63	6202 CM ZZ	6202 CM ZZ	M225SM	6313 C3 - (NU313W C3)*	6213 C3
M71	6203 CM ZZ	6203 CM ZZ	M250M	6314 C3 - (NU314W C3)*	6214 C3
M80	6204 CM ZZ	6204 CM ZZ	M280SM	6317 C3 - (NU317W C3)*	6317 C3
M90S-L	6205 CM ZZ	6205 CM ZZ	M315SM	6317 C3 - (NU317W C3)*	6317 C3
M100L	6206 C3 ZZ	6206 C3 ZZ	M315L	6319 C3 - (NU319W C3)*	6319 C3
M112M	6306 C3 ZZ	6306 C3 ZZ	2/8 Poles		
M132S-M	6208 C3 ZZ	6208 C3 ZZ			
M160M-L	6309 C3 ZZ	6309 C3 ZZ			
M180M-L	6310 C3 ZZ	6310 C3 ZZ			
M200La	6312 C3 ZZ	6312 C3 ZZ			

\* Optional for drive end 4, 6, 8 Poles



### **Rotors**

Rotor squirrel cages are available either in die cast aluminium (Al) or special aluminium alloy (Al Si 13 – UNI 4514). They are dynamically balanced as specified on page 18.

### **Windings**

Windings are manufactured with stator cores made from laminated silicon/steel plates (iron losses lower than 3 W/Kg). Coils are made of double coat copper wire specially treated class “H”. Slot and other insulation materials are treated class “F”. All windings are securely laced and tested before and after assembling. A water based resin impregnation is carried out for curing motor winding, with the aim to increase heat dissipation and to reduce vibration. Motors intended for use at extremely temperature or damp conditions can be equipped with the following type of protection devices:

### **Thermal protections**

There are several suitable methods for motor protection. Current-responsive protectors provide safeguards against common causes of overload where the line current increases appreciably. On the other hand, temperature-responsive devices protect against running overloads that produce a gradual increase in winding temperature. Motors can be protected by the following type of embedded temperature detectors or overcurrent switches:

#### ***Thermal protection switch with bimetal release***

It consists of a normally closed bimetal disc. The contact opens when the winding temperature reaches limits that are dangerous for the insulation system: 130°C for three-phase and 150°C for single-phase. After cooling down to below its re-setting switching temperature (usually 20°C lower than the pre-set temperature), the thermal sensor suddenly snaps back into its initial position.

Each device has double sensitive heads for three-phase motors and one for single-phase. The maximum allowable current is 2.5A at 250V. The two leads from the sensor must be connected to a control-circuit, to manage corrective action.

In the small-size single-phase motors (with rated current lower than 11A), bimetal devices can disconnect one leg of power source.

#### ***PTC thermistor***

Thermistors are resistive temperature detectors to be connected to a suitable releasing device. Once the operating temperature has been reached, the three sensors quickly increase their resistance.

#### ***Overcurrent protection***

External overcurrent relay with manual re-setting are available on single-phase motors and must be commensurated to motor rated current.

### **Climatic protection**

#### ***Anti-condensation heater***

If motors are exposed to strong temperature fluctuations or damp conditions, anti-condensation heaters (space heater) can be fitted as an option to avoid condensation problems. All the strip heaters are secured to the winding heads with the aim to maintain their temperature from 5 to 10°C warmer than surrounding air. Heater supply voltage is 230V single-phase as standard, 110V is also available on demand. Wattage rating is from 8 up to 50W. Heaters should be wired interlocked with the motor, that means they are turned on when the motor is not running and turned off when it is running.

#### ***Condensation drain holes***

To allow water which enters the motor to drain, one or more holes placed on the bottom of motor casing are available.

#### ***Tropical protection***

The standard motor is suitable for operation under all working conditions (moisture, saline atmosphere, etc). However in order to provide a further protection against fungus and high humidity, as found in tropical climates, high coating capability varnishes are available as an option.



## 2. c)



### **Wiring and connection diagrams (IEC 34-8)**

Standard CEG motors are equipped with 6 studs terminal blocks made of phenolic resin. Brass terminal marking comply with IEC 34-8.

Leads coming from the winding coils through motor frame hole terminate with closed loop connectors at terminal block. Nuts and bridges for motor connection are fitted in a plastic bag inside the terminal box.

See following paragraphs for connection diagrams:

- Single-speed THREE-PHASE motor connection diagrams section 3. a1 page 32
- Two-speed THREE-PHASE motor connection diagrams section 3. b1 page 36
- SINGLE-PHASE motor connection diagrams section 3. d1 page 44
- SINGLE- and THREE-PHASE motor connection diagrams section 3. g1 page 58

Different terminal blocks are available on demand: 8 studs for separate brake connection, 9 studs for star/delta starting and 12 studs for double speed motors with separate windings.

External switches, commutators and leads longer than standard are also available.

### **Terminal boxes**

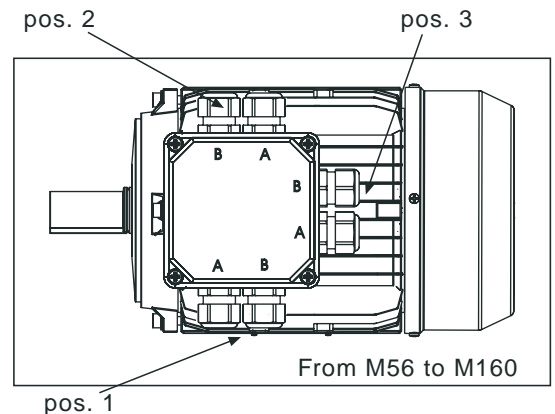
Standard construction for CEG terminal box consists of compartment and cover made of aluminium alloy or thermoplastic material. Two rubber gaskets are fitted between cover and compartment and between compartment and motor frame. Single component terminal box type can be fitted as an option.

Special boxes are available to contain single-phase motor capacitors, switch devices or commutators for customized version.

The standard position of the cable glands is at the right, seen from the drive-end (pos. 1). Thanks to the symmetrical construction of the box, this can also be adjusted in any of the 4 directions shown in the table here below to suit the existing connection facilities:

**Chart 12: PG or metric cable glands**

THREE-PHASE			SINGLE-PHASE		
Motor size	Pg A - B	Metric A - B	Motor size	Pg A - B	Metric A - B
M56 ÷ M71	Pg 11	M16x1,5	M56 ÷ M71	Pg 11	M16x1,5
M80 ÷ M90S	Pg 16	M20x1,5	M80 ÷ M90S	Pg 16	M20x1,5
M90L ÷ M100	Pg 16	M25x1,5	M90L ÷ M100	Pg 16	M25x1,5
M112 ÷ M160	Pg 21	M32x1,5			
M180 ÷ M200	Pg 29	M40x1,5			
M225 ÷ M250	Pg 36	M50x1,5			
M280 ÷ M315	Pg 42	M63x1,5			



The cross-reference table below lists cable gland type and size fitted with CEG motors. As standard, all three-phase motors are delivered with one cable gland, while two cable glands are fitted with double-speed and single-phase motors.

REMARK: according to EN 50262, Pg is going to be replaced by metric cable glands.

### **Fans (IEC 34-6)**

CEG motors are air-cooled by means of a radial flow fan that allows fully reversible rotation; reference standard is IEC 34-6. The fan is mounted opposite to the drive-end of the motor so to provide additional cooling by blowing air over the exterior of the motor.

Fans are made of high resistance thermoplastic material in the range from size 56 to 160 and of aluminium for frames up to 315.

Motors intended for use in extremely temperature conditions (> 160°C) can be fitted with steel fabricated fans as an option. Inverter-duty motors, required to run at speeds lower than synchronous, can be equipped with a fan mounted to a separate motor, making cooling air-flow independent on motor speed.

## 2. c)

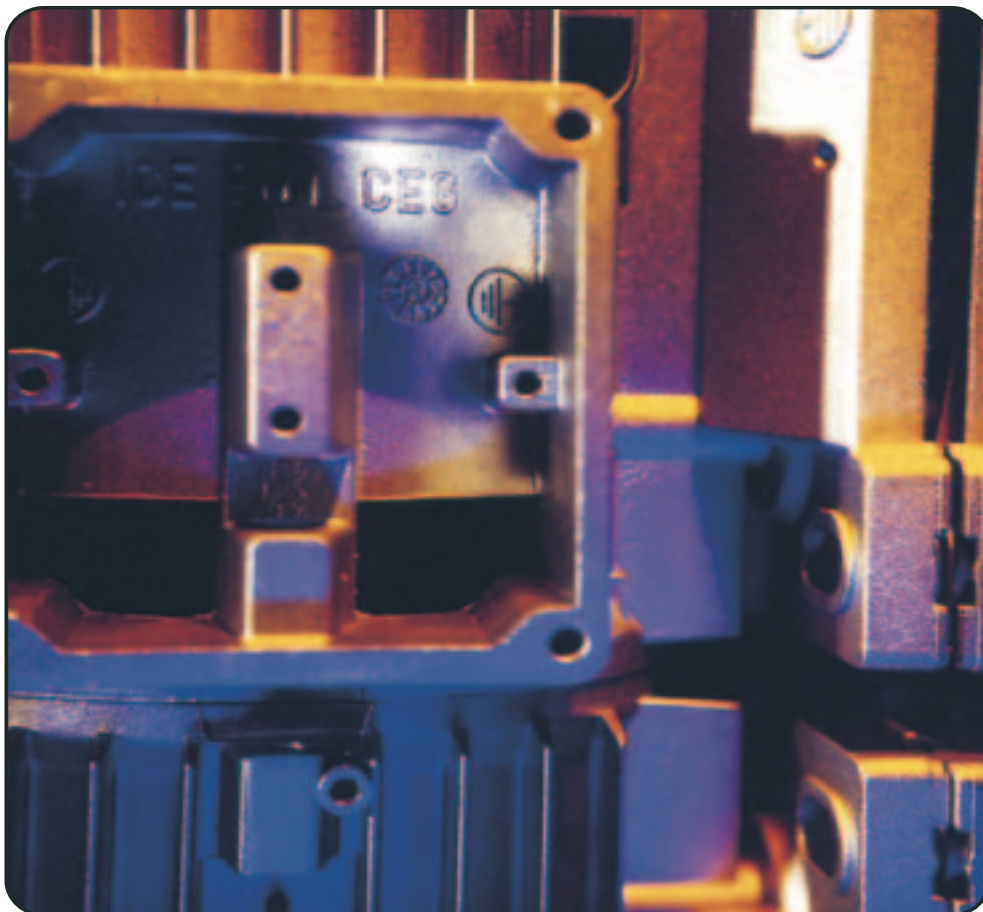
### **Fan covers**

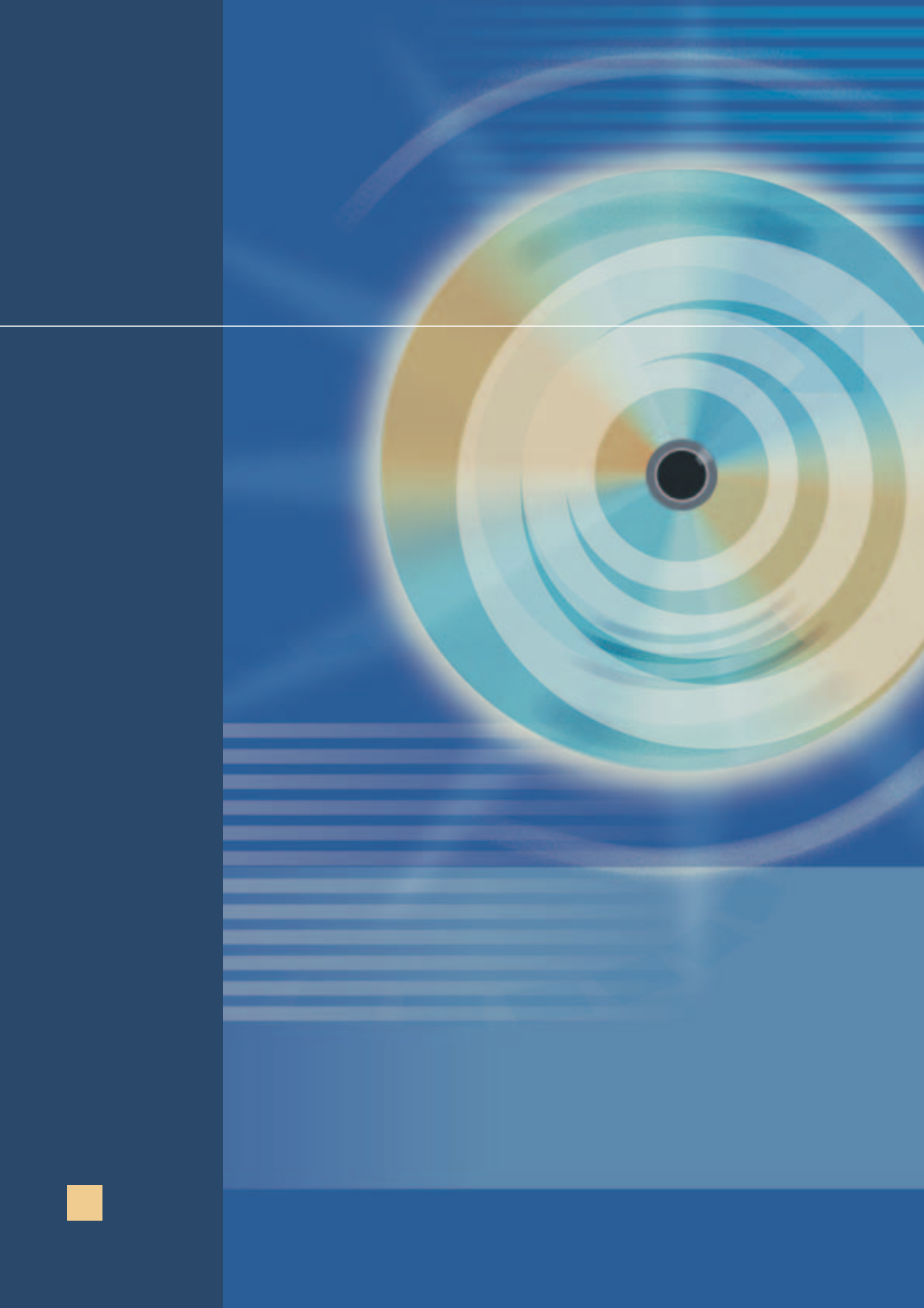
Motor fan cover provides a protection for the fan and increases the effectiveness of airflow in directing it across the exterior of the casing. Two constructions are available, galvanized steel sheet- or plastic material-made, depending on the product range.

### **Paint finish**

CEG motors finish coat is a water-based varnish with non-toxic pigments (lead and chrome free). Standard colour is BLUE RAL 5010, unpainted motors are an option. Thanks to CEG own painting plant, following special colours are also available on demand:

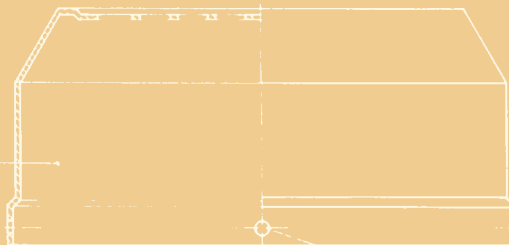
BLACK RAL 9005, GREEN RAL 6011, GREY RAL 7021.







17



16



18

15

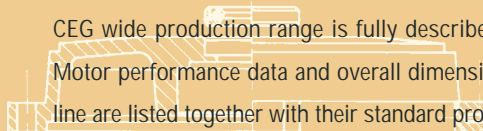


# Product range

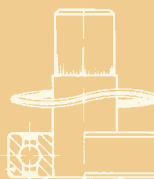
CEG wide production range is fully described in the following pages. Motor performance data and overall dimensions for each CEG product line are listed together with their standard production features.

14

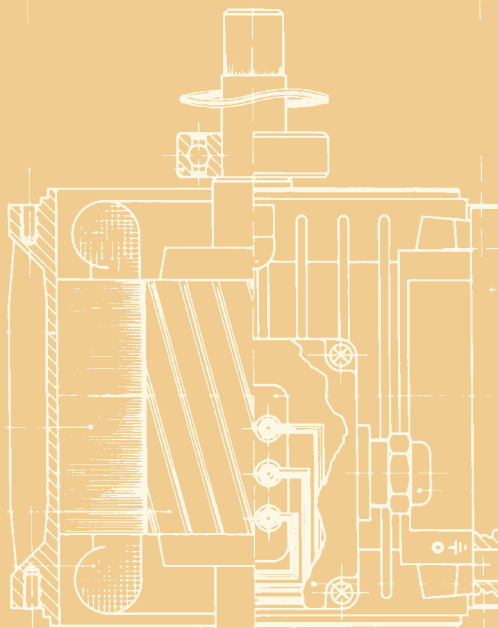
5



13



8



12

19

11

20

10

21

9

22

8

7

6

23

5



4



3



2

14

1



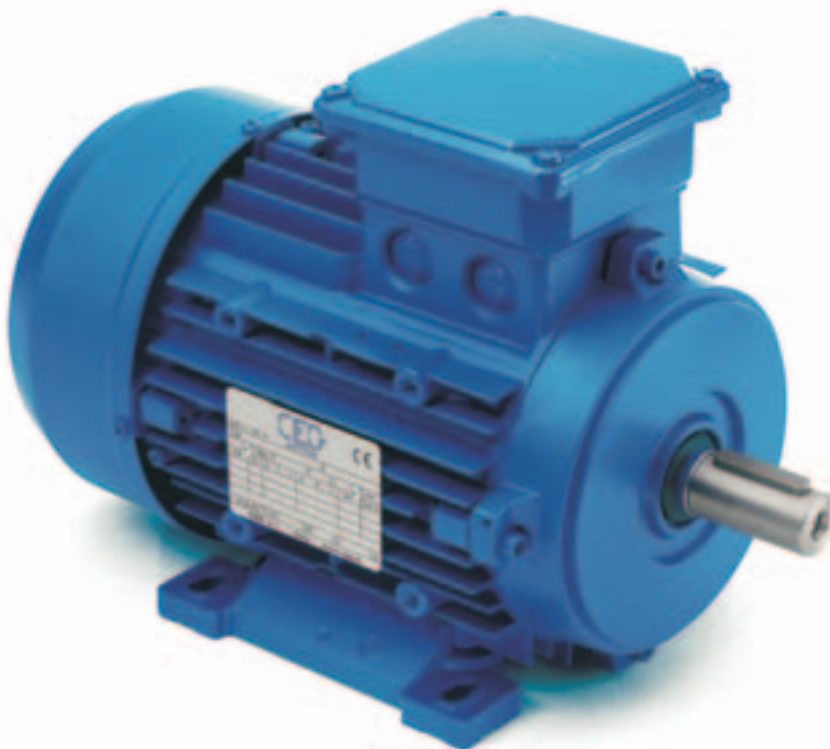
All technical data stated in this catalogue may change without any prior notice.



# Single-speed three-phase motors (*MTSTD*)

## PRODUCTION STANDARDS

Mounting arrangement	IMB3
Terminal box position	On top (BS)
Rated voltage	230/400 V 50 Hz ( $P_n \leq 3$ kW) 400/690 V 50 Hz ( $P_n > 3$ kW)
Protection rating	IP55
Bearings	ZZ
Winding insulation	Class F
Terminal box type	2 aluminium components (box + cover)
End-shields assembly	Bosses and bolts
Paint finish	BLUE RAL 5010
Fan cover	Galvanized steel sheet
Duty	S1



## Meaning of the symbols

$P_n$	= rated power	$M_s$	= locked-rotor torque
$n$	= rated speed	$M_m$	= breakdown torque
$I_n$	= rated current	$J$	= moment of inertia
$I_s$	= locked-rotor current	$\cos \varphi$	= power factor
$M_n$	= rated torque	$\eta$	= efficiency

3. a)



**SINGLE-SPEED THREE-PHASE MOTORS**

3000 Rpm    2 poles    50 Hz

Size	Pn		n min <sup>-1</sup>	In(400V) A	Cosφ	η %	Mn Nm	Mm/Mn	Ms/Mn	Is/In	J Kgm <sup>2</sup>	Weight Kg
	kW	Hp										
M56a	0,09	0,12	2850	0,3	0,64	70	0,3	3,5	3,3	4,2	0,00008	3,4
M56b	0,135	0,18	2800	0,58	0,56	60	0,46	3	3	3,5	0,00008	3,4
M63a	0,185	0,25	2810	0,52	0,77	67	0,63	3,3	3,3	4,1	0,00013	4,1
M63b	0,25	0,35	2830	0,74	0,75	65	0,84	3,2	3,1	4,6	0,00015	4,4
M63c	0,37	0,5	2820	1,1	0,74	65	1,25	3,2	3,1	4,5	0,00017	4,9
M71a	0,37	0,5	2830	0,98	0,8	68	1,25	3	2,9	4,9	0,00017	5,8
M71b	0,55	0,75	2800	1,33	0,82	73	1,9	2,6	2,5	5,1	0,00027	6,5
M71c	0,75	1	2860	1,97	0,8	69	2,5	3,6	3,9	5,1	0,00033	7,6
M80a	0,75	1	2830	1,8	0,81	73	2,53	3	3	5,3	0,00039	8,4
M80b	1,1	1,5	2820	2,7	0,8	75	3,72	3,3	3,2	5,9	0,00051	9,5
M80c	1,5	2	2820	3,4	0,8	80	5,07	3,2	3,4	5,2	0,00068	10,5
M80d	1,85	2,5	2810	4,6	0,77	75	6,28	3,5	3,6	5,4	0,00078	11,4
M90Sa	1,5	2	2860	3,65	0,78	77	5	3	3,1	5,4	0,00093	12,3
M90Sb	1,85	2,5	2830	4,3	0,82	75	6,2	2,7	2,7	5	0,00093	12,8
M90La	2,2	3	2830	4,85	0,85	78	7,42	2,9	2,9	5,5	0,00115	15
M90Lb	3	4	2870	6,55	0,83	80	10	3,4	3,3	6	0,00142	17,5
M100La	3	4	2870	6,5	0,83	79	10	3,5	3,7	6,2	0,00211	19,7
M100Lb	4	5,5	2880	9,1	0,82	79	13,3	3,9	3,8	6,5	0,00272	24
M112Ma	4	5,5	2900	8,83	0,8	82	13,2	4	2,7	6,5	0,00317	25,7
M112Mb	5,5	7,5	2900	12,2	0,82	80	18,1	3,1	3,1	6,7	0,00434	31,6
M112Mc	7,5	10	2880	16,9	0,79	81	24,9	3,3	2,4	6,3	0,00484	34,5
M132Sa	5,5	7,5	2900	12,3	0,82	79	18,1	3	3	6,9	0,00744	36,5
M132Sb	7,5	10	2920	16,8	0,78	82	24,5	3,4	3,2	7	0,0091	42,5
M132Ma	11	15	2925	23	0,81	83	35,9	3,4	3,3	7	0,01146	52,5
M132Mb	15	20	2915	28,7	0,86	88	49	3,5	3,3	6,5	0,0138	59
M160Ma	11	15	2940	21,7	0,86	84	35,7	3,3	3,1	6,7	0,0238	72
M160Mb	15	20	2955	28,9	0,86	86	48,5	3,5	3,9	7,5	0,03117	86
M160La	18,5	25	2955	35,8	0,86	87	59,8	3,7	3,6	6	0,03671	98
M160Lb	22	30	2940	41,5	0,87	87	71,5	3,8	3,2	7,3	0,04188	109
M180M	22	30	2925	39,8	0,89	90	72	3,2	2,6	7,3	0,063	170
M200La	30	40	2925	53,7	0,89	92	98	3	2,4	7	0,076	185
M200Lb	37	50	2940	64,1	0,9	93	120	3,2	2,4	7,2	0,13	255
M225M	45	60	2940	78	0,9	93	146	3,2	2,5	7,2	0,15	275
M250M	55	75	2940	94,2	0,91	93	179	3,3	2,3	7,5	0,21	340
M280S	75	100	2940	128,4	0,91	93	244	2,9	2	7,5	0,47	485
M280M	90	120	2940	152,4	0,92	93	292	2,9	1,7	6,9	0,52	515
M315S	110	150	2965	182,4	0,93	94	355	3,4	2,1	7,2	0,85	720
M315M	132	180	2965	219	0,94	93	426	3,4	2,3	7,5	1,02	770
M315La	160	215	2970	264	0,92	95	514	2,8	1,8	7,2	1,42	970
M315Lb	200	270	2970	327	0,93	95	642	2,8	1,8	7,2	1,48	1100

### 3. a)



## SINGLE-SPEED THREE-PHASE MOTORS

1500 Rpm 4 poles 50 Hz

Size	Pn		n min <sup>-1</sup>	In(400V) A	Cosφ	η %	Mn Nm	Mm/Mn	Ms/Mn	Is/In	J Kgm <sup>2</sup>	Weight Kg
	kW	Hp										
M56b	0,09	0,12	1365	0,4	0,65	55	0,63	2,5	2,7	2,6	0,00011	3,1
M63a	0,135	0,18	1360	0,55	0,65	58	0,98	2,2	2,3	2,5	0,00016	4
M63b	0,185	0,25	1375	0,65	0,7	60	1,28	2,5	2,5	3	0,00002	4,6
M63c	0,25	0,35	1365	0,88	0,69	60	1,75	2,3	2,6	3,1	0,00023	5
M71a	0,25	0,35	1410	0,83	0,73	60	1,7	2,7	2,6	4,5	0,00058	6
M71b	0,37	0,5	1380	1,1	0,71	67	2,56	2,6	2,8	4	0,00065	6,6
M71c	0,55	0,75	1355	1,5	0,79	68	3,87	2,1	2,5	4	0,00087	7,7
M80a	0,55	0,75	1410	1,5	0,8	65	3,72	2,1	1,7	4	0,00124	8
M80b	0,75	1	1410	2,1	0,75	69	5,07	2,5	2,4	4,4	0,00167	9,5
M80c	1,1	1,5	1405	2,9	0,77	73	7,47	2,5	2,2	4,7	0,00185	11,7
M90S	1,1	1,5	1400	2,6	0,83	75	7,5	2,5	2,6	4,8	0,00168	12,4
M90La	1,5	2	1415	3,8	0,76	75	10,1	3,1	3,2	5	0,00217	14,5
M90Lb	1,85	2,5	1405	4,40	0,79	77	12,6	3,9	3,2	5,2	0,00257	16,5
M100La	2,2	3	1430	5,6	0,73	78	14,7	2,6	2,7	5	0,00335	18,5
M100Lb	3	4	1410	7,1	0,79	79	20,3	2,7	2,6	5,3	0,00463	21,4
M100Lc	4	5,5	1400	9	0,84	77	27,3	2,4	2,1	4,6	0,00508	23,5
M112Ma	4	5,5	1440	8,8	0,81	81	26,5	2,7	2,6	5,5	0,00866	31,3
M112Mb	5,5	7,5	1420	11,8	0,81	83	37	3,3	2,8	6	0,00955	34,5
M132S	5,5	7,5	1425	11,5	0,85	81	36,8	2,5	2,6	5,1	0,01803	42
M132Ma	7,5	10	1465	16,5	0,78	85	49,5	2,6	2,6	5,8	0,02218	52,5
M132Mb	9,2	12,5	1450	18,9	0,81	85	61,2	3,2	2,7	5,7	0,02436	56,5
M132Mc	11	15	1425	22	0,85	85	73,7	2,3	2,5	5,2	0,02672	60
M160M	11	15	1465	22	0,81	89	71,7	2,4	2,2	5,2	0,04575	79,2
M160L	15	20	1460	30,8	0,8	90	98	2,3	2,8	5,5	0,05968	97,5
M180M	18,5	25	1455	34,6	0,86	90	121	2,5	2,3	6,2	0,087	170
M180L	22	30	1455	40,7	0,86	91	144	2,5	2,2	6,2	0,096	170
M200L	30	40	1455	56,2	0,85	91	197	2,6	2,5	6,8	0,2	190
M225S	37	50	1465	67,7	0,86	92	241	2,6	2,6	6,7	0,27	260
M225M	45	60	1465	83,4	0,85	92	293	2,5	2,5	6,9	0,32	280
M250M	55	75	1470	101	0,85	93	357	2,4	2,4	6,8	0,5	350
M280S	75	100	1475	133	0,87	94	485	2,3	2,1	7,2	1	495
M280M	90	120	1475	158	0,88	94	583	2,3	2,3	7,2	1,2	545
M315S	110	150	1485	191	0,88	95	707	2,8	2,3	6,8	2,19	790
M315M	132	180	1485	229	0,88	95	849	2,8	2,3	7	2,7	885
M315La	160	215	1485	271	0,89	96	1028	2,2	1,9	6,8	3,57	1110
M315Lb	200	270	1485	339	0,89	96	1285	2	1,9	6,8	3,97	1150

3. a)



**SINGLE-SPEED THREE-PHASE MOTORS**

1000 Rpm 6 poles 50 Hz

Size	Pn		n min <sup>-1</sup>	In(400V) A	Cosφ	η %	Mn Nm	Mm/Mn	Ms/Mn	Is/In	J Kgm <sup>2</sup>	Weight Kg
	kW	Hp										
M63b	0,12	0,17	860	0,78	0,56	40	1,33	1,8	1,9	1,8	0,00023	5
M71a	0,185	0,25	900	0,80	0,6	55	1,96	2,1	2,1	2,4	0,00065	6,6
M71b	0,25	0,35	910	1,06	0,62	55	2,62	2,2	2,2	2,5	0,00087	7,7
M80a	0,37	0,5	915	1,25	0,73	60	3,86	2,2	2,2	2,7	0,0014	8,3
M80b	0,55	0,75	900	1,65	0,74	64	5,8	1,9	1,8	3	0,00186	10
M90S	0,75	1	900	2,1	0,75	69	7,8	2,2	2,1	3,4	0,00266	12
M90L	1,1	1,5	910	3,15	0,73	68	11,6	2,2	2,3	3,5	0,0025	14,3
M100L	1,5	2	940	4,3	0,68	73	15,2	2,2	2,3	4,6	0,00562	19
M112M	2,2	3	955	5,3	0,77	78	22	2,6	1,5	5,1	0,01333	30
M132S	3	4	950	7,55	0,77	75	30,2	2,5	1,6	4,6	0,02187	40
M132Ma	4	5,5	960	9,26	0,75	82	39,6	2,2	2	5	0,02541	46,4
M132Mb	5,5	7,5	950	12,5	0,79	81	56	2,2	1,5	4	0,03068	52,5
M160M	7,5	10	960	16	0,8	86	74,6	2,5	2,3	5	0,06927	78
M160L	11	15	975	24,4	0,75	87	108	3,7	2,8	5,5	0,12674	110
M180L	15	20	970	29,4	0,84	88	148	3	2,3	7	0,15	155
M200La	18,5	25	975	34,6	0,86	90	181	2,8	2	6,9	0,24	190
M200Lb	22	30	975	42,2	0,84	90	215	2,3	2,2	6	0,41	250
M225M	30	40	975	57,5	0,84	90	294	2,4	2,1	6,8	0,46	270
M250M	37	50	980	71	0,83	91	360	2,5	2,3	6,3	0,65	335
M280S	45	60	980	85,4	0,83	92	438	2,3	2,2	6,5	1,2	440
M280M	55	75	980	102	0,85	92	536	2,3	2,1	6,1	1,3	460
M315S	75	100	985	136	0,85	94	740	2,5	2,3	6,5	3,04	745
M315M	90	120	985	163	0,85	94	886	2,4	2,2	6,5	3,25	780
M315La	110	150	990	190	0,89	95	1066	2,4	1,6	6,7	4,54	960
M315Lb	132	180	990	224	0,90	95	1279	2,4	1,7	7	5,13	1010

**SINGLE-SPEED THREE-PHASE MOTORS**

750 Rpm 8 poles 50 Hz

Size	Pn		n min <sup>-1</sup>	In(400V) A	Cosφ	η %	Mn Nm	Mm/Mn	Ms/Mn	Is/In	J Kgm <sup>2</sup>	Weight Kg
	kW	Hp										
M71	0,135	0,18	660	0,77	0,56	50	1,92	2,4	2,4	2,1	0,00087	7,5
M80a	0,185	0,25	690	0,96	0,57	49	2,56	2,2	1,9	2,4	0,0014	8,7
M80b	0,25	0,35	650	1	0,64	56	3,67	2	1,9	2,3	0,00186	10
M90S	0,37	0,5	660	1,5	0,63	57	5,35	1,6	1,4	2,1	0,00186	12,6
M90L	0,55	0,75	680	2,02	0,68	58	7,7	1,4	1,3	2,7	0,00217	14,3
M100La	0,75	1	700	2,44	0,69	64	10,3	1,7	1,4	3	0,00563	18,9
M100Lb	1,1	1,5	690	3,6	0,66	67	15,2	1,9	1,5	3	0,00716	22,3
M112M	1,5	2	700	5	0,65	67	20,5	2	1,6	3	0,01159	27,3
M132S	2,2	3	720	6,6	0,66	81	29,1	2,1	1,6	4	0,02541	44,8
M132M	3	4	715	8	0,69	78	40,3	2,2	1,6	4	0,03068	52
M160Ma	4	5,5	730	11	0,65	81	52,3	2,2	2,1	4	0,06927	84
M160Mb	5,5	7,5	720	15,3	0,65	80	73	2,9	2,4	4,5	0,09353	90
M160L	7,5	10	715	17	0,75	84	100	2,2	1,5	4	0,10252	110
M180L	11	15	725	24,8	0,74	87	145	2,7	2	6	0,15	155
M200L	15	20	730	30,5	0,81	88	196	2,7	2	6,2	0,25	190
M225S	18,5	25	735	38	0,79	89	240	2,8	2,1	6,8	0,41	250
M225M	22	30	735	44,3	0,8	90	286	2,8	2,1	6,6	0,46	265
M250M	30	40	735	61	0,79	90	390	2,3	2,1	5,7	0,7	345
M280S	37	50	735	77,7	0,75	92	480	2,7	1,9	6,7	1,2	440
M280M	45	60	735	93,3	0,76	92	584	2,7	1,9	6,7	1,4	470
M315S	55	75	740	102	0,83	94	710	2,8	2,2	7	3,29	725
M315La	90	120	740	163	0,85	94	1161	2,1	1,5	6	5,21	965
M315Lb	110	150	740	197	0,86	94	1419	2,1	1,5	6	6,03	1025

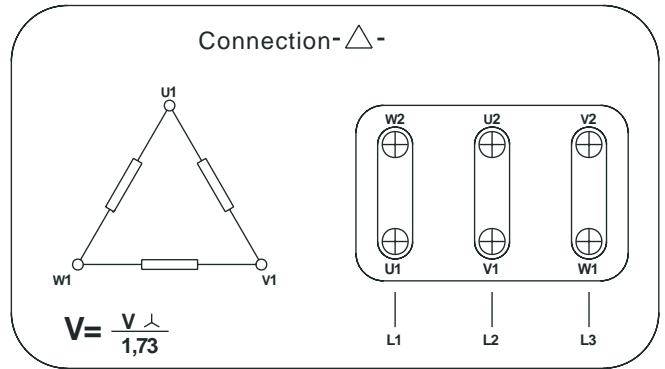
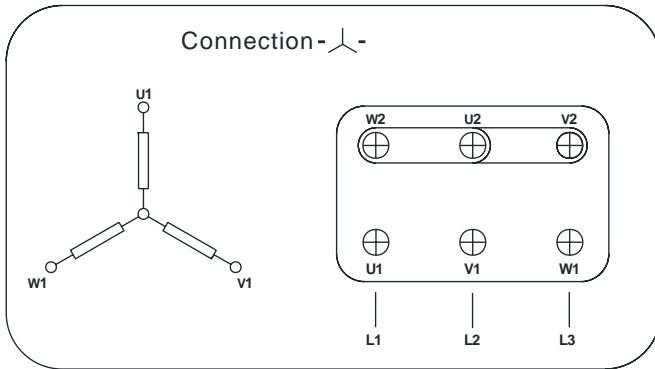
### 3. a 1)

# Single-speed three-phase motor connection diagrams

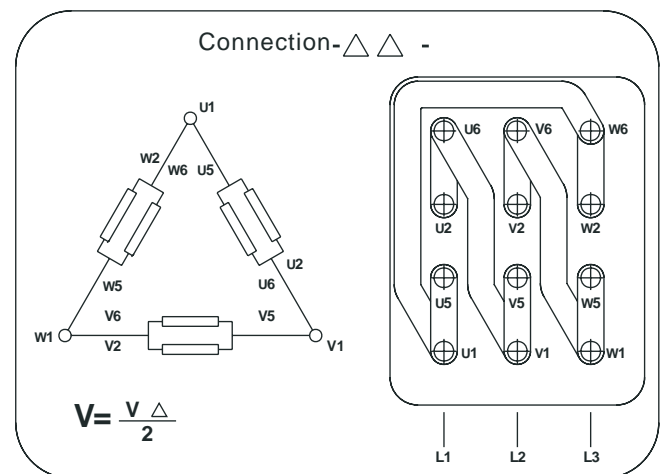
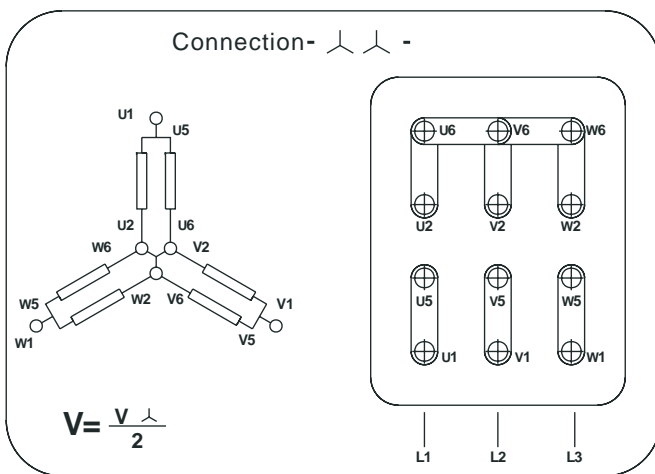
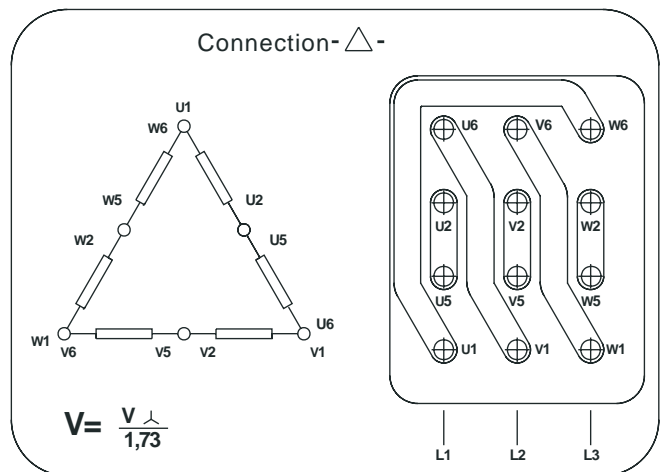
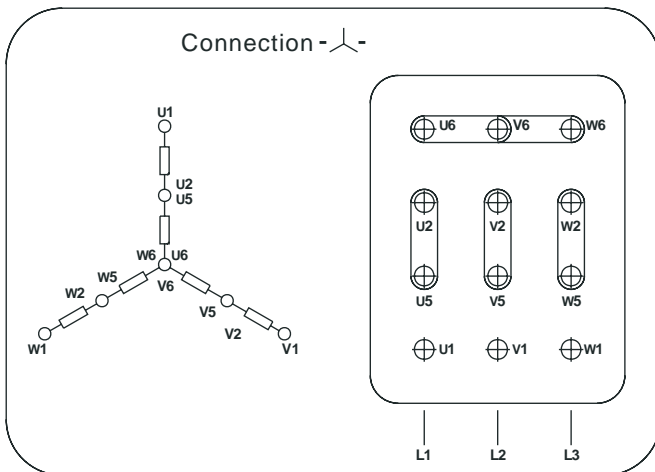


## Connection diagrams for single-speed three-phase motors

Connections with 6 studs



Connections with 12 studs



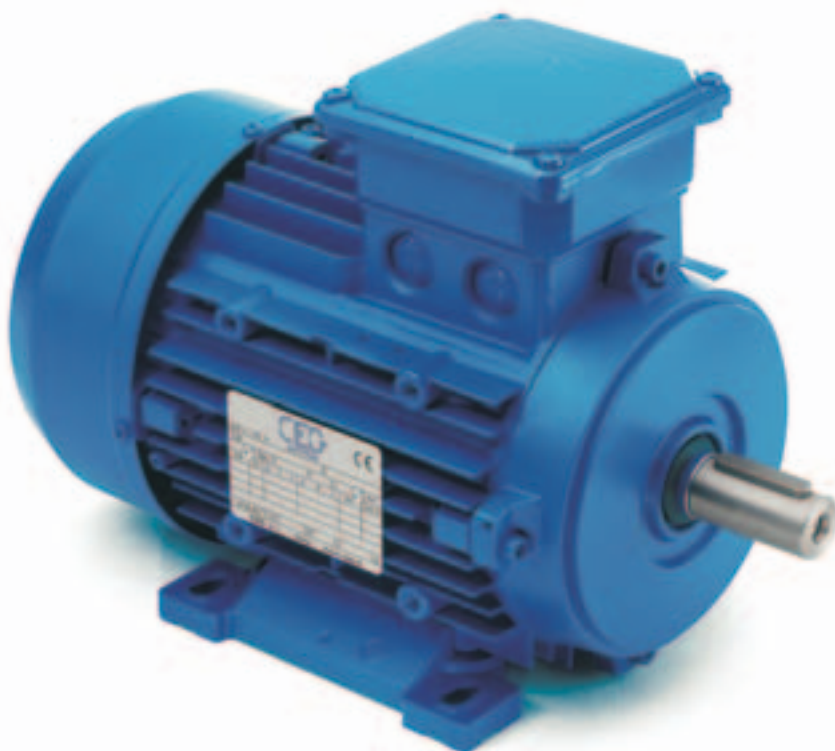


## Two-speed three-phase motors (DPSTD)



### PRODUCTION STANDARDS

Mounting arrangement	IMB3
Terminal box position	On top (BS)
Rated voltage	400 V 50 Hz
Protection rating	IP55
Bearings	ZZ
Winding insulation	Class F
Terminal box type	2 aluminium components (box + cover)
End-shields assembly	Bosses and bolts
Paint finish	BLUE RAL 5010
Fan cover	Galvanized steel sheet
Duty	S1



### Meaning of the symbols

$P_n$	= rated power	$M_s$	= locked-rotor torque
$n$	= rated speed	$M_m$	= breakdown torque
$I_n$	= rated current	$J$	= moment of inertia
$I_s$	= locked-rotor current	$\cos \varphi$	= power factor
$M_n$	= rated torque	$\eta$	= efficiency



### TWO-SPEED THREE-PHASE MOTORS

3000/1500 Rpm 2/4 poles 50 Hz (SINGLE WINDING)

Size	Pn		n min <sup>-1</sup>	In(400V) A	Cosφ	η %	Mn Nm	J Kgm <sup>2</sup>	Weight Kg
	kW	Hp							
M56	0,11/0,07	0,15/0,1	2720-1370	0,41-0,33	0,75-0,6	52-52	0,39-0,49	0,00012	2,8
M63	0,22/0,15	0,3/0,2	2760-1400	0,67-0,57	0,88-0,63	54-60	0,76-1	0,00023	4,7
M71a	0,3/0,22	0,4/0,3	2870-1445	0,85-0,85	0,7-0,6	60-61	1-1,45	0,00065	6,5
M71b	0,55/0,37	0,75/0,5	2830-1405	1,3-1,25	0,82-0,62	75-69	1,85-2,5	0,00065	7,5
M80a	0,6/0,45	0,8/0,6	2840-1415	1,7-1,3	0,77-0,74	65-65	1,74-1,35	0,00081	9,8
M80b	0,8/0,6	1,1/0,8	2860-1410	2,4-1,8	0,74-0,71	65-69	2,67-4,06	0,00102	10
M80c	1,1/0,75	1,5/1	2865-1420	3,1-2,2	0,86-0,73	68-67	3,66-5,06	0,00121	11,5
M90Sa	1,5/1,1	2/1,5	2850-1425	4,1-2,9	0,74-0,73	71-76	5-7,4	0,00186	13
M90Sb	1,85/1,25	2,5/1,7	2840-1420	5-3,1	0,77-0,76	70-76	6,22-8,4	0,00217	14,5
M90La	2,2/1,5	3/2	2840-1410	5-3,5	0,84-0,79	75-78	7,4-10,15	0,00252	16,8
M90Lb	2,5/1,85	3,5/2,5	2850-1420	5,9-4,64	0,83-0,77	74-75	8,37-12,5	0,0027	19
M100La	3/2,2	4/3	2850-1410	7,16-5,3	0,82-0,78	74-77	10-14,9	0,00367	19,5
M100Lb	4/3	5,5/4	2875-1425	9,8-7,2	0,8-0,79	73-73	13,3-20,1	0,00454	23
M112M	4,5/3,3	6/4,5	2865-1430	10,6-7,65	0,88-0,8	70-78	15,1-22,2	0,00866	31,5
M132Sa	5,5/4,5	7,5/6	2915-1450	12,9-9,9	0,82-0,81	77-81	18-29,6	0,01803	42
M132Sb	7,5/6	10/8	2910-1445	18,3-15	0,85-0,8	74-77	24,6-39,6	0,02074	45,5
M132M	8,1/6,6	11/9	2915-1440	17,6-14,4	0,88-0,85	76-78	26,5-47,8	0,02218	52,9
M160M	11/9	15/12	2970-1480	25,9-19,5	0,75-0,77	82-87	35,4-58,1	0,0505	100
M160L	14/11	19/15	2960-1480	33-23,8	0,75-0,77	82-87	45,2-71,5	0,05968	107
M180M	18,5/15	25/20	2950-1480	41,9-32	0,8-0,8	80-85	59,9-96,8	0,087	130,7

### TWO-SPEED THREE-PHASE MOTORS

1500/750 Rpm 4/8 poles 50 Hz (SINGLE WINDING)

Size	Pn		n min <sup>-1</sup>	In(400V) A	Cosφ	η %	Mn Nm	J Kgm <sup>2</sup>	Weight Kg
	kW	Hp							
M71	0,185/0,09	0,25/0,12	1430-680	0,66-0,91	0,68-0,56	60-45	1,24-1,26	0,00087	9,8
M80a	0,37/0,2	0,5/0,28	1410-700	0,96-0,97	0,81-0,6	69-50	2,5-2,86	0,00186	10
M80b	0,55/0,3	0,75/0,4	1390-700	1,4-1,5	0,87-0,6	67-47	3,77-4,1	0,00208	10,2
M90S	0,75/0,37	1/0,5	1360-680	1,7-1,7	0,88-0,58	70-53	5,26-5,2	0,00186	13
M90L	1/0,5	1,35/0,7	1375-690	2,2-2,3	0,88-0,56	74-56	6,94-6,92	0,00217	14,3
M100La	1,4/0,66	1,9/0,9	1400-680	3,2-2,5	0,85-0,6	75-63	9,55-9,27	0,00367	18,5
M100Lb	1,6/0,9	2,2/1,2	1390-700	3,5-3,3	0,88-0,6	75-65	11-12,3	0,00463	21
M112Ma	1,85/1,1	2,5/1,5	1420-720	4-4,4	0,87-0,62	76-63	12,4-14,6	0,01159	27
M112Mb	2,2/1,4	3/1,9	1440-720	4,6-4,4	0,89-0,66	78-69	14,6-18,6	0,01333	30
M132S	3,7/2	5/2,8	1450-720	7,4-7,1	0,9-0,59	83-73	24,4-26,5	0,02541	45
M132M	5,1/3	7/4	1435-710	10,2-8,3	0,92-0,71	79-74	33,9-40,4	0,03068	51,8
M160Ma	6/4	8/5,5	1440-725	13-11,8	0,86-0,63	78-78	39,8-52,7	0,06927	77,9
M160Mb	7,5/5	10/6,8	1430-715	15,7-13,9	0,89-0,67	78-78	50-66,8	0,06927	77,9
M160L	10/7	14/9	1460-720	22,1-19,8	0,84-0,62	78-78	65,4-86,3	0,1052	111

3. b)



TWO-SPEED THREE-PHASE MOTORS									
1500/1000 Rpm      4/6 poles      50 Hz (DOUBLE WINDING)									
Size	Pn		n	In(400V)	Cosφ	η	Mn	J	Weight
	kW	Hp	min <sup>-1</sup>	A		%	Nm	Kgm <sup>2</sup>	Kg
M71	0,3/0,22	0,4/0,3	1430-830	1,2-0,9	0,7-0,74	60-50	2-2,5	0,0009	6,6
M80	0,55/0,37	0,75/0,5	1445-940	1,5-1,2	0,77-0,76	67-50	3,6-3,8	0,00228	11,5
M90S	0,75/0,55	1/0,75	1445-945	2,1-1,8	0,77-0,75	66-60	5-5,5	0,00186	13
M90L	1,1/0,75	1,5/1	1425-920	2,9-2,5	0,78-0,7	71-61	7,4-7,8	0,00217	14,7
M100L	1,5/0,9	2/1,2	1465-965	4,4-2,7	0,7-0,7	70-70	9,8-8,9	0,00716	22
M112Ma	1,85/1,32	2,5/1,8	1465-965	4,6-3,6	0,8-0,75	72-70	12-12,9	0,01159	28
M112Mb	2,2/1,5	3/2	1460-970	5,1-4,1	0,85-0,75	73-70	14,4-14,9	0,01333	30,5
M132S	3,3/2,2	4,5/3	1460-970	7,3-5,7	0,83-0,71	79-78	21,6-21,7	0,02523	36
M132Ma	4/2,5	5,5/3,5	1460-965	8,6-7	0,82-0,72	82-75	26,2-25,7	0,02541	46
M132Mb	5,5/4	7,5/5,5	1460-975	11,2-10	0,87-0,75	82-77	36-39,2	0,03068	53
M160M	7,5/5	10/6,8	1470-960	15,6-10,7	0,85-0,81	84-79	48,7-44,5	0,09353	90

TWO-SPEED THREE-PHASE MOTORS									
3000/750 Rpm      2/8 poles      50 Hz (DOUBLE WINDING)									
Size	Pn		n	In(400V)	Cosφ	η	Mn	J	Weight
	kW	Hp	min <sup>-1</sup>	A		%	Nm	Kgm <sup>2</sup>	Kg
M71	0,22/0,075	0,3/0,1	2850-660	0,73-0,43	0,73-0,63	60-40	0,74-1,08	0,00087	7
M80a	0,37/0,09	0,5/0,12	2880-640	1,1-0,5	0,8-0,66	62-45	1,23-1,34	0,00081	9
M80b	0,55/0,15	0,75/0,2	2880-640	1,5-0,8	0,86-0,63	62-45	1,84-2,24	0,00102	11
M90S	0,75/0,185	1/0,25	2820-660	2,1-0,8	0,88-0,81	60-46	2,54-2,7	0,00168	13,5
M90L	1,1/0,25	1,5/0,35	2890-690	2,8-1,2	0,85-0,62	68-50	3,63-3,46	0,00217	14,4
M100L	1,6/0,45	2,2/0,6	2910-700	3,9-1,82	0,85-0,63	69-57	5,25-6,14	0,00367	22
M112M	2,7/0,75	3,7/1	2840-675	7,1-2,6	0,83-0,7	66-60	9,1-10,6	0,01333	30
M132M	4/1,5	5,5/2	2935-710	9,2-5,5	0,89-0,6	71-66	13-20,2	0,02074	46
M160M	8/3	11/4	2960-725	15,7-9,5	0,9-0,61	82-75	25,8-39,5	0,05968	104

TWO-SPEED THREE-PHASE MOTORS									
3000/1000 Rpm      2/6 poles      50 Hz (DOUBLE WINDING)									
Size	Pn		n	In(400V)	Cosφ	η	Mn	J	Weight
	kW	Hp	min <sup>-1</sup>	A		%	Nm	Kgm <sup>2</sup>	Kg
M71	0,25/0,15	0,35/0,2	2890-900	0,78-0,64	0,8-0,68	58-50	0,83-1,6	0,00087	6,5
M80	0,37/0,25	0,5/0,35	2850-910	1-0,94	0,8-0,7	68-55	1,24-2,62	0,000186	11
M90L	1,1/0,37	1,5/0,5	2870-960	2,6-1,3	0,86-0,68	75-60	3,66-3,68	0,00217	15
M100L	2/0,75	2,7/1	2860-970	4,2-2,3	0,9-0,7	77-68	6,7-7,4	0,00368	23
M112M	3/1,1	4/1,5	2870-980	6,4-3	0,85-0,75	80-70	10-10,7	0,00847	30
M132M	3,7/1,7	5/2	2920-980	8,4-4,7	0,85-0,75	75-70	12-16,5	0,0209	45

TWO-SPEED THREE-PHASE MOTORS									
1000/750 Rpm      6/8 poles      50 Hz (DOUBLE WINDING)									
Size	Pn		n	In(400V)	Cosφ	η	Mn	J	Weight
	kW	Hp	min <sup>-1</sup>	A		%	Nm	Kgm <sup>2</sup>	Kg
M80	0,25/0,14	0,35/0,19	920-685	0,96-0,73	0,78-0,71	47-38	2,6-1,95	0,00186	12
M90L	0,55/0,25	0,75/0,35	920-700	1,6-1,1	0,77-0,68	65-48	5,7-3,4	0,00302	15
M100	0,95/0,55	1,3/0,75	960-700	2,9-1,9	0,72-0,7	65-60	9,5-7,5	0,00563	23
M112M	1,5/0,75	2/1	965-730	4,1-2,5	0,72-0,68	73-63	15-9,8	0,01333	30
M132S	2,2/1,1	3/1,5	960-740	6,1-3,6	0,72-0,78	73-65	22-14,2	0,02622	59
M132M	3/1,85	4/2,5	960-750	7,8-5,79	0,74-0,7	75-65	30-23,5	0,0289	63

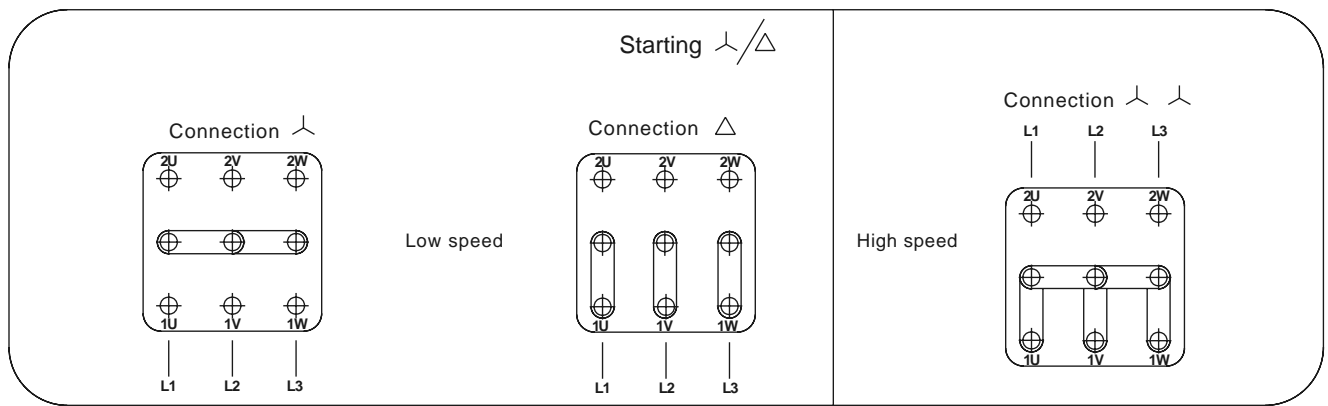
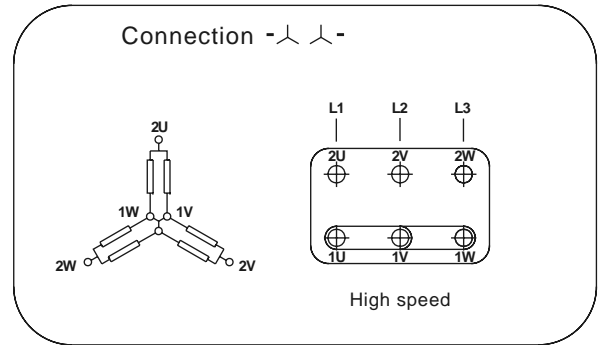
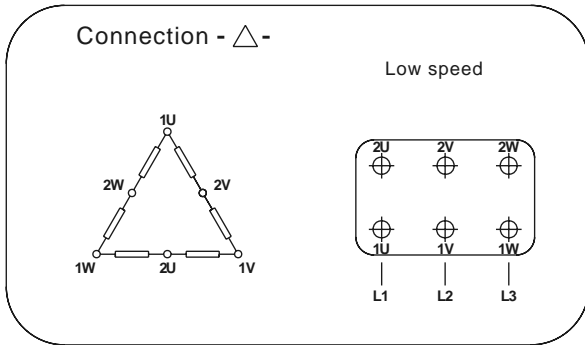
3. b 1)

# Two-speed three-phase motor connection diagrams

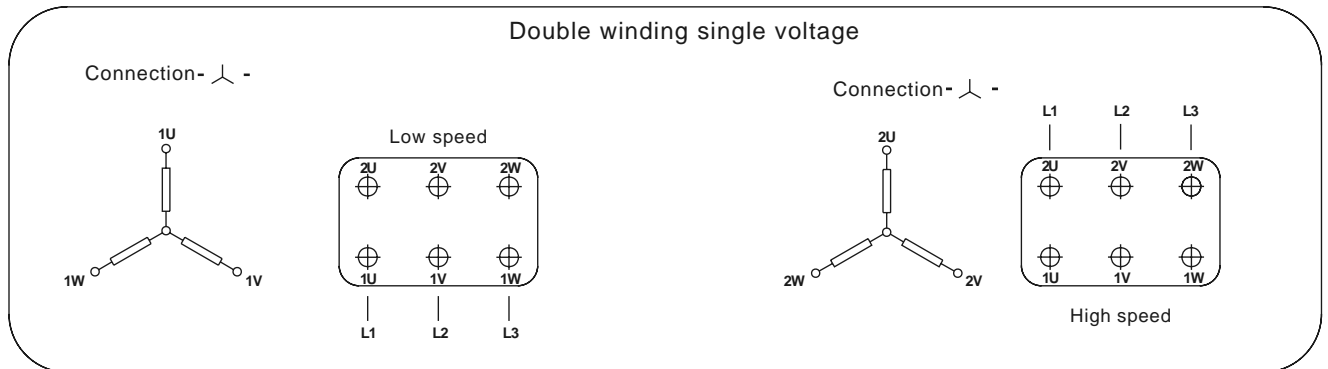


## Connection diagrams for two-speed three-phase motors

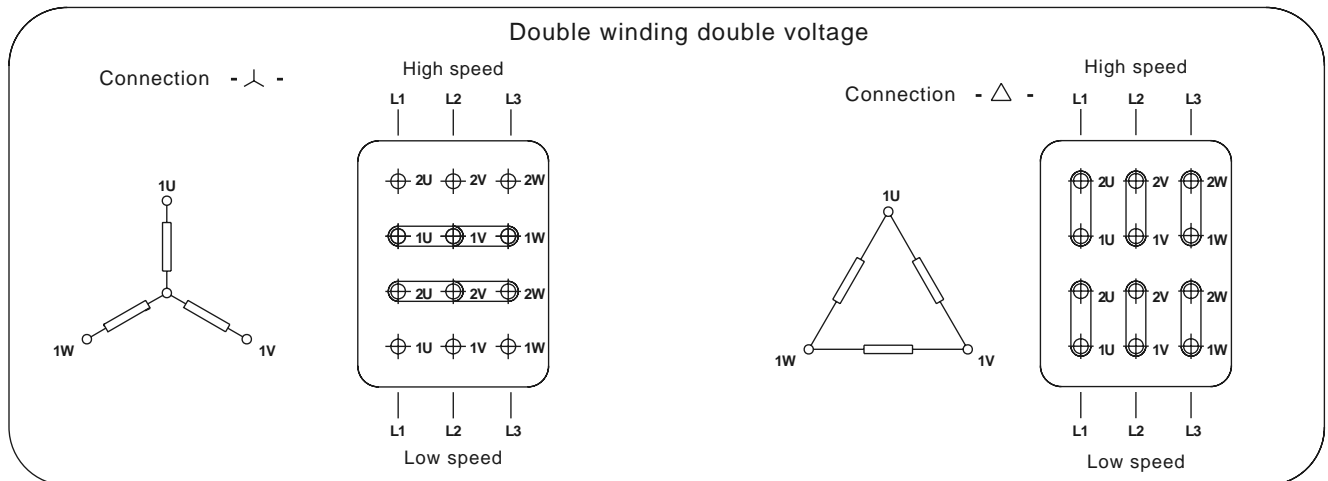
Single winding single voltage



Double winding single voltage



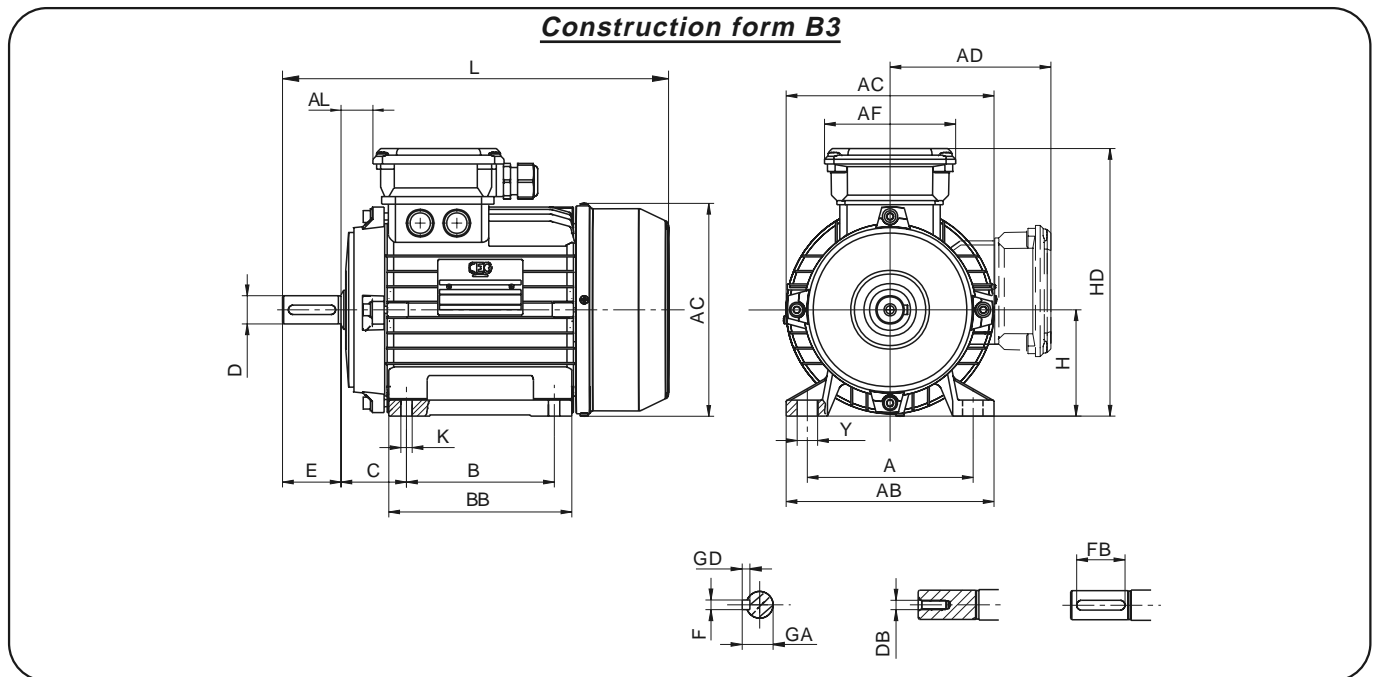
Double winding double voltage



3. b 2)

# Single and two-speed three-phase motor overall dimensions (IEC - 72)

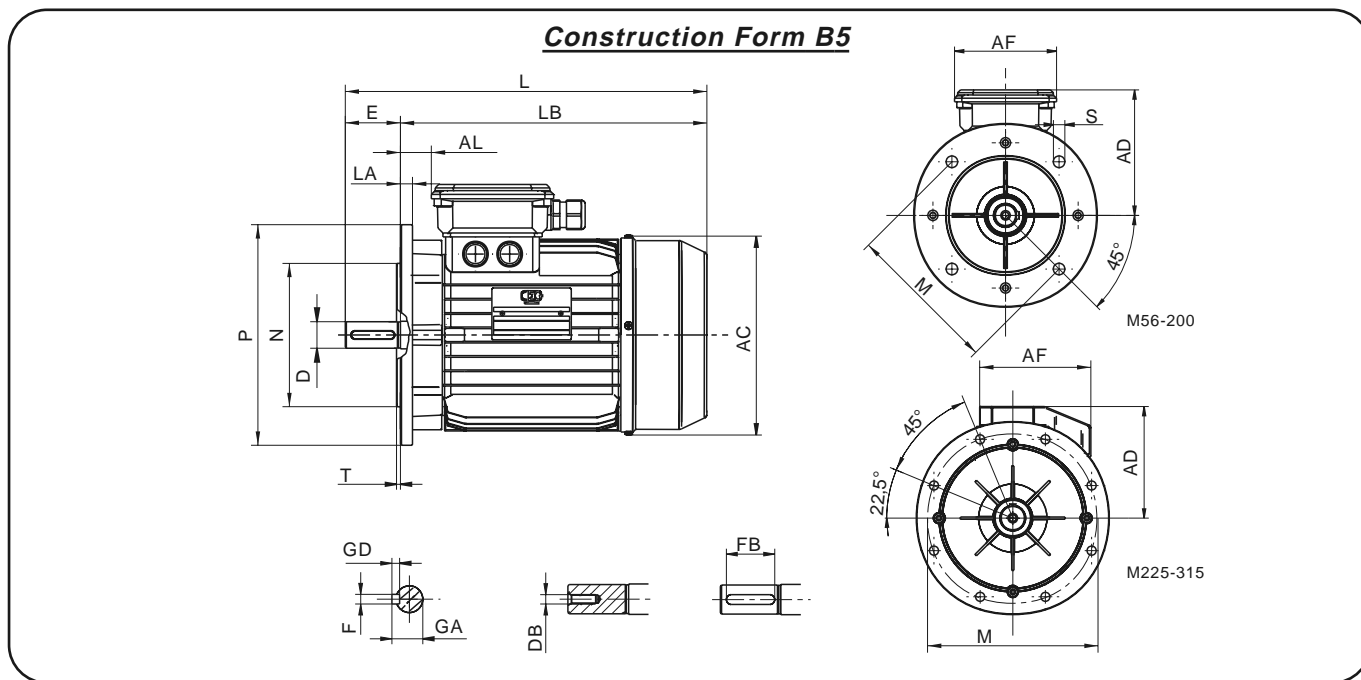
## MT – DP OVERALL DIMENSIONS: B3 (B6 – B7 – B8 – V5 – V6) MOUNTING ARRANGEMENT



Size	A	AB	B	BB	C	D	E	H	HD	L	K	Y	AC	AD	AF	AL	F	FB	GA	GD	DB
M56	90	109	71	91	36	9	20	56	168	187	6	11	115	112	93	13	3	15	10,2	3	M3
M63	100	120	80	106	40	11	23	63	176	208	7	12	123	113	93	19	4	15	12,5	4	M4
M71	112	136	90	108	45	14	30	71	196	245	8	12	147	125	93	24	5	20	16	5	M5
M80	125	160	100	125	50	19	40	80	213	279	9,5	17	165	133	111	23	6	30	21,5	6	M6
M90S	140	170	100	131	56	24	50	90	227	305	9,5	17	181	148	111	28	8	40	27	7	M8
M90L	140	170	125	156	56	24	50	90	227	330	9,5	17	181	148	111	28	8	40	27	7	M8
M100L	160	200	140	170	63	28	60	100	247	370	11	21	198	156	111	36	8	50	31	7	M10
M112M	190	225	140	177	70	28	60	112	285	388	11	21	222	173	124	38	8	50	31	7	M10
M132S	216	260	140	181	89	38	80	132	321	460	11	21	264	189	133	44	10	70	41	8	M12
M132M	216	260	178	220	89	38	80	132	321	500	11	21	264	189	133	44	10	70	41	8	M12
M160M	254	318	210	260	108	42	110	160	392	610	13	23	317	235	186	79	12	90	45	8	M16
M160L	254	318	254	304	108	42	110	160	392	645	13	23	317	235	186	79	12	90	45	8	M16
M180M	279	320	241	295	121	48	110	180	428	699	15	15	320		267	64	14	90	51,5	9	M16
M180L	279	320	279	329	121	48	110	180	428	699	15	15	320		267	64	14	90	51,5	9	M16
M200LA 2p	318	373	305	360	133	55	110	200	460	685	19	19	362		272	60	16	90	59	10	M20
M200LB 4-8p	318	400	305	379	133	55	110	200	474	785	19	19	403		317	79	16	90	59	10	M20
M225S 2P	356	429	286	383	149	55	110	225	506	787	19	19	403		317	73	16	100	59	10	M20
M225S 4-8P	356	429	286	383	149	60	140	225	506	817	19	19	403		317	73	18	120	64	11	M20
M225M 2P	356	429	311	383	149	55	110	225	506	787	19	19	403		317	73	16	100	59	10	M20
M225M 4-8P	356	429	311	383	149	60	140	225	506	817	19	19	403		317	73	18	120	64	11	M20
M250M 2P	406	487	349	426	168	60	140	250	562	885	22	22	445		321	87	18	120	64	11	M20
M250M 4-8P	406	487	349	426	168	65	140	250	562	885	22	22	445		321	87	18	120	69	11	M20
M280S 2P	457	565	368	512	190	65	140	280	665	970	22	22	550		405	104	18	120	69	11	M20
M280S 4-8P	457	565	368	512	190	75	140	280	665	970	22	22	550		405	104	20	120	79,5	12	M20
M280M 2P	457	565	419	512	190	65	140	280	665	985	22	22	550		405	104	18	120	69	11	M20
M280M 4-8P	457	565	419	512	190	75	140	280	665	985	22	22	550		405	104	20	120	79,5	12	M20
M315S 2P	508	608	406	605	216	65	140	315	790	1080	27	27	680		456	107	18	120	69	11	M20
M315S 4-8P	508	608	406	605	216	80	170	315	790	1110	27	27	680		456	107	22	140	85	14	M20
M315M 2P	508	608	457	605	216	65	140	315	790	1150	27	27	680		456	107	18	120	69	11	M20
M315M 4-8P	508	608	457	605	216	80	170	315	790	1180	27	27	680		456	107	22	140	85	14	M20
M315L 2P	508	608	508	620	216	65	140	315	790	1290	27	27	680		456	107	18	120	69	11	M20
M315L 4-8P	508	608	508	620	216	80	170	315	790	1290	27	27	680		456	107	22	140	85	14	M20



MT – DP OVERALL DIMENSIONS: B5 (V1 – V3) MOUNTING ARRANGEMENT

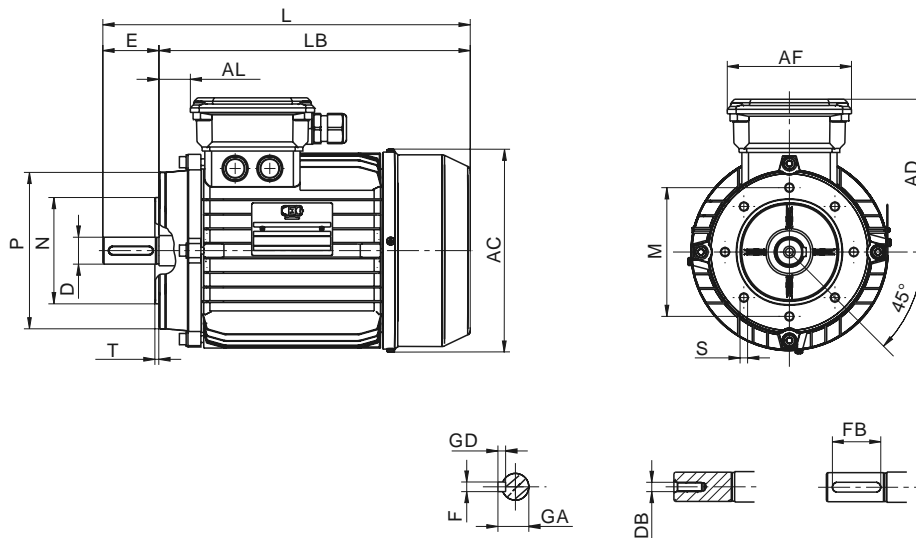


Size	P	N	M	T	S	D	E	F	FB	GA	GD	L	LB	LA	AD	AF	AL	AC	DB
M56	120	80	100	2,5	7	9	20	3	15	10,2	3	187	167	8	112	93	13	115	M3
M63	140	95	115	2,5	9,5	11	23	4	15	12,5	4	208	185	10	113	93	19	123	M4
M71	160	110	130	3	9,5	14	30	5	20	16	5	242	212	9	125	93	24	147	M5
M80	200	130	165	3	11,5	19	40	6	30	21,5	6	279	239	10,5	133	111	23	165	M6
M90S	200	130	165	3	11,5	24	50	8	40	27	7	305	255	10,5	148	111	28	181	M8
M90L	200	130	165	3	11,5	24	50	8	40	27	7	330	280	10,5	148	111	28	181	M8
M100L	250	180	215	2,5	14	28	60	8	50	31	7	370	310	14	156	111	36	198	M10
M112M	250	180	215	2,5	14	28	60	8	50	31	7	388	328	14	173	124	38	222	M10
M132S	300	230	265	4	14	38	80	10	70	41	8	460	380	20	189	133	44	264	M12
M132M	300	230	265	4	14	38	80	10	70	41	8	500	420	20	189	133	44	264	M12
M160M	350	250	300	5	18	42	110	12	90	45	8	610	500	15	235	186	79	317	M16
M160L	350	250	300	5	18	42	110	12	90	45	8	645	535	15	235	186	79	317	M16
M180M	350	250	300	5	19	48	110	14	90	51,5	9	699	589	17	248	267	64	320	M16
M180L	350	250	300	5	19	48	110	14	90	51,5	9	699	589	17	248	267	64	320	M16
M200LA	400	300	350	5	18	55	110	16	90	59	10	685	575	16	261	272	60	362	M20
M200LB	400	300	350	5	18	55	110	16	90	59	10	787	677	16	274	317	79	403	M20
M225S 2P	450	350	400	5	18	55	110	16	90	59	10	787	677	16	294	317	73	403	M20
M225S 4-8P	450	350	400	5	18	60	140	18	120	64	11	817	677	16	294	317	73	403	M20
M225M 2P	450	350	400	5	18	55	110	16	90	59	10	787	677	16	294	317	73	403	M20
M225M 4-8P	450	350	400	5	18	60	140	18	120	64	11	817	677	16	294	317	73	403	M20
M250M 2P	550	450	500	5	18	60	140	18	120	64	11	885	745	20	350	321	88	445	M20
M250M 4-8P	550	450	500	5	18	65	140	18	120	69	11	885	745	20	350	321	88	445	M20
M280S 2P	550	450	500	5	18	65	140	18	120	69	11	970	830	20	385	405	104	550	M20
M280S 4-8P	550	450	500	5	18	75	140	20	120	79,5	12	970	830	20	385	405	104	550	M20
M280M 2P	550	450	500	5	18	65	140	18	120	69	11	970	830	20	385	405	104	550	M20
M280M 4-8P	550	450	500	5	18	75	140	20	120	79,5	12	985	845	20	385	405	104	550	M20
M315S 2P	660	550	600	6	22	65	140	18	120	69	11	1080	940	22	475	456	107	680	M20
M315S 4-8P	660	550	600	6	22	80	170	22	140	85	14	1110	940	22	475	456	107	680	M20
M315M 2P	660	550	600	6	22	65	140	18	120	69	11	1150	1010	22	475	456	107	680	M20
M315M 4-8P	660	550	600	6	22	80	170	22	140	85	14	1180	1010	22	475	456	107	680	M20
M315L 2P	660	550	600	6	22	65	140	18	120	69	11	1260	1120	22	475	456	107	680	M20
M315L 4-8P	660	550	600	6	22	80	170	22	140	85	14	1290	1120	22	475	456	107	680	M20



MT – DP OVERALL DIMENSIONS: B14 (V18 – V19) MOUNTING ARRANGEMENT

**Construction Form B14**



Size	P	N	M	T	S	D	E	F	FB	GA	GD	L	LB	AD	AF	AL	AC	DB
M56	80	50	65	2,5	M5	9	20	3	15	10,2	3	187	167	112	93	13	115	M3
M63	90	60	75	2,5	M5	11	23	4	15	12,5	4	208	185	113	93	19	123	M4
M71	105	70	85	3	M6	14	30	5	20	16	5	242	212	125	93	24	147	M5
M80	120	80	100	3	M6	19	40	6	30	21,5	6	279	239	133	111	23	165	M6
M90S	140	95	115	3	M8	24	50	8	40	27	7	305	255	148	111	28	181	M8
M90L	140	95	115	3	M8	24	50	8	40	27	7	330	280	148	111	28	181	M8
M100L	160	110	130	3,5	M8	28	60	8	50	31	7	370	310	156	111	36	198	M10
M112M	160	110	130	3,5	M8	28	60	8	50	31	7	388	328	173	124	38	222	M10
M132S	200	130	165	4	M10	38	80	10	70	41	8	460	380	189	133	44	264	M12
M132M	200	130	165	4	M10	38	80	10	70	41	8	500	420	189	133	44	264	M12

## Permanent capacitor single-phase motors (MMSTD)

### PRODUCTION STANDARDS

Mounting arrangement	IMB3
Terminal box position	On top (BS)
Rated voltage	230 V 50 Hz
Run capacitor	External, permanently connected
Protection rating	IP55
Bearings	ZZ
Winding insulation	Class F
Terminal box type	2 aluminium components (box + cover)
End-shields assembly	Bosses and bolts
Paint finish	BLUE RAL 5010
Fan cover	Galvanized steel sheet
Duty	S1



### Meaning of the symbols

$P_n$	= rated power	$M_m$	= breakdown torque
$n$	= rated speed	$J$	= moment of inertia
$I_n$	= rated current	$\cos \varphi$	= power factor
$I_s$	= locked-rotor current	$\eta$	= efficiency
$M_n$	= rated torque	$C_m$	= running capacitor
$M_s$	= locked-rotor torque	$C_a$	= starting capacitor



### SINGLE - PHASE MOTORS

3000 Rpm 2 poles 50 Hz

Size	Pn		n min <sup>-1</sup>	In(230V) A	Cosφ	η %	Mn Nm	Ms/Mn	Is/In	Cm μF	J Kgm <sup>2</sup>	Weight Kg
	kW	Hp										
M56	0,11	0,15	2680	1	0,94	50	0,65	1,2	1,9	6,3	0,00008	3,3
M63a	0,185	0,25	2730	1,4	0,99	58	0,63	1	2,8	8	0,00014	4,4
M63b	0,25	0,35	2750	2,1	0,95	55	0,87	1,1	2,7	10	0,00017	4,9
M71a	0,37	0,5	2730	3,4	0,89	53	1,3	0,73	2,8	12	0,00032	6,6
M71b	0,55	0,75	2730	4,3	0,92	61	1,92	0,62	2,8	16	0,00038	7,7
M80a	0,75	1	2770	5,1	0,94	68	2,58	0,83	3,6	20	0,00066	10
M80b	1,1	1,5	2750	7,1	0,96	70	3,82	0,55	3,5	25	0,00083	11,4
M80c	1,5	2	2700	9,8	0,95	70	5,3	0,58	3,6	35	0,00092	12,3
M90Sb	1,5	2	2750	9	0,98	75	5,2	0,74	3,7	40	0,00114	14,7
M90La	1,85	2,5	2750	10,7	0,99	74	6,4	0,64	3,7	50	0,0013	16,8
M90Lb	2,2	3	2740	13,4	0,99	72	8,2	0,7	3,2	60	0,0013	16,8
M100L	2,5	3,5	2850	14,7	0,99	73	8,4	0,7	4	80	0,00246	22

### SINGLE - PHASE MOTORS

1500 Rpm 4 poles 50 Hz

Size	Pn		n min <sup>-1</sup>	In(230V) A	Cosφ	η %	Mn Nm	Ms/Mn	Is/In	Cm μF	J Kgm <sup>2</sup>	Weight Kg
	kW	Hp										
M56	0,09	0,12	1350	0,9	0,83	50	0,49	0,65	2	5	0,00012	3,3
M63a	0,11	0,15	1350	1,2	0,83	50	0,78	1	2,1	6,3	0,00013	4
M63b	0,185	0,25	1400	1,5	0,99	54	1,23	1	2	10	0,00024	4,7
M71a	0,25	0,35	1330	2	0,93	60	2,05	1	2,3	10	0,00064	6,5
M71b	0,37	0,5	1350	3	0,96	55	2,6	1	2,5	16	0,00086	7,7
M80a	0,55	0,75	1360	3,7	0,98	64	3,86	0,52	2,7	16	0,00142	8,9
M80b	0,75	1	1400	5,3	0,94	65	5,1	0,5	3,5	20	0,00184	10,4
M90S	1,1	1,5	1380	6,7	0,98	71	7,6	0,52	3,3	35	0,00185	13,3
M90La	1,5	2	1360	9,3	0,96	73	10,8	0,5	3	45	0,00247	16,2
M90Lb	1,85	2,5	1360	12,1	0,91	73	13	0,5	3,1	55	0,00268	17,8
M100La	1,85	2,5	1360	12,2	0,94	70	13	0,6	3	55	0,00403	21,4
M100Lb	2,2	3	1350	13	0,97	76	15,6	0,5	4	70	0,00506	23,9

### SINGLE - PHASE MOTORS

1000 Rpm 6 poles 50 Hz

Size	Pn		n min <sup>-1</sup>	In(230V) A	Cosφ	η %	Mn Nm	Ms/Mn	Is/In	Cm μF	J Kgm <sup>2</sup>	Weight Kg
	kW	Hp										
M71	0,185	0,25	920	1,8	0,8	55	1,92	0,7	2,2	8	0,00065	7
M80a	0,25	0,35	940	2,5	0,8	55	2,54	0,6	2,7	10	0,00142	8,5
M80b	0,37	0,5	920	3,3	0,94	51	3,84	0,65	2,1	16	0,00186	10
M90S	0,55	0,75	910	4,3	0,86	65	5,8	0,54	2,3	16	0,00228	12,3
M90La	0,75	1	945	5,8	0,88	64	7,6	0,5	2,7	25	0,00296	14,5
M90Lb	1,1	1,5	930	8,3	0,96	60	11,3	0,54	2,5	35	0,00267	17
M100La	1,1	1,5	935	8,1	0,91	65	11,25	0,4	2,3	35	0,00343	20
M100Lb	1,5	2	930	10,6	0,96	64	15,4	0,5	2,9	50	0,00403	21,3

## Cap start/cap run single-phase motors (MMDSG)

Single-phase motors generally have lower starting torque than the rated torque. When higher starting torque is required, they can be equipped with an additional starting capacitor connected during starting phase only. Starting capacitor has to be disconnected when motor torque approaches the pull-out torque; following devices are therefore available for this purpose:

- manual starting switches,
- two type of automatic starting devices:
  - **electronic**
  - **centrifugal switch** (standard for CEG) or other **electromechanical devices**

### PRODUCTION STANDARDS

Mounting arrangement	IMB3
Terminal box position	On top (BS)
Rated voltage	230 V 50 Hz
Running capacitor	Internal, permanently connected
Starting capacitor	Internal, connected during starting by centrifugal switch
Protection rating	IP54
Bearings	2 RS
Winding insulation	Class F
Terminal box type	Capacitor-holder
End-shields assembly	Bosses and bolts
Paint finish	BLUE RAL 5010
Fan cover	Galvanized steel sheet
Duty	S1



### Meaning of the symbols

P <sub>n</sub>	= rated power	M <sub>m</sub>	= breakdown torque
n	= rated speed	J	= moment of inertia
I <sub>n</sub>	= rated current	cos φ	= power factor
I <sub>s</sub>	= locked-rotor current	η	= efficiency
M <sub>n</sub>	= rated torque	C <sub>m</sub>	= running capacitor
M <sub>s</sub>	= locked-rotor torque	C <sub>a</sub>	= starting capacitor



3. d)



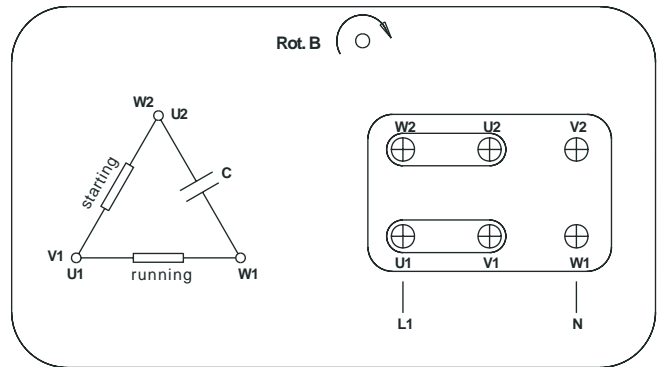
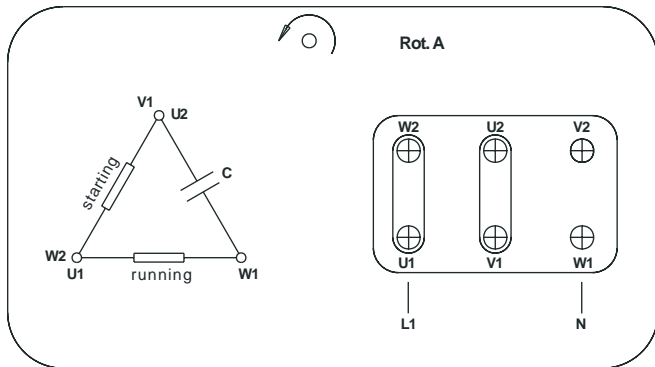
SINGLE-PHASE MOTORS (CAP START / CAP RUN)													
3000 Rpm 2 poles 50 Hz													
Size	Pn		n	In(230V)	Cosφ	η	Mn	Ms/Mn	Is/In	Cm	Ca	J	Weight
	kW	Hp	min <sup>-1</sup>	A		%	Nm			μF	μF	Kgm <sup>2</sup>	Kg
M71a	0,37	0,5	2730	3,4	0,89	53	1,3	1,3	2,8	12	63-80	0,00032	7
M71b	0,55	0,75	2730	4,3	0,92	61	1,92	1,4	2,8	16	63-80	0,00038	8,3
M80a	0,75	1	2770	5,1	0,94	68	2,58	1,5	3,6	20	63-80	0,00066	10
M80b	1,1	1,5	2710	7	0,99	69	3,9	1,6	3,3	25	80-100	0,00083	11,8
M80c	1,5	2	2700	9,8	0,95	70	5,3	1,6	3,3	35	80-100	0,00092	12,5
M90Sb	1,5	2	2750	9	0,98	75	5,2	1,9	3,7	40	100-125	0,00114	15
M90La	1,85	2,5	2750	10,7	0,99	74	6,4	2	3,7	50	100-125	0,0013	16,8
M90Lb	2,2	3	2740	13,4	0,99	72	8,2	1,9	3,2	60	125-156	0,0013	16,8
M100L	2,5	3,5	2850	14,7	0,99	73	8,4	1,8	4	80	125-156	0,00246	22,4

SINGLE-PHASE MOTORS (CAP START / CAP RUN)													
1500 Rpm 4 poles 50 Hz													
Size	Pn		n	In(230V)	Cosφ	η	Mn	Ms/Mn	Is/In	Cm	Ca	J	Weight
	kW	Hp	min <sup>-1</sup>	A		%	Nm			μF	μF	Kgm <sup>2</sup>	Kg
M71	0,37	0,5	1350	3	0,96	55	2,6	1,5	2,5	12,5	63-80	0,00086	8
M80a	0,55	0,75	1360	3,7	0,98	64	3,86	1,3	2,7	14	63-80	0,00142	9
M80b	0,75	1	1400	5,3	0,94	65	5,1	1,3	3,5	20	63-80	0,00184	10,4
M90S	1,1	1,5	1380	6,7	0,98	71	7,6	1,3	3,3	35	80-100	0,00185	13,4
M90La	1,5	2	1360	9,3	0,96	73	10,8	1,5	3	45	100-125	0,00247	16,2
M90Lb	1,85	2,5	1360	12,1	0,91	73	13	1,5	3,1	55	100-125	0,00268	18,2
M100La	1,85	2,5	1360	12,2	0,94	70	13	1,6	3	55	100-125	0,00403	21,5
M100Lb	2,2	3	1350	13	0,97	76	15,6	1,7	4	70	125-156	0,00506	24

SINGLE-PHASE MOTORS (CAP START / CAP RUN)													
1000 Rpm 6 poles 50 Hz													
Size	Pn		n	In(230V)	Cosφ	η	Mn	Ms/Mn	Is/In	Cm	Ca	J	Weight
	kW	Hp	min <sup>-1</sup>	A		%	Nm			μF	μF	Kgm <sup>2</sup>	Kg
M80	0,37	0,5	920	3	0,83	64	3,84	1,5	2,7	16	63-80	0,00186	10
M90S	0,55	0,75	910	4,3	0,86	65	5,8	1,3	2,3	16	63-80	0,00228	13
M90La	0,75	1	945	5,8	0,88	64	7,6	1,3	2,7	25	80-100	0,00296	14,9
M90Lb	1,1	1,5	930	8,3	0,96	60	11,3	1,4	2,5	35	80-100	0,00267	17
M100La	1,1	1,5	935	8,1	0,91	65	11,85	1,5	3	35	100-125	0,00343	19
M100Lb	1,5	2	930	10,6	0,96	64	15,4	1,4	2,9	50	100-125	0,00403	21

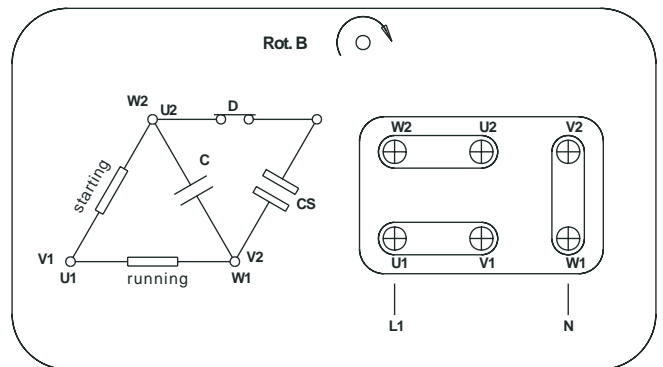
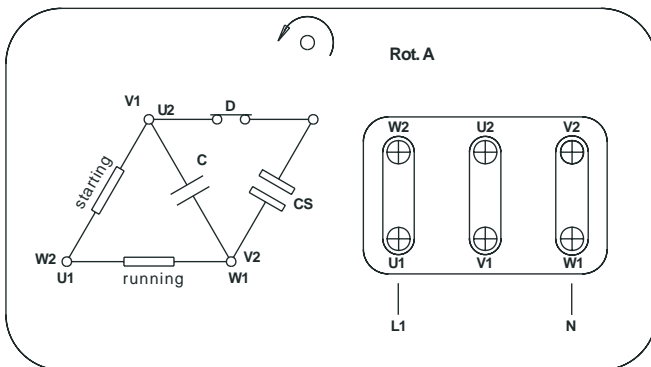


## Connection diagrams for standard single-phase motors



C = Running capacitor

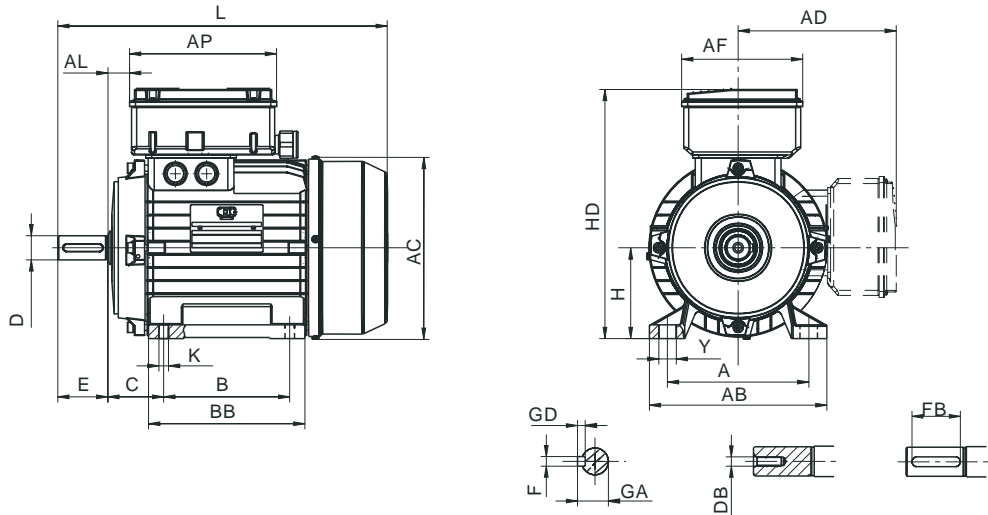
## Connection diagrams for cap start/cap run single-phase motors



C = Running capacitor  
 D = Centrifugal switch  
 CS = Starting capacitor

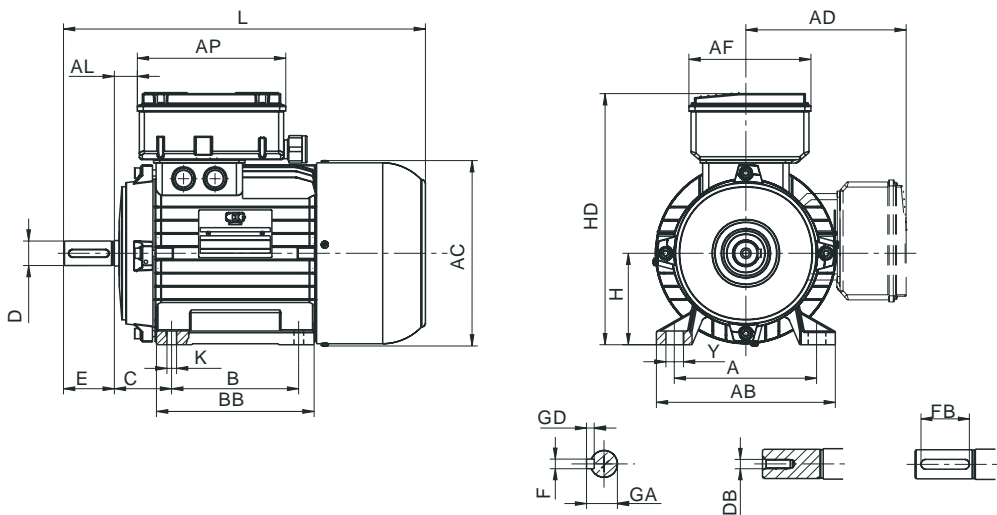
## PERMANENT CAPACITOR single-phase motors overall dimensions (version with capacitor-holder)

### Construction Form B3



Size	A	AB	B	BB	C	D	E	H	HD	L	K	Y	AC	AD	AF	AP	AL	F	FB	GA	GD	DB
M56	90	109	71	91	36	9	20	56	175	187	6	11	115	119	92	121	13	3	15	10,2	3	M3
M63	100	120	80	106	40	11	23	63	187	214	7	12	123	124	92	121	19	4	15	12,5	4	M4
M71	112	136	90	108	45	14	30	71	203	245	8	12	147	132	92	121	24	5	20	16	5	M5
M80	125	160	100	125	50	19	40	80	235	279	9,5	17	165	155	119	146	17	6	30	21,5	6	M6
M90S	140	175	100	131	56	24	50	90	249	305	9,5	17	181	159	119	146	22	8	40	27	7	M8
M90L	140	175	125	156	56	24	50	90	249	330	9,5	17	181	159	119	146	22	8	40	27	7	M8
M100L	160	200	140	170	63	28	60	100	269	370	11	21	198	169	119	146	36	8	50	31	7	M10

## CAP START / CAP RUN single-phase motors overall dimensions

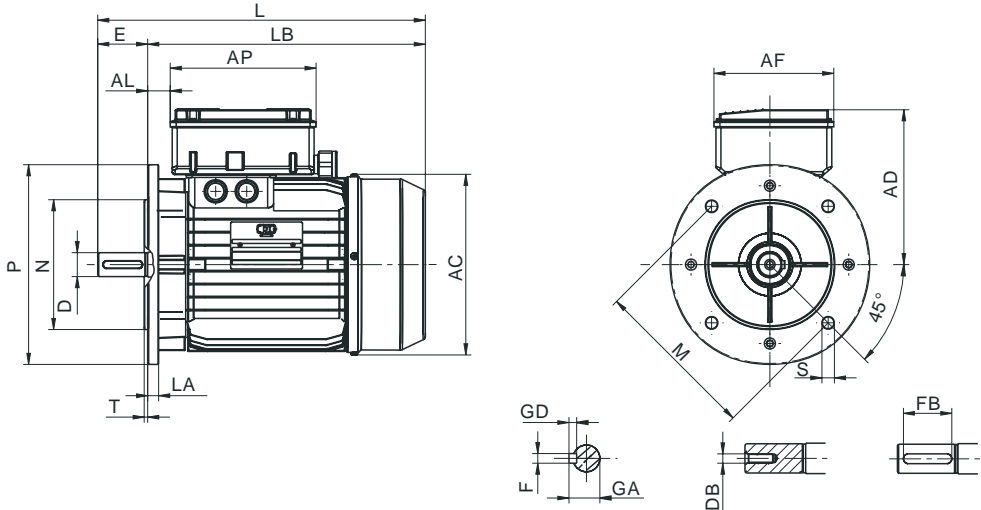


Size	A	AB	B	BB	C	D	E	H	HD	L	K	Y	AC	AD	AF	AP	AL	F	FB	GA	GD	DB
M63	100	120	80	106	40	11	23	63	187	240	7	12	123	124	92	121	19	4	15	12,5	4	M4
M71	112	136	90	108	45	14	30	71	203	280	8	12	147	132	92	121	24	5	20	16	5	M5
M80	125	160	100	125	50	19	40	80	235	290	9,5	17	165	155	119	146	17	6	30	21,5	6	M6
M90S	140	175	100	131	56	24	50	90	249	322	9,5	17	181	159	119	146	22	8	40	27	7	M8
M90L	140	175	125	156	56	24	50	90	249	347	9,5	17	181	159	119	146	22	8	40	27	7	M8
M100L	160	200	140	170	63	28	60	100	269	393	11	21	198	169	119	146	36	8	50	31	7	M10



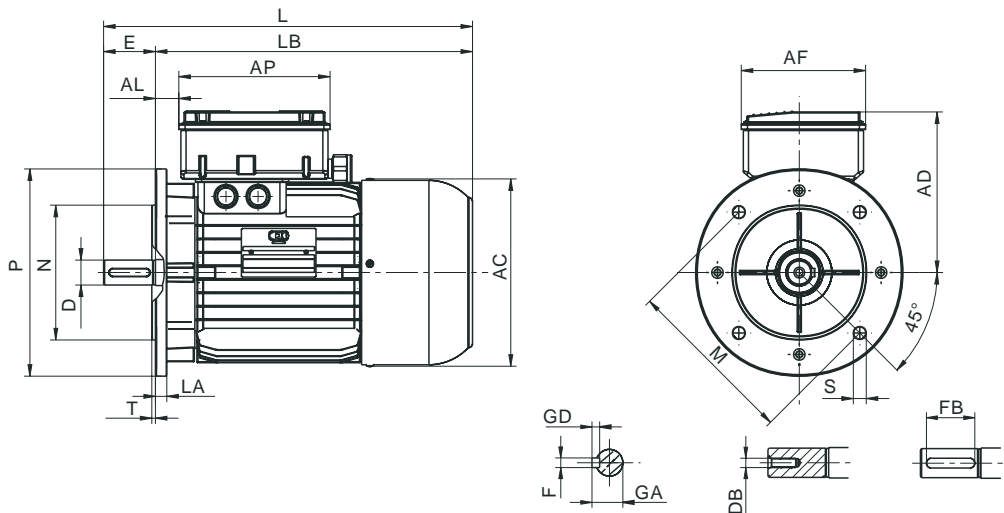
**PERMANENT CAPACITOR single-phase motors overall dimensions (version with capacitor-holder)**

**Construction Form B5**



Size	P	N	M	T	S	D	E	F	FB	GA	GD	L	LB	LA	AD	AF	AP	AL	AC	DB
M56	120	80	100	2,5	7	9	20	3	15	10,2	3	187	167	8	119	92	121	13	115	M3
M63	140	95	115	2,5	9,5	11	23	4	15	12,5	4	214	191	10	124	92	121	19	123	M4
M71	160	110	130	3	9,5	14	30	5	20	16	5	242	212	9	132	92	121	24	147	M5
M80	200	130	165	3	11,5	19	40	6	30	21,5	6	279	239	10,5	155	119	146	17	165	M6
M90S	200	130	165	3	11,5	24	50	8	40	27	7	305	255	10,5	159	119	146	22	181	M8
M90L	200	130	165	3	11,5	24	50	8	40	27	7	330	280	10,5	159	119	146	22	181	M8
M100L	250	180	215	3,5	14	28	60	8	50	31	7	370	310	14	169	119	146	36	198	M10

**CAP START / CAP RUN single-phase motors overall dimensions**

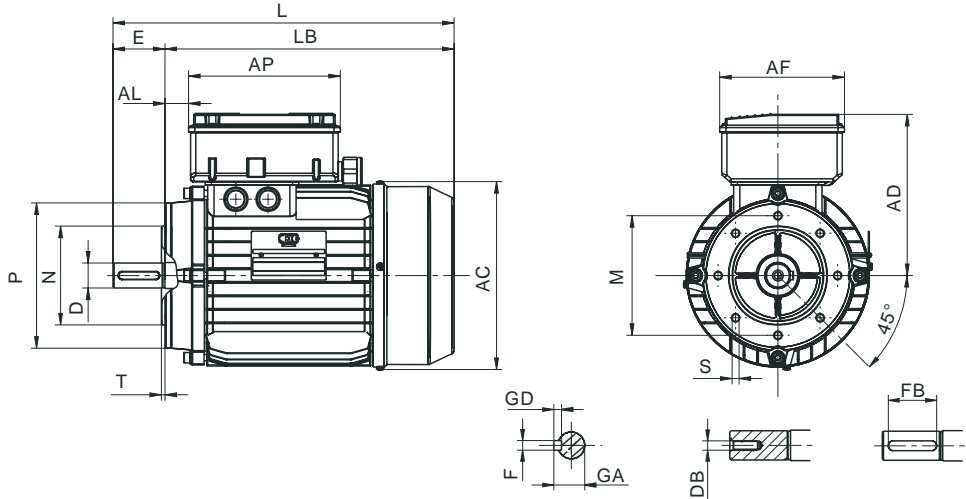


Size	P	N	M	T	S	D	E	F	FB	GA	GD	L	LB	LA	AD	AF	AP	AL	AC	DB
M63	140	95	115	2,5	9,5	11	23	4	15	12,5	4	240	217	10	124	92	121	19	123	M4
M71	160	110	130	3	9,5	14	30	5	20	16	5	286	256	9	132	92	121	24	147	M5
M80	200	130	165	3	11,5	19	40	6	30	21,5	6	290	250	10,5	155	119	146	17	165	M6
M90S	200	130	165	3	11,5	24	50	8	40	27	7	322	272	10,5	159	119	146	22	181	M8
M90L	200	130	165	3	11,5	24	50	8	40	27	7	347	297	10,5	159	119	146	22	181	M8
M100L	250	180	215	3,5	14	28	60	8	50	31	7	393	333	14	169	119	146	36	198	M10



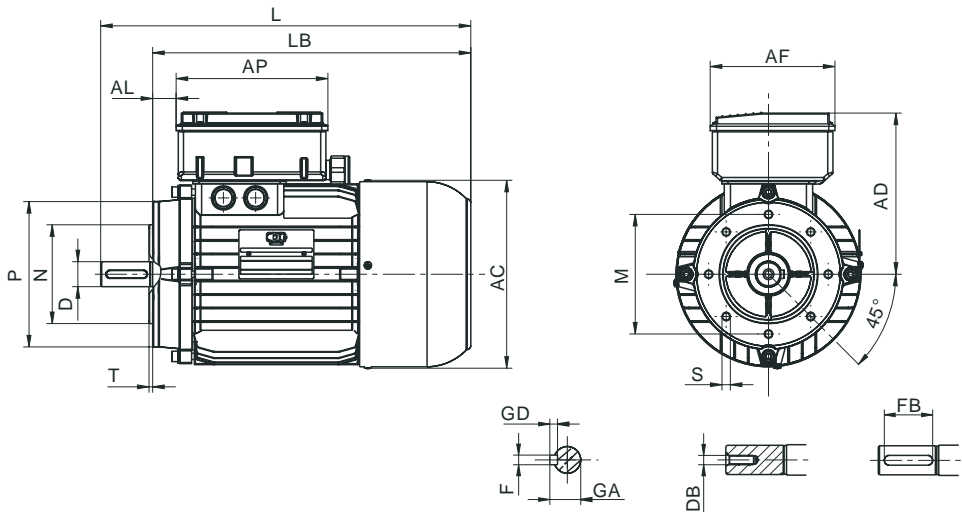
**PERMANENT CAPACITOR single-phase motors overall dimensions (version with capacitor-holder)**

**Construction Form B14**



Size	P	N	M	T	S	D	E	F	FB	GA	GD	L	LB	AD	AF	AP	AL	AC	DB
M56	80	50	65	2,5	M5	9	20	3	15	10,2	3	187	167	119	92	121	13	115	M3
M63	90	60	75	2,5	M5	11	23	4	15	12,5	4	214	191	124	92	121	19	123	M4
M71	105	70	85	3	M6	14	30	5	20	16	5	242	212	132	92	121	24	147	M5
M80	120	80	100	3	M6	19	40	6	30	21,5	6	279	239	155	119	146	17	165	M6
M90S	140	95	115	3	M8	24	50	8	40	27	7	305	255	159	119	146	22	181	M8
M90L	140	95	115	3	M8	24	50	8	40	27	7	330	280	159	119	146	22	181	M8
M100L	160	110	130	3,5	M8	28	60	8	50	31	7	370	310	169	119	146	36	198	M10

**CAP START / CAP RUN single-phase motors overall dimensions**

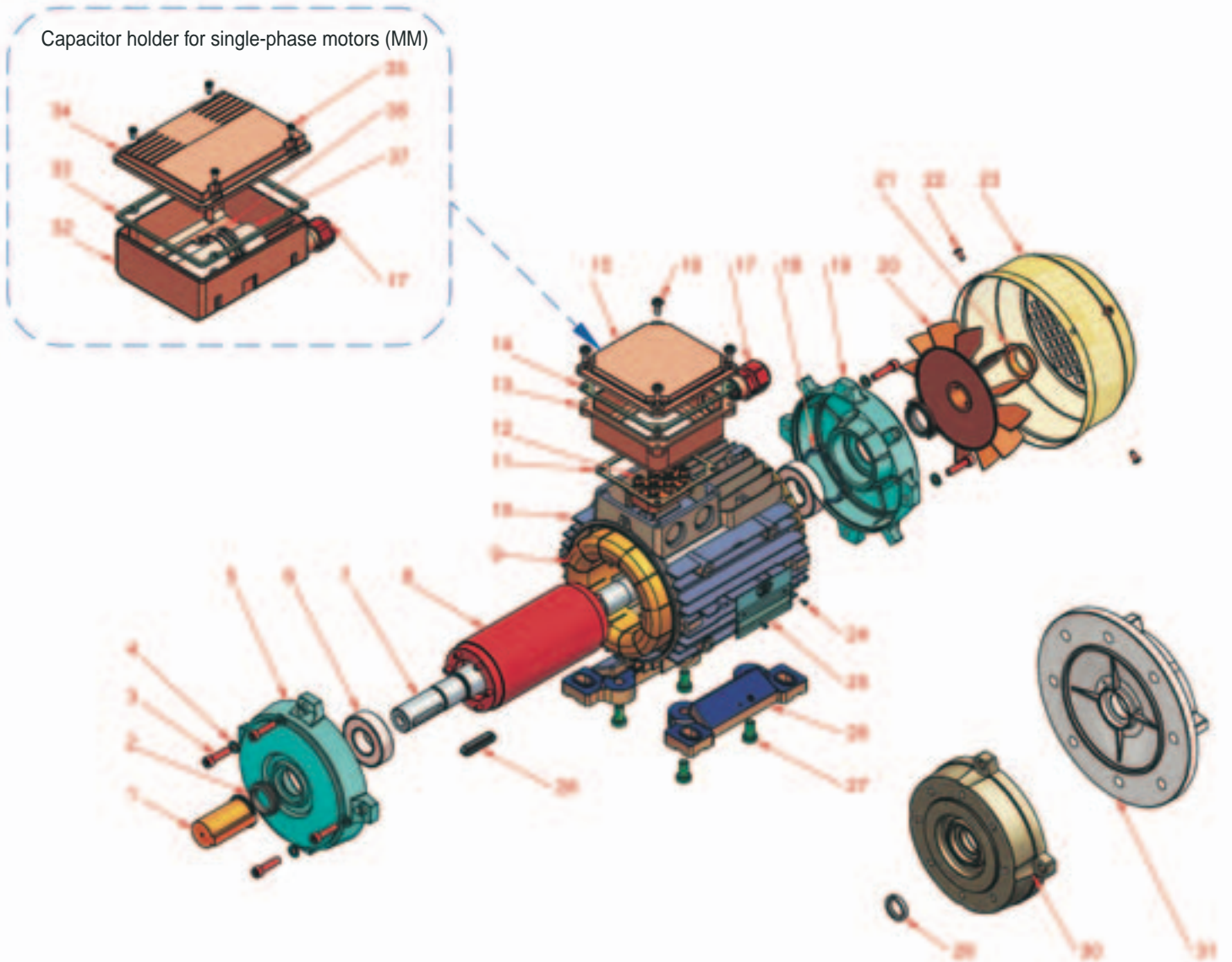


Size	P	N	M	T	S	D	E	F	FB	GA	GD	L	LB	AD	AF	AP	AL	AC	DB
M63	90	60	75	2,5	M5	11	23	4	15	12,5	4	240	217	124	92	121	19	123	M4
M71	105	70	85	3	M6	14	30	5	20	16	5	286	256	132	92	121	24	147	M5
M80	120	80	100	3	M6	19	40	6	30	21,5	6	290	250	155	119	146	17	165	M6
M90S	140	95	115	3	M8	24	50	8	40	27	7	322	272	159	119	146	22	181	M8
M90L	140	95	115	3	M8	24	50	8	40	27	7	347	297	159	119	146	22	181	M8
M100L	160	110	130	3,5	M8	28	60	8	50	31	7	393	333	169	119	146	36	198	M10



# Standard three- and single-phase motor exploded view

Capacitor holder for single-phase motors (MM)



- 1 Shaft protection
- 2 Dust seal (V-ring)
- 3 End-shield bolts
- 4 Washer
- 5 End-shield (drive end)
- 6 Bearing
- 7 Shaft
- 8 Rotor
- 9 Stator assembly
- 10 Casing
- 11 IP55 rubber gasket
- 12 Terminal block
- 13 Terminal box
- 14 IP65 rubber gasket
- 15 Terminal box cover
- 16 Terminal box fixing screws
- 17 Cable gland
- 18 Pre-load washer
- 19 End-shield (non-drive end)

- 20 Cooling fan (PVC)
- 21 Fan tightening ring
- 22 Fan cover fixing screws
- 23 Fan cover
- 24 Nameplate fixing screws
- 25 Nameplate
- 26 Feet
- 27 Feet fixing bolts
- 28 Key
- 29 Oil seal
- 30 B14 flange
- 31 B5 flange
- 32 MM version: capacitor holder - box
- 33 MM version: IP55 rubber gasket
- 34 MM version: capacitor holder - cover
- 35 MM version: capacitor holder fixing screws
- 36 MM version: capacitor clamp
- 37 MM version: capacitor



All the CEG brakes are failsafe type that means the device is locked when the voltage disappears. Therefore they enable the motor and driven equipment to stop stopped and held still. For this reason CEG brake motors are suitable for:

- reduction of time during which equipments are not operating;
- positioning and locating needs in automation;
- the safety of the operator and compliance to the standards.

Following type are available depending on the application:

1. **FPC type:** DC powered gradual brake with single friction surface,  
(see section 3.e on page 50)
2. **FHC type:** DC powered high torque brake with double friction surface,  
(see section 3.f on page 51)
3. **FHA type:** AC powered high torque brake with double friction surface.  
(see section 3.g on page 52)



## Meaning of the symbols

$P_n$	= rated power	$M_m$	= breakdown torque
$n$	= rated speed	$J$	= moment of inertia
$I_n$	= rated current	$\cos \varphi$	= power factor
$I_s$	= locked-rotor current	$\eta$	= efficiency
$M_n$	= rated torque	$C_m$	= running capacitor
$M_s$	= locked-rotor torque	$C_a$	= starting capacitor

# Gradual DC brake (MTFPC, DPFPC, MMFPC)



PRODUCTION STANDARDS	
Mounting arrangement	IMB3
Terminal box position	On top (BS)
Rated voltage	<b>MT</b> 230/400V 50 Hz ( $P_n \leq 3$ kW)
	400/690V 50 Hz ( $P_n > 3$ kW)
	<b>DP</b> 400V 50 Hz
	<b>MM</b> 230V 50 Hz
Brake rated voltage (separate connection)	230V (400 V for $P_n > 3$ kW)
Voltage rectifier	Half- or full-wave type
Protection rating	IP54
Bearings	2 RS
Winding insulation	Class F
Terminal box type	2 aluminium components (box + cover)
End-shields assembly	Bosses and bolts
Paint finish	BLUE RAL 5010
Fan cover	Galvanized steel sheet
Duty	S1

This type of brake is designed for machinery where gradual but not necessarily precision braking is required. Thanks to the single friction surface, FPC brake provides noiseless controlled stopping with low braking torque to prevent damage to machinery and operator alike.

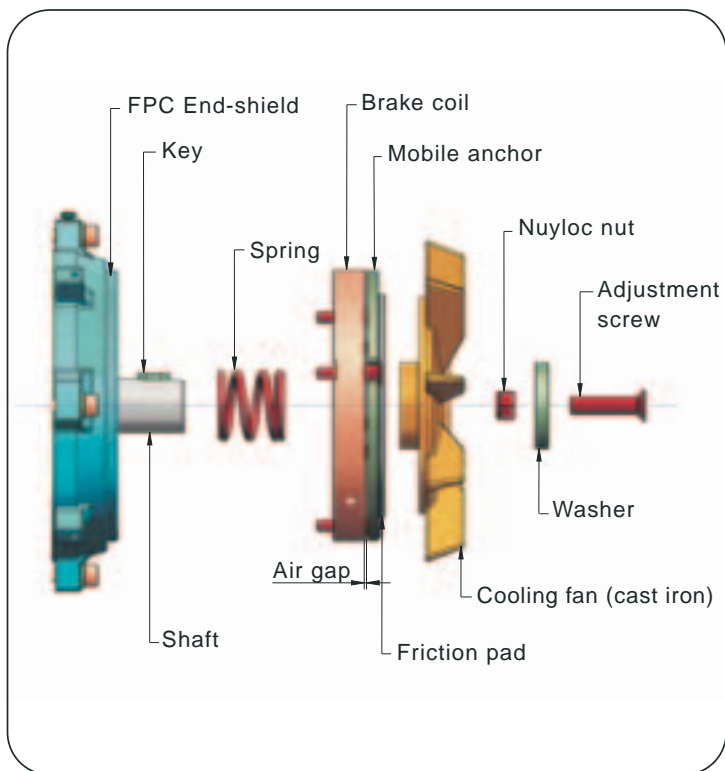
The brake friction is applied by the action of a set of springs that push the armature plate against the internal surface of the cast iron cooling fan. When the coil is energized through a rectifier, the brake is released.

The brakes are supplied adjusted to the nominal values air gap and must be reset when wear occurs. The rate brake wear depends on operating conditions. To reset air gap it is necessary to tighten up the adjustment screw till reaching the rated value listed in the table below.

The access to the adjustment screw is possible with no need for the fan cover to be removed.

REMARK: when placing an enquiry, following information are required: application details, AC brake voltage supply, load inertia, duty cycle with number of starts/stops per hour, type of supply connection (on terminal block or separate).

Special rectifier are available to provide EMC filtering and/or to reduce time of brake operation.



Size	Braking torque (Nm)	Power (W)	Enganging time (ms)	Release time (ms)	Air gap (mm)
M63	2,5	15	20	40	0,2
M71	4	15	15	100	0,2
M80	9	20	15	120	0,2
M90	9,5	20	15	120	0,25
M100	12	30	10	200	0,25
M112	12,5	30	10	200	0,25
M132	23	30	10	200	0,3
M160	23	60	13	215	0,3

### 3. f)

# High-torque DC brake (MTFHC, DPFHC, MMFHC)

## PRODUCTION STANDARDS

Mounting arrangement	IMB3
Terminal box position	On top (BS)
Rated voltage	<b>MT</b> 230/400V 50 Hz ( $P_n \leq 3$ kW)
	400/690V 50 Hz ( $P_n > 3$ kW)
	<b>DP</b> 400V 50 Hz
	<b>MM</b> 230V 50 Hz
Brake rated voltage (separate connection)	230V (400 V for $P_n > 3$ kW)
Voltage rectifier	"LENZE" type from M63 to M100
	Speed-up type from M112 to M160
Protection rating	IP54
Bearings	2 RS
Winding insulation	Class F
Terminal box type	2 aluminium components FH type (box + cover)
End-shields assembly	Bosses and bolts
Paint finish	BLUE RAL 5010
Fan cover	Galvanized steel sheet
Duty	S1

The FHC braking torque is provided by the compression of springs working on a disc with double friction pad. The brakes are released by DC current in their electromagnetic coil. This means that the braking force is produced in the non-current state and in the event of supply failure.

FHC's main features are:

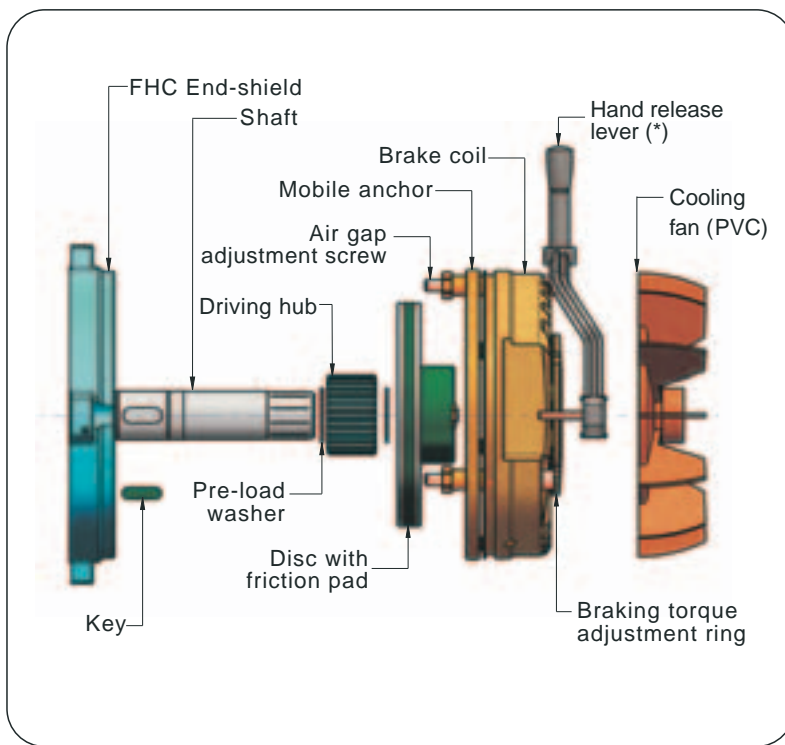
- silent operation;
- adjustable braking torque;
- braking without axial shifting
- negligible additional inertia
- hand-release lever available on demand (\*)

FHC brakes are maintenance-free except for the periodical inspection and adjustment of the air gap made necessary by friction material wear. The rate of brake wear depends on operating conditions.

Air gap can be reset to its rated value (see table below) through the cylindrical screws located on the back side of the brake.

Braking torque can also be regulated by acting on the adjustment ring at the same brake side.

REMARK: when placing an enquiry, following information are required: application details, AC brake voltage supply, load inertia, duty cycle with number of starts/stops per hour, type of supply connection (on terminal block or separate). Special rectifier are available to provide EMC filtering and/or to reduce time of brake operation.



Size	Braking torque (Nm)	Power (W)	Enganging time (ms)	Release time (ms)	Air gap (mm)
M56	1	8	20	30	0,15
M63	4	20	17	35	0,2
M71	4	20	17	35	0,2
M80	8	25	35	65	0,2
M90	16	30	40	90	0,2
M100	32	40	50	120	0,3
M112	60	50	65	150	0,3
M132	150	60	110	210	0,3
M160	260	75	200	400	0,3

# High-torque AC brake (MTFHA, DPFHA)

## PRODUCTION STANDARDS

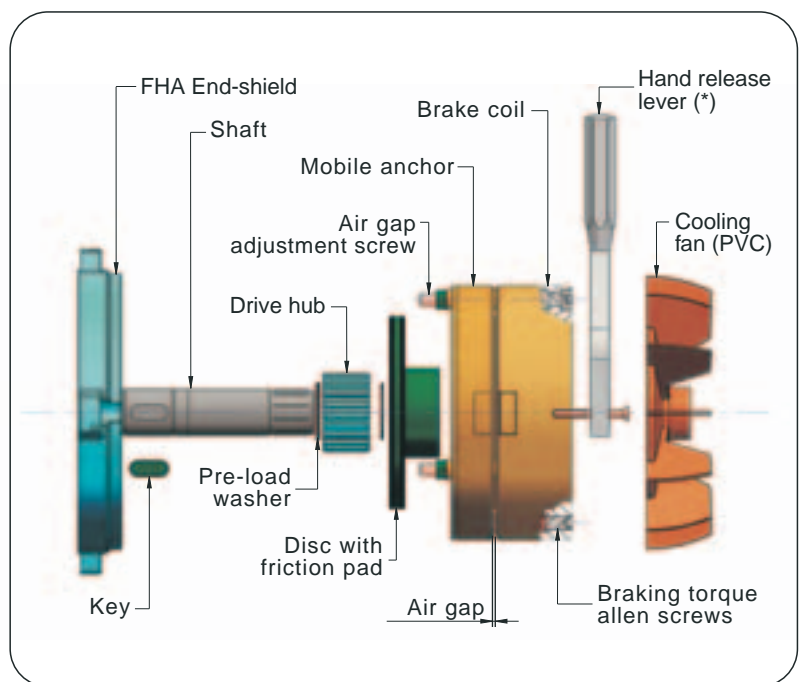
Mounting arrangement	IMB3	
Terminal box position	On top (BS)	
Rated voltage	<b>MT</b> 230/400V	50 Hz ( $P_n \leq 3$ kW)
	400/690V	50 Hz ( $P_n > 3$ kW)
	<b>DP</b> 400V	50 Hz
Brake rated voltage (separate connection)	230/400 V	
Protection rating	IP54	
Bearings	2 RS	
Winding insulation	Class F	
Terminal box type	2 aluminium components FH type (box + cover)	
End-schields assembly	Bosses and bolts	
Paint finish	BLUE RAL 5010	
Fan cover	Galvanized steel sheet	
Duty	S1	

The FHA brakes provide similar braking performance as FHC type but, thanks to the AC coil design, they allow more operation per hour.

Braking air gap can be reset through the adjusting screws (see picture at site), once the cylindrical bolts located at the back side of the unit have been loosen.

Braking torque can also be adjusted through the three allen screws located at the rear of brake unit.

Hand-release lever is available on demand (\*).



Size	Braking torque (Nm)	Power (W)	Enganging time (ms)	Release time (ms)	Air gap (mm)
M63	5	18	4	20	0,2
M71	5	18	4	20	0,2
M80	10	25	4	40	0,25
M90	20	30	6	60	0,3
M100	40	35	8	90	0,3
M112	70	40	16	120	0,35
M132	150	60	16	180	0,4
M160	350	75	15	90	0,5



### SINGLE-SPEED THREE-PHASE BRAKE MOTORS

3000 Rpm 2 poles 50 Hz

Size	Pn		n	In(400V)	Cosφ	η	Mn	Mm/Mn	Ms/Mn	Is/In	J*	Weight*
	kW	Hp	min <sup>-1</sup>	A		%	Nm				Kgm <sup>2</sup>	Kg
•M56b	0,135	0,18	2800	0,45	0,7	63	0,46	3	3	3,5	0,00008	4,2
M63a	0,185	0,25	2810	0,52	0,77	67	0,63	3,3	3,3	4,1	0,00049	5,1
M63b	0,25	0,35	2830	0,74	0,75	65	0,84	3,1	3,2	4,6	0,00051	5,4
M71a	0,37	0,5	2830	0,98	0,8	68	1,25	2,9	3	4,9	0,00064	7,1
M71b	0,55	0,75	2800	1,33	0,82	73	1,9	2,5	2,6	5,1	0,00074	7,8
M80a	0,75	1	2830	1,8	0,81	73	2,53	3	3	5,3	0,00149	10,6
M80b	1,1	1,5	2820	2,7	0,8	75	3,72	3,2	3,3	5,9	0,00161	11,7
M80c	1,5	2	2820	3,4	0,8	80	5,07	3,4	3,2	5,2	0,00178	12,7
M90Sa	1,5	2	2860	3,65	0,78	77	5	3,1	3	5,4	0,00216	14,5
M90Sb	1,85	2,5	2830	4,3	0,82	75	6,2	2,7	2,7	5	0,00216	15
M90La	2,2	3	2830	4,85	0,85	78	7,42	2,9	2,9	5,5	0,00238	17,3
••M90Lb	3	4	2870	6,55	0,83	80	10	3,3	3,4	6	0,00265	19,5
M100La	3	4	2870	6,5	0,83	79	10	3,7	3,5	6,2	0,00476	23
••M100Lb	4	5,5	2880	9,1	0,82	79	13,3	3,8	3,9	6,5	0,00577	27,5
M112Ma	4	5,5	2900	8,83	0,8	82	13,2	2,74	3,4	6,5	0,00609	29,2
M112Mb	5,5	7,5	2900	12,2	0,82	80	18,1	3,1	3,1	6,7	0,00726	35,5
M132Sa	5,5	7,5	2900	12,3	0,82	79	18,1	3	3	6,9	0,014	44,3
M132Sb	7,5	10	2920	16,8	0,78	82	24,5	3,2	3,4	7	0,0156	50
M160Ma	11	15	2940	21,7	0,86	84	35,7	3,1	3,3	6,7	0,0384	79
M160Mb	15	20	2955	28,9	0,86	86	48,5	3,94	3,5	7,5	0,0458	93

### SINGLE-SPEED THREE-PHASE BRAKE MOTORS

1500 Rpm 4 poles 50 Hz

Size	Pn		n	In(400V)	Cosφ	η	Mn	Mm/Mn	Ms/Mn	Is/In	J*	Weight*
	kW	Hp	min <sup>-1</sup>	A		%	Nm				Kgm <sup>2</sup>	Kg
•M56b	0,09	0,12	1365	0,4	0,65	55	0,63	2,5	2,7	2,6	0,00011	4,1
M63a	0,135	0,18	1360	0,55	0,65	58	0,98	2,2	2,3	2,5	0,000524	5
M63b	0,185	0,25	1375	0,65	0,7	60	1,25	2,5	2,5	3	0,000564	5,7
M71a	0,25	0,35	1410	0,83	0,73	60	1,7	2,7	2,6	4,5	0,00186	7,5
M71b	0,37	0,5	1380	1,1	0,71	67	2,56	2,6	2,8	4	0,00112	8
M80a	0,55	0,75	1410	1,5	0,8	65	3,72	2,1	1,7	4	0,00234	10,5
M80b	0,75	1	1410	2,1	0,75	69	5,07	2,5	2,4	4,4	0,00277	12
M90S	1,1	1,5	1400	2,6	0,83	75	7,5	2,5	2,6	4,8	0,00291	14,5
M90La	1,5	2	1415	3,8	0,76	75	10,1	3,1	3,2	5	0,0034	16,9
M90Lb	1,85	2,5	1405	4,36	0,79	77	12,6	3,9	3,2	5,2	0,0038	18,5
M100La	2,2	3	1430	4,4	0,75	79	14,7	2,6	2,7	5	0,00935	21,5
M100Lb	3	4	1410	7,1	0,79	79	20,3	2,7	2,6	5,3	0,00728	24,9
••M100Lc	4	5,5	1400	9	0,84	77	27,3	2,4	2,1	4,6	0,00773	26,8
M112Ma	4	5,5	1440	8,8	0,8	82	26,5	2,7	2,6	5,5	0,0116	34,6
M132S	5,5	7,5	1425	11,5	0,85	81	36,8	2,5	2,6	5,1	0,0245	49,5
M132Ma	7,5	10	1430	15,3	0,84	84	50	2,7	2,7	6	0,0287	60
••M132Mb	9,2	12,5	1435	19,4	0,83	85	61,2	3,2	2,7	5,7	0,0309	63,9
••M132Mc	11	15	1425	22	0,85	85	73,7	2,3	2,5	5,2	0,03325	68
M160M	11	15	1465	22	0,81	89	71,7	2,4	2,2	7,2	0,06038	86,2
M160L	15	20	1460	31,8	0,8	86	98	2,6	2,5	5,8	0,07431	104,5

\* Weight and inertia referred to FPC version

• Not available with FPC brake

•• Available only with FPC brake

### 3. g)



#### SINGLE-SPEED THREE-PHASE BRAKE MOTORS

1000 Rpm 6 poles 50 Hz

Size	Pn		n min <sup>-1</sup>	In(400V) A	Cosφ	η %	Mn Nm	Mm/Mn	Ms/Mn	Is/In	J* Kgm <sup>2</sup>	Weight* Kg
	kW	Hp										
M63b	0,12	0,17	860	0,78	0,56	40	1,33	1,8	1,9	1,8	0,00059	6,2
M71a	0,185	0,25	900	0,80	0,6	55	1,96	2,1	2,1	2,4	0,00112	7,7
M71b	0,25	0,35	910	1,06	0,62	55	2,62	2,2	2,2	2,5	0,00134	9,2
M80a	0,37	0,5	915	1,25	0,73	60	3,86	2,2	2,2	2,7	0,0025	10,5
M80b	0,55	0,75	900	1,65	0,74	64	5,8	1,9	1,8	3	0,00296	12,2
M90S	0,75	1	920	2,5	0,65	66	7,8	2,3	2,1	3,4	0,00389	14
M90L	1,1	1,5	910	3,15	0,73	68	11,6	2,3	2,3	3,5	0,00373	16,7
M100L	1,5	2	940	4,3	0,68	73	15,2	2,7	2,3	4,6	0,00827	22,5
M112M	2,2	3	955	5,3	0,77	78	22	2,6	1,5	5,1	0,01625	33,7
M132S	3	4	950	7,55	0,77	75	30,2	2,5	1,6	4,6	0,0284	44,5
M132Ma	4	5,5	960	9,26	0,75	82	39,6	2,2	2	5	0,03194	54,2
M132Mb	5,5	7,5	950	12,5	0,79	81	56	2	1,5	4	0,03721	60
M160M	7,5	10	960	16	0,8	86	74,6	2,5	2,3	5	0,0839	85
M160L	11	15	975	24,4	0,75	87	108	2,8	2,4	5,5	0,14137	117

#### SINGLE-SPEED THREE-PHASE BRAKE MOTORS

750 Rpm 8 poles 50 Hz

Size	Pn		n min <sup>-1</sup>	In(400V) A	Cosφ	η %	Mn Nm	Mm/Mn	Ms/Mn	Is/In	J* Kgm <sup>2</sup>	Weight* Kg
	kW	Hp										
M80a	0,185	0,25	690	0,96	0,57	49	2,56	2,2	1,9	2,4	0,0025	10,9
M80b	0,25	0,35	650	1	0,64	56	3,67	2	1,9	2,3	0,00296	12,2
M90S	0,37	0,5	660	1,5	0,63	57	5,35	1,6	1,4	2,1	0,00309	14,8
M90L	0,55	0,75	680	2,02	0,68	58	7,7	1,4	1,3	2,7	0,0034	16,5
M100La	0,75	1	700	2,44	0,69	64	10,3	1,7	1,4	3	0,00828	21,5
M100Lb	1,1	1,5	690	3,6	0,66	67	15,2	1,9	1,5	3	0,00981	25,8
M112M	1,5	2	700	5	0,65	67	20,5	2	1,6	3	0,01451	31
M132S	2,2	3	710	6,6	0,66	73	29,6	2,2	2	3,5	0,03194	49,3
M132M	3	4	715	8	0,69	78	40,3	2,2	1,6	4	0,03721	56,5
M160Ma	4	5,5	730	11	0,65	81	52,3	2,2	2,1	4	0,0839	91
M160Mb	5,5	7,5	720	15,3	0,65	80	73	2,9	2,4	4,5	0,010816	97
M160L	7,5	10	715	17	0,75	84	100	2,2	1,5	4	0,11715	117

\* Weight and inertia referred to FPC version



### TWO-SPEED THREE-PHASE BRAKE MOTORS

3000/1500 Rpm 2/4 poles 50 Hz (SINGLE -WINDING)

Size	Pn		n	In(400V)	Cosφ	η	Mn	J*	Weight*
	kW	Hp	min <sup>-1</sup>	A		%	Nm	Kgm <sup>2</sup>	Kg
•M56	0,11/0,07	0,15/0,1	2720-1370	0,41-0,33	0,75-0,6	52-52	0,39-0,49	0,00012	3,8
M63	0,22/0,15	0,3/0,2	2760-1400	0,67-0,57	0,88-0,63	54-60	0,76-1	0,00059	5,7
M71a	0,3/0,22	0,4/0,3	2870-1445	0,85-0,85	0,7-0,6	60-61	1-1,45	0,00112	7,8
M71b	0,55/0,37	0,75/0,5	2830-1405	1,3-1,25	0,82-0,62	75-69	1,85-2,5	0,00065	8,8
M80a	0,6/0,45	0,8/0,6	2840-1415	1,7-1,3	0,77-0,74	65-65	1,74-1,35	0,00191	12
M80b	0,8/0,6	1,1/0,8	2860-1410	2,4-1,8	0,74-0,71	65-69	2,67-4,06	0,00212	12,2
M80c	1,1/0,75	1,5/1	2865-1420	3,1-2,2	0,86-0,73	68-67	3,66-5,06	0,00231	13,7
M90Sa	1,5/1,1	2/1,5	2850-1425	4,1-2,9	0,74-0,73	71-76	5-7,4	0,00309	15,2
M90Sb	1,85/1,25	2,5/1,7	2840-1420	5-3,1	0,77-0,76	70-76	6,22-8,4	0,0034	16,7
M90La	2,2/1,5	3/2	2840-1410	5-3,5	0,84-0,79	75-78	7,4-10,15	0,00375	19
M100La	3/2,2	4/3	2850-1410	7,25-5,35	0,84-0,81	70-75	10-13,5	0,00632	23,1
M100Lb	4/3	5,5/4	2875-1425	9,8-7,2	0,8-0,79	73-73	13,3-20,1	0,00719	26,5
M112M	4,5/3,3	6/4,5	2865-1430	10,6-7,65	0,88-0,8	70-78	15,1-22,2	0,01158	35,2
M132Sa	5,5/4,5	7,5/6	2915-1450	12,9-9,9	0,82-0,81	77-81	18-29,6	0,02456	46,5
M132Sb	7,5/6	10/8	2910-1445	18,3-15	0,85-0,8	74-77	24,6-39,6	0,02727	50
M132M	8,1/6,6	11/9	2915-1440	17,6-14,4	0,88-0,85	76-78	26,5-47,8	0,02871	57,4
M160M	11/9	15/12	2970-1480	25,9-19,5	0,75-0,77	82-87	35,4-58,1	0,06513	107
M160L	14/11	19/15	2960-1470	33-23,8	0,75-0,77	82-87	45,2-71,5	0,07431	114

### TWO-SPEED THREE-PHASE BRAKE MOTORS

1500/750 Rpm 4/8 poles 50 Hz (SINGLE -WINDING)

Size	Pn		n	In(400V)	Cosφ	η	Mn	J*	Weight*
	kW	Hp	min <sup>-1</sup>	A		%	Nm	Kgm <sup>2</sup>	Kg
M71	0,185/0,09	0,25/0,12	1430-680	0,66-0,5	0,68-0,6	60-45	1,24-1,26	0,00134	11
M80a	0,37/0,2	0,5/0,28	1410-700	0,96-0,97	0,81-0,6	69-50	2,5-2,86	0,00296	12,2
M80b	0,55/0,3	0,75/0,4	1390-700	1,4-1,5	0,87-0,6	67-47	3,77-4,1	0,00318	12,4
M90S	0,75/0,37	1/0,5	1360-680	1,7-1,7	0,88-0,58	70-53	5,26-5,2	0,00309	15,2
M90L	1/0,5	1,35/0,7	1375-690	2,2-2,3	0,88-0,56	74-56	6,94-6,92	0,0034	16,5
M100La	1,4/0,66	1,9/0,9	1400-680	3,2-2,5	0,85-0,6	75-63	9,55-9,27	0,00632	22
M100Lb	1,6/0,9	2,2/1,2	1390-700	3,5-3,3	0,88-0,6	75-65	11-12,3	0,00728	24,5
M112Mb	2,2/1,4	3/1,9	1440-720	4,6-4,4	0,89-0,66	78-69	14,6-18,6	0,01625	33,7
M132S	3,7/2	5/2,8	1450-720	7,4-7,1	0,9-0,59	83-73	24,4-26,5	0,03194	49,5
M132M	5,1/3	7/4	1435-710	10,2-8,3	0,92-0,71	79-74	33,9-40,4	0,03721	56,3
M160Ma	6/4	8/5,5	1440-725	13-11,8	0,86-0,63	78-78	39,8-52,7	0,0839	84,9
M160Mb	7,5/5	10/6,8	1430-715	15,7-13,9	0,89-0,67	78-78	50-66,8	0,0839	84,9

### TWO-SPEED THREE-PHASE BRAKE MOTORS

1500/1000 Rpm 4/6 poles 50 HZ (SINGLE -WINDING)

Size	Pn		n	In(400V)	Cosφ	η	Mn	J*	Weight*
	kW	Hp	min <sup>-1</sup>	A		%	Nm	Kgm <sup>2</sup>	Kg
M71	0,3/0,22	0,4/0,3	1430-830	1,2-0,9	0,7-0,74	60-50	2-2,5	0,00137	7,9
M80	0,55/0,37	0,75/0,5	1445-940	1,5-1,2	0,77-0,76	67-50	3,6-3,8	0,00338	13,7
M90S	0,75/0,55	1/0,75	1445-945	2,1-1,8	0,77-0,75	66-60	5-5,5	0,00309	15,2
M90L	1,1/0,75	1,5/1	1425-920	2,9-2,5	0,78-0,7	71-61	7,4-7,8	0,0034	16,9
M100L	1,5/0,9	2/1,2	1465-965	4,4-2,7	0,7-0,7	70-70	9,8-8,9	0,00981	25,5
M112Ma	1,85/1,32	2,5/1,8	1465-965	4,6-3,6	0,8-0,75	72-70	12-12,9	0,01451	31,7
M112Mb	2,2/1,5	3/2	1460-970	5,1-4,1	0,85-0,75	73-70	14,4-14,9	0,01625	34,2
M132S	3,3/2,2	4,5/3	1460-970	7,3-5,7	0,83-0,71	79-78	21,6-21,7	0,03176	40,5
M132Ma	4/2,5	5,5/3,5	1460-965	8,6-7	0,82-0,72	82-75	26,2-25,7	0,03194	50,5
M132Mb	5,5/4	7,5/5,5	1460-975	11,2-10	0,87-0,75	82-77	36-39,2	0,03721	57,5
M160M	7,5/5	10-6,8	1470-960	15,6-10,7	0,85-0,81	84-79	48,7-44,5	0,10816	97

\* Weight and inertia referred to FPC version

• Not available with FPC brake



### TWO-SPEED THREE-PHASE BRAKE MOTORS

3000/750 Rpm 2/8 poles 50 Hz (DOUBLE WINDING)

Size	Pn		n min <sup>-1</sup>	In(400V) A	Cosφ	η %	Mn Nm	J* Kgm <sup>2</sup>	Weight* Kg
	kW	Hp							
M71	0,22/0,075	0,3/0,1	2850-660	0,73-0,43	0,73-0,63	60-40	0,74-1,08	0,00134	8,3
M80a	0,37/0,09	0,5/0,12	2880-640	1,1-0,5	0,8-0,6	62-45	1,23-1,34	0,00191	11,2
M80b	0,55/0,15	0,75/0,2	2880-640	1,5-0,8	0,86-0,63	62-45	1,84-2,24	0,00212	13,2
M90S	0,75/0,185	1/0,25	2820-660	2,1-0,81	0,88-0,72	60-46	2,54-2,7	0,00291	15,7
M90L	1,1/0,25	1,5/0,35	2890-690	2,8-1,2	0,85-0,62	68-50	3,63-3,46	0,0034	16,6
M100L	1,6/0,45	2,2/0,6	2910-700	3,9-1,82	0,85-0,63	69-57	5,25-6,14	0,00632	25,5
M112M	2,7/0,75	3,7/1	2840-675	7,1-2,6	0,83-0,7	66-60	9,1-10,6	0,01625	33,7
M132M	4/1,5	5,5/2	2935-710	8,2-5,5	0,88-0,6	80-66	13-20,2	0,02727	50,5

### TWO-SPEED THREE-PHASE BRAKE MOTORS

3000/1000 Rpm 2/6 poles 50 Hz (DOUBLE WINDING)

Size	Pn		n min <sup>-1</sup>	In(400V) A	Cosφ	η %	Mn Nm	J* Kgm <sup>2</sup>	Weight* Kg
	kW	Hp							
M71	0,25/0,15	0,35/0,2	2890-900	0,78-0,64	0,8-0,68	58-50	0,83-1,6	0,00134	7,8
M80	0,37/0,25	0,5/0,35	2850-910	1-0,94	0,8-0,7	68-55	1,24-2,62	0,00296	13,2
M90L	1,1/0,37	1,5/0,5	2870-960	2,6-1,3	0,86-0,68	75-60	3,66-3,68	0,0034	17,2
M100L	2/0,75	2,7/1	2860-970	4,2-2,3	0,9-0,7	77-68	6,7-7,4	0,00633	26,5
M112M	3/1,1	4/1,5	2870-980	6,4-3	0,85-0,75	80-70	10-10,7	0,01139	33,7
M132M	3,7/1,7	5/2	2920-980	8,4-4,7	0,85-0,75	75-70	12-16,5	0,02743	49,5

### TWO-SPEED THREE-PHASE BRAKE MOTORS

1000/750 Rpm 6/8 poles 50 Hz (DOUBLE WINDING)

Size	Pn		n min <sup>-1</sup>	In(400V) A	Cosφ	η %	Mn Nm	J* Kgm <sup>2</sup>	Weight* Kg
	kW	Hp							
M80	0,25-0,14	0,35-0,19	920-685	0,96-0,73	0,78-0,71	47-38	2,6-1,95	0,00134	14,2
M90L	0,55-0,25	0,75-0,35	920-700	1,6-1,1	0,77-0,68	65-48	5,7-3,4	0,00425	17,2
M100L	0,95-0,55	1,3-0,75	960-700	2,9-1,9	0,72-0,7	65-60	9,5-7,5	0,00828	26,5
M112M	1,5-0,75	2-1	965-730	4,1-2,5	0,72-0,68	73-63	15-9,8	0,01622	33,7
M132S	2,2-1,1	3-1,5	960-740	6,1-3,6	0,72-0,78	73-65	22-14,2	0,03275	63,5
M132M	3-1,85	4-2,5	960-750	7,8-5,9	0,74-0,7	75-65	30-23,5	0,03543	67,5

\* Weight and inertia referred to FPC version



### SINGLE-PHASE BRAKE MOTORS

3000 Rpm 2 poles 50 Hz

Size	Pn		n min <sup>-1</sup>	In(230V) A	Cosφ	η %	Mn Nm	Ms/Mn	Is/In	Cm μF	J* Kgm <sup>2</sup>	Weight* Kg
	kW	Hp										
•M56	0,11	0,15	2680	1	0,94	50	0,39	1,2	1,9	6,3	0,00008	4,3
M63a	0,185	0,25	2730	1,4	0,99	58	0,65	1	2,8	8	0,0005	5,4
M63b	0,25	0,35	2750	2,1	0,97	55	0,87	1,1	2,7	12	0,00053	5,9
M71a	0,37	0,5	2730	3,4	0,89	53	1,3	0,73	2,8	12	0,00079	7,9
M71b	0,55	0,75	2730	4,3	0,92	61	1,92	0,62	2,8	16	0,00085	9
M80a	0,75	1	2770	5,1	0,94	68	2,58	0,83	3,6	20	0,00176	12,2
M80b	1,1	1,5	2710	7	0,99	69	3,9	0,64	3,3	25	0,00193	13,6
M80c	1,5	2	2700	9,8	0,95	70	5,3	0,58	3,3	35	0,00202	14,2
M90Sb	1,5	2	2750	9	0,98	75	5,2	0,74	3,7	40	0,00237	16,9
M90La	1,85	2,5	2750	10,7	0,99	74	6,4	0,64	3,7	50	0,00253	19
M90Lb	2,2	3	2740	13,4	0,99	72	8,2	0,7	3,2	60	0,00253	19
M100L	2,5	3,5	2850	14,7	0,99	73	8,4	0,7	4	80	0,00511	25,5

### SINGLE-PHASE BRAKE MOTORS

1500 Rpm 4 poles 50 Hz

Size	Pn		n min <sup>-1</sup>	In(230V) A	Cosφ	η %	Mn Nm	Ms/Mn	Is/In	Cm μF	J* Kgm <sup>2</sup>	Weight* Kg
	kW	Hp										
•M56	0,09	0,12	1350	0,9	0,83	50	0,49	0,65	2	5	0,00012	4,3
M63a	0,11	0,15	1350	1,2	0,83	50	0,78	1	2,1	6,3	0,00013	5
M63b	0,185	0,25	1400	1,5	0,99	54	1,23	1	2	10	0,0006	5,7
M71a	0,25	0,35	1330	2	0,93	60	2,05	1	2,3	10	0,00111	7,8
M71b	0,37	0,5	1350	3	0,96	55	2,6	1	2,5	16	0,00133	9
M80a	0,55	0,75	1360	3,7	0,98	64	3,86	0,52	2,7	14	0,00252	11,1
M80b	0,75	1	1400	5,3	0,94	65	5,1	0,5	3,5	20	0,00294	12,6
M90S	1,1	1,5	1380	6,7	0,98	71	7,6	0,52	3,3	35	0,0038	15,5
M90La	1,5	2	1360	9,3	0,96	73	10,8	0,5	3	45	0,0037	18,4
M90Lb	1,85	2,5	1360	12,1	0,91	73	13	0,5	3,1	55	0,00391	20
M100La	1,85	2,5	1360	12,2	0,94	70	13	0,6	3	55	0,00668	23,6
M100Lb	2,2	3	1350	13	0,97	76	15,6	0,5	4	70	0,00771	26,4

### SINGLE-PHASE BRAKE MOTORS

1000 Rpm 6 poles 50 Hz

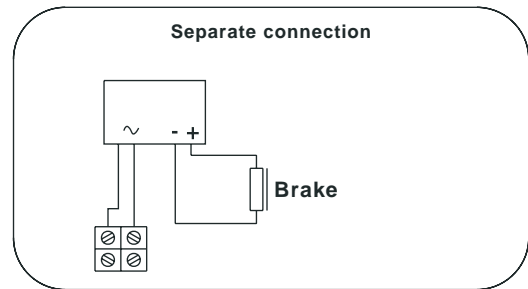
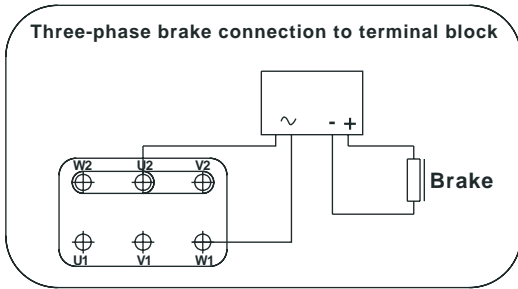
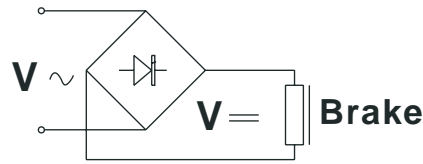
Size	Pn		n min <sup>-1</sup>	In(230V) A	Cosφ	η %	Mn Nm	Ms/Mn	Is/In	Cm μF	J* Kgm <sup>2</sup>	Weight* Kg
	kW	Hp										
M71	0,185	0,25	920	1,8	0,8	55	1,92	0,7	2,2	8	0,00112	8,3
M80a	0,25	0,35	940	2,5	0,8	55	2,54	0,6	2,7	10	0,00252	10,7
M80b	0,37	0,5	920	3	0,83	64	3,84	0,6	2,7	16	0,00396	12,2
M90S	0,55	0,75	910	4,3	0,86	65	5,8	0,54	2,3	16	0,00351	14,5
M90La	0,75	1	945	5,8	0,88	64	7,6	0,5	2,7	25	0,00419	16,7
M90Lb	1,1	1,5	930	8,3	0,96	60	11,3	0,54	2,5	35	0,0039	19,2
M100La	1,1	1,5	925	7,3	0,95	69	11,36	0,5	3	45	0,00608	23,5
M100Lb	1,5	2	930	10,6	0,96	64	15,4	0,5	2,9	50	0,00608	24,8

- \* Weight and inertia referred to FPC version
- Not available with FPC brake

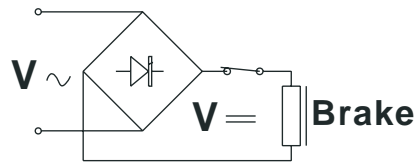




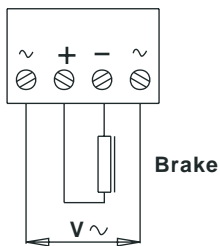
## FPC Type



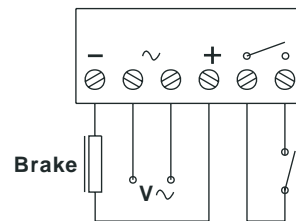
## FHC Type



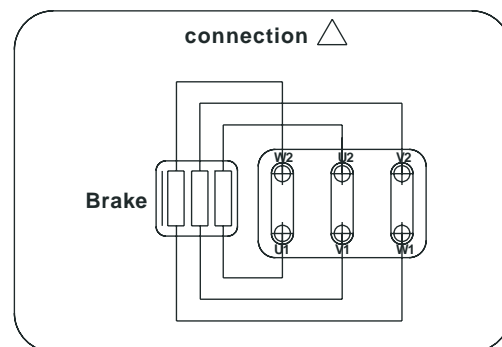
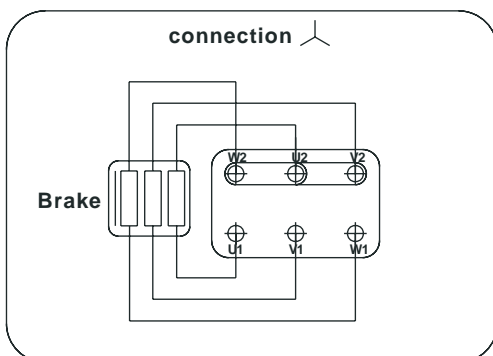
Rectifier with 4 terminals



Rectifier with 6 terminals

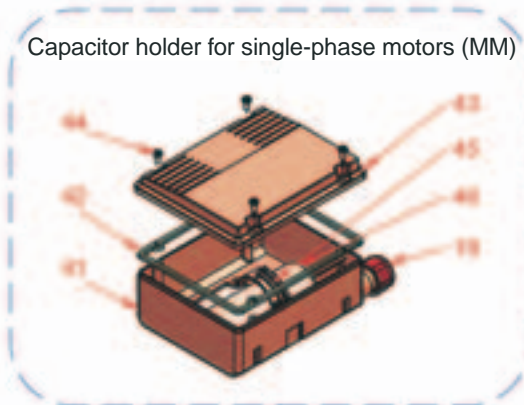


## FHA Type

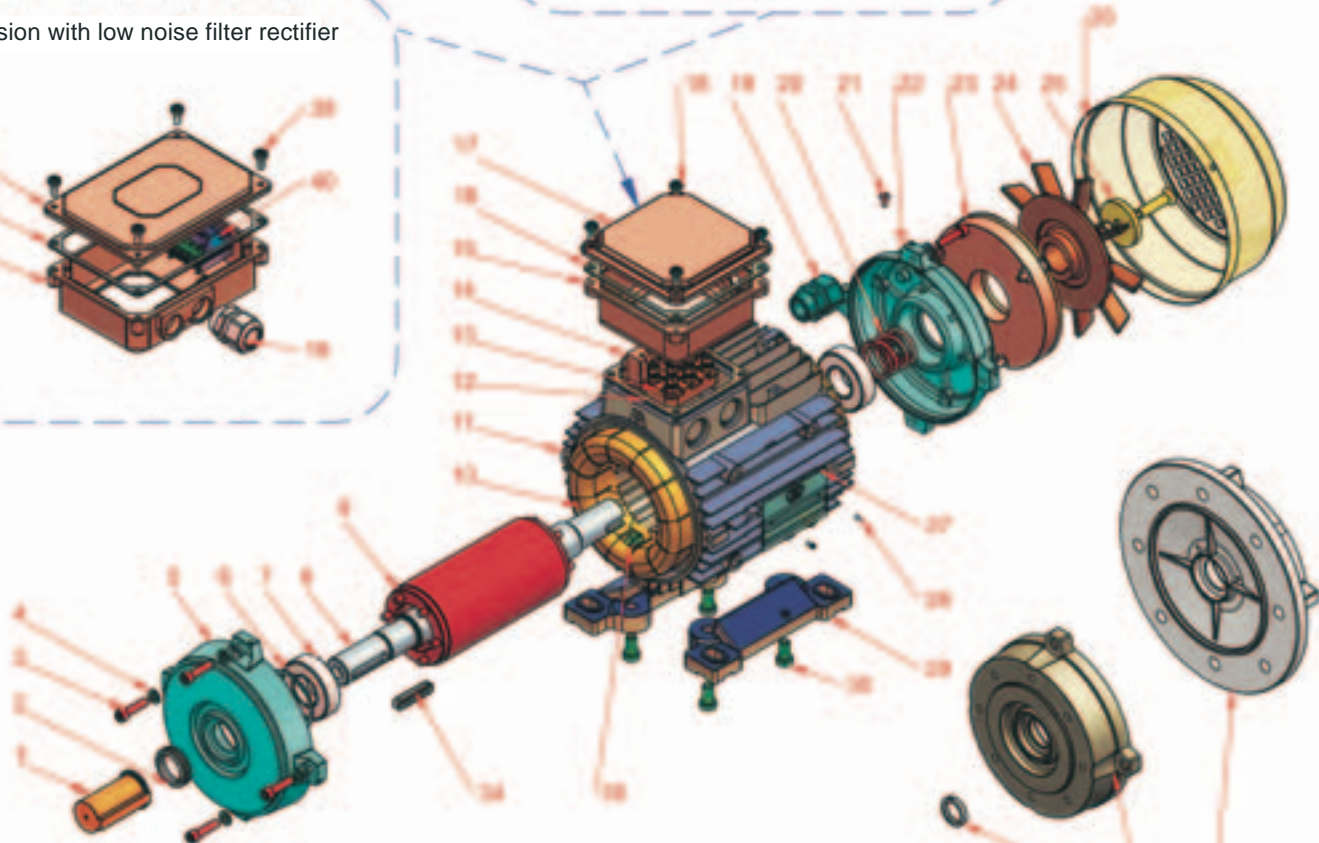
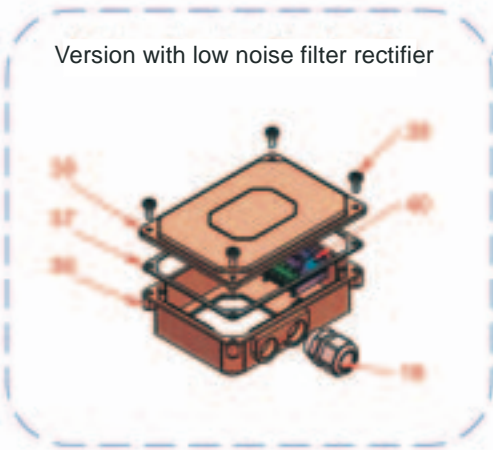


# FPC brake motor exploded view

Capacitor holder for single-phase motors (MM)

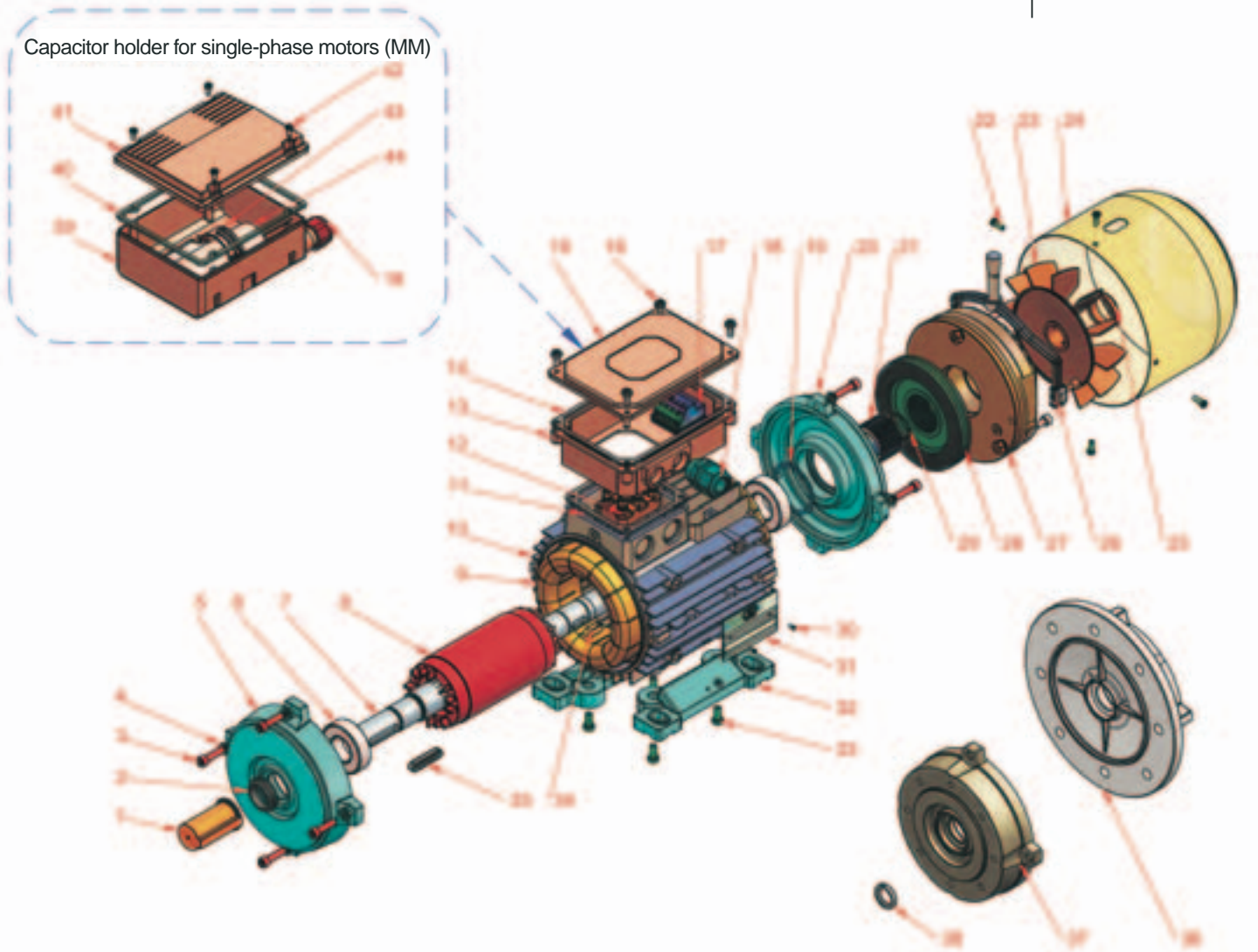


Version with low noise filter rectifier

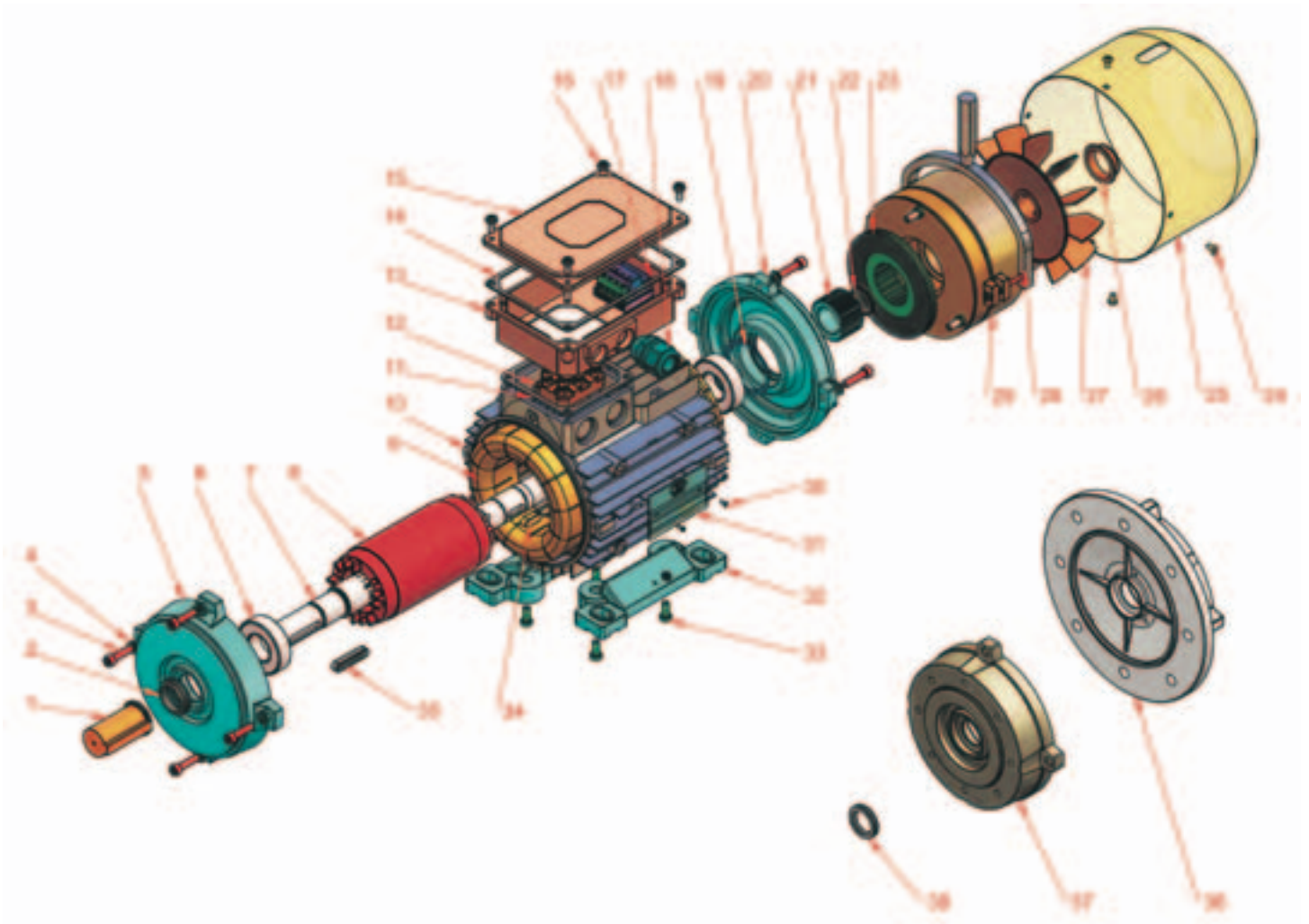


- |                                   |   |
|-----------------------------------|---|
| 1 Shaft protection                | 24 Cooling fan (cast iron)                    |
| 2 Dust seal (V-ring)              | 25 Brake adjustment screws                    |
| 3 End-shield bolts                | 26 Fan cover                                  |
| 4 Washer                          | 27 Nameplate                                  |
| 5 End-shield (drive end)          | 28 Nameplate fixing screws                    |
| 6 Pre-load washer                 | 29 Feet                                       |
| 7 Bearing                         | 30 Feet fixing bolts                          |
| 8 FPC motor shaft                 | 31 B5 flange                                  |
| 9 Rotor                           | 32 B14 flange                                 |
| 10 Stator assembly                | 33 Oil seal                                   |
| 11 Casing                         | 34 Key  |
| 12 IP55 rubber gasket             | 35 Shaft key for FPC unit                     |
| 13 Terminal block                 | 36 FH - type: terminal box                    |
| 14 Rectifier                      | 37 FH - type: IP65 rubber gasket              |
| 15 Terminal box                   | 38 FH - type: terminal box cover              |
| 16 IP65 rubber gasket             | 39 FH - type: terminal box fixing screws      |
| 17 Terminal box cover             | 40 Low-noise filter rectifier                 |
| 18 Terminal box fixing screws     | 41 MM version: capacitor holder box           |
| 19 Cable gland                    | 42 MM version: IP55 rubber gasket             |
| 20 Adjustable axial spring        | 43 MM version: capacitor holder - cover       |
| 21 Fan cover fixing screws        | 44 MM version: capacitor holder fixing screws |
| 22 FPC end-shield (non-drive end) | 45 MM version: capacitor clamp                |
| 23 FPC coil                       | 46 Capacitor                                  |

Capacitor holder for single-phase motors (MM)



- |  |   |
|--|---|
| 1 Shaft protection                       | 23 Cooling fan (PVC)                          |
| 2 Dust seal (V-ring)                     | 24 FHC/FHA fan cover                          |
| 3 End-shield bolts                       | 25 Fan tightening ring                        |
| 4 Washer                                 | 26 Hand-release lever (optional)              |
| 5 End-shield (drive end)                 | 27 Brake coil                                 |
| 6 Bearing                                | 28 Brake disc                                 |
| 7 FHC motor shaft                        | 29 Pre-load washer                            |
| 8 Rotor                                  | 30 Nameplate fixing screws                    |
| 9 Stator assembly                        | 31 Nameplate                                  |
| 10 Casing                                | 32 Feet                                       |
| 11 IP55 rubber gasket                    | 33 Feet fixing bolts                          |
| 12 Terminal block                        | 34 Shaft key for FHC unit                     |
| 13 FH - type: terminal box               | 35 Shaft key                                  |
| 14 FH - type: IP65 rubber gasket         | 36 B5 flange                                  |
| 15 FH - type: terminal box cover         | 37 B14 flange                                 |
| 16 FH - type: terminal box fixing screws | 38 Oil seal                                   |
| 17 Rectifier                             | 39 MM version: capacitor holder box           |
| 18 Cable gland                           | 40 MM version: IP55 rubber gasket             |
| 19 Pre-load washer                       | 41 MM version: capacitor holder - cover       |
| 20 FHC end-shield (non-drive end)        | 42 MM version: capacitor holder fixing screws |
| 21 Driving hub                           | 43 MM version: capacitor clamp                |
| 22 Fan cover fixing screws               | 44 Capacitor                                  |

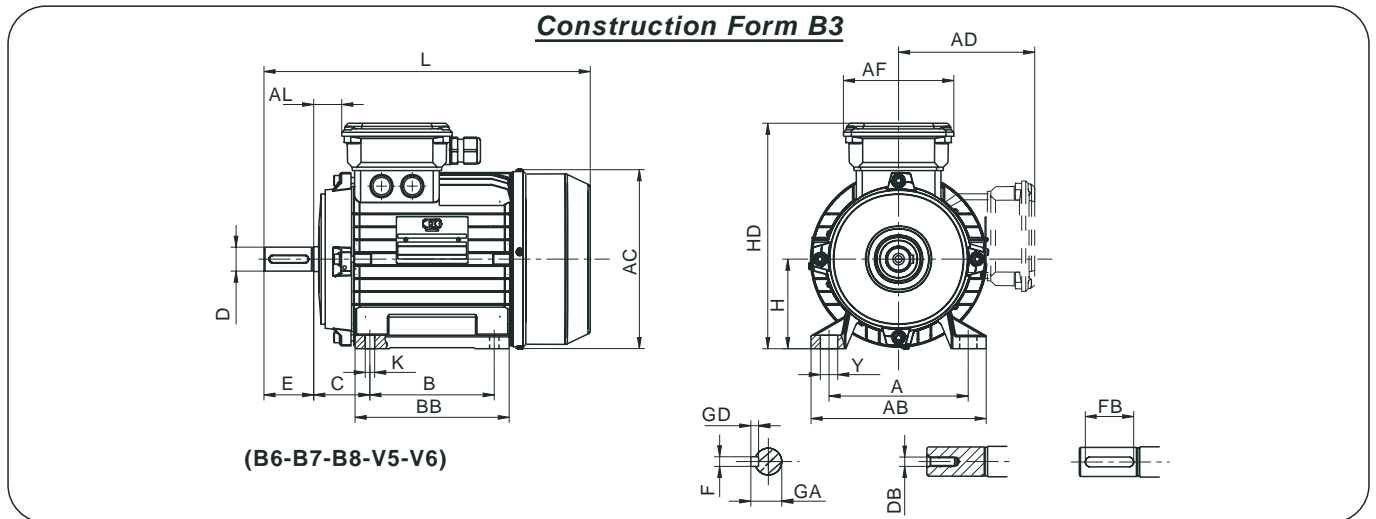


- 1 Shaft protection
- 2 Dust seal (V-ring)
- 3 End-shield bolts
- 4 Washer
- 5 End-shield (drive end)
- 6 Bearing
- 7 FHA motor shaft
- 8 Rotor
- 9 Stator assembly
- 10 Casing
- 11 IP55 rubber gasket
- 12 Terminal block
- 13 FH - type: terminal box
- 14 FH - type: IP65 rubber gasket
- 15 FH - type: terminal box cover
- 16 FH - type: terminal box fixing screws
- 17 Brake terminal block
- 18 Cable gland
- 19 Pre-load washer

- 20 FHA end-shield (non-drive end)
- 21 Driving hub
- 22 Pre-load washer
- 23 Brake coil
- 24 Fan cover fixing screws
- 25 FHC/FHA fan cover
- 26 Fan tightening ring
- 27 Cooling fan (PVC)
- 28 Hand-release lever (optional)
- 29 Brake disc
- 30 Nameplate fixing screws
- 31 Nameplate
- 32 Feet
- 33 Feet fixing bolts
- 34 Shaft key for FHA unit
- 35 Shaft key
- 36 B5 flange
- 37 B14 flange
- 38 Oil seal

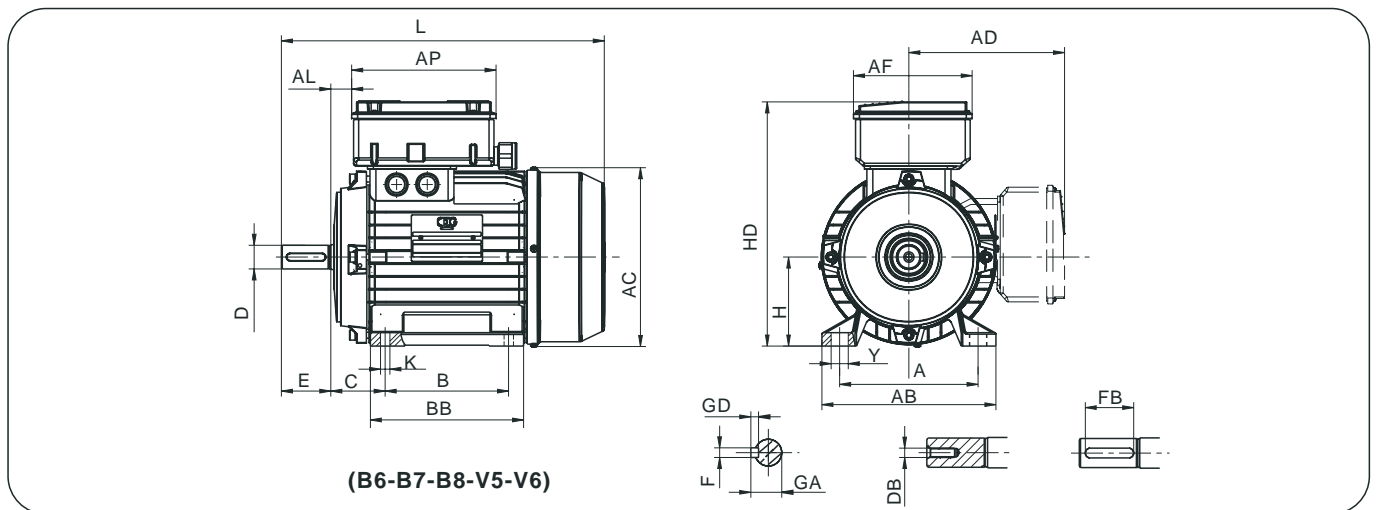


## FPC BRAKE THREE-PHASE MOTORS OVERALL DIMENSIONS (single and double speed)



Size	A	AB	B	BB	C	D	E	H	HD	L	K	Y	AC	AD	AF	AL	F	FB	GA	GD	DB
M63	100	120	80	106	40	11	23	63	176	249	7	12	123	113	93	19	4	15	12,5	4	M4
M71	112	136	90	108	45	14	30	71	196	256	8	12	147	125	93	24	5	20	16	5	M5
M80	125	160	100	125	50	19	40	80	213	291	9,5	17	165	133	111	23	6	30	21,5	6	M6
M90S	140	175	100	131	56	24	50	90	227	305	9,5	17	181	148	111	28	8	40	27	7	M8
M90L	140	175	125	156	56	24	50	90	227	330	9,5	17	181	148	111	28	8	40	27	7	M8
M100L	160	200	140	170	63	28	60	100	247	370	11	21	198	156	111	36	8	50	31	7	M10
M112M	190	225	140	177	70	28	60	112	285	388	11	21	222	173	124	38	8	50	31	7	M10
M132S	216	260	140	181	89	38	80	132	321	460	11	21	264	189	133	44	10	70	41	8	M12
M132M	216	260	178	220	89	38	80	132	321	500	11	21	264	189	133	44	10	70	41	8	M12
M160M	254	318	210	260	108	42	110	160	392	770	13	23	317	235	186	79	12	90	45	8	M16
M160L	254	318	254	304	108	42	110	160	392	805	13	23	317	235	186	79	12	90	45	8	M16

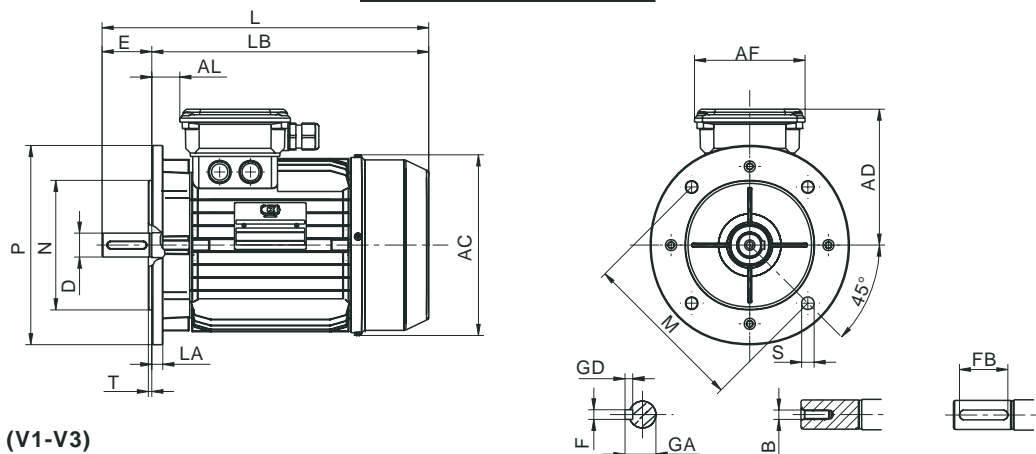
## FPC BRAKE SINGLE-PHASE MOTORS OVERALL DIMENSIONS (version with capacitor holder)



Size	A	AB	B	BB	C	D	E	H	HD	L	K	Y	AC	AD	AF	AP	AL	F	FB	GA	GD	DB
M63	100	120	80	106	40	11	23	63	187	249	7	12	123	124	92	121	19	4	15	13	4	M4
M71	112	136	90	108	45	14	30	71	203	256	8	12	147	132	92	121	24	5	20	16	5	M5
M80	125	160	100	125	50	19	40	80	235	291	9,5	17	165	155	119	146	17	6	30	22	6	M6
M90S	140	175	100	131	56	24	50	90	249	305	9,5	17	181	159	119	146	22	8	40	27	7	M8
M90L	140	175	125	156	56	24	50	90	249	330	9,5	17	181	159	119	146	22	8	40	27	7	M8
M100L	160	200	140	170	63	28	60	100	269	370	11	21	198	169	119	146	30	8	50	31	7	M10

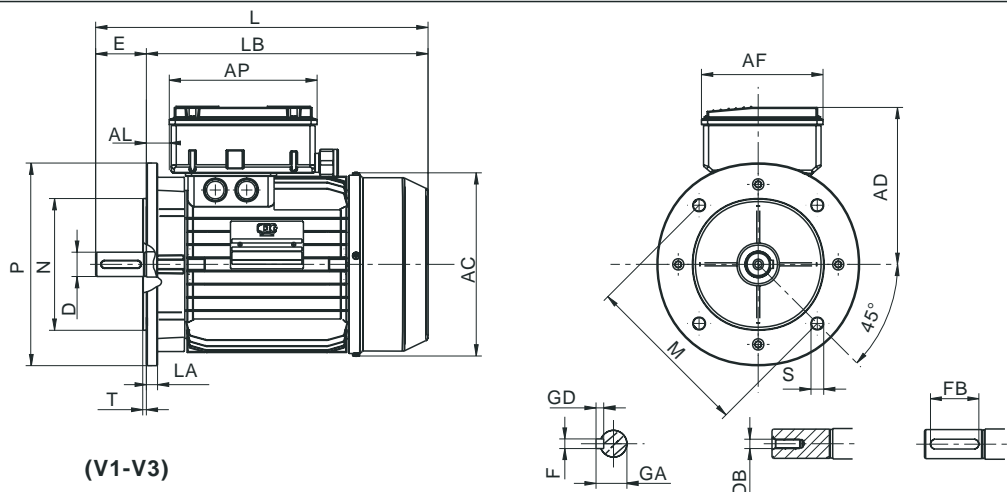
FPC BRAKE THREE-PHASE MOTORS OVERALL DIMENSIONS (single and double speed)

**Construction Form B5**



Size	P	N	M	T	S	D	E	F	FB	GA	GD	L	LB	LA	AD	AF	AL	AC	DB
M63	140	95	115	2,5	9,5	11	23	4	15	12,5	4	249	226	10	113	93	19	123	M4
M71	160	110	130	3	9,5	14	30	5	20	16	5	256	226	9	125	93	24	147	M5
M80	200	130	165	3	11,5	19	40	6	30	21,5	6	291	251	10,5	133	111	23	165	M6
M90S	200	130	165	3	11,5	24	50	8	40	27	7	305	255	10,5	148	111	28	181	M8
M90L	200	130	165	3	11,5	24	50	8	40	27	7	330	280	10,5	148	111	28	181	M8
M100L	250	180	215	3,5	14	28	60	8	50	31	7	370	310	14	156	111	36	198	M10
M112M	250	180	215	3,5	14	28	60	8	50	31	7	388	328	14	173	124	38	222	M10
M132S	300	230	265	4	14	38	80	10	70	41	8	460	380	20	189	133	44	264	M12
M132M	300	230	265	4	14	38	80	10	70	41	8	500	420	20	189	133	44	264	M12
M160M	350	250	300	5	18	42	110	12	90	45	8	770	660	15	235	186	79	317	M16
M160L	350	250	300	5	18	42	110	12	90	45	8	805	695	15	235	186	79	317	M16

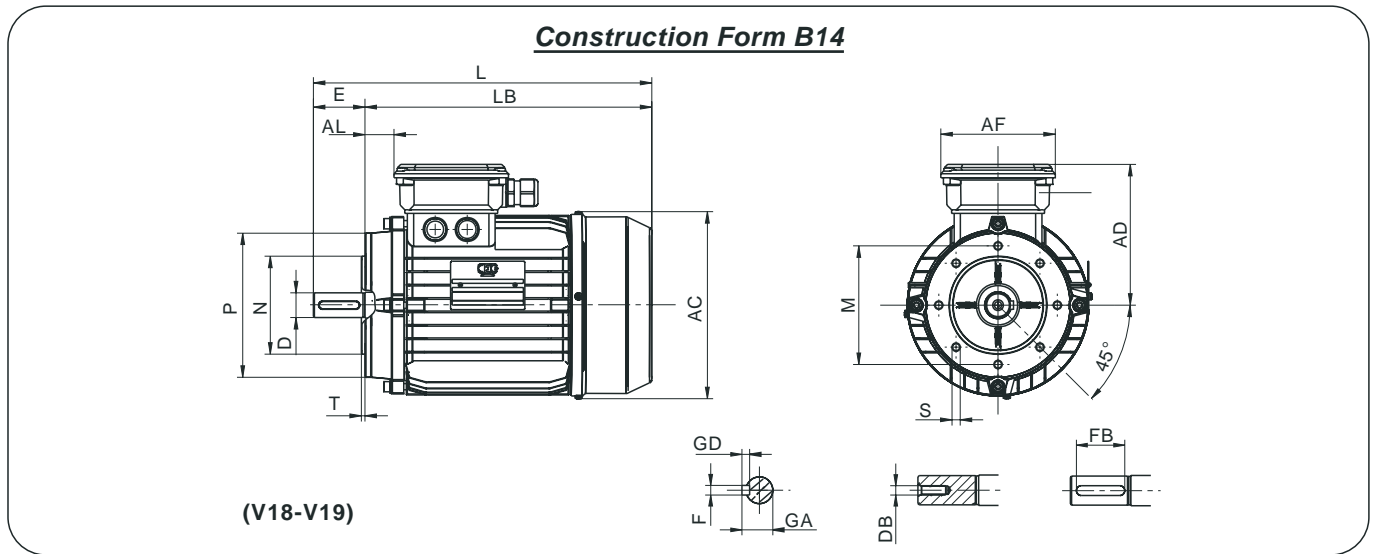
FPC BRAKE SINGLE-PHASE MOTORS OVERALL DIMENSIONS (version with capacitor holder)



Size	P	N	M	T	S	D	E	F	FB	GA	GD	L	LB	LA	AD	AF	AP	AL	AC	DB
M63	140	95	115	2,5	9,5	11	23	4	15	12,5	4	249	226	10	124	93	131	19	123	M4
M71	160	110	130	3	9,5	14	30	5	20	16	5	256	226	9	132	93	131	24	147	M5
M80	200	130	165	3	11,5	19	40	6	30	21,5	6	291	251	10,5	155	109	152	17	165	M6
M90S	200	130	165	3	11,5	24	50	8	40	27	7	305	255	10,5	159	109	152	22	181	M8
M90L	200	130	165	3	11,5	24	50	8	40	27	7	330	280	10,5	159	109	152	22	181	M8
M100L	250	180	215	3,5	14	28	60	8	50	31	7	370	310	14	169	109	152	30	198	M10

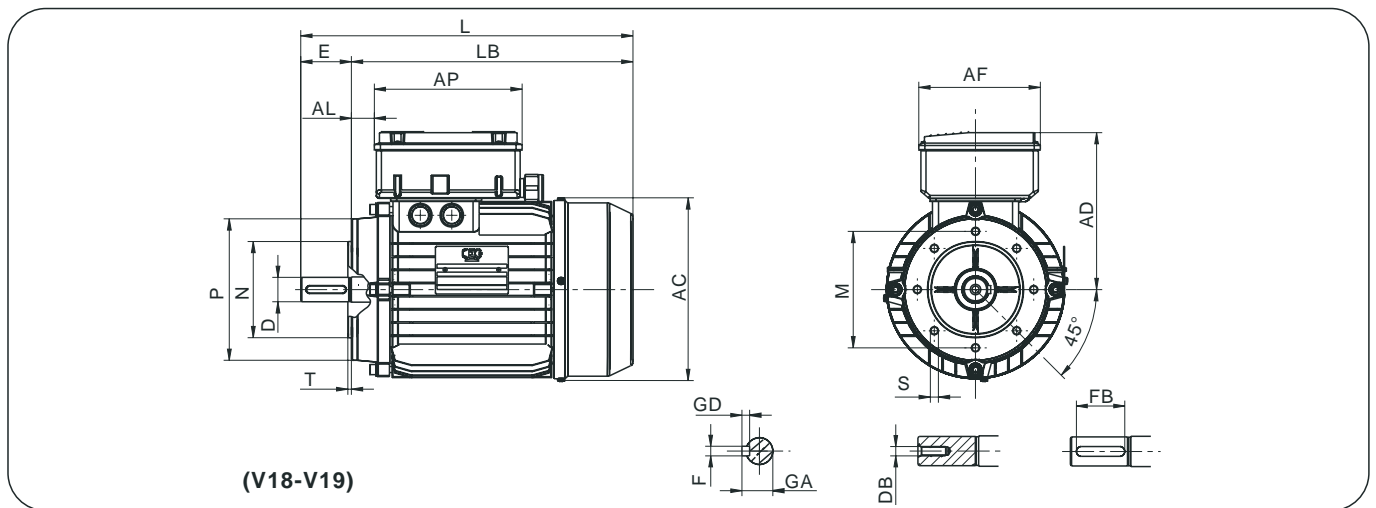


FPC BRAKE THREE-PHASE MOTORS OVERALL DIMENSIONS (single and double speed)



Size	P	N	M	T	S	D	E	F	FB	GA	GD	L	LB	AD	AF	AL	AC	DB
M63	90	60	75	2,5	M5	11	23	4	15	12,5	4	249	226	113	93	19	123	M4
M71	105	70	85	3	M6	14	30	5	20	16	5	256	226	125	93	24	147	M5
M80	120	80	100	3	M6	19	40	6	30	21,5	6	291	251	133	111	23	165	M6
M90S	140	95	115	3	M8	24	50	8	40	27	7	305	255	148	111	28	181	M8
M90L	140	95	115	3	M8	24	50	8	40	27	7	330	280	148	111	28	181	M8
M100M	160	110	130	3,5	M8	28	60	8	50	31	7	370	310	156	111	36	198	M10
M112L	160	110	130	3,5	M8	28	60	8	50	31	7	388	328	173	124	38	222	M10
M132S	200	130	165	4	M10	38	80	10	70	41	8	460	380	189	133	44	264	M12
M132M	200	130	165	4	M10	38	80	10	70	41	8	500	420	189	133	44	264	M12

FPC BRAKE SINGLE-PHASE MOTORS OVERALL DIMENSIONS (version with capacitor holder)

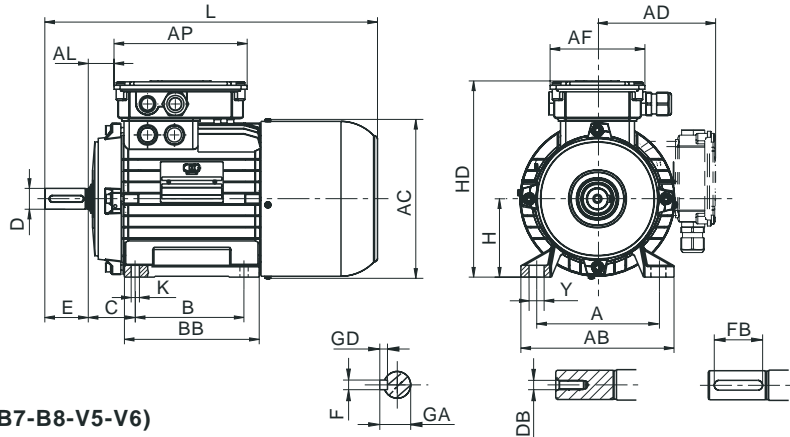


Size	P	N	M	T	S	D	E	F	FB	GA	GD	L	LB	AD	AF	AP	AL	AC	DB
M63	90	60	75	2,5	M5	11	23	4	15	12,5	4	249	226	124	92	121	19	123	M4
M71	105	70	85	3	M6	14	30	5	20	16	5	256	226	132	92	121	24	147	M5
M80	120	80	100	3	M6	19	40	6	30	21,5	6	291	251	155	119	146	17	165	M6
M90S	140	95	115	3	M8	24	50	8	40	27	7	305	255	159	119	146	22	181	M8
M90L	140	95	115	3	M8	24	50	8	40	27	7	330	280	159	119	146	22	181	M8
M100L	160	110	130	3,5	M8	28	60	8	50	31	7	370	310	169	119	146	30	198	M10



**FHC/FHA BRAKE THREE-PHASE MOTORS OVERALL DIMENSIONS (single and double speed)**

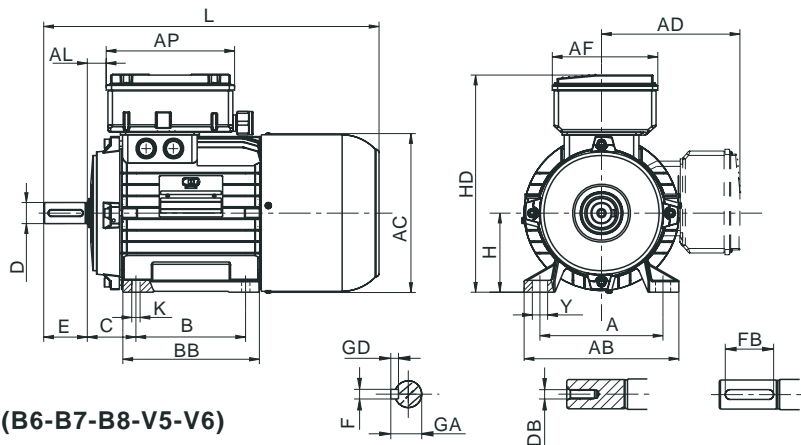
**Construction Form B3**



(B6-B7-B8-V5-V6)

Size	A	AB	B	BB	C	D	E	H	HD	L	K	Y	AC	AD	AF	AP	AL	F	FB	GA	GD	DB
M56	90	109	71	91	36	9	20	56	168	209	6	11	115	112	93	131	13	3	15	10,2	3	M3
M63	100	120	80	106	40	11	23	63	176	249	7	12	123	113	93	131	19	4	15	12,5	4	M4
M71	112	136	90	108	45	14	30	71	196	286	8	12	147	125	93	131	24	5	20	16	5	M5
M80	125	160	100	125	50	19	40	80	213	332	9,5	17	165	133	109	152	23	6	30	21,5	6	M6
M90S	140	175	100	131	56	24	50	90	227	357	9,5	17	181	148	109	152	28	8	40	27	7	M8
M90L	140	175	125	156	56	24	50	90	227	382	9,5	17	181	148	109	152	28	8	40	27	7	M8
M100L	160	200	140	170	63	28	60	100	247	442	11	21	198	156	109	152	32	8	50	31	7	M10
M112M	190	225	140	177	70	28	60	112	283	447	11	21	222	171	132	205	35	8	50	31	7	M10
M132S	216	260	140	181	89	38	80	132	323	534	11	21	264	191	134	208	44	10	70	41	8	M12
M132M	216	260	178	220	89	38	80	132	323	574	11	21	264	191	134	208	44	10	70	41	8	M12
M160M	254	318	210	260	108	42	110	160	392	770	13	23	317	235	186	171	79	12	90	45	8	M16
M160L	254	318	254	304	108	42	110	160	392	805	13	23	317	235	186	171	79	12	90	45	8	M16

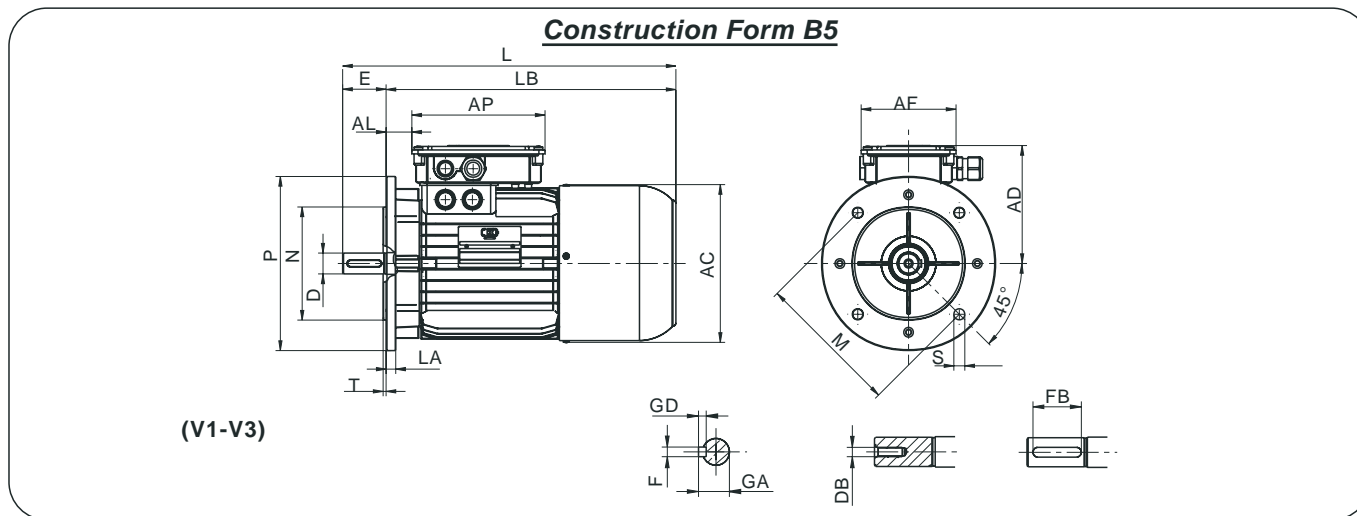
**FHC BRAKE SINGLE-PHASE MOTORS OVERALL DIMENSIONS (version with capacitor holder)**



(B6-B7-B8-V5-V6)

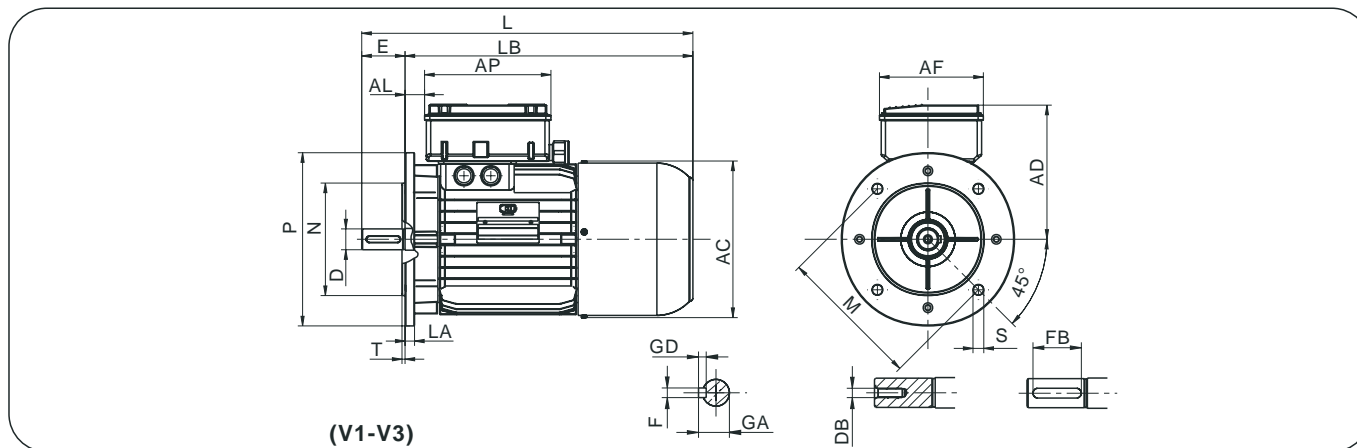
Size	A	AB	B	BB	C	D	E	H	HD	L	K	Y	AC	AD	AF	AP	AL	F	FB	GA	GD	DB
M56	90	109	71	91	36	9	20	56	175	209	6	11	115	119	92	121	13	3	15	10,2	3	M3
M63	100	120	80	106	40	11	23	63	187	249	7	12	123	124	92	121	19	4	15	12,5	4	M4
M71	112	136	90	108	45	14	30	71	203	286	8	12	147	132	92	121	24	5	20	16	5	M5
M80	125	160	100	125	50	19	40	80	235	332	9,5	17	165	155	119	146	17	6	30	21,5	6	M6
M90S	140	175	100	131	56	24	50	90	249	357	9,5	17	181	159	119	146	22	8	40	27	7	M8
M90L	140	175	125	156	56	24	50	90	249	382	9,5	17	181	159	119	146	22	8	40	27	7	M8
M100L	160	200	140	170	63	28	60	100	269	442	11	21	198	169	119	146	30	8	50	31	7	M10

FHC/FHA BRAKE THREE-PHASE MOTORS OVERALL DIMENSIONS (single and double speed)



Size	P	N	M	T	S	D	E	F	FB	GA	GD	L	LB	LA	AD	AF	AP	AL	AC	DB
M56	120	80	100	2,5	7	9	20	3	15	10,2	3	209	189	8	112	93	131	13	115	M3
M63	140	95	115	2,5	9,5	11	23	4	15	12,5	4	249	226	10	113	93	131	19	123	M4
M71	160	110	130	3	9,5	14	30	5	20	16	5	286	256	9	125	93	131	24	147	M5
M80	200	130	165	3	11,5	19	40	6	30	21,5	6	332	292	10,5	133	109	152	23	165	M6
M90S	200	130	165	3	11,5	24	50	8	40	27	7	357	307	10,5	148	109	152	28	181	M8
M90L	200	130	165	3	11,5	24	50	8	40	27	7	382	332	10,5	148	109	152	28	181	M8
M100L	250	180	215	3,5	14	28	60	8	50	31	7	442	382	14	156	109	152	32	198	M10
M112M	250	180	215	3,5	14	28	60	8	50	31	7	447	387	14	171	132	205	35	222	M10
M132S	300	230	265	4	14	38	80	10	70	41	8	534	454	20	191	134	208	44	264	M12
M132M	300	230	265	4	14	38	80	10	70	41	8	574	494	20	191	134	208	44	264	M12
M160M	350	250	300	5	18	42	110	12	90	45	8	770	660	15	235	186	171	79	317	M16
M160L	350	250	300	5	18	42	110	12	90	45	8	805	695	15	235	186	171	79	317	M16

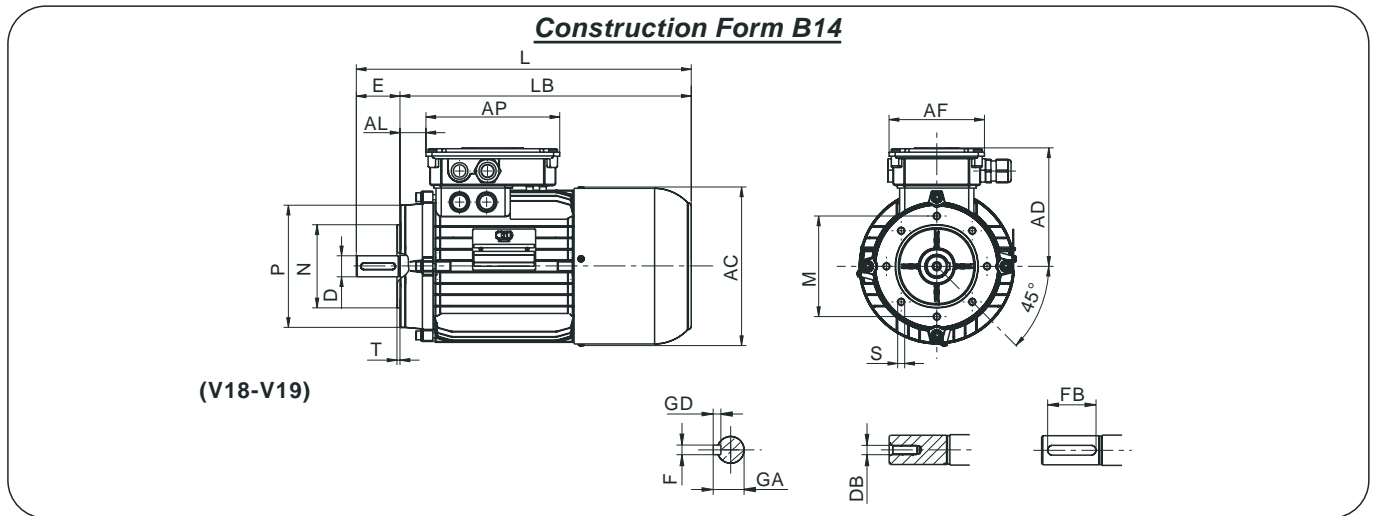
FHC BRAKE SINGLE-PHASE MOTORS OVERALL DIMENSIONS (version with capacitor holder)



Size	P	N	M	T	S	D	E	F	FB	GA	GD	L	LB	LA	AD	AF	AP	AL	AC	DB
M56	120	80	100	2,5	7	9	20	3	15	10,2	3	209	189	8	119	92	121	13	115	M3
M63	140	95	115	2,5	9,5	11	23	4	15	12,5	4	249	226	10	124	92	121	19	123	M4
M71	160	110	130	3	9,5	14	30	5	20	16	5	286	256	9	132	92	121	24	147	M5
M80	200	130	165	3	11,5	19	40	6	30	21,5	6	332	292	10,5	155	119	146	17	165	M6
M90S	200	130	165	3	11,5	24	50	8	40	27	7	357	307	10,5	159	119	146	22	181	M8
M90L	200	130	165	3	11,5	24	50	8	40	27	7	382	332	10,5	159	119	146	22	181	M8
M100L	250	180	215	3,5	14	28	60	8	50	31	7	442	382	14	169	119	146	30	198	M10

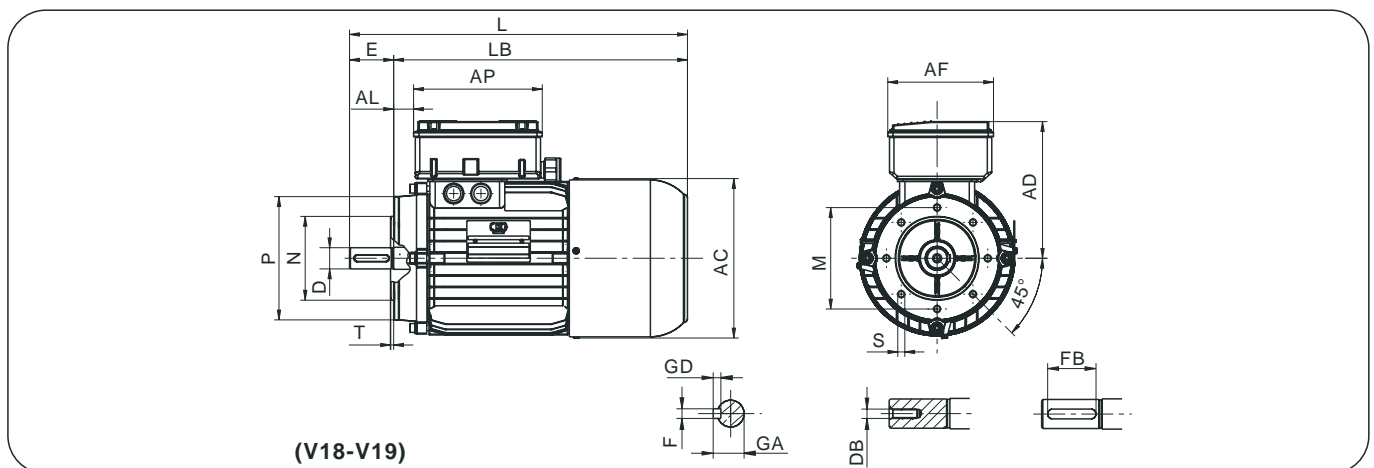
### 3. g 5)

#### FHC/FHA BRAKE THREE-PHASE MOTORS OVERALL DIMENSIONS (single and double speed)



Size	P	N	M	T	S	D	E	F	FB	GA	GD	L	LB	AD	AF	AP	AL	AC	DB
M56	80	50	65	2,5	M5	9	20	3	15	10,2	3	209	189	112	93	131	13	115	M3
M63	90	60	75	2,5	M5	11	23	4	15	12,5	4	249	226	113	93	131	19	123	M4
M71	105	70	85	3	M6	14	30	5	20	16	5	286	256	125	93	131	24	147	M5
M80	120	80	100	3	M6	19	40	6	30	21,5	6	332	292	133	109	152	23	165	M6
M90S	140	95	115	3	M8	24	50	8	40	27	7	357	307	148	109	152	28	181	M8
M90L	140	95	115	3	M8	24	50	8	40	27	7	382	332	148	109	152	28	181	M8
M100L	160	110	130	3,5	M8	28	60	8	50	31	7	442	382	156	109	152	32	198	M10
M112M	160	110	130	3,5	M8	28	60	8	50	31	7	447	387	171	132	205	35	222	M10
M132S	200	130	165	4	M10	38	80	10	70	41	8	534	454	191	134	208	44	264	M12
M132M	200	130	165	4	M10	38	80	10	70	41	8	574	494	191	134	208	44	264	M12

#### FHC BRAKE SINGLE-PHASE MOTORS OVERALL DIMENSIONS (version with capacitor holder)



Size	P	N	M	T	S	D	E	F	FB	GA	GD	L	LB	AD	AF	AP	AL	AC	DB
M56	80	50	65	2,5	M5	9	20	3	15	10,2	3	209	189	119	92	121	13	115	M3
M63	90	60	75	2,5	M5	11	23	4	15	12,5	4	249	226	124	92	121	19	123	M4
M71	105	70	85	3	M6	14	30	5	20	16	5	286	256	132	92	121	24	147	M5
M80	120	80	100	3	M6	19	40	6	30	21,5	6	332	292	155	119	146	17	165	M6
M90S	140	95	115	3	M8	24	50	8	40	27	7	357	307	159	119	146	22	181	M8
M90L	140	95	115	3	M8	24	50	8	40	27	7	382	332	159	119	146	22	181	M8
M100L	160	110	130	3,5	M8	28	60	8	50	31	7	442	382	169	119	146	30	198	M10

## High-pressure water pump motors (*MTACP, MMACP*)



### PRODUCTION STANDARDS

Mounting arrangement	IMB3	
Terminal box position	On top (BS)	
Rated voltage	<b>MT</b> 230/400V	50 Hz ( $P_n \leq 3$ kW)
	400/690V	50 Hz ( $P_n > 3$ kW)
	<b>MM</b> 230V	50 Hz
Protection rating	IP54	
Bearing (only at Non-drive end)	2 RS	
Winding insulation	Class F	
Terminal box type	1 aluminium component	
End-shields assembly	Bosses and bolts	
Paint finish	BLUE RAL 5010	
Fan cover	Galvanized steel sheet	
Duty	S1	

This product type is suitable for applications involving connection to pump units, such as pressure washers, machine tools, etc.



### Meaning of the symbols:

$P_n$	= rated power	$M_m$	= breakdown torque
$n$	= rated speed	$J$	= moment of inertia
$I_n$	= rated current	$\cos \varphi$	= power factor
$I_s$	= locked-rotor current	$\eta$	= efficiency
$M_n$	= rated torque	$C_m$	= running capacitor
$M_s$	= locked-rotor torque	$C_a$	= starting capacitor

### THREE-PHASE MOTORS FOR HIGH-PRESSURE PUMPS

3000 Rpm 2 poles 50 Hz

Size	Pn		n	In(400V)	Cosφ	η	Mn	Mm/Mn	Ms/Mn	Is/In	J	Weight
	kW	Hp	min <sup>-1</sup>	A		%	Nm				Kgm <sup>2</sup>	Kg
M90L	1,5	2	2860	3,65	0,78	77	5	3	3,1	5,4	0,00093	12,3
M90L	1,85	2,5	2830	4,3	0,82	75	6,2	2,7	2,7	5	0,00093	12,8
M90La	2,2	3	2830	4,85	0,85	78	7,42	2,9	2,9	5,5	0,00115	14,5
M90Lb	3	4	2870	6,55	0,83	80	10	3,4	3,3	6	0,00142	17
M100La	3	4	2870	6,5	0,83	79	10	3,5	3,7	6,2	0,00211	19,7
M100Lb	4	5,5	2880	9,1	0,82	79	13,3	3,9	3,8	6,5	0,00272	23
M112Ma	4	5,5	2900	8,83	0,8	82	13,2	3,4	2,7	6,5	0,00317	25,7
M112Mb	5,5	7,5	2900	12,2	0,82	80	18,1	3,1	3,1	6,7	0,00434	31,6
M112Mc	7,5	10	2880	16,9	0,79	81	24,9	3,3	2,4	6,3	0,00484	34,5
M132Sa	5,5	7,5	2900	12,3	0,82	79	18,1	3	3	6,9	0,00744	36,5
M132Sb	7,5	10	2920	16,8	0,78	82	24,5	3,4	3,2	7	0,0091	42,5
M132Ma	11	15	2925	23	0,81	83	35,9	3,4	3,3	7	0,01146	52,5

### THREE-PHASE MOTORS FOR HIGH-PRESSURE PUMPS

1500 Rpm 4 poles 50 Hz

Size	Pn		n	In(400V)	Cosφ	η	Mn	Mm/Mn	Ms/Mn	Is/In	J	Weight
	kW	Hp	min <sup>-1</sup>	A		%	Nm				Kgm <sup>2</sup>	Kg
M90L	1,1	1,5	1400	2,6	0,83	75	7,5	2,5	2,6	4,8	0,00168	12,7
M90La	1,5	2	1415	3,8	0,76	75	10,1	3,1	3,2	5	0,00217	16,7
M90Lb	1,85	2,5	1405	4,40	0,79	77	12,6	3,9	3,2	5,2	0,00257	16,5
M100La	2,2	3	1430	5,4	0,75	79	14,7	2,6	2,7	5	0,00335	18
M100Lb	3	4	1410	7,1	0,79	79	20,3	2,7	2,6	5,3	0,00463	20,9
M100Lc	4	5,5	1400	9	0,84	77	27,3	2,4	2,1	4,6	0,00508	22,5
M112Ma	4	5,5	1440	8,8	0,8	82	26,5	2,7	2,6	5,5	0,00866	30
M112Mb	5,5	7,5	1420	11,8	0,82	81	37	3,3	2,8	6	0,00955	33
M132S	5,5	7,5	1425	11,5	0,85	81	36,8	2,5	2,6	5,1	0,01803	34,7
M132Ma	7,5	10	1430	15,3	0,84	84	50	2,7	2,7	6	0,02218	50
M132Mb	9,2	12,5	1435	19,4	0,83	85	61,2	3,2	2,7	5,7	0,02436	52,4
M132Mc	11	15	1425	22	0,85	85	73,7	2,3	2,5	5,2	0,02672	58,6

### SINGLE-PHASE MOTORS FOR HIGH-PRESSURE PUMPS

3000 Rpm 2 poles 50 Hz

Size	Pn		n	In(230V)	Cosφ	η	Mn	Ms/Mn	Is/In	Cm	J	Weight
	kW	Hp	min <sup>-1</sup>	A		%	Nm			μF	Kgm <sup>2</sup>	Kg
M90L	1,5	2	2750	9	0,98	75	5,2	0,74	3,7	40	0,00114	14,4
M90La	1,85	2,5	2750	10,7	0,99	74	6,4	0,64	3,7	50	0,0013	16
M90Lb	2,2	3	2740	13,4	0,99	72	8,2	0,7	3,2	60	0,0013	16
M100L	2,5	3,5	2850	14,7	0,99	73	8,4	0,7	4	80	0,00246	24

### SINGLE-PHASE MOTORS FOR HIGH-PRESSURE PUMPS

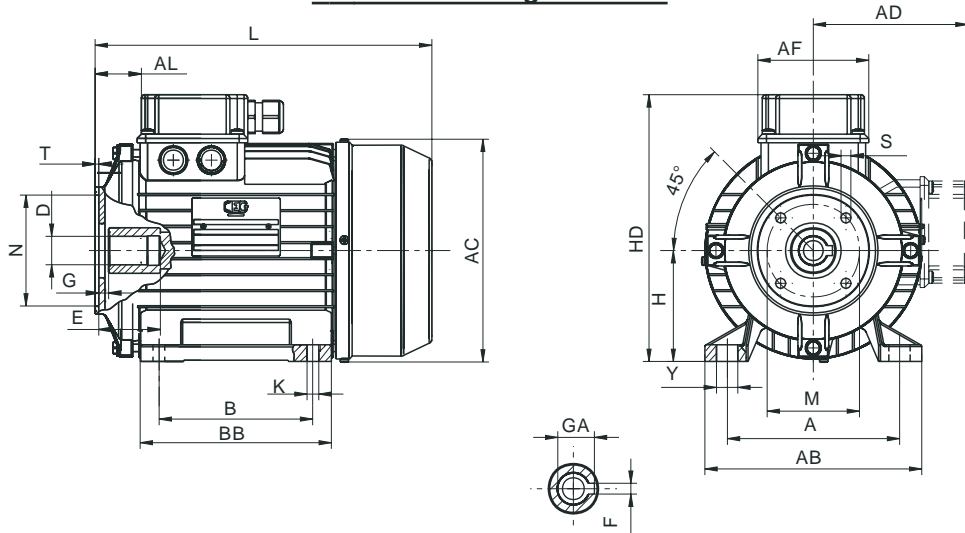
1500 Rpm 4 poles 50 Hz

Size	Pn		n	In(230V)	Cosφ	η	Mn	Ms/Mn	Is/In	Cm	J	Weight
	kW	Hp	min <sup>-1</sup>	A		%	Nm			μF	Kgm <sup>2</sup>	Kg
M90L	1,1	1,5	1380	6,7	0,98	71	7,6	0,52	3,3	35	0,00185	13,4
M90La	1,5	2	1360	9,3	0,96	73	10,8	0,5	3	45	0,00247	15,5
M90Lb	1,85	2,5	1360	12,1	0,91	73	13	0,5	3,1	55	0,00268	17,4
M100La	1,85	2,5	1360	12,2	0,94	70	13	0,6	3	55	0,00403	22
M100Lb	2,2	3	1350	13	0,97	76	15,6	0,5	4	70	0,00506	22,5



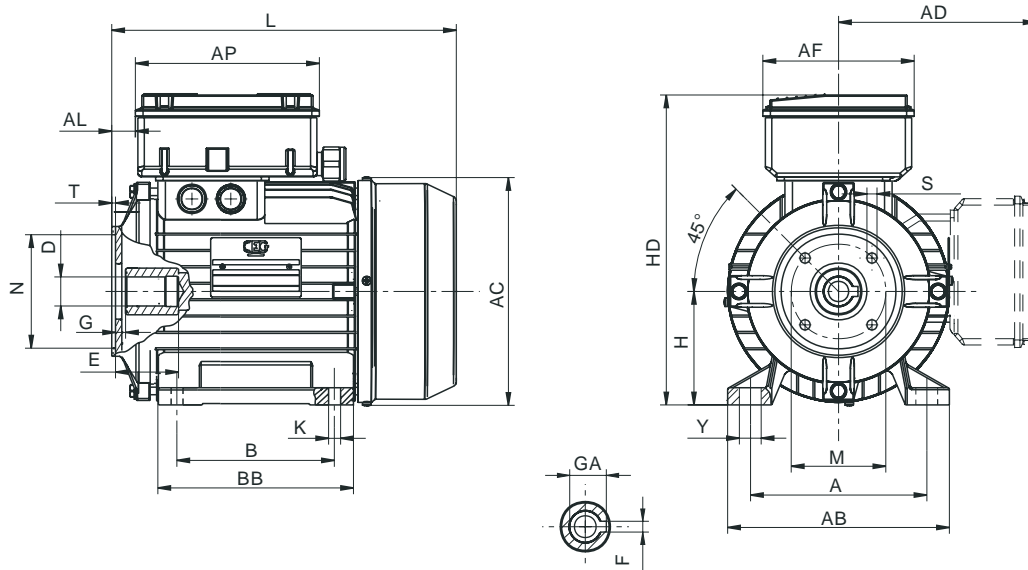
## OVERALL DIMENSIONS OF THREE-PHASE MOTORS FOR HIGH-PRESSURE PUMPS

*Version with flange Ø90 mm*



Size	A	AB	B	BB	D	E	G	H	HD	L	K	Y	N	M	S	T	AC	AD	AF	AL	F	GA
M90L	140	175	125	156	24	48	8	90	219	276	9,5	17	90	75	7	4	181	129	89	33	8	27,3
M100	160	200	140	170	24	48	8	100	240	307	11	21	90	75	7	4	198	138	89	48	8	27,3

## OVERALL DIMENSIONS OF SINGLE-PHASE MOTORS FOR HIGH-PRESSURE PUMPS (version with capacitor holder)

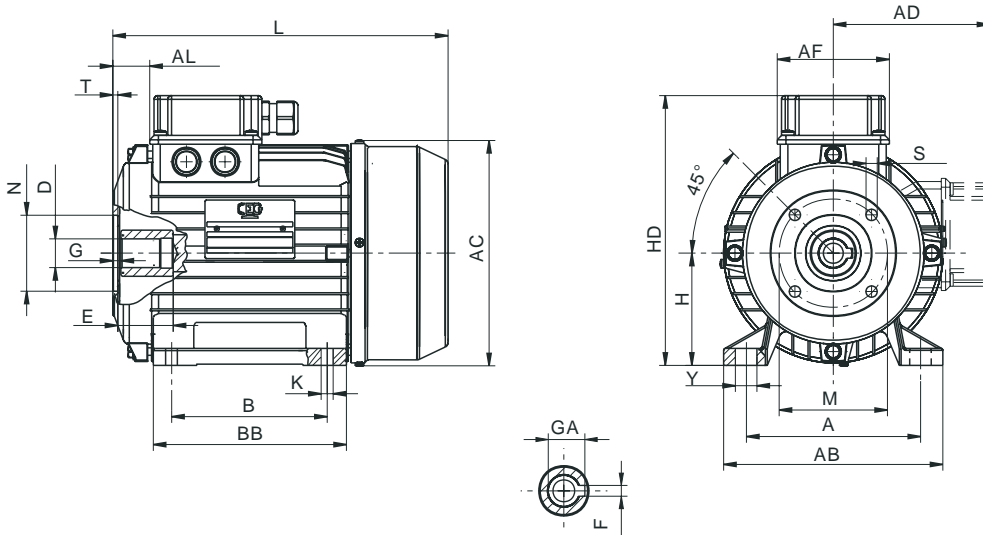


Size	A	AB	B	BB	D	E	G	H	HD	L	K	Y	N	M	S	T	AC	AD	AF	AP	AL	F	GA
M90L	140	175	125	156	24	48	8	90	249	276	9,5	17	90	75	7	3	181	159	119	146	18	8	27,3
M100	160	200	140	170	24	48	8	100	269	307	11	21	90	75	7	3	198	169	119	146	32	8	27,3



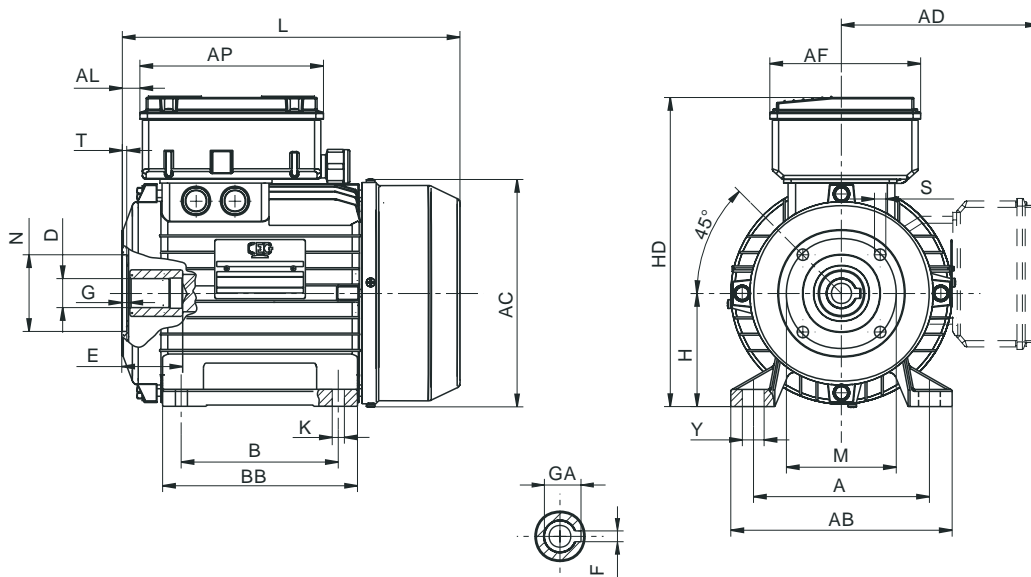
**OVERALL DIMENSIONS OF THREE-PHASE MOTORS FOR HIGH-PRESSURE PUMPS**

*Version with for flange Ø61 mm*



Size	A	AB	B	BB	D	E	G	H	HD	L	K	Y	N	M	S	T	AC	AD	AF	AL	F	GA
M90L	140	175	125	156	24	45	5	90	219	271	9,5	17	61	87	9	4,5	181	129	89	33	8	27,3
M100L	160	200	140	170	24	45	5	100	240	301	11	21	61	87	9	4,5	198	138	89	48	8	27,3
M112M	190	225	140	177	24	45	5	112	266	321	11	21	61	87	9	4,5	222	154	89	48	8	27,3
M132S	216	260	140	181	24	55	5	132	310	379	11	21	61	87	9	4,5	264	178	112	55	8	27,3
M132M	216	260	178	220	24	55	5	132	310	419	11	21	61	87	9	4,5	264	178	112	55	8	27,3

**OVERALL DIMENSIONS OF SINGLE-PHASE MOTORS FOR HIGH-PRESSURE PUMPS (version with capacitor holder)**



Size	A	AB	B	BB	D	E	G	H	HD	L	K	Y	N	M	S	T	AC	AD	AF	AP	AL	F	GA
M90L	140	175	125	156	24	45	5	90	249	271	9,5	17	61	87	9	4,5	181	159	119	146	16	8	27,3
M100L	160	200	140	170	24	45	5	100	269	301	11	21	61	87	9	4,5	198	169	119	146	26	8	27,3

## Low centre motors (ETSTD, EMSTD)

CEG low centre motors have been specially designed to provide the same power as the IEC standard series but with lower shaft height. Thanks to their square extrude casing, they are particularly suitable for applications where reduced dimensions are required: circular saws, cutting-off machines for wood and metals, drilling machines, etc.

Following coupling options are available for CEG low centre motors:

- **B3 version** fitted with two clamping discs and a fixing nut to mount the saw blade with ease. The motor can be secured to the driven equipment base by means of "T" shaped slots.
- **B14 version** fitted with the same shaft and flange as the IEC series. The motor can be secured to the driven equipment by means of the "T" shaped slots on casing base. When necessary, the flange threaded holes can also be used to fix the motor.

PRODUCTION STANDARDS		
	Blade clamping discs (B3) •	B14 flange
Coupling	See overall dimension diagrams <b>E48</b> p. 75 – <b>E63</b> p. 77 – <b>E80</b> p. 79	See overall dimension diagrams <b>E48</b> p. 76 – <b>E63</b> p. 78 – <b>E80</b> p. 80
Terminal box position	Left side, near fan cover •• (Only <b>E48</b> motor can also be fitted with terminal box on the rear side)	Left side, near fan cover •• (Only <b>E48</b> motor can also be fitted with terminal box on the rear side)
Rated voltage	<b>ET</b> 230/400 V 50 Hz ( $P_n \leq 3$ kW) 400/690 V 50 Hz ( $P_n > 3$ kW) <b>EM</b> 230 V 50 Hz	<b>ET</b> 230/400 V 50 Hz ( $P_n \leq 3$ kW) 400/690 V 50 Hz ( $P_n > 3$ kW) <b>EM</b> 230 V 50 Hz
Protection rating	IP55	IP55
Bearings	ZZ	ZZ
Winding insulation	Class F	Class F
Terminal Box type	<b>ET</b> 2 aluminium components (box + cover) <b>EM</b> capacitor-holder	<b>ET</b> 2 aluminium components (box + cover) <b>EM</b> capacitor-holder
End-shields assembly	Tie rods	Tie rods
Paint finish	Unpainted	Unpainted
Fan cover	<b>E48</b> aluminium – <b>E63 / E80</b> plastic	<b>E48</b> aluminium – <b>E63 / E80</b> plastic
Duty	S6 - 60%	S6 - 60%

- For B3 version right-hand (DX) or left-hand (SX) thread to be specified on order.
- On demand terminal box position can be on the right side and/or near shaft-end.



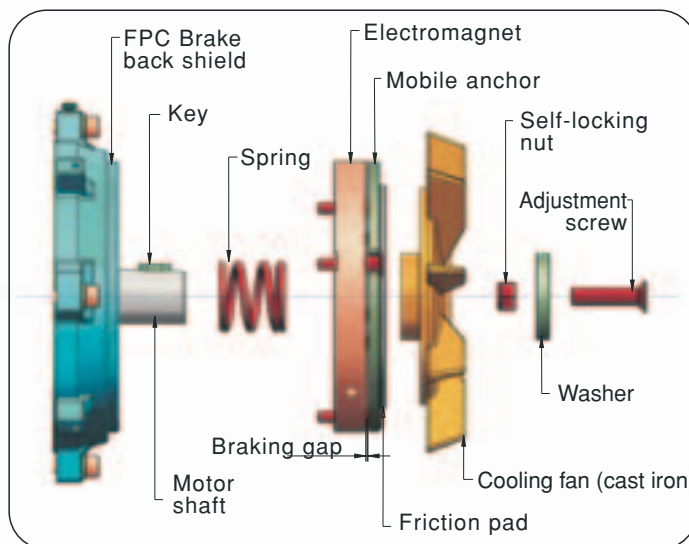
# Low centre motors with FPC brake (ETFPC, EMFPC)

E63 and E80 low centre motor are also available fitted with gradual DC brake (FPC type). Their main features are the same as the standard E-series (see section 3.i).

PRODUCTION STANDARDS		
	Blade clamping discs (B3)•	B14 flange
Coupling	See overall dimension diagrams <b>E63</b> p. 77 – <b>E80</b> p. 79	See overall dimension diagrams <b>E63</b> p. 78 – <b>E80</b> p. 80
Terminal box position	Left side, near fan cover ••	Left side, near fan cover ••
Rated voltage	<b>ET</b> 230/400 V 50 Hz ( $P_n \leq 3$ kW) 400/690 V 50 Hz ( $P_n > 3$ kW)	<b>ET</b> 230/400 V 50 Hz ( $P_n \leq 3$ kW) 400/690 V 50 Hz ( $P_n > 3$ kW)
	<b>EM</b> 230 V 50 Hz	<b>EM</b> 230 V 50 Hz
Brake rated voltage (separate connection)	230 V (400 V for $P_n > 3$ kW)	230 V (400 V for $P_n > 3$ kW)
Rectifier type	Half-wave	Half-wave
Protection rating	IP54	IP54
Bearings	2RS	2RS
Winding insulation	Class F	Class F
Terminal box type	<b>ET</b> 2 aluminium components (box + cover) <b>EM</b> capacitor-holder	<b>ET</b> 2 aluminium components (box + cover) <b>EM</b> capacitor-holder
End-shields assembly	Tie rods	Tie rods
Paint finish	Unpainted	Unpainted
Fan cover	Plastic	Plastic
Duty	S6 - 60%	S6 - 60%

- For B3 version right-hand (DX) or left-hand (SX) thread to be specified on order.
- On demand terminal box position can be on the right side and/or near shaft-end.

Size	Braking torque (Nm)	Power (W)	Engaging time (ms)	Release time (ms)	Air gap (mm)
E63	4	18	40	100	0,2
E80	9	25	45	120	0,2



### Meaning of the symbols

$P_n$	= rated power	$M_m$	= breakdown torque
$n$	= rated speed	$J$	= moment of inertia
$I_n$	= rated current	$\cos\varphi$	= power factor
$I_s$	= locked-rotor current	$\eta$	= efficiency
$M_n$	= rated torque	$C_m$	= running capacitor
$M_s$	= locked-rotor torque	$C_a$	= starting capacitor

REMARK: Weights refer to standard B3 version without blade discs

### THREE-PHASE LOW CENTRE MOTORS

3000 Rpm 2 poles 50 Hz

Size	Pn		n min <sup>-1</sup>	In(400V) A	Cosφ	η %	Mn Nm	Mm/Mn	Ms/Mn	Is/In	J** Kgm <sup>2</sup>	Weight*** Kg
	kW	Hp										
• E48Sb	0,55	0,75	2750	1,4	0,84	67	1,91	2	2,1	3	0,00019	5,6
• E48Sc	0,75	1	2800	1,9	0,88	66	2,7	3	3,2	2,8	0,00025	6,5
• E48Ma	1,1	1,5	2750	2,6	0,8	75	3,82	2,5	2,6	3,9	0,0003	8
• E48Lb	1,3	1,8	2700	3	0,82	77	4,6	2,7	2,8	4	0,00037	9,5
• E48L	1,5	2	2750	3,5	0,8	77	5,2	3,2	3,3	4,6	0,00043	10
E63Sa	1,1	1,5	2740	2,6	0,83	75	3,82	3	3,1	5	0,0006	10,7
E63Sb	1,5	2	2720	3,4	0,84	76	5,3	2,3	2,4	4,3	0,00075	11,5
E63Sc	1,85	2,5	2760	4,2	0,84	76	6,31	3,2	3,4	4,6	0,0009	12,5
E63La	2,2	3	2810	4,75	0,82	82	7,48	3,3	3,4	5,5	0,00103	15
E63Lb	3	4	2780	6,4	0,84	81	10,2	3,3	3,5	6	0,00115	17
E80S	3	4	2850	6,55	0,83	80	10	3,4	3,4	6	0,0016	25,5
E80Sb	4	5,5	2890	9,2	0,8	80	13,3	3,3	3,4	6,8	0,002	27,5
E80M	5,5	7,5	2870	11,5	0,82	85	18,5	3,6	3,7	6,3	0,00225	31,3
E80L	7,5	10	2850	15,4	0,86	82	25,2	3,1	3,1	5	0,00275	38,8

### THREE-PHASE LOW CENTRE MOTORS

1500 Rpm 4 poles 50 Hz

Size	Pn		n min <sup>-1</sup>	In(400V) A	Cosφ	η %	Mn Nm	Mm/Mn	Ms/Mn	Is/In	J** Kgm <sup>2</sup>	Weight*** Kg
	kW	Hp										
• E48S	0,37	0,5	1410	1,6	0,51	67	2,5	3,9	4	3,5	0,00035	6,7
• E48M	0,55	0,75	1350	1,7	0,7	67	3,9	2,6	2,7	3,2	0,00045	8,5
• E48L	0,75	1	1300	2,4	0,68	66	5,5	2,2	2,3	2,2	0,0005	9,3
E63Sa	0,75	1	1380	1,9	0,78	73	5,2	2,2	2,1	4,2	0,0011	11,2
E63Sb	1,1	1,5	1400	2,7	0,77	76	7,5	2,2	2,3	3,9	0,00125	12,6
E63La	1,5	2	1350	3,9	0,76	73	10,6	1,8	2	3	0,0015	14
E80S	2,2	3	1400	5	0,81	79	15	3,3	3,4	5,6	0,0028	24,5
E80M	3	4	1370	6,8	0,82	78	20,9	2,1	2,3	4,4	0,00325	30

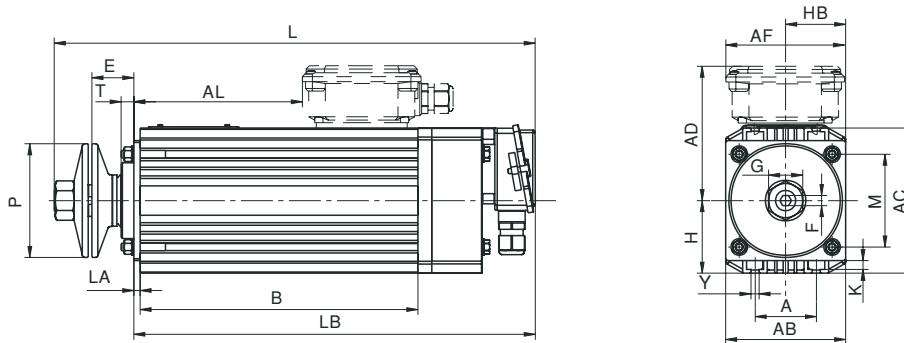
### SINGLE-PHASE LOW CENTRE MOTORS

3000 Rpm 2 poles 50 Hz

Size	Pn		n min <sup>-1</sup>	In(230V) A	Cosφ	η %	Mn Nm	Mm/Mn	Is/In	Cm μF	J** Kgm <sup>2</sup>	Weight*** Kg
	kW	Hp										
• E48Sa	0,37	0,5	2700	2,9	0,99	56	1,31	1,3	2	10	0,00019	6,1
• E48Sb	0,55	0,75	2800	3,5	0,98	70	1,87	1,3	2,2	14	0,00025	6,9
• E48Ma	0,75	1	2800	5,3	0,96	64	2,55	1,6	3,1	16	0,0003	8,1
• E48M	1,1	1,5	2800	7	0,95	72	3,75	1,5	3,3	20	0,00043	9,5
E63S	1,1	1,5	2800	7	0,92	74	3,75	1,6	2,8	25	0,00075	11
E63La	1,5	2	2800	9,7	0,95	71	5,1	1,6	3,8	30	0,0009	13
E63Lb	1,85	2,5	2750	13	0,95	65	6,4	1,5	2,7	35	0,001	13,5
E63Lc	2,2	3	2800	13,1	0,96	76	7,64	1,6	3,4	40	0,00115	17
E80Sa	1,5	2	2750	9,8	0,92	72	5,2	1,7	3,7	35	0,0012	22
E80Sb	2,2	3	2750	13,9	0,97	71	7,6	1,6	3,7	40	0,0014	26

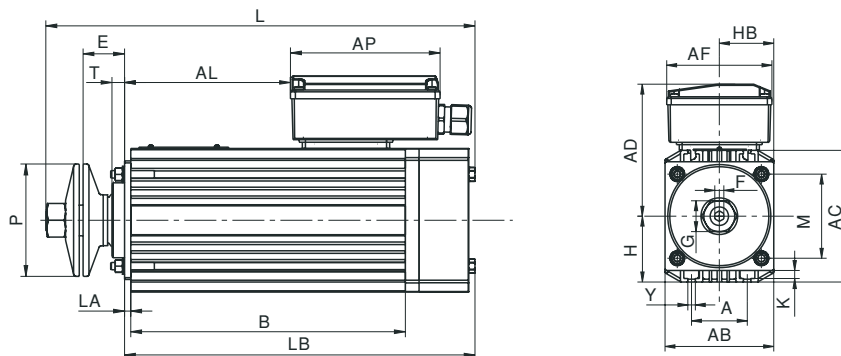
- E48 motor not available with FPC brake
- \*\* Rotor assembly inertia (J) referred to motor without blade clamping discs
- \*\*\*Weight without brake

**Shaft height 48 mm (E48), three-phase with blade discs (B3)**

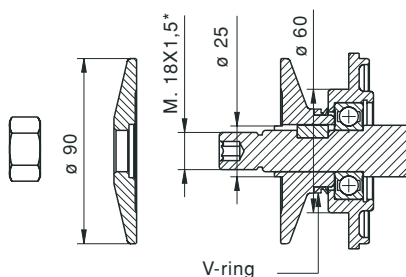


Size	A	AB	AC	B	E	F	G	H	HB	L	LB	K	Y	M	P	T	AD	AF	AL	LA
E48S	48	95	115	150	33	8	27	57,5	47,5	321	259	7	6	73,5	90	10	109	94	63	5
E48M	48	95	115	200	33	8	27	57,5	47,5	371	303	7	6	73,5	90	10	109	94	113	5
E48L	48	95	115	220	33	8	27	57,5	47,5	391	323	7	6	73,5	90	10	109	94	133	5

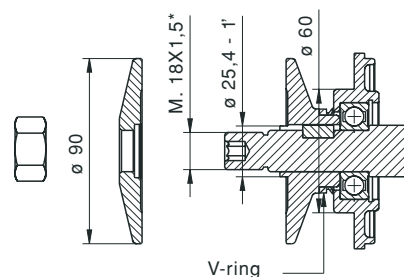
**Shaft height 48 mm (E48), single-phase with blade discs (B3)**



Size	A	AB	AC	B	E	F	G	H	HB	L	LB	K	Y	M	P	T	AD	AF	AL	AP	LA
E48S	48	95	115	150	33	8	27	57,5	47,5	279	212	7	6	73,5	90	10	115	92	63	121	5
E48M	48	95	115	200	33	8	27	57,5	47,5	329	262	7	6	73,5	90	10	115	92	113	121	5



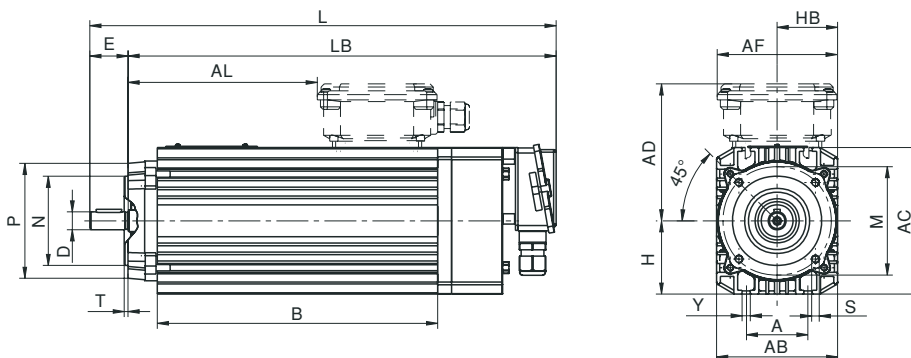
Standard shaft-end



Optional shaft-end

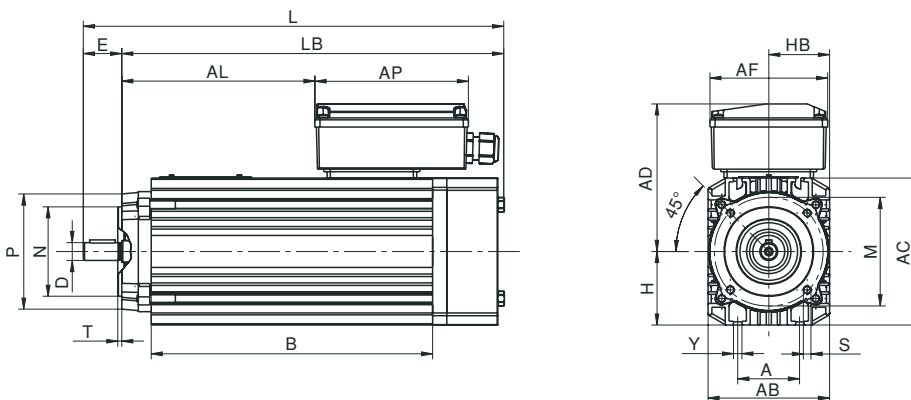


**Shaft height 48 mm (E48), three-phase with coupling flange (B14)**

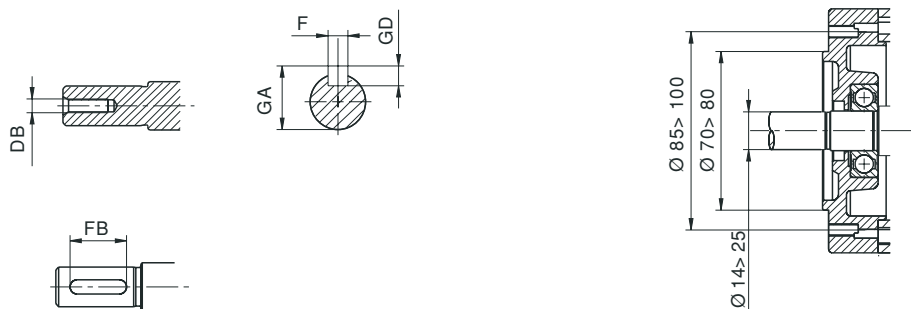


Size	A	AB	AC	B	H	HB	L	LB	Y	P	N	M	T	S	D	E	F	FB	GA	GD	AD	AF	AL	DB
E48S	48	95	115	150	57,5	47,5	301	271	6	105	70	85	3	M6	14	30	5	20	16	5	109	94	81	M5
E48M	48	95	115	200	57,5	47,5	351	321	6	105	70	85	3	M6	14	30	5	20	16	5	109	94	131	M5
E48L	48	95	115	220	57,5	47,5	383	343	6	120	80	100	3	M6	19	40	6	30	21,5	6	115	92	153	M

**Shaft height 48 mm (E48), single-phase with coupling flange (B14)**



Size	A	AB	AC	B	H	HB	L	LB	Y	P	N	M	T	S	D	E	F	FB	GA	GD	AD	AF	AL	AP	DB
E48S	48	95	115	150	57,5	47,5	260	230	6	105	70	85	3	M6	14	30	5	20	21,5	5	115	92	81	121	M5
E48M	48	95	115	200	57,5	47,5	310	280	6	105	70	85	3	M6	14	30	5	20	21,5	5	115	92	131	121	M5
E48L	48	95	115	220	57,5	47,5	341	301	6	120	80	100	3	M6	19	40	6	30	21,5	6	115	92	153	121	M6

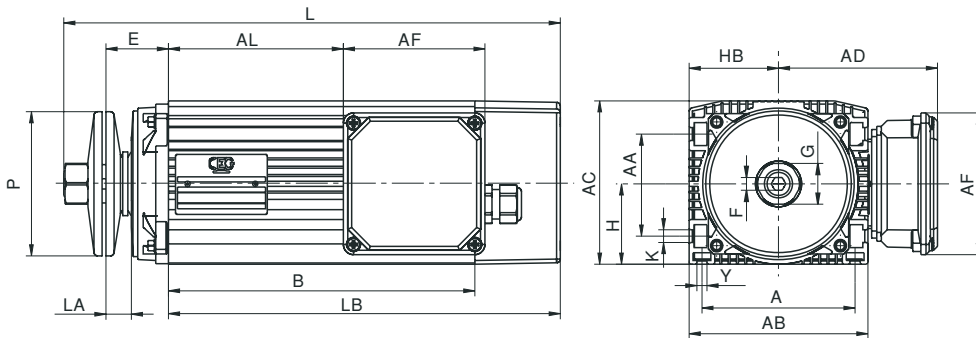


Shaft dimensions

Optional flange dimensions

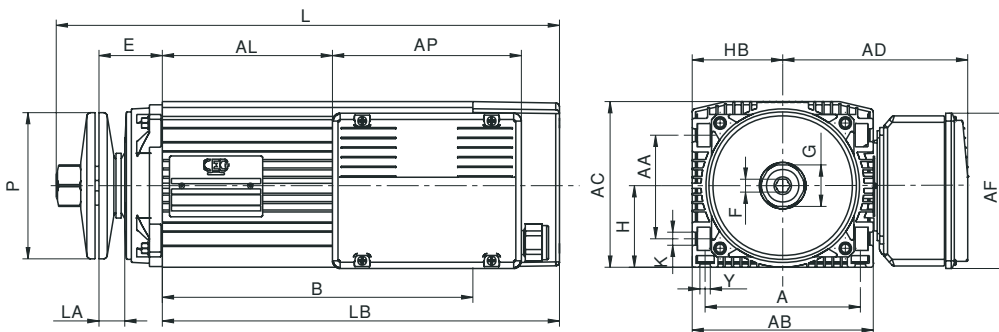
### 3.11)

#### **Shaft height 63/71 mm (E63), three-phase with blade discs (B3)**

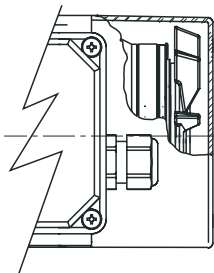


Size	A	AB	AC	AA	B	E	F	G	H	HB	L	LB	K	Y	P	AD	AF	AL	LA
E63S	120	140	128	80	180	49	10	32	63	71	330	247	10	8	114	125	111	77	20
E63L	120	140	128	80	240	49	10	32	63	71	390	307	10	8	114	125	111	137	20

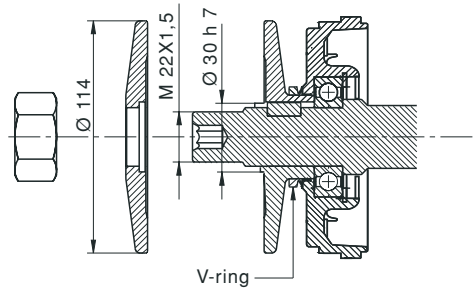
#### **Shaft height 63/71 mm (E63), single-phase with blade discs (B3)**



Size	A	AB	AC	AA	B	E	F	G	H	HB	L	LB	K	Y	P	AD	AF	AP	AL	LA
E63S	120	140	128	80	180	49	10	32	63	71	330	247	10	8	114	143	120	146	71	20
E63L	120	140	128	80	240	49	10	32	63	71	390	307	10	8	114	143	120	146	131	20

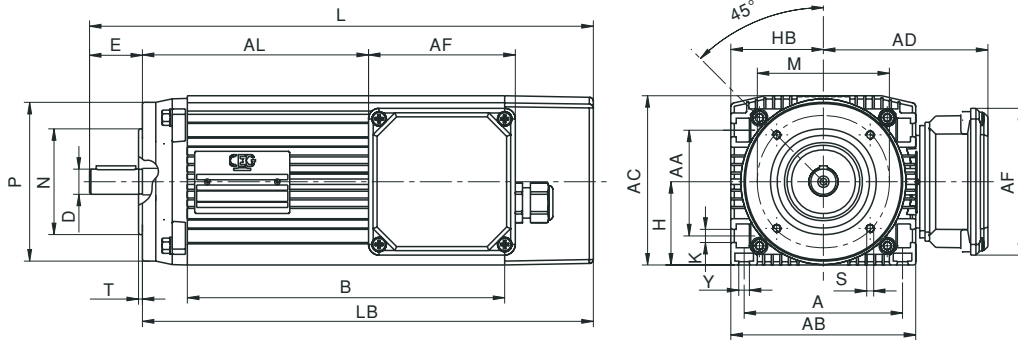


FPC brake application



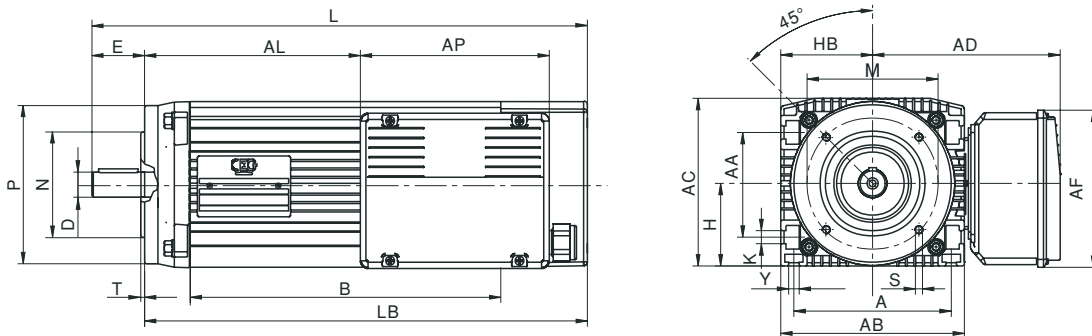
Standard shaft-end

**Shaft height 63/71 mm (E63), three-phase with coupling flange (B14)**

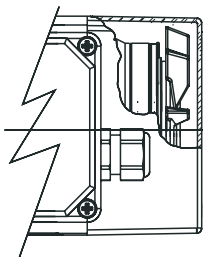


Size	A	AB	AC	AA	B	H	HB	L	LB	Y	K	P	N	M	T	S	D	E	F	FB	GA	GD	AD	AF	AL	DB
E63S	120	140	128	80	180	63	71	321	281	8	10	120	80	100	3	M6	19	40	6	30	21.5	6	125	111	111	M6
E63L	120	140	128	80	240	63	71	391	341	8	10	120	80	100	3	M6	24	50	8	40	27	7	125	111	171	M8

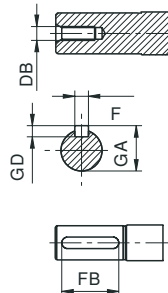
**Shaft height 63/71 mm (E63), single-phase with coupling flange (B14)**



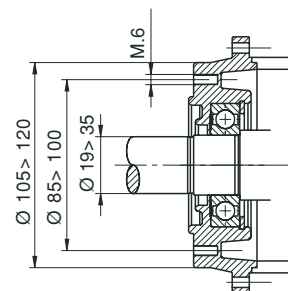
Size	A	AB	AC	AA	B	H	HB	L	LB	Y	K	P	N	M	T	S	D	E	F	FB	GA	GD	AD	AF	AL	AP	DB
E63S	120	140	128	80	180	63	71	321	281	8	10	120	80	100	3	M6	19	40	6	30	21.5	6	143	120	105	146	M6
E63L	120	140	128	80	240	63	71	391	341	8	10	120	80	100	3	M6	24	50	8	40	27	7	143	120	165	146	M8



FPC brake application

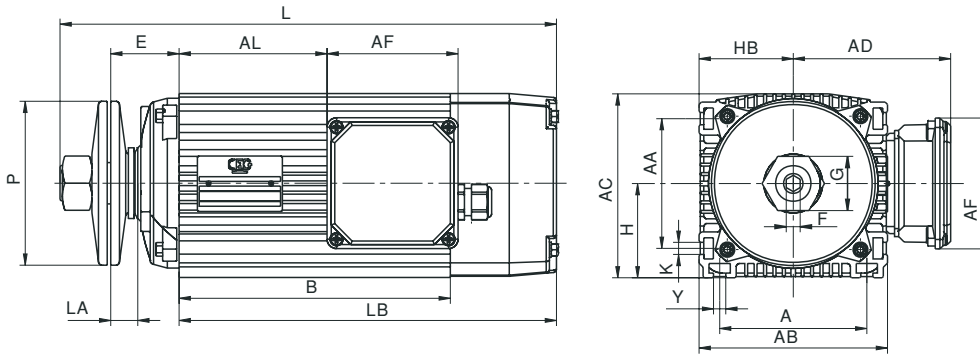


Shaft dimensions



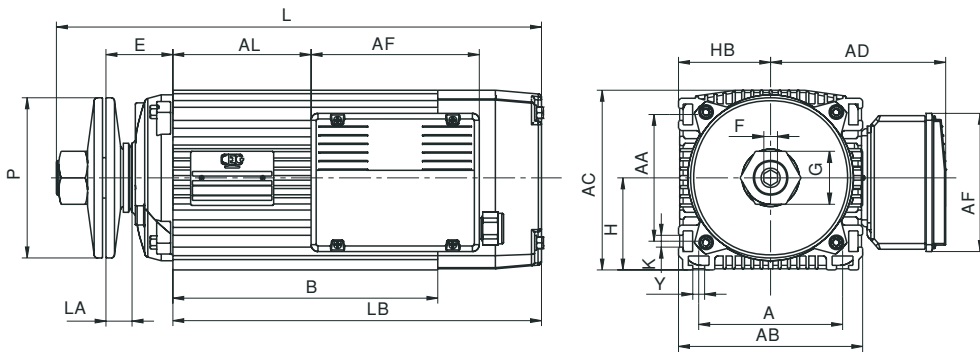
Optional flange dimensions

**Shaft height 80 mm (E80), three-phase with blade discs (B3)**

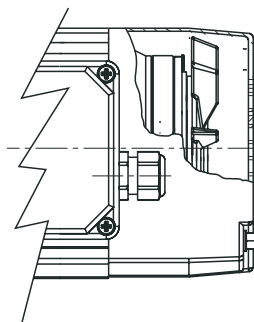


Size	A	AB	AC	AA	B	E	F	G	H	HB	L	LB	K	Y	P	AD	AF	AL	LA
E80S	125	160	156	110	230	58	12	46	80	80	421	320	10	10	140	135	111	125	23
E80M	125	160	156	110	280	58	12	46	80	80	471	370	10	10	140	135	111	175	23
E80L	125	160	156	110	350	58	12	46	80	80	541	440	10	10	140	135	111	245	23

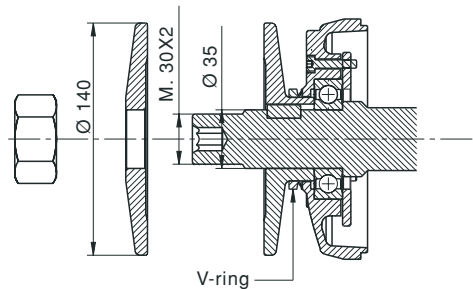
**Shaft height 80 mm (E80), single-phase with blade discs (B3)**



Size	A	AB	AC	AA	B	E	F	G	H	HB	L	LB	K	Y	P	AD	AF	AL	AP	LA
E80S	125	160	156	110	230	58	12	46	80	80	421	320	10	10	140	152	119	120	146	23
E80M	125	160	156	110	280	58	12	46	80	80	471	320	10	10	140	152	119	170	146	23

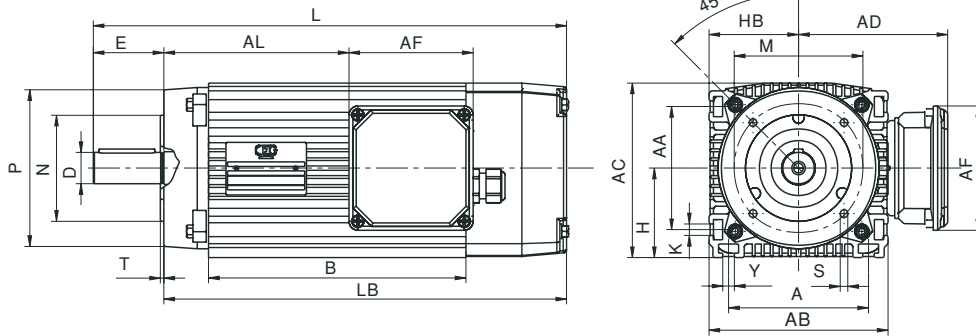


FPC brake application



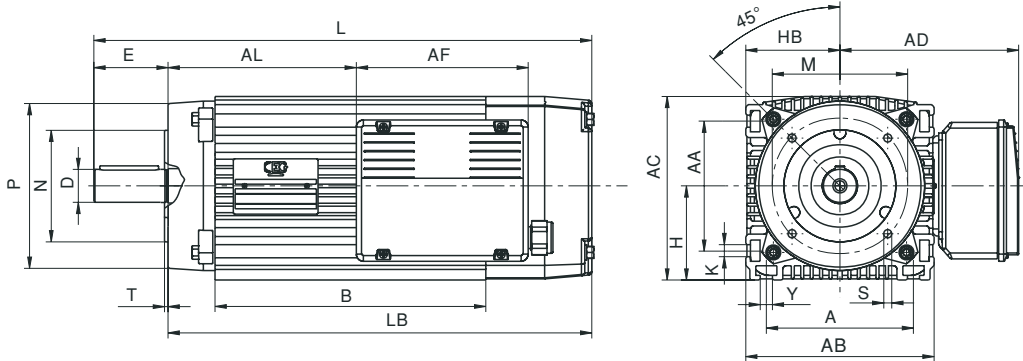
Standard shaft-end

**Shaft height 80 mm (E80), three-phase with coupling flange (B14)**

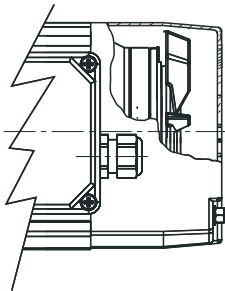


Size	A	AB	AC	AA	B	H	HB	L	LB	K	Y	P	N	M	T	S	D	E	F	FB	GA	GD	AD	AF	AL	DB
E80S	125	160	156	110	230	80	80	410	360	10	10	140	95	115	3	M8	24	50	8	40	27	7	134	111	165	M8
E80M	125	160	156	110	280	80	80	470	410	10	10	140	95	115	3	M8	28	60	8	50	31	7	134	111	215	M10
E80L	125	160	156	110	350	80	80	540	480	10	10	140	95	115	3	M8	28	60	8	50	31	7	134	111	285	M10

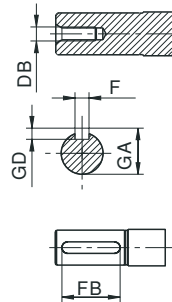
**Shaft height 80 mm (E80), single-phase with coupling flange (B14)**



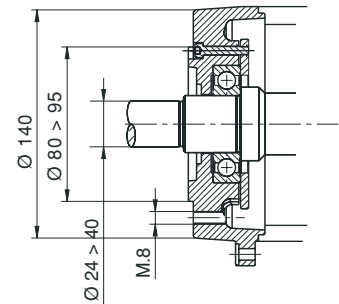
Size	A	AB	AC	AA	B	H	HB	L	LB	Y	K	P	N	M	T	S	D	E	F	FB	GA	GD	AD	AF	AL	AP	DB
E80S	125	160	156	110	230	80	80	410	360	10	10	140	95	115	3	M8	24	50	8	40	27	7	152	120	160	146	M8
E80L	125	160	156	110	280	80	80	470	410	10	10	140	95	115	3	M8	28	60	8	50	31	7	152	120	210	146	M10



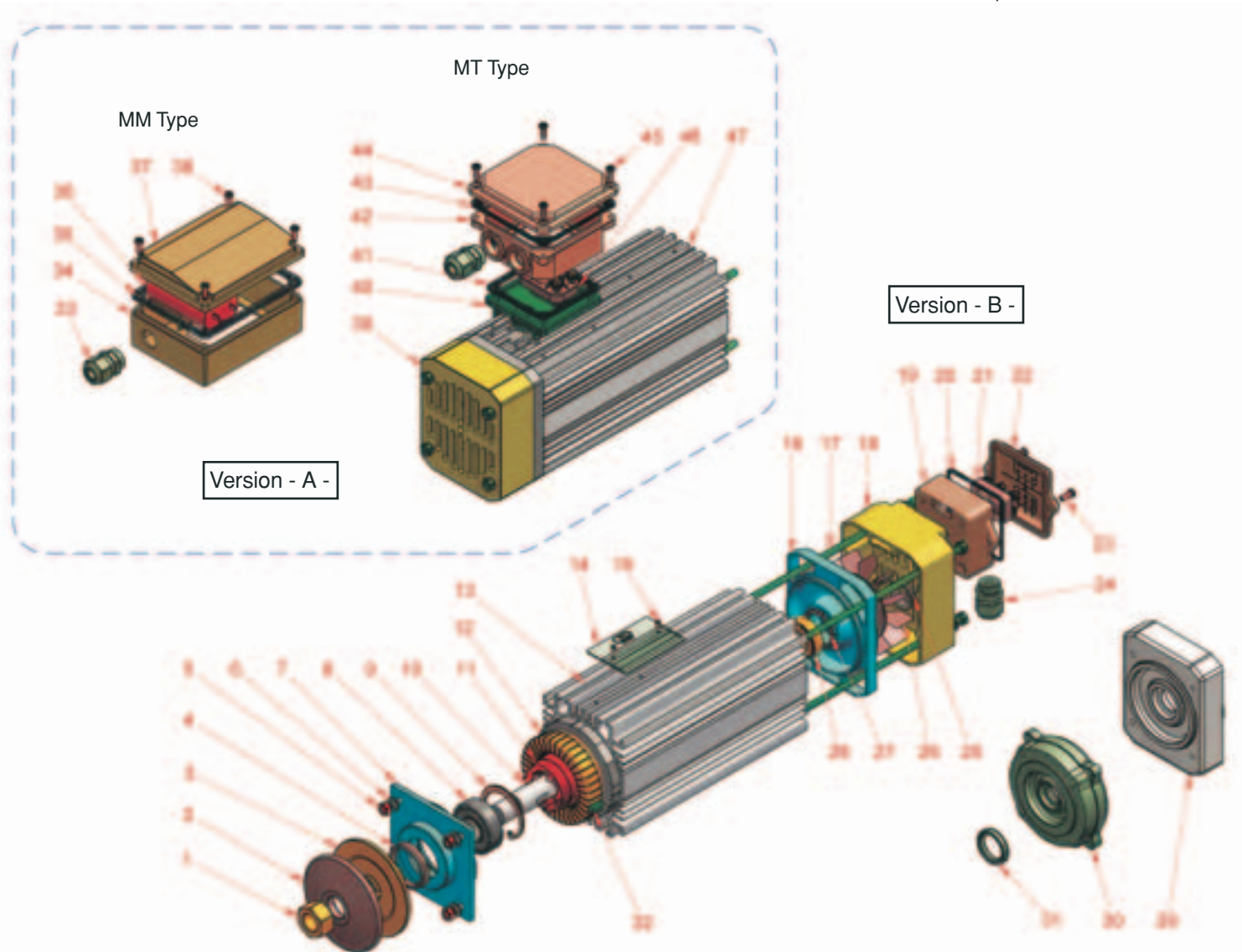
FPC brake application



Shaft dimensions

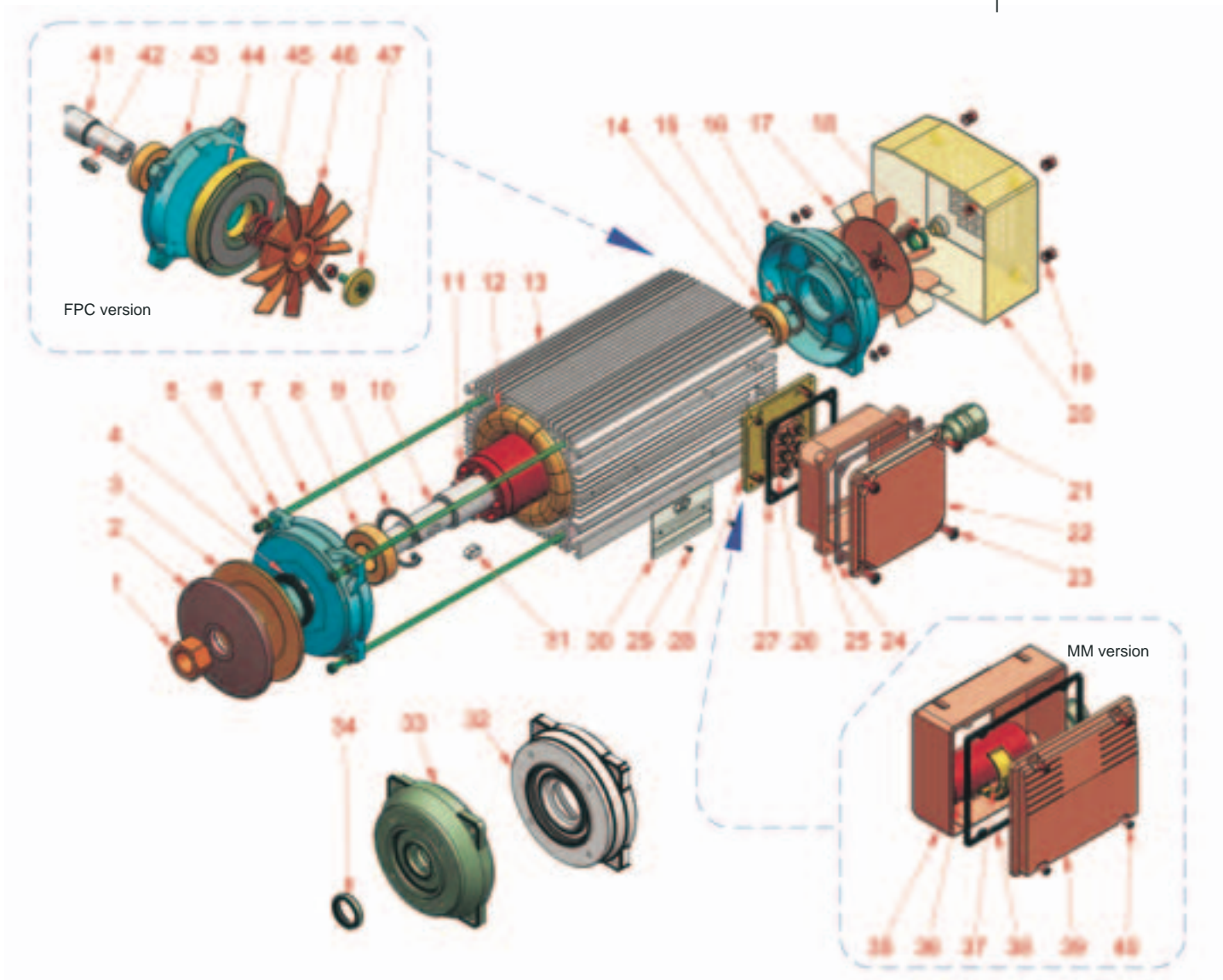


Optional flange dimensions



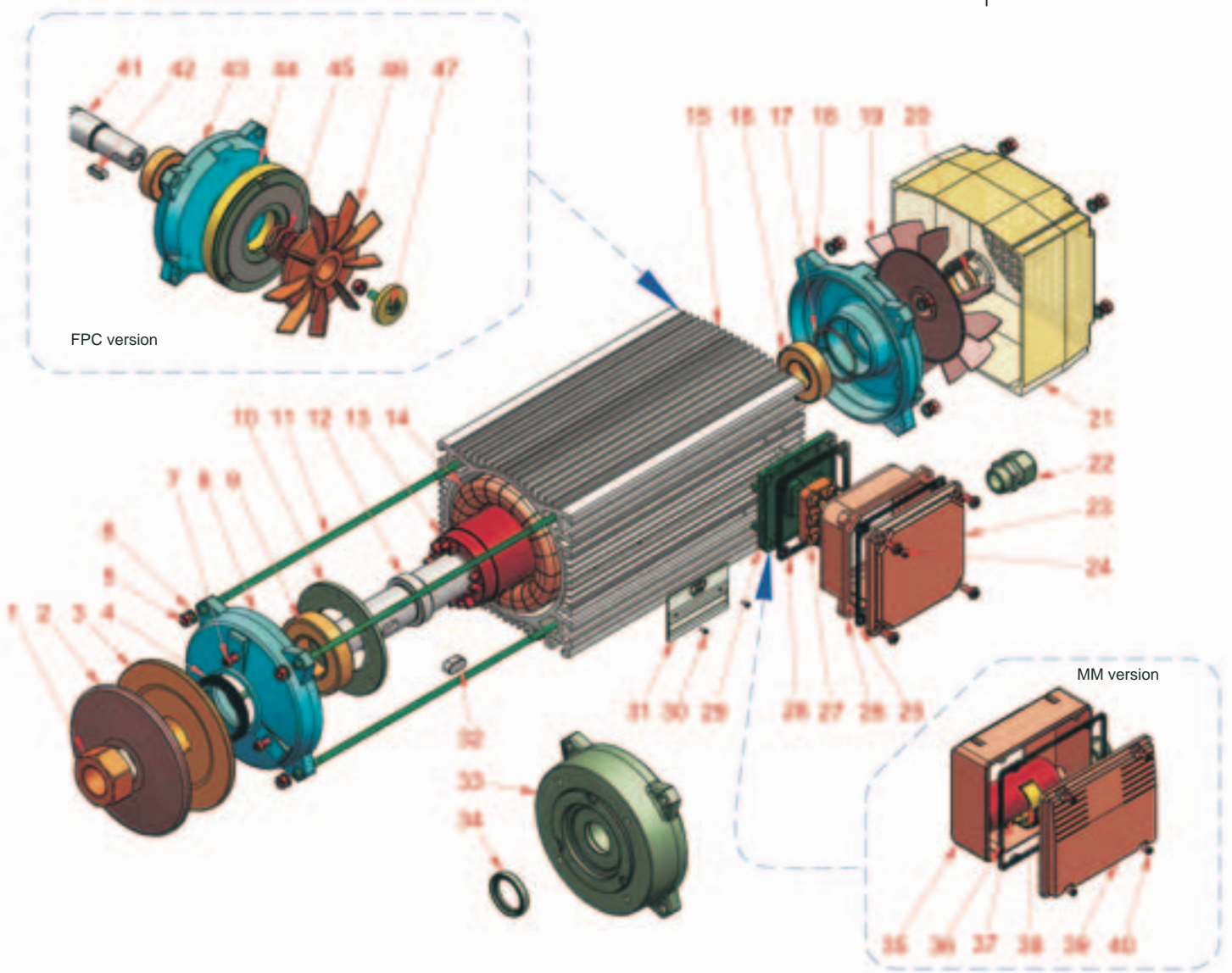
- |  |  |
|--|--|
| 1 Blade nut                              | 25 Fan tightening ring                                 |
| 2 Blade Clamping disc                    | 26 Cooling fan (PVC)                                   |
| 3 Blade holding disc                     | 27 Pre-load washer                                     |
| 4 Dust seal (V-ring)                     | 28 Bearing (non-drive end)                             |
| 5 End-shield bolts                       | 29 B14 flange (IEC80)                                  |
| 6 Washers                                | 30 B14 flange (IEC71)                                  |
| 7 End-shield (drive end)                 | 31 Oil seal  |
| 8 Bearing (drive end)                    | 32 Shaft key   |
| 9 Pre-load washer                        | 33 Version A - MM type: cable gland                    |
| 10 Shaft                                 | 34 Version A - MM type: capacitor holder - box         |
| 11 Rotor                                 | 35 Version A - MM type: IP55 rubber gasket             |
| 12 Stator assembly                       | 36 Capacitor   |
| 13 Version B: casing                     | 37 Version A - MM type: capacitor holder - cover       |
| 14 Nameplate                             | 38 Version A - MM type: capacitor holder fixing screws |
| 15 Nameplate fixing screws               | 39 Version A: fan cover                                |
| 16 End-shield (non-drive end)            | 40 Version A: terminal box base (PVC)                  |
| 17 Tie rods                              | 41 Version A - MT type: IP 55 rubber gasket            |
| 18 Version B: fan cover                  | 42 Version A - MT type: terminal box                   |
| 19 Version B: terminal box               | 43 Version A - MT type: IP 65 rubber gasket            |
| 20 Version B: IP55 rubber gasket         | 44 Version A - MT type: terminal box cover             |
| 21 Version B: terminal block             | 45 Version A - MT type: terminal box fixing screws     |
| 22 Version B: terminal box cover         | 46 Version A: terminal block                           |
| 23 Version B: terminal box fixing screws | 47 Version A - MT and MM type: casing                  |
| 24 Version B: cable gland                |  |





- 1 Blade nut
- 2 Blade Clamping disc
- 3 Blade holding disc
- 4 Dust seal (V-ring)
- 5 Washers
- 6 End-shield (drive end)
- 7 Tie rods
- 8 Bearing (drive end)
- 9 Pre-load washer
- 10 Shaft
- 11 Rotor
- 12 Stator assembly
- 13 Casing
- 14 Bearing (non-drive end)
- 15 Pre-load washer
- 16 End-shield (non-drive end)
- 17 Cooling fan (PVC)
- 18 Fan tightening ring
- 19 Tie rod nuts
- 20 Fan cover
- 21 Cable gland
- 22 Terminal box – cover
- 23 Terminal box fixing screws
- 24 IP65 rubber gasket

- 25 Terminal box
- 26 Terminal block
- 27 IP55 rubber gasket
- 28 Terminal box base (PVC)
- 29 Nameplate fixing screws
- 30 Nameplate
- 31 Shaft key
- 32 B14 flange (IEC80)
- 33 B14 flange (IEC71)
- 34 Oil seal
- 35 MM type: capacitor holder - box
- 36 MM type: capacitor
- 37 MM type: capacitor clamp
- 38 MM type: IP55 rubber gasket
- 39 MM type: capacitor holder - cover
- 40 MM type: capacitor holder fixing screws
- 41 FPC version: shaft
- 42 FPC version: shaft key
- 43 FPC version: end-shield (non-drive end)
- 44 FPC version: brake unit
- 45 FPC version: adjustable axial spring
- 46 FPC version: cooling fan (cast iron)
- 47 FPC version: brake adjustment screws



- |   |  |
|---|--|
| 1 Blade nut                             | 25 IP65 rubber gasket                      |
| 2 Blade Clamping disc                   | 26 Terminal box                            |
| 3 Blade holding disc                    | 27 Terminal block                          |
| 4 Dust seal (V-ring)                    | 28 IP55 rubber gasket                      |
| 5 Washers                               | 29 Terminal box base (PVC)                 |
| 6 End-shield (drive end)                | 30 Nameplate fixing screws                 |
| 7 Tie rods                              | 31 Nameplate                               |
| 8 Cast iron end-shield (drive end)      | 32 Shaft key                               |
| 9 Bearing (drive end)                   | 33 B14 flange (IEC90)                      |
| 10 Circlips                             | 34 Oil seal                                |
| 11 Tie rods                             | 35 MM type: capacitor holder - box         |
| 12 Shaft                                | 36 MM type: IP55 rubber gasket             |
| 13 Rotor                                | 37 MM type: capacitor                      |
| 14 Stator assembly                      | 38 MM type: capacitor clamp                |
| 15 Casing                               | 39 MM type: capacitor holder - cover       |
| 16 Bearing (non-drive end)              | 40 MM type: capacitor holder fixing screws |
| 17 Pre-load washer                      | 41 FPC version: shaft                      |
| 18 Cast iron end-shield (non-drive end) | 42 FPC version: shaft key                  |
| 19 Cooling fan (PVC)                    | 43 FPC version: end-shield (non-drive end) |
| 20 Fan tightening ring                  | 44 FPC version: brake unit                 |
| 21 Fan cover                            | 45 FPC version: adjustable axial spring    |
| 22 Cable gland                          | 46 FPC version: cooling fan (cast iron)    |
| 23 Terminal box – cover                 | 47 FPC version: brake adjustment screws    |
| 24 Terminal box fixing screws           |  |

# UL-CSA approved motors (MTOML, MMOML)

## PRODUCTION STANDARDS for THREE-PHASE MOTORS

Mounting arrangement	IMB3
Terminal box position	On top (BS)
Voltage range •	From 110V to 760 V 60Hz
Protection rating	IP55
Bearings	ZZ
Winding insulation	Class F
Terminal box type	2 aluminium components (box + cover)
End-shields assembly	Bosses and bolts
Paint finish	BLUE RAL 5010
Fan cover	Galvanized steel sheet
Duty	S1




## PRODUCTION STANDARDS for SINGLE-PHASE MOTORS




Mounting arrangement	IMB3
Terminal box position	On top (BS)
Protection rating	IP55
Bearings	ZZ
Winding insulation	Class F
Terminal box type	Capacitor-holder
End-shields assembly	Bosses and bolts
Paint finish	BLUE RAL 5010
Fan cover	Galvanized steel sheet
Duty	S1

• Approved voltage ranges.

**UL:** three phase from 110V to 440V delta, from 190V to 760V star – single phase from 110V to 240V

**CSA:** three phase 600V max – single phase from 110V to 240V

		
		MOT. 3~IEC 34
Tipo		N.
<input type="radio"/>	Serv. S	IP CL <input type="radio"/> MV12
Hp		kW Hz
$\Delta$ V $\Delta$ A	$\Delta$ A	min <sup>-1</sup> Cos.φ
t amb.40°C		S.F. Eff. % kg
CEG S.r.l. - www.ceg.it - Made in Italy		

		
		MOT. 1~IEC 34
M.		N. min <sup>-1</sup>
<input type="radio"/> t amb.40°C		SM14 <input type="radio"/>
kW		Hp Hz
V		A
Cond.μ F.		VL
Cos.φ		IP CL Ser.S
CEG S.r.l. - www.ceg.it - Made in Italy		

## Meaning of the symbols

Pn = rated power	Mm = breakdown torque
n = rated speed	J = moment of inertia
In = rated current	Cos φ = power factor
Is = locked-rotor current	η = efficiency
Mn = rated torque	Cm = running capacitor
Ms = locked-rotor torque	Ca = starting capacitor



### APPROVED THREE-PHASE MOTORS

3600 min<sup>-1</sup> 2 poles 60 Hz

Approval	Size	Pn		n min <sup>-1</sup>	In(460V) A	Cosφ	η %	Mn Nm	Mm/Mn	Ms/Mn	Is/In	J Kgm <sup>2</sup>	Weight Kg
		kW	Hp										
UL - CSA	M56b	0,135	0,18	3360	0,4	0,7	63	0,45	3	3	3,5	0,00008	3,4
UL - CSA	M63a	0,185	0,25	3375	0,5	0,77	67	0,63	3,3	3,3	4,1	0,00013	4,1
UL - CSA	M63b	0,25	0,35	3395	0,6	0,75	65	0,84	3,2	3,1	4,6	0,00015	4,4
UL - CSA	M71a	0,37	0,5	3395	0,9	0,8	68	1,25	3	2,9	4,9	0,00017	5,8
UL - CSA	M71b	0,55	0,75	3360	1,2	0,82	73	1,9	2,6	2,5	5,1	0,00027	6,5
UL - CSA	M80a	0,75	1	3395	1,6	0,81	73	2,53	3	3	5,3	0,00039	8,4
UL - CSA	M80b	1,1	1,5	3385	2,3	0,8	75	3,72	3,3	3,2	5,9	0,00051	9,5
UL - CSA	M80c	1,5	2	3385	3	0,79	74	2,52	3,4	3,7	5,9	0,00039	7,3
UL - CSA	M80d	1,85	2,5	3370	4	0,77	75	6,28	3,5	3,6	5,4	0,00078	11,4
UL - CSA	M90Sa	1,5	2	3435	3,2	0,78	77	5	3	3,1	5,4	0,00093	12,3
UL - CSA	M90S	1,85	2,5	3395	3,7	0,82	75	6,2	2,7	2,7	5	0,00093	12,8
UL - CSA	M90La	2,2	3	3395	4,2	0,85	78	7,42	2,9	2,9	5,5	0,00115	15
UL - CSA	M90Lb	3	4	3445	5,7	0,83	80	10	3,4	3,3	6	0,00142	17,5
UL - CSA	M100La	3	4	3445	5,7	0,83	79	10	3,5	3,7	6,2	0,00211	19,7
UL - CSA	M100Lb	4	5,5	3455	7,9	0,82	79	13,3	3,9	3,8	6,5	0,00272	24
UL - CSA	M112Ma	4	5,5	3480	7,7	0,8	82	13,2	3,4	2,7	6,5	0,00317	25,7
UL - CSA	M112Mb	5,5	7,5	3480	10,6	0,82	80	18,1	3,1	3,1	6,7	0,00434	31,6
UL - CSA	M132Sa	5,5	7,5	3480	10,7	0,82	79	18,1	3	3	6,9	0,00744	36,5
UL - CSA	M132Sb	7,5	10	3505	14,6	0,78	82	24,5	3,4	3,2	7	0,0091	42,5
UL - CSA	M132Ma	11	15	3510	20	0,81	83	35,9	3,4	3,3	7	0,01146	52,5
UL - CSA	M160Ma	11	15	3530	18,9	0,86	84	35,7	3,3	3,1	6,7	0,0238	72
UL - CSA	M160Mb	15	20	3545	25,1	0,86	86	48,5	3,5	3,9	7,5	0,03117	86
UL - CSA	M160La	18,5	25	3545	31,1	0,86	87	59,8	3,7	3,6	6	0,03671	98
UL - CSA	M160Lb	22	30	3530	36,1	0,87	87	71,5	3,8	3,2	7,3	0,04188	109

### APPROVED THREE-PHASE MOTORS

1800 min<sup>-1</sup> 4 poles 60 Hz

Approval	Size	Pn		n min <sup>-1</sup>	In(460V) A	Cosφ	η %	Mn Nm	Mm/Mn	Ms/Mn	Is/In	J Kgm <sup>2</sup>	Weight Kg
		kW	Hp										
UL - CSA	M56b	0,09	0,12	1640	0,3	0,65	55	0,63	2,5	2,7	2,6	0,00011	3,1
UL - CSA	M63a	0,135	0,18	1630	0,5	0,65	58	0,98	2,2	2,3	2,5	0,00016	4
UL - CSA	M63b	0,185	0,25	1650	0,6	0,7	60	1,28	2,5	2,5	3	0,00002	4,6
UL - CSA	M71a	0,25	0,35	1690	0,7	0,73	60	1,7	2,7	2,6	4,5	0,00058	6
UL - CSA	M71b	0,37	0,5	1655	1	0,71	67	2,56	2,6	2,8	4	0,00065	6,6
UL - CSA	M71c	0,55	0,75	1625	1,3	0,79	68	3,87	2,1	2,5	4	0,00087	7,7
UL - CSA	M80a	0,55	0,75	1690	1,3	0,8	65	3,72	2,1	1,7	4	0,00124	8
UL - CSA	M80b	0,75	1	1690	1,8	0,75	69	5,07	2,5	2,4	4,4	0,00167	9,5
UL - CSA	M80c	1,1	1,5	1685	2,5	0,77	73	7,47	2,5	2,2	4,7	0,00185	11,7
UL - CSA	M90S	1,1	1,5	1680	2,3	0,83	75	7,5	2,5	2,6	4,8	0,00168	12,4
UL - CSA	M90La	1,5	2	1700	3,3	0,76	75	10,1	3,1	3,2	5	0,00217	14,5
UL - CSA	M90Lb	1,85	2,5	1685	3,8	0,79	77	12,6	3,9	3,2	5,2	0,00257	16,5
UL - CSA	M100La	2,2	3	1715	4,7	0,75	79	14,7	2,6	2,7	5	0,00335	18,5
UL - CSA	M100Lb	3	4	1690	6,2	0,79	79	20,3	2,7	2,6	5,3	0,00463	21,4
UL - CSA	M100Lc	4	5,5	1680	7,8	0,84	77	27,3	2,4	2,1	4,6	0,00508	23,5
UL - CSA	M112Ma	4	5,5	1730	7,7	0,8	82	26,5	2,7	2,6	5,5	0,00866	31,5
UL - CSA	M112Mb	5,5	7,5	1705	10,3	0,82	81	37	3,3	2,8	6	0,00955	34,5
UL - CSA	M132S	5,5	7,5	1710	10	0,85	81	36,8	2,5	2,6	5,1	0,01803	42
UL - CSA	M132Ma	7,5	10	1715	13,3	0,84	84	50	2,7	2,7	6	0,02218	52,5
UL - CSA	M132Mb	9,2	12,5	1720	16,9	0,83	85	61,2	3,2	2,7	5,7	0,02436	56,5
UL - CSA	M160M	11	15	1760	19,1	0,81	89	71,7	2,4	2,2	7,2	0,04575	79,2
UL - CSA	M160L	15	20	1755	27,7	0,8	86	98	2,6	2,5	5,8	0,05968	97,5





### APPROVED THREE-PHASE MOTORS

1200 min<sup>-1</sup> 2 poles 60 Hz

Approval	Size	Pn		n min <sup>-1</sup>	In(460V) A	Cosφ	η %	Mn Nm	Mm/Mn	Ms/Mn	Is/In	J Kgm <sup>2</sup>	Weight Kg
		kW	Hp										
UL - CSA	M63b	0,12	0,17	1035	0,7	0,56	40	1,33	1,8	1,9	1,8	0,00023	5
UL - CSA	M71a	0,185	0,25	1080	0,7	0,6	55	1,96	2,1	2,1	2,4	0,00065	6,6
UL - CSA	M71b	0,25	0,35	1090	0,9	0,62	55	2,62	2,2	2,2	2,5	0,00087	7,7
UL - CSA	M80a	0,37	0,5	1100	1,1	0,73	60	3,86	2,2	2,2	2,7	0,0014	8,3
UL - CSA	M80b	0,55	0,75	1080	1,4	0,74	64	5,8	1,9	1,8	3	0,00186	10
UL - CSA	M90S	0,75	1	1105	2,2	0,65	66	7,8	2,3	2,1	3,4	0,00266	12
UL - CSA	M90L	1,1	1,5	1095	2,7	0,73	68	11,6	2,3	2,3	3,5	0,0025	14,3
UL - CSA	M100L	1,5	2	1130	3,7	0,68	73	15,2	2,7	2,3	4,6	0,00562	19
UL - CSA	M112M	2,2	3	1145	4,6	0,77	78	22	2,6	1,5	5,1	0,01333	30
UL - CSA	M132S	3	4	1140	6,6	0,77	75	30,2	2,5	1,6	4,6	0,02187	40
UL - CSA	M132Ma	4	5,5	1150	8,1	0,75	82	39,6	2,2	2	5	0,02541	46,4
UL - CSA	M132Mb	5,5	7,5	1140	10,9	0,79	81	56	2	1,5	4	0,03068	52,5
UL - CSA	M160M	7,5	10	1150	14,4	0,8	86	74,6	2,5	2,3	5	0,06927	78
UL - CSA	M160L	11	15	1170	21,2	0,75	87	108	2,8	2,4	5,5	0,12674	110

### APPROVED SINGLE-PHASE MOTORS

3600 min<sup>-1</sup> 2 poles 60 Hz

Approval	Size	Pn		n min <sup>-1</sup>	In(460V) A	Cosφ	η %	Mn Nm	Ms/Mn	Is/In	Cm μF	J Kgm <sup>2</sup>	Weight Kg
		kW	Hp										
UL - CSA	M56	0,11	0,15	3215	0,9	0,94	50	0,39	1,2	1,9	6,3	0,00008	3,3
UL - CSA	M63a	0,185	0,25	3275	1,2	0,99	58	0,65	1	2,8	8	0,00014	4,4
UL - CSA	M63b	0,25	0,35	3300	1,8	0,97	55	0,87	1,1	2,7	12	0,00017	4,9
UL - CSA	M71a	0,37	0,5	3275	3	0,89	53	1,3	0,73	2,8	12	0,00032	6,6
UL - CSA	M71b	0,55	0,75	3275	3,7	0,92	61	1,92	0,62	2,8	16	0,00038	7,7
UL - CSA	M80a	0,75	1	3325	4,4	0,94	68	2,58	0,83	3,6	20	0,00066	10
UL - CSA	M80b	1,1	1,5	3255	6,1	0,99	69	3,9	0,64	3,3	25	0,00083	11,4
UL - CSA	M80c	1,5	2	3240	8,5	0,95	70	5,3	0,58	3,3	35	0,00092	12,3
UL - CSA	M90Sa	1,5	2	3300	7,8	0,98	75	5,2	0,74	3,7	40	0,00114	14,7
UL - CSA	M90La	1,85	2,5	3300	9,3	0,99	74	6,4	0,64	3,7	50	0,0013	16,8
UL - CSA	M90Lb	2,2	3	3290	11,7	0,99	72	8,2	0,7	3,2	60	0,0013	16,8
UL - CSA	M100L	2,5	3,5	3360	13,7	0,95	73	8,5	0,7	4	85	0,00246	22

### APPROVED SINGLE-PHASE MOTORS

1800 min<sup>-1</sup> 4 poles 60 Hz

Approval	Size	Pn		n min <sup>-1</sup>	In(460V) A	Cosφ	η %	Mn Nm	Ms/Mn	Is/In	Cm μF	J Kgm <sup>2</sup>	Weight Kg
		kW	Hp										
UL - CSA	M56a	0,09	0,12	1620	0,8	0,83	50	0,49	0,65	2	5	0,00012	3,3
UL - CSA	M56b	0,11	0,15	1620	0,9	0,85	57	0,78	1	2,1	5	0,00013	4
UL - CSA	M63	0,185	0,25	1680	1,3	0,99	54	1,23	1	2	10	0,00024	4,7
UL - CSA	M71a	0,25	0,35	1600	1,7	0,93	60	2,05	1	2,3	10	0,00064	6,5
UL - CSA	M71b	0,37	0,5	1620	2,6	0,96	55	2,6	1	2,5	16	0,00086	7,7
UL - CSA	M80a	0,55	0,75	1630	3,2	0,98	64	3,86	0,52	2,7	14	0,00142	8,9
UL - CSA	M80b	0,75	1	1680	4,6	0,94	65	5,1	0,5	3,5	20	0,00184	10,4
UL - CSA	M90S	1,1	1,5	1655	5,8	0,98	71	7,6	0,52	3,3	35	0,00185	13,3
UL - CSA	M90La	1,5	2	1630	8,1	0,96	73	10,8	0,5	3	45	0,00247	16,2
UL - CSA	M90Lb	1,85	2,5	1630	10,5	0,91	73	13	0,5	3,1	55	0,00268	17,8
UL - CSA	M100La	1,85	2,5	1630	10,6	0,94	70	13	0,6	3	55	0,00403	21,4
UL - CSA	M100Lb	2,2	3	1620	11,3	0,97	76	15,6	0,5	4	70	0,00506	23,9

# UL-CSA approved low centre motors (ETOML, EMOML)

Low centre motors are available with UL-CSA approval according to following features:

PRODUCTION STANDARDS		
	Blade clamping discs (B3) •	B14 flange
Coupling	See dimension diagrams E48 p. 75 – E63 p. 77 – E80 p. 79	See dimension diagrams E48 p. 76 – E63 p. 78 – E80 p. 80
Terminal box position	Left side, near fan cover •• (Only E48 motor can also be fitted with terminal box on the rear side)	Left side, near fan cover •• (Only E48 motor can also be fitted with terminal box on the rear side)
Voltage range	ET from 110 to 760 V 60 Hz ••• EM from 110 to 240 V 60 Hz	ET from 110 to 760 V 60 Hz ••• EM from 110 to 760 V 60 Hz
Protection rating	IP55	IP55
Bearings	ZZ	ZZ
Winding insulation	Class F	Class F
Terminal Box type	ET 2 aluminium components (box + cover) EM capacitor-holder	ET 2 aluminium components (box + cover) EM capacitor-holder
End-shields assembly	Tie rods	Tie rods
Paint finish	Unpainted	Unpainted
Fan cover	E48 aluminium – E63 / E80 plastic	E48 aluminium – E63 / E80 plastic
Duty	S6 - 60%	S6 - 60%

- For B3 version right-hand (DX) or left-hand (SX) thread to be specified on order.
- On demand terminal box position can be on the right side and/or near shaft-end.
- Approved voltage ranges:

**UL:** three phase from 110V to 440V delta, from 190V to 760V star – single phase from 110V to 240V

**CSA:** three phase 600V max – single phase from 110V to 240V

CEG		ULCE	
MOT. 3~IEC 34			
Tipo		N.	
<input type="radio"/>	Serv. S	IP	CL <input type="radio"/> MV12
Hp		kW	
$\Delta$ V	$\Delta$ A	mln <sup>-1</sup>	Cos.φ
t amb.40°C		S.F.	Eff. %
kg			
CEG S.r.l. - www.ceg.it - Made in Italy			

CEG		ULCE	
MOT. 1~IEC 34			
M.		N.	
mln <sup>-1</sup>		SM14 <input type="radio"/>	
kW		Hp	
V		A	
Cond.μ F.		VL	
Cos.φ		IP CL Ser.S	
CEG S.r.l. - www.ceg.it - Made in Italy			

### Meaning of the symbols

Pn	= rated power	Mm	= breakdown torque
n	= rated speed	J	= moment of inertia
In	= rated current	Cos φ	= power factor
Is	= locked-rotor current	η	= efficiency
Mn	= rated torque	Cm	= running capacitor
Ms	= locked-rotor torque	Ca	= starting capacitor



### APPROVED THREE-PHASE LOW CENTRE MOTORS

3600 min<sup>-1</sup> 2 poles 60 Hz

Approval	Size	Pn		n min <sup>-1</sup>	In(460V) A	Cosφ	η %	Mn Nm	Mm/Mn	Ms/Mn	Is/In	J Kgm <sup>2</sup>	Weight Kg
		kW	Hp										
UL - CSA	E48Sb	0,55	0,75	3300	1,2	0,84	67	1,91	2	2,1	3	0,00019	5,6
UL - CSA	E48Sc	0,75	1	3360	1,7	0,88	66	1,87	3	3,2	2,8	0,00025	6,5
UL - CSA	E48Ma	1,1	1,5	3300	2,3	0,8	75	3,82	2,5	2,6	3,9	0,0003	8
UL - CSA	E48L	1,5	2	3300	3	0,8	77	5,2	3,2	3,3	4,6	0,00043	10
UL - CSA	E63Sa	1,1	1,5	3290	2,3	0,83	75	3,82	3	3,1	5	0,0006	10,7
UL - CSA	E63Sb	1,5	2	3265	3	0,84	76	5,3	2,3	2,4	4,3	0,00075	11,5
UL - CSA	E63Sc	1,85	2,5	3315	4,2	0,84	76	6,31	3,2	3,4	4,6	0,0009	12,7
UL - CSA	E63Lb	3	4	3335	5,6	0,84	81	10,2	3,3	3,5	6	0,00115	17
UL - CSA	E80S	3	4	3420	5,7	0,83	80	10	3,4	3,4	6	0,0016	25,5
UL - CSA	E80Sb	4	5,5	3470	8	0,8	80	13,3	3,3	3,4	6,8	0,002	27,5
UL - CSA	E80M	5,5	7,5	3445	10	0,82	85	18,5	3,6	3,7	6,3	0,00225	31,3
UL - CSA	E80L	7,5	10	3420	13,4	0,86	82	25,2	3,1	3,1	5	0,00275	38,8

### APPROVED THREE-PHASE LOW CENTRE MOTORS

1800 min<sup>-1</sup> 4 poles 60 Hz

Approval	Size	Pn		n min <sup>-1</sup>	In(460V) A	Cosφ	η %	Mn Nm	Mm/Mn	Ms/Mn	Is/In	J Kgm <sup>2</sup>	Weight Kg
		kW	Hp										
UL - CSA	E48S	0,37	0,5	1690	1,4	0,51	67	2,5	3,9	4	3,5	0,00035	6,7
UL - CSA	E48M	0,55	0,75	1620	1,5	0,7	67	3,9	2,6	2,7	3,2	0,00045	8,5
UL - CSA	E48L	0,75	1	1560	2,1	0,68	66	5,5	2,2	2,3	2,2	0,0005	9,3
UL - CSA	E63Sa	0,75	1	1655	1,7	0,78	73	5,2	2,2	2,1	4,2	0,0011	11,2
UL - CSA	E63Sb	1,1	1,5	1680	2,3	0,77	76	7,5	2,2	2,3	3,9	0,00125	12,6
UL - CSA	E63La	1,5	2	1620	3,4	0,76	73	10,6	1,8	2	3	0,0015	14
UL - CSA	E80S	2,2	3	1680	4,3	0,81	79	15	3,3	3,4	5,6	0,0028	24,5
UL - CSA	E80M	3	4	1645	5,9	0,82	78	20,9	2,1	2,3	4,4	0,00325	30

### APPROVED SINGLE-PHASE LOW CENTRE MOTORS

3600 min<sup>-1</sup> 2 poles 60 Hz

Approval	Size	Pn		n min <sup>-1</sup>	In(460V) A	Cosφ	η %	Mn Nm	Mm/Mn	Is/In	Cm μF	J Kgm <sup>2</sup>	Weight Kg
		kW	Hp										
UL - CSA	E48Sa	0,37	0,5	3240	2,5	0,99	56	1,31	1,3	2	10	0,00019	6,1
UL - CSA	E48Sb	0,55	0,75	3360	3	0,98	70	1,87	1,3	2,2	14	0,00025	6,9
UL - CSA	E48Ma	0,75	1	3360	4,6	0,96	64	2,55	1,6	3,1	16	0,0003	8,1
UL - CSA	E48M	1,1	1,5	3360	6,1	0,95	72	3,75	1,5	3,3	20	0,00043	9,5
UL - CSA	E63S	1,1	1,5	3360	6,1	0,92	74	3,75	1,6	2,8	25	0,00075	11
UL - CSA	E63La	1,5	2	3360	8,4	0,95	71	5,1	1,6	3,8	30	0,0009	13
UL - CSA	E63Lc	2,2	3	3360	11,6	0,96	76	7,64	1,6	3,4	40	0,00115	17
UL - CSA	E80Sa	1,5	2	3300	8,5	0,92	72	5,2	1,7	3,7	35	0,0012	22
UL - CSA	E80Sb	2,2	3	3300	12,1	0,97	71	7,6	1,6	3,7	40	0,0014	26
UL - CSA	E80Sc	3	4	3360	15,4	0,98	75	10,2	1,5	4,9	50	0,00205	31

## High efficiency three-phase motors (MTEF2)

The CEMEP (European organisation of motor manufacturers) and the European Commission have agreed to a joint classification system for motor efficiency. Three different decreasing levels have been identified indeed: from the highest eff1, eff2 to eff3. To contribute to *energy saving*, CEG has designed MTEF2 motor family that complies with eff2 efficiency class.

### PRODUCTION STANDARDS for THREE-PHASE MOTORS

Mounting arrangement	IMB3
Terminal box position	On top (BS)
Rated voltage	230/400V 50/60 Hz
Protection rating	IP55
Bearings	ZZ
Winding insulation	Class F
Terminal box type	2 aluminium components (box + cover)
End-shields assembly	Bosses and bolts
Paint finish	BLUE RAL 5010
Fan cover	Galvanized steel sheet
Duty	S1



### Meaning of the symbol

$P_n$	= rated power	$M_s$	= locked-rotor torque
$n$	= rated speed	$M_m$	= breakdown torque
$I_n$	= rated current	$J$	= moment of inertia
$I_s$	= locked-rotor current	$\cos \varphi$	= power factor
$M_n$	= rated torque	$\eta$	= efficiency



### THREE-PHASE MOTORS (MTEF2)

3000 min<sup>-1</sup> 2 poles 50 Hz

Size	Pn		n min <sup>-1</sup>	In(400V) A	Cosφ	η %	Mn Nm	Mm/Mn	Ms/Mn	Is/In	J Kgm <sup>2</sup>	Weight Kg
	kW	Hp										
M80a	0,75	1	2840	1,85	0,79	74	2,52	3,4	3,7	5,9	0,00039	7,3
M80b	1,1	1,5	2830	2,8	0,75	76,2	3,7	3,2	2,8	4,8	0,00051	10
M90Sa	1,5	2	2870	3,7	0,75	78,5	5	3,7	3,9	6,3	0,00093	12,4
M90La	2,2	3	2850	4,9	0,8	81	7,37	2,9	2,9	5,5	0,00115	14,9
M100La	3	4	2900	6,6	0,79	83	9,9	4,8	4,6	8,5	0,00211	19,7
M112Ma	4	5,5	2935	8,5	0,8	85	13	4,2	3,5	8,9	0,00317	25,7
M132Sa	5,5	7,5	2915	12,8	0,79	86	18	3,6	2,8	6,8	0,00744	36
M132Sb	7,5	10	2925	16	0,78	87	24,5	3,5	3,2	5,9	0,0091	44
M160Ma	11	15	2925	21,5	0,84	88,5	35,9	4	3,2	8	0,0238	72
M160Mb	15	20	2925	27,6	0,88	89,5	49	3	2,9	7	0,03117	80
M160La	18,5	25	2940	34,5	0,85	90,5	60,1	3	3,4	8	0,03671	96
M160Lb	22	30	2945	41,4	0,84	90,5	70,7	3,6	4,8	5	0,063	170
M200La	30	40	2925	53,7	0,89	92	98	3	2,4	7	0,076	185
M200Lb	37	50	2940	64,1	0,9	93	120	3,2	2,4	7,2	0,13	255
M225M	45	60	2940	78	0,9	93,4	146	3,2	2,5	7,2	0,15	275
M250M	55	75	2950	93,5	0,91	93,4	179	3,3	2,3	7,5	0,21	340

### THREE-PHASE MOTORS (MTEF2)

1500 min<sup>-1</sup> 4 poles 50 Hz

Size	Pn		n min <sup>-1</sup>	In(400V) A	Cosφ	η %	Mn Nm	Mm/Mn	Ms/Mn	Is/In	J Kgm <sup>2</sup>	Weight Kg
	kW	Hp										
M80b	0,75	1	1420	1,95	0,74	74,5	5	2,5	2,4	5,1	0,00167	9,5
M90S	1,1	1,5	1375	2,65	0,78	76,5	7,5	2,4	2,2	4,2	0,00168	12,4
M90La	1,5	2	1410	3,65	0,75	80	10,1	3,2	2,9	5,3	0,00217	14,5
M100La	2,2	3	1430	5,5	0,72	81	14,7	3,2	2,5	8,5	0,00367	19,5
M100Lb	3	4	1435	7,3	0,72	82,8	20	3,4	2,8	6,1	0,00508	23,5
M112Ma	4	5,5	1435	8,2	0,82	84,5	26,6	2,8	2,2	5,9	0,00866	31,3
M132S	5,5	7,5	1440	11,5	0,81	85,7	36,5	2,6	2,3	5,9	0,01803	42
M132Ma	7,5	10	1450	15,2	0,82	87	49,4	3	2,4	6,6	0,02218	52,5
M160M	11	15	1465	22	0,81	88,5	71,7	2,4	2,2	7,2	0,04575	79,2
M160L	15	20	1460	30,3	0,8	89,4	98	2,6	2,5	5,8	0,05968	97,5
M180M	18,5	25	1455	34,6	0,86	90,5	121	2,5	2,3	6,2	0,087	170
M180L	22	30	1455	40,7	0,86	91	144	2,5	2,2	6,2	0,16	170
M200L	30	40	1465	55,7	0,85	91,5	197	2,6	2,5	6,8	0,2	190
M225S	37	50	1470	67,7	0,85	92	241	2,6	2,6	6,7	0,27	260
M225M	45	60	1470	83	0,85	92,5	293	2,5	2,5	6,9	0,45	280
M250M	55	75	1475	99,4	0,86	93	357	2,4	2,4	6,8	0,5	350
M280S	75	100	1485	135	0,85	94,3	485	2,3	2,1	7,2	1	490
M280M	90	120	1485	156	0,88	95	583	2,3	2,3	7,2	1,2	545

### THREE-PHASE MOTORS (MTEF2)

1000 min<sup>-1</sup> 6 poles 50 Hz

Size	Pn		n min <sup>-1</sup>	In(400V) A	Cosφ	η %	Mn Nm	Mm/Mn	Ms/Mn	Is/In	J Kgm <sup>2</sup>	Weight Kg
	kW	Hp										
M90S	0,75	1	950	2,3	0,65	72,5	7,54	3,1	2,9	5	0,00266	12
M90L	1,1	1,5	940	3,3	0,65	75,2	11,18	3,2	3,1	5	0,0025	14,3
M100L	1,5	2	960	4,1	0,66	80	14,92	3,3	2,8	5,1	0,00562	19
M112M	2,2	3	955	5,05	0,75	80	22	2,1	1,6	5	0,01333	30

## Options for Inverter-duty three-phase motors

CEG three-phase motors intended to be used for operation on static frequency converters are equipped with the following special features:

- increased phase insulation
- winding in double impregnation
- low iron losses stacks
- improved balancing level

Motors from frame size M71 to M132 can be fitted with single-phase **forced ventilation kit** located inside the motor fan cover. From size M160 up to M315 three-phase forced ventilation kit is installed.

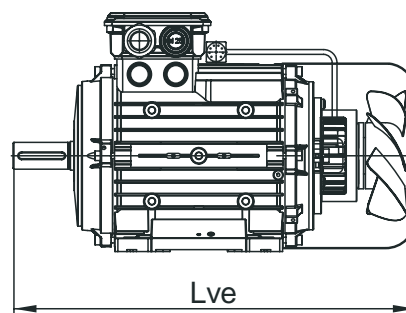
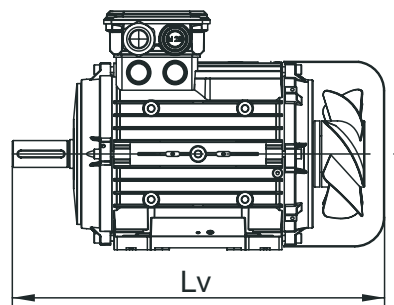
**Speed/position feedback devices** such as encoders, resolver, tacho-generator can also be fitted on demand.

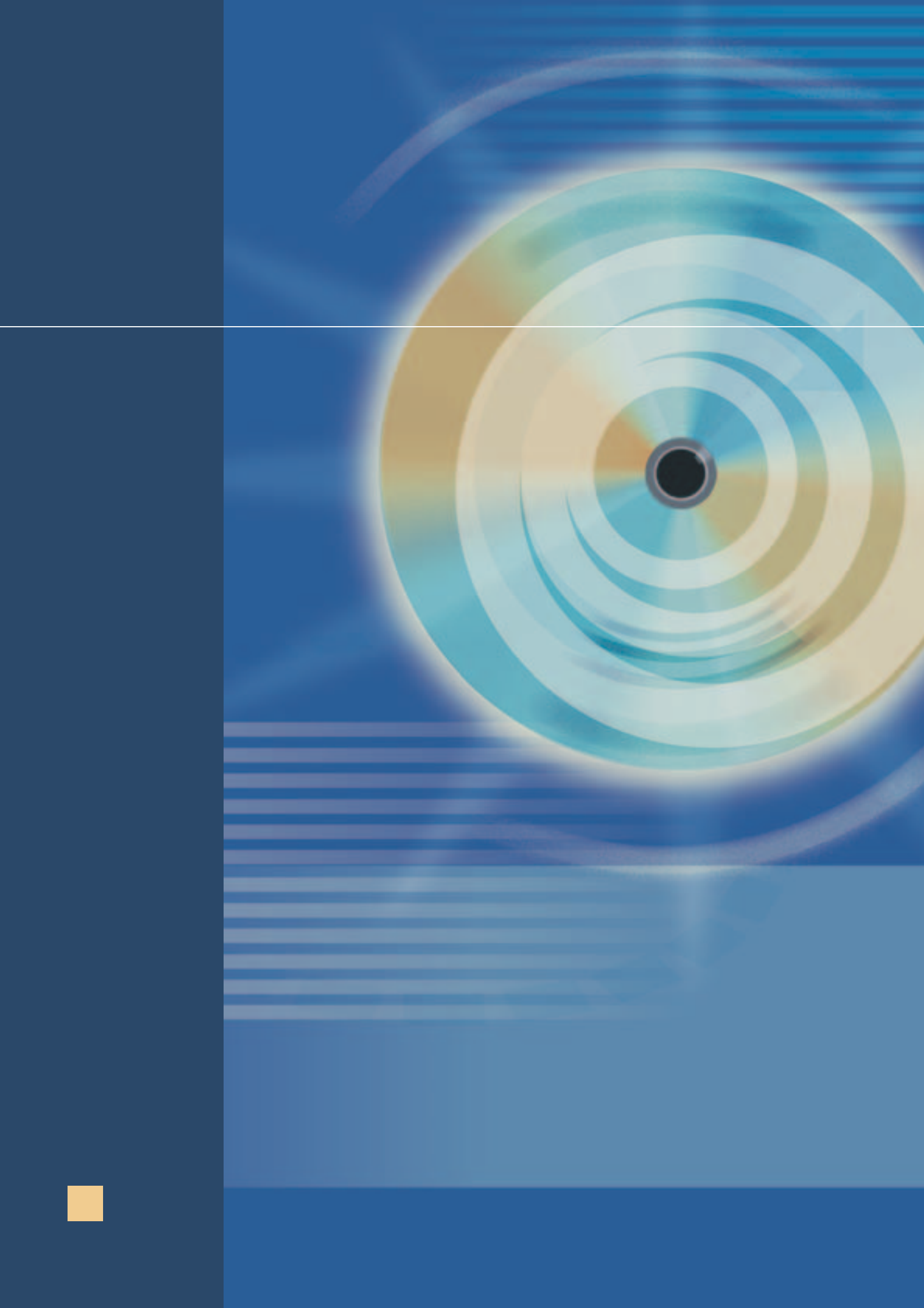
### FORCED VENTILATION

Size	Input Power (W)	Rated Current In (A)	Rated Voltage Vn (V)	Speed Rpm
M71	18	0,1	230	2650
M80	18	0,1	230	2650
M90	39	0,2	230	2870
M100	39	0,2	230	2870
M112	50	0,25	230	2740
M132	50	0,25	230	2740
M160	150	0,26	230/400	2900
M180	270	0,41	230/400	2800
M200	840	2,6/1,5	230/400	1632
M225	840	2,6/1,5	230/400	1632
M250	1080	3,4/2,1	230/400	1692
M280	1500	5/2,9	230/400	1692
M315	1500	5/2,9	230/400	1692

### MOTOR LENGTH WITH FORCED VENTILATION KIT

Size	Lv	Lve
M71	286	336
M80	290	340
M90S	322	372
M90L	347	397
M100	382	432
M112	400	450
M132S	460	510
M132L	500	550
M160M	620	680
M160L	655	715
M180M/L	803	863
M200L	870	960
M225S/M	890	980
M250M	984	1074
M280S/M	1100	1190
M315S/M	1275	1365
M315L	1375	1465





# Service

Over the years CEG has focussed its interest in the improvement of products and manufacturing process through a customer-oriented business strategy. CEG is still small enough to be able to meet and exceed expectations of each customer who is known by name.

Thanks to the ISO9001 Certification, this straight contact with the customer has been optimized by improving company skills, information flow, sale and after-sale service.

The key points of CEG service management are described in this chapter.

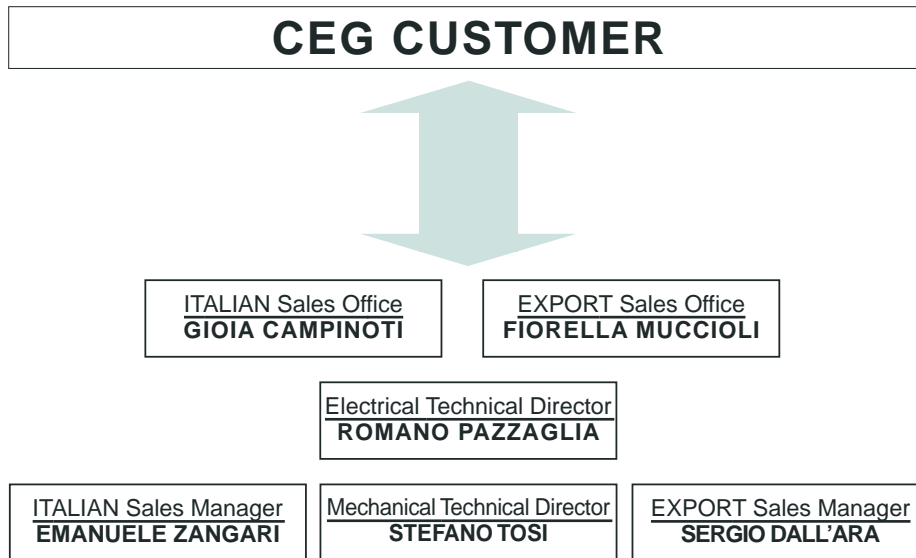




## 4. a)

# Customer care

Our experience teaches us that the customer always needs a reference person inside the company to address his request to. For this main reason, the complete CEG staff is particularly devoted to supply any kind of technical and business support in the shortest time. This being the mission, the CEG management has been improved and simplified through the following customer committed structure.



The sales offices are the first and straight reference for quick quotations, updating on placed orders and information about delivery terms. When applications need tailored motors, CEG technical department is always available to work on new designs and rapid prototypes.

Sales manager are the final responsible for special projects, sale agreements and sale network management.

## 4. b)

# Product selection

With the aim to collect all the basic manufacturing specifications that identify a motor, following data need to be defined on enquiries and/or orders:

- Quantity
- Product family (designation, approvals, etc)
- Application and drive type (direct coupling, flat or V-belt, gears, etc)
- Frame size
- Output power (kW)
- Supply voltage/frequency (V, Hz)
- Starting method (direct-on-line or Y-Δ)
- Speed (rpm)
- Mounting arrangement (IEC 34-7)
- Terminal box location
- Degree of protection (IP)
- Direction of rotation

For special design, following additional information are required :

- shaft dimensions,
- flange dimensions,
- insulation class,
- paint coating,
- brake type and supply,
- overload and thermal protections,
- climatic protection,
- switch devices,
- radial and axial force.

Visit CEG web site [www.ceg.it](http://www.ceg.it) and fill in the Form for enquiries on-line.

#### Offer form

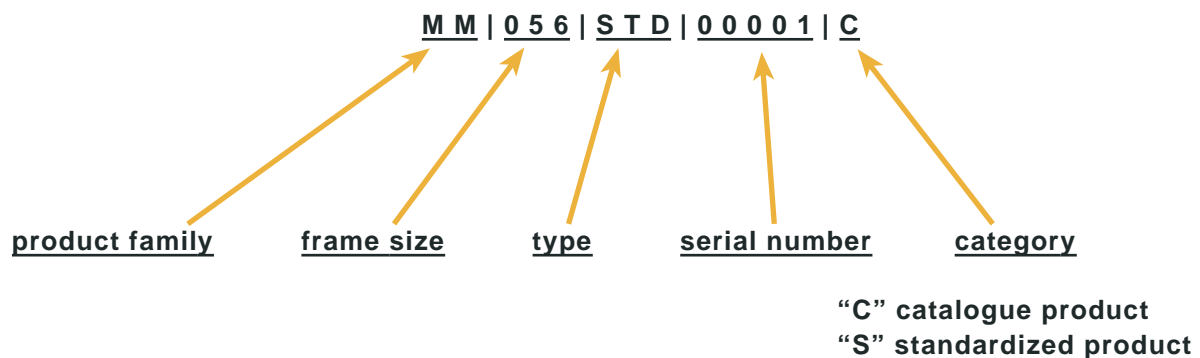
Once all the motor details have been defined, CEG Sale Staff will prepare the Offer Form specifying price, delivery terms, payment conditions, etc. "General sales conditions" are also available at CEG web site [www.ceg.it](http://www.ceg.it).

## 4. c)

# Reading product code

Once ordered, each motor is identified by a sole product code based on motor features. This code can then be used to make product selection easier for future enquiries and orders. It will also be displayed on all order acknowledgements and invoices and can be matched to customer reference for a better mutual understanding.

Following guideline will help customer in reading CEG product code:



## 4. d)

# Acknowledgement

Orders must be placed in written form by e-mail or fax (CEG offer form signed by the customer is also accepted). CEG acknowledgement will then be sent as confirmation where product code, quantity, price, week of delivery and all the remaining sale conditions are specified. This document will be useful for the customer final check, that is highly recommended to avoid any misunderstanding.

# Where we are

