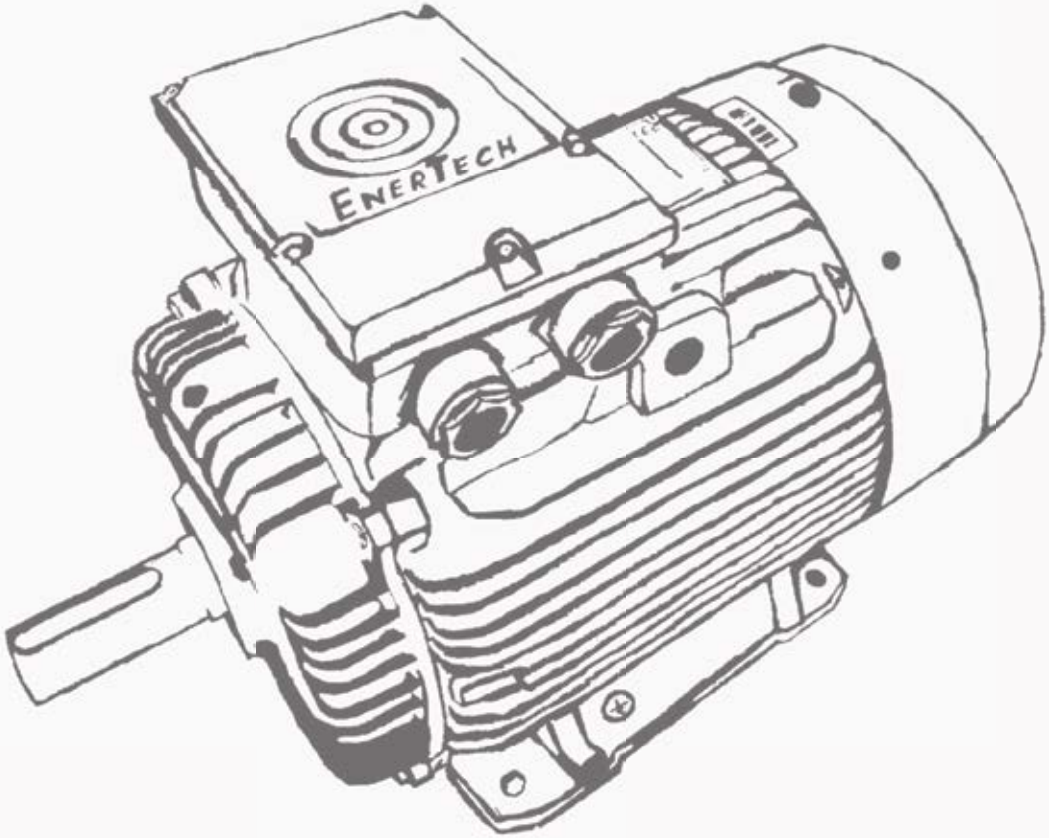


EnerTech

IE1

Three phase asynchronous

ESC Series Motors

Enhanced performance cast iron units

enertechmotors.com.au

EnerTech

INTRODUCTION

ESC motors are suitable for driving various kinds of machines or equiments. The output ratings are from 0.18kW to 500kW. The frame sizes are from 80 to 400.

The ESC motors have cast iron stator frames, endshields and terminal boxes The feet integrally cast into the stator frame.

The location of the terminal box in standard design is on the top, on the right or on the left are possible. The position of the entry opening can be adjusted to suit the existing connection facilities by turning through 90o.

All motors comply with the requirements of European CE making.

All motors are designed for high efficiency and low temperature giving a long economical service life.

Motors from frame sizes 63 to 160 wih aluminium stator frames, terminal boxes and cast iron endshields are
also available.

ISET s.r.l.

ISTITUTO SERVIZI EUROPEI TECNOLOGICI

CERTIFICATE OF COMPLIANCE

Certificado de Conformidade - Сертификат соответствия - Konformitätserklärung

1) APPLICANT:
Enertech Electric Motors (Australia)
5 Kintyre Court, Greenvale 3059, Victoria, Australia.

2) CERTIFICATE NO.:
IT041253ET170135

TEST REPORT(S) NO.:
SCC(17)-70012A-01-LVD;
SCC(17)-70012A-01-EMC
CEPREI (Sichuan) Laboratory

3) WITH REFERENCE TO EC DIRECTIVE APPLIED:
Low Voltage Directive 2014/35/EU
Electromagnetic Compatibility 2014/30/EU

HARMONIZED STANDARDS APPLIED:
EN 60034-1:2010+AC:2010; EN 61000-6-1:2007;
EN 61000-6-3:2007/A1:2011/AC:2012;
EN 61000-3-2:2014; EN 61000-3-3:2013

4) CERTIFICATION ISET MARK:

ISTITUTO SERVIZI EUROPEI TECNOLOGICI

5) PRODUCT CHARACTERISTICS: ESC Series Three-Phase Asynchronous Motor

MODEL(S): See the following annex 1

REMARK: The verification has been carried out on voluntary application of the manufacturer based only on the documents prepared and provided by the manufacturer itself. The product(s) satisfies the requirements of the Certification Mark of ISET according to the ISET regulations. The manufacturer is responsible to maintain the internal production control to ensure the compliance of the product. ISET declines any liability with reference to any other noncompliance of documents, product or test report that have been submitted to evaluation. However CE marking and EC declaration are duties of the manufacturer before putting into service of its product(s) on market. The manufacturer is liable to take all the necessary actions required by the applicable directives&procedures.

6) DATE OF ISSUE: 19/01/2017 DATE OF EXPIRE: 18/01/2022

CERTIFICATION MANAGER:

ISET S.R.L. ISTITUTO SERVIZI EUROPEI TECNOLOGICI

General Specification

Cooling and ventilation

The standard cooling method is totally Enclosed fan-cooled (TEFC) in accordance with code IC411 of I EC 60034-6. Standard motors in sizes 80-315 are equipped with radial-flow plastic fans. Standard motors in size 355 are equipped with radial-flow aluminium fans.

Enclosure

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

Voltage and frequency

Standard voltages are 380V/50Hz or 415V/50Hz, but can be wound for any single voltage in the range 200-600V at a frequency 50 or 60 Hz. The motors will operate satisfactorily with voltage variations of ±10% from the rated voltage.

Connection

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

Noise

The permitted noise levels of electrical machines are fixed in IEC60034 - 9 (EN60034-9). The noise level of ESC motors is well below these limit value. Fordetails, please referto the performance data tables.

Vibration

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

Quality assurance

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

Standards and regulations

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

1. International Electrotechnical commission - IEC 60034 and I EC 60072.
2. British Standards - BS5000 and BS 4999.
3. Australian Standards -AS 1359.
4. The requirements of European EC marking. Low voltage Directive 73/23 (1973), modified by Directive 93/68 (1993) and the EMC - Directive 89/336. These ESC motors are designed to use with other machinery, and they should only be used if the complete machinery is in conformity with the provisions of the Directive of safety of machinery (89/93/EEC).
5. CEMEP agreement-all motors with standard rating include in this catalogue comply with efficiency class IE1 and bear the corresponding label on the rating plate. For efficiency data at 50%, 75% and full load, please refer to the performance data tables. Motors comply with efficiency class IE2 are available on request.

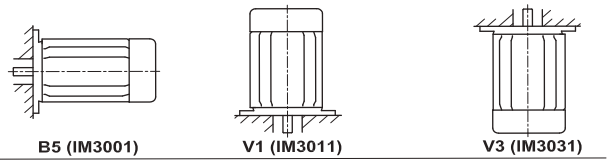
Standards	IEC	CENELEC	BS
General requirements for electrical machines	60034-1	EN 60034-1	4999-1 4999-69
Methods of determining losses and efficiency	60034-2	HD 53 2	4999-34
Degrees of protection	60034-5	EN60034-5	4999-20
Methods of cooling	60034-6	EN60034-6	4999-21
Mounting arrangements	60034-7	EN60034-7	4999-22
Terminal markings and direction of rotation	60034-8	HD 53 8S4	4999-3
Noise limits	60034-9	EN60034-9	4999-51
Starting performance	60034-12	EN60034-12	4999-112
Mechanical vibration	60034-14	EN60034-14	4999-50
Standard voltages	60038	HD 472 S1	---
Dimensions and output ratings	60072	---	---
Mounting dimensions and relationship framesizes-output ratings	60072	HD 231	4999-10 51-110
Shaft dimensions	60072	HD 231	4999-10
Classification of environmental conditions	600721-2-1	---	---
Insulation material	60085	---	---

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

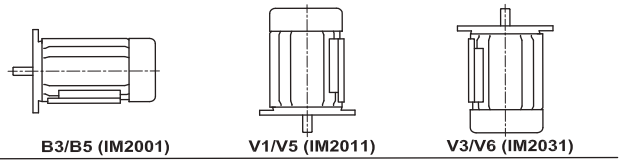
Standards mounting arrangements

Foot mounting

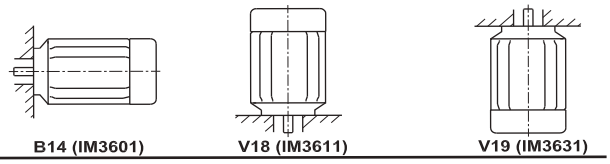
Large flange



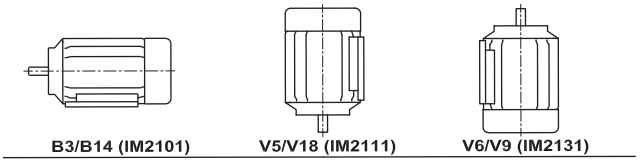
Large flange and feet



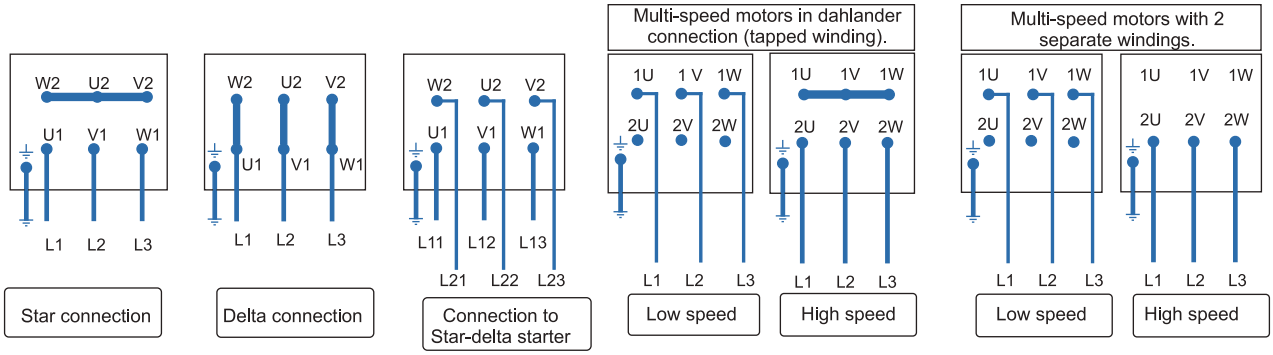
Small flange (face)



Small flange (face) and feet

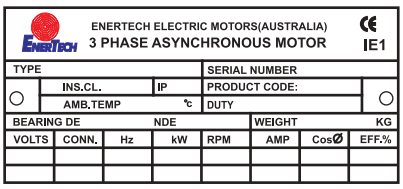


Connection diagrams three phase motors with cage rotor

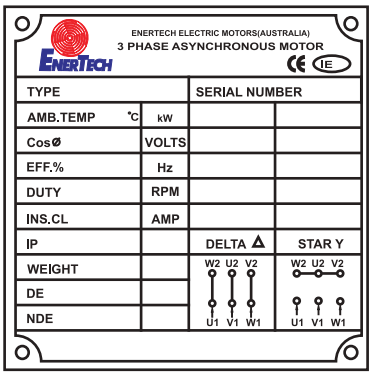


Rating plates

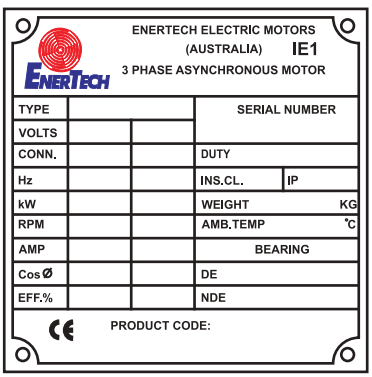
Frame size from 80 to 132



Frame size from 160 to 315



Frame size 355



General Specification

Against solar radiation

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

Degree of protection

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

IP standards explanation

IP	5	5
	1	2

International protection rating prefix
(IEC 60034 - 5)

First numeral

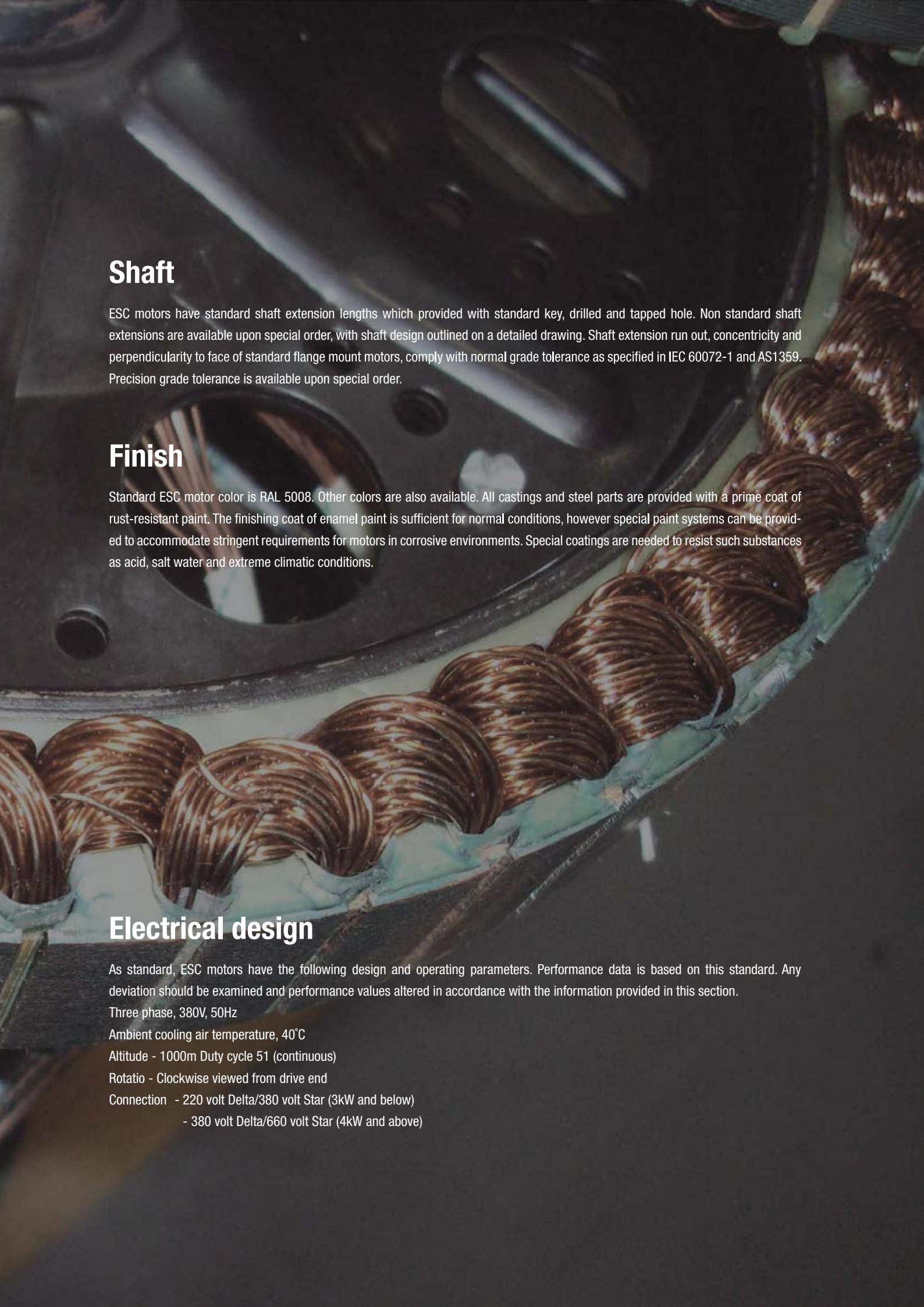
First characteristic numeral Degree of protection of persons against approach to live parts or contact with live or moving parts (other than smooth rotating shafts and the like) inside the enclosure, and degree of protection of equipment within the enclosure against the ingress of solid foreign bodies.

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

Second numeral

Second characteristic numeral

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



Shaft

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

Finish

Standard ESC motor color is RAL 5008. Other colors are also available. All castings and steel parts are provided with a prime coat of rust-resistant paint. The finishing coat of enamel paint is sufficient for normal conditions, however special paint systems can be provided to accommodate stringent requirements for motors in corrosive environments. Special coatings are needed to resist such substances as acid, salt water and extreme climatic conditions.

Electrical design

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

Three phase, 380V, 50Hz

Ambient cooling air temperature, 40˚C

Altitude - 1000m Duty cycle 51 (continuous)

Rotatio - Clockwise viewed from drive end

Connection - 220 volt Delta/380 volt Star (3kW and below)

- 380 volt Delta/660 volt Star (4kW and above)

Electrical Design

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

Electrical Design

Voltage and frequency

Standard ESC motors are designed for a power supply of three phase 380V, 50Hz. Motors can be manufactured for any supply between 100V and 1100V and frequencies other than 50Hz. Standard ESC motors wound for a certain voltage at 50Hz can also operate at other voltages at 50Hz and 60Hz without modification, subject to the changes in their data.

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

* Not applicable for motors with F class temperature rise.

* Note: This table is not applicable for hazardous area motors.

1) N = Full load current T_N = Full load torque

I_L/I_N = Locked rotor current/ full load current

T_L/T_N = Locked rotor torque/ full load torque

T_B/T_N = Breakdown torque/full load torque

Standard torque values for alternative supplies are obtainable only with special windings. For these purpose-built motors the performance data is the same as for 380V motors except for the currents which are calculated with the accompanying formula:

Where:

$$I_X = \frac{380 \times I_N}{U_X}$$

I_X = Current

I_N = Full load current at 380 volt

U_X = Design voltage

Temperature and altitude

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

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

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

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

Example 1:

Effective Power required = 15 kW

Air temperature =50°C (factor 0.93)

Altitude = 2500 metres (factor 0.91)

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

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

Example 2:

Rated power = 11 kW

Air temperature = 50°C (factor 0.93)

Altitude = 1500 metres (factor 0.98)

Effective Power = 1 1 x 0.93 x 0.98 = 10.0 kW

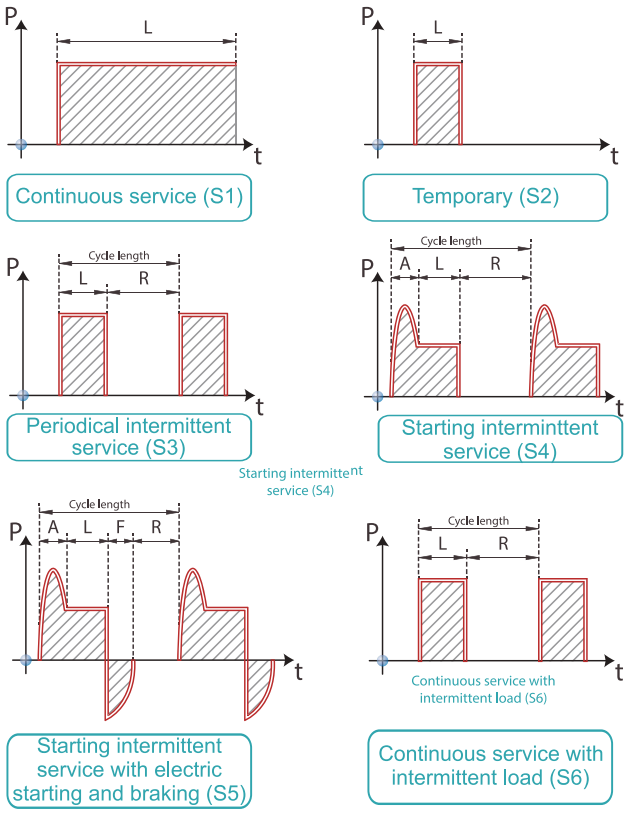
Rotation

For clockwise rotation, viewed from drive end, standard three phase ESC motor terminal markings coincide with the sequence of the phase line conductors. For counter clockwise rotation, viewed from drive end, two of the line conductors have to be reversed. This is made clear in the table of connection diagrams three phase motors with cage rotor (page 3).

Duty

ESC motors are supplied suitable for S1 operation (continuous operation under rated load). When the motor is operate under any other type of duty the followilg information should be supplied to deterinne the correct motor size:

- Type and frequency of switching cycles as per duty factors S3 to 57 and duty cycle factor.
- Load torque variation during motor acceleration and braking (in graphical form).
- Moment ofi-iertia of the bad on the motor shaft.
- Type of braking (eg mechanical. electrical through phase reversal or DC injection).



Explanation	
D = Cycle length	
L = Load time	R= Resting time
A = Starting time	F = Braking time

Intermittent ratio calculation in percentage	
S3 = L/(D)*100	S4 = (A+L)/(D)*100
S5 = (A+L+F)/D*100	S6 = L/(D)*100

Permissible output

Apply the factors o the axanpanying table to the output rating for motors with duty cycles that are notconbnuous. For other duties (S4. S5. S8 and S7) contact us for appropriate duty cycle factors.

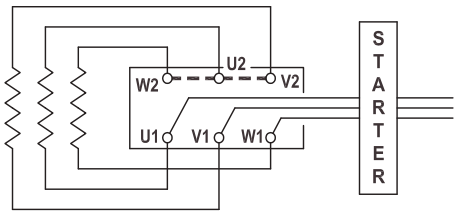
	Poles	Duty cycle factor		
		For frames 80 to 132	For frames 160 to 250	For frames 280 to 355
Short-time duty, S2				
30 min	2	1.05	1.20	1.20
	4 to 8	1.10	1.20	1.20
60 min	2 to 8	1.00	1.10	1.10
Intermittent duty, S3				
15%	2	1.15	1.45	1.40
	4 to 8	1.40	1.40	1.40
25%	2	1.10	1.30	1.30
	4 to 8	1.30	1.25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

Connection

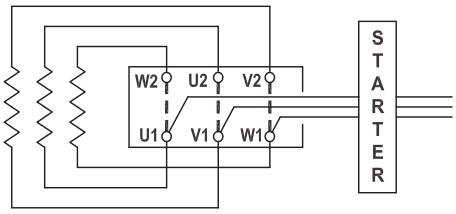
A motor's rated voltage must agree with the power suppV line-to-line voltage. It is carefully to ensure the correct connection to the motor terminals.

Internal connections, voltages and VF drive selection

Standard terminal connections for motors 3kW and below is 220V delta / 380V star. These motors are designed for 380V Direct On Line (D.O.L.) starting, when connected in the star configuration. They are also suitable for operation with 220V three phase variable frequency drives. when connected in the delta configuration. Standard terminal connections for motors 4kW and above is 380V delta / 660V star. These motors are designed for 380V Direct On Line (D.O.L.) starting, when connected in the delta configuration. They are also suitable for operation with 380V three phase variable frequency drives. Alternatively they can be operated D.O.L. in the star configuration from a 660V supply or with a 660V variable frequency drive. In this case the drive must be supplied with an output reactor to protect the winding insulation. These size motors are also suitable for 380V star-delta starting as described below. Motor connected for D.O.L. starting with bridges in place for star connection (3kW and below).



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



Starting

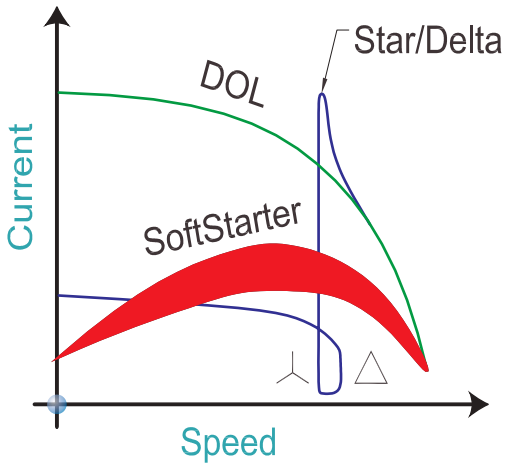
All of the following starter options are available and are the best supplied together with the motor.

D.O.L Starters

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

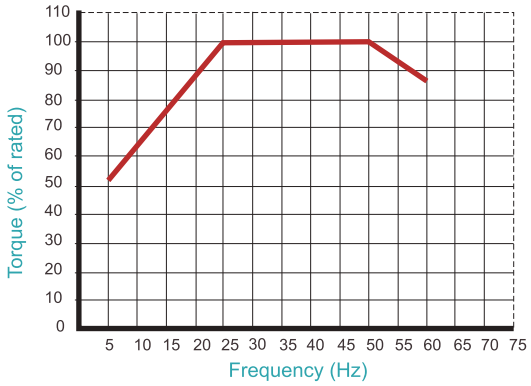
Star - Delta starting

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



VVVF Drives

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



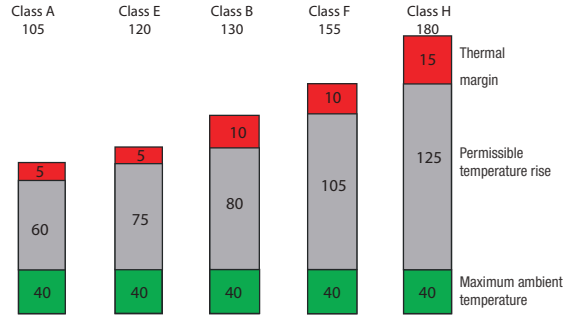
EDM Concerns

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

Electrical Design

Insulation

The insulation system is Class F (155°C) and the motors are designed to operate with Class B (80°C). This ensures long life and reliability with the ability to withstand ambient temperatures as high as 54°C or up to 15% overload in adverse electrical supply situations. Non-Standard ESC will provide a safety margin of 45°C and can be safely operated at elevated ambient temperatures. Due to their conservative design many sizes in the ESC range of motors have temperature rises considerably less than 80°C and therefore provide even greater safety margins.



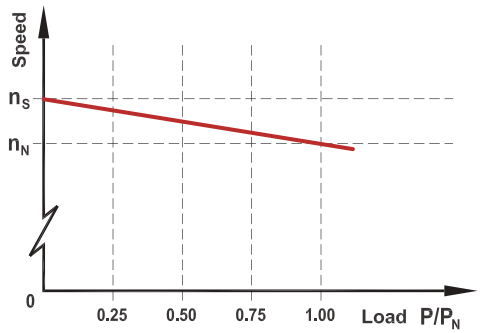
Temperxature Limits According to IEC 85

Thermal protection

Motors can be protected against excessive temperature rise by inserting, at various positions within the windings, thermal probes which can either give a warning signal or cut off the supply to the motor in the event of a temperature abnormality. The units fitted to ESC motors, frame sizes 150°C and above, are PTC thermistors. These thermovariable resistors, with positive temperature co-efficient, are fitted one per phase, series connected and are terminated in a terminal strip located in the terminal box. Trip temperature is 150°C (180°C for EHC series). Additional 130°C thermistors can be fitted as an option for alarm connection.

Speed at partial loads

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



Where:

n_N = full load speed

n_S = asynchronous speed

P/P_N = partial load factor

Current at partial loads

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

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

Where:

I_x = partial load current (amps)

$Pout_x$ = partial load (kW)

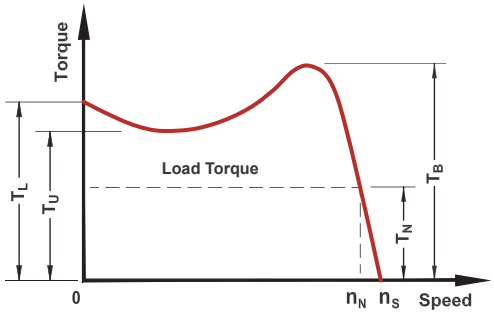
U_N = rated voltage

$\cos \varphi_x$ = partial load power factor

η_x = partial load efficiency (%)

Torque characteristics

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



Where:

T_N = full load torque

T_L = locked rotor torque

T_U = pull-up torque

T_B = break down torque

n_N = full load speed

n_S = asynchronous speed

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

$$T_N = \frac{9950 \times p_N}{n_N}$$

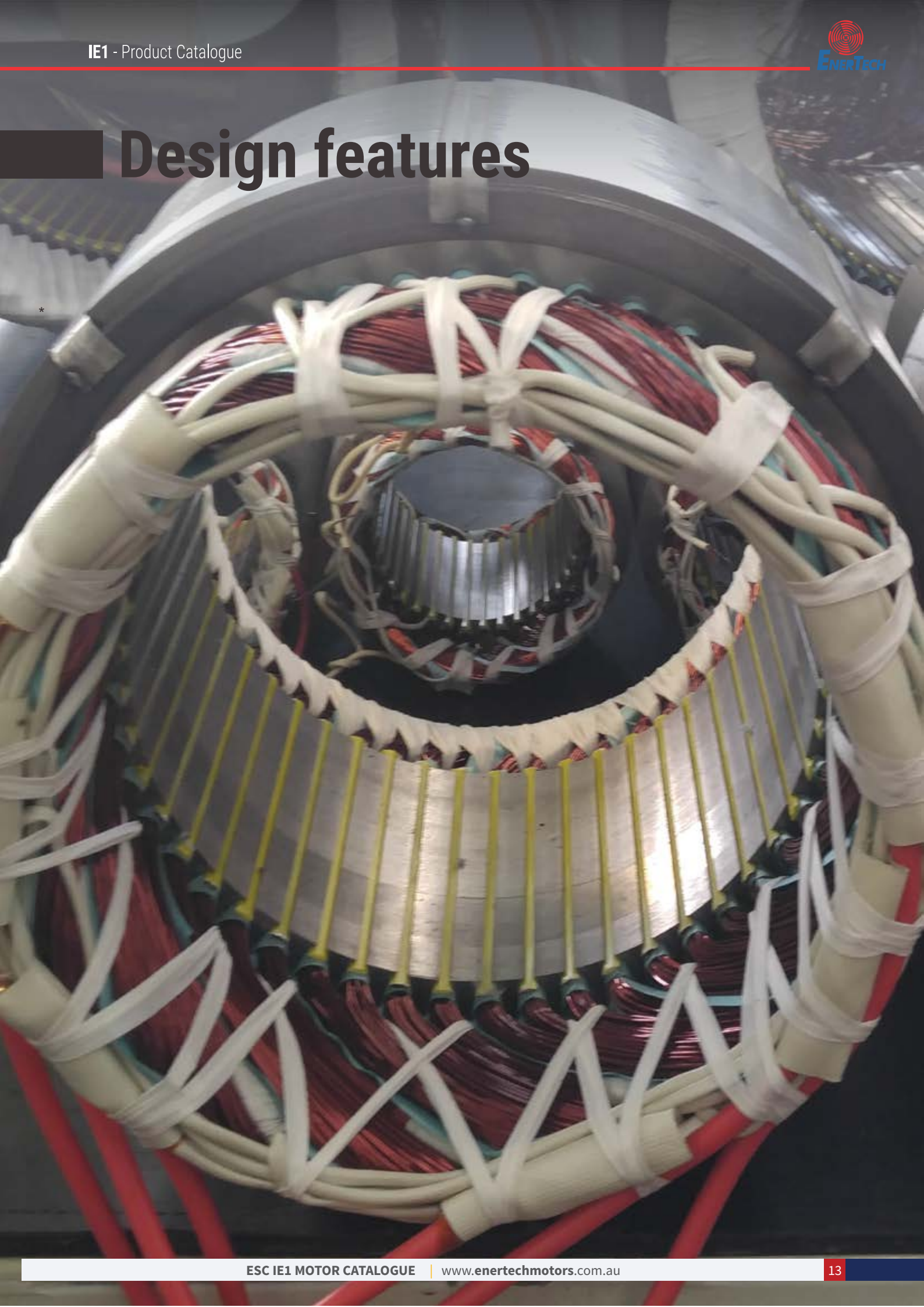
Where:

T_N = full load torque (Nm)

P_N = full load output power (kW)

n_N = full load speed (r/min)

Design features



Design features

Permissible radial loads on the shaft with standard bearings

The values of radial load calculated considering:

- Frequency 50Hz;
- Temperature not exceeding 90°C;
- 20,000 hours of life for 2-pole motors;
- 40,000 hours of life for 4, 6, 8-pole motors.

For operation at 60Hz the values have to be reduced by 6% in order to achieve the same useful life. For double speed motors, consider always the higher speed.

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

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

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

Where:

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

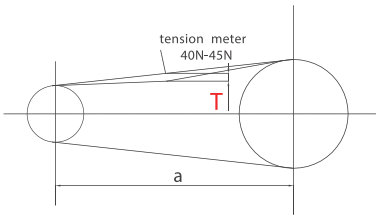
F : The cross-sectional area of the belt (cm^2)

α_1 : Arc of contact small (belt) pulley

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

z : Number of belt

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



Deflection Amount T (mm)

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

Example: there is 1 trapezoidbelt drive

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

The angle of the wheel hug small belt

$$\alpha_1 = 180^\circ - (d_2 - d_1)\ \frac{57}{a}$$
$$= 180 - (460 - 310) \times 57/1300 = 173^\circ.4$$

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

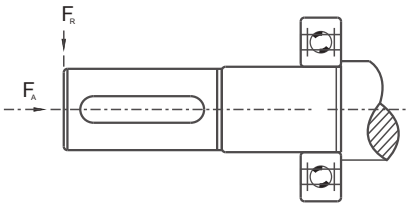
$$F_R = 2\sigma_0 F \sin\frac{\alpha_1}{2} z \ (N)$$
$$= 2x150x2.3x0.998x8 = 5\ 509\ N$$

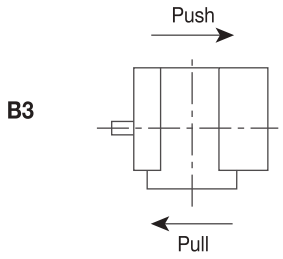
Frame size	Pole number	Permissible radial load F_R [N]	
		Ball bearings	Roller bearings
63	2	365	---
	4	365	---
	6	410	---
	8	455	---
71	2	455	---
	4	450	---
	6	515	---
	8	565	---
80	2	590	---
	4	590	---
	6	670	---
	8	735	---
90	2	670	---
	4	660	---
	6	750	---
	8	830	---
100	2	1850	---
	4	915	---
	6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

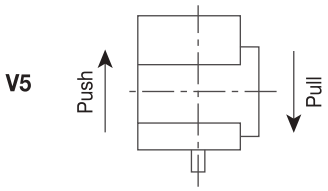
Permissible axial loads on the shaft with standard bearings

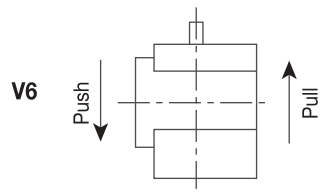
If the shaft end is loaded at X_{max} with the permissible radial load F_A, an additional axial load is allowed

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









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

Performance Data

2 Pole - 3000 rpm asynchronous speed 50Hz

Output (kW)	Frame Size	Full lock speed (rpm)	Current Full load I_N, 50Hz 380V (A)	400V (A)	415V (A)	Locked rotor I_L/I_N	Efficiency % at % full load 100	75	50	power factor, cos φ at % full load 100	75	50	Torque Full load T_N (Nm)	Locked rotor T_L/T_N	Break down T_B/T_N	Moment of inertia J=1/4 GD^2 ($kgxm^2$)	Noise level at 1 meter dB(A)	Net weight (kg)
0.75	80M1	2840	1.8	1.7	1.6	5.5	75.5	71.4	68.9	0.83	0.81	0.67	2.5	2.2	2.5	0.001	61	16
1.1	80M2	2840	2.6	2.4	2.4	5.5	76.1	74.7	72.1	0.84	0.79	0.67	3.7	2.2	2.6	0.001	63	18
1.5	90S	2850	3.3	3.2	3.0	6	79.5	76.5	74.4	0.85	0.81	0.71	5.0	2.7	3.2	0.001	65	22
2.2	90L	2850	4.8	4.5	4.4	6.1	81.7	78.3	76.9	0.85	0.81	0.72	7.4	2.9	3.1	0.001	69	25
3	100L	2880	6.3	5.9	5.8	6.9	83.1	81	79.8	0.87	0.85	0.75	10.0	3	3.5	0.004	72	33
4	112M1	2880	8.2	7.8	7.5	6.7	83.5	82.5	81.8	0.88	0.88	0.81	13.3	2.5	3.1	0.006	74	45
5.5	132S1	2900	11.0	10.5	10.1	7.4	85.9	84	83.2	0.88	0.84	0.76	18.1	2.5	3.3	0.011	83	64
7.5	132S2	2900	14.8	14.0	13.6	7.6	87.5	85.6	83.8	0.88	0.87	0.78	24.6	2.4	3.2	0.013	83	70
11	160M1	2930	21.2	20.2	19.5	7.3	88.4	89.3	88.1	0.89	0.88	0.82	35.9	2.3	2.6	0.039	83	125
15	160M2	2930	28.6	27.2	26.2	7.2	89.4	88.9	84.4	0.89	0.89	0.84	48.9	2.3	2.6	0.044	83	135
18.5	160L	2935	34.7	33.0	31.8	7.3	90.0	91.1	89.7	0.90	0.90	0.83	60.2	2.2	2.7	0.057	84	155
22	180M	2940	41.0	39.0	37.6	7	90.5	88.5	86.5	0.90	0.87	0.82	71.5	2.4	3	0.077	84	180
30	200L1	2950	55.4	52.6	50.7	5.9	91.4	90.2	88.0	0.90	0.88	0.82	97.1	1.9	3	0.125	86	265
37	200L2	2955	67.9	64.5	62.2	6.5	92.0	92.0	90.5	0.90	0.86	0.79	119.6	2.3	3.3	0.140	88	285
45	225M	2960	82.1	78.0	75.2	7.1	92.5	91.9	89.5	0.90	0.88	0.85	145.2	2.4	3.3	0.230	90	340
55	250M1	2965	99.8	94.8	91.4	8	93.0	92.2	89.8	0.90	0.87	0.81	177.2	2.7	3.1	0.320	90	435
75	280S	2965	135.3	128.5	123.9	6.8	93.6	92.5	90.1	0.90	0.89	0.84	241.6	2.2	3.2	0.595	90	540
90	280M1	2970	160.0	152.0	146.5	7.2	93.9	92.9	91.0	0.91	0.89	0.87	289.4	2.2	3	0.678	90	580
110	315S	2975	195.4	185.6	178.9	6.1	94.0	93.6	91.7	0.91	0.89	0.82	353.1	2.3	2.6	1.170	90	1080
132	315M	2980	233.2	221.6	213.6	7.1	94.5	94.5	93.1	0.91	0.92	0.90	423.0	2.3	2.8	1.550	90	1175
160	315L1	2980	279.3	265.4	255.8	7.4	94.6	94.7	93.2	0.92	0.91	0.88	512.8	2.5	2.7	1.750	91	1300
200	315L2	2980	348.4	331.0	319.0	7.3	94.8	94.9	94.1	0.92	0.91	0.88	640.9	2.7	3	2.050	91	1300
250	355M	2985	433.7	412.0	397.1	7.1	95.2	94.5	92.5	0.92	0.92	0.89	799.8	1.8	2.6	3.560	93	1840
315	355L	2985	545.3	518.0	499.3	6.3	95.4	95.2	93.8	0.92	0.93	0.91	1007.8	1.7	2.9	4.120	94	1950

High Output Design*

5.5	112M2	2890	11.2	10.6	10.3	7.4	84.7	83.9	83.1	0.88	0.88	0.81	18.2	2.6	3.3	0.007	78	50
11	132M	2915	21.6	20.5	19.8	7.2	87.6	86.9	85.4	0.88	0.88	0.81	36.0	2.4	3.3	0.028	83	87
75	250M2	2965	133.0	126.4	121.8	6.8	92.7	92.5	90.1	0.91	0.89	0.84	241.6	2.2	3.2	0.595	90	438
110	280M2	2970	194.7	185.0	178.3	6.8	93.3	92.5	91.6	0.91	0.89	0.82	353.7	2.6	3.1	0.860	88	605

* The motor is increased output (kW) in a reduced frame size electric motor.

4 Pole - 1500 rpm asynchronous speed 50Hz

Output (kW)	Frame Size	Full lock speed (rpm)	Current Full load I_N, 50Hz 380V (A)	400V (A)	415V (A)	Locked rotor I_L/I_N	Efficiency % at % full load 100	75	50	power factor, cos φ at % full load 100	75	50	Torque Full load T_N (Nm)	Locked rotor T_L/T_N	Break down T_B/T_N	Moment of inertia J=1/4 GD^2 ($kgxm^2$)	Noise level at 1 meter dB(A)	Net weight (kg)
0.55	80M1	1390	1.5	1.5	1.4	4.6	71	70.5	68.9	0.75	0.67	0.55	3.7	2.4	2.7	0.002	54	17
0.75	80M2	1390	2.0	2.0	1.8	4.4	73	71.8	69.5	0.76	0.66	0.54	5.0	2.2	2.7	0.002	57	18
1.1	90S	1400	2.8	2.7	2.6	4.3	76.2	74.6	73.2	0.77	0.68	0.55	7.5	2.2	3	0.002	61	22
1.5	90L	1400	3.7	3.5	3.4	4.7	78.5	77	75.3	0.79	0.71	0.58	10.2	2.5	3	0.003	61	27
2.2	100L1	1420	5.1	4.8	4.7	5.3	81	78.9	77.4	0.81	0.73	0.59	14.8	2.5	2.9	0.007	61	34
3	100L2	1420	6.7	6.4	6.1	5.7	82.6	81.3	80.2	0.82	0.75	0.63	20.2	2.4	3	0.007	63	38
4	112M	1440	8.8	8.4	8.0	5.7	84.2	82.8	81.7	0.82	0.77	0.69	26.5	2.7	3.1	0.010	67	43
5.5	132S	1440	11.7	11.2	10.7	6.8	85.7	84.2	82.7	0.83	0.77	0.65	36.2	2.3	3.1	0.022	68	68
7.5	132M1	1440	15.6	14.8	14.2	7.2	87	85.6	83.7	0.84	0.82	0.72	49.4	2.6	3.1	0.030	68	81
11	160M	1460	22.5	21.4	20.6	6.8	88.4	87.8	85.1	0.84	0.82	0.76	72.0	2.3	2.8	0.075	70	128
15	160L	1460	30.0	28.5	27.5	7.4	89.4	89.5	84.0	0.85	0.80	0.74	98.1	2.6	3.4	0.093	73	148
18.5	180M	1465	36.3	34.5	33.3	7	90.0	90.5	88.6	0.86	0.83	0.73	120.6	2.1	3.2	0.140	75	175
22	180L	1470	42.9	40.8	39.3	6.8	90.5	91.0	89.3	0.86	0.85	0.76	142.9	2.1	3	0.159	75	185
30	200L	1475	58.0	55.1	53.1	6.5	91.4	92.3	91.2	0.86	0.87	0.81	194.2	2.2	3	0.265	80	275
37	225S	1475	70.2	66.7	64.3	7	92	92.2	91.1	0.87	0.87	0.77	239.6	2.1	3.2	0.404	81	323
45	225M	1475	85.0	80.7	77.8	6.6	92.5	92.5	91.3	0.87	0.86	0.80	291.4	2.2	2.8	0.470	82	345
55	250M1	1480	103.3	98.1	94.6	6.3	93	92.6	91.0	0.87	0.84	0.78	354.9	2.2	2.7	0.670	82	423
75	280S	1480	139.9	132.9	128.1	6.3	93.6	93.6	92.0	0.87	0.86	0.81	484.0	2.3	2.8	1.120	84	574
90	280M1	1485	167.4	159.0	153.3	7.1	93.9	94.0	92.9	0.87	0.87	0.81	578.8	2.6	3	1.460	84	630
110	315S	1485	201.0	190.9	184.0	5.8	94.5	94.4	93.8	0.88	0.88	0.84	707.4	2.1	2.8	3.100	88	1105
132	315M	1485	240.4	228.4	220.1	6.3	94.8	94.6	93.0	0.88	0.87	0.82	848.9	2.2	2.6	3.300	88	1235
160	315L1	1489	287.8	273.4	263.6	5.7	94.9	95.0	94.0	0.89	0.86	0.81	1026.2	2	2.6	3.790	87	1330
200	315L2	1489	359.8	341.8	329.3	6.2	94.9	94.9	94.0	0.89	0.86	0.81	1282.7	2.3	2.7	4.500	89	1360
250	355M	1490	443.3	421.2	405.9	6.5	95.2	94.7	93.2	0.9	0.89	0.85	1602.3	2.1	3.1	5.670	90	1900
315	355L	1490	558.6	530.7	511.5	6	95.2	94.8	94.3	0.9	0.89	0.88	2019.0	2.1	3.3	6.660	90	2050

High Output Design*

11	132M2	1450	22.7	21.6	20.8	6.2	87.6	87.2	86.1	0.84	0.8	0.72	72.4	2.2	2.8	0.063	69	88
75	250M2	1480	136.0	129.2	124.5	6.3	92.7	92.6	91.9	0.89	0.87	0.83	484.0	2.2	3.2	0.880	82	455
110	280M2	1480	200.8	190.8	183.9	6.2	93.3	93.1	92.5	0.89	0.86	0.81	709.8	2.4	2.8	2.680	85	670

* The motor is increased output (kW) in a reduced frame size electric motor.

6 Pole - 1000 rpm asynchronous speed 50Hz

Output (kW)	Frame Size	Full lock speed (rpm)	Current Full load I_N, 50Hz 380V (A)	400V (A)	415V (A)	Locked rotor I_L/I_N	Efficiency % at % full load 100	75	50	power factor, cos φ at % full load 100	75	50	Torque Full load T_N (Nm)	Locked rotor T_L/T_N	Break down T_B/T_N	Moment of inertia J=1/4 GD² (kgxm²)	Noise level at 1 meter dB(A)	Net weight (kg)
0.37	80M1	890	1.3	1.2	1.1	3.2	62	61.4	55.5	0.70	0.63	0.52	3.9	1.8	2	0.002	46	17
0.55	80M2	890	1.8	1.7	1.6	3.3	65	64.7	63.2	0.72	0.62	0.52	5.7	2	2.2	0.003	50	19
0.75	90S	910	2.3	2.2	2.0	3.6	69	68.7	65.6	0.72	0.74	0.54	7.8	2.3	2.6	0.003	53	23
1.1	90L	910	3.2	3.0	2.8	3.5	72	71.6	69.5	0.73	0.65	0.52	11.4	2.1	2.5	0.004	59	25
1.5	100L	920	4.0	3.8	3.7	4.3	76	74.8	72.4	0.75	0.66	0.54	15.5	2.3	2.9	0.007	62	33
2.2	112M	940	5.6	5.3	5.0	4.4	79	77.2	75.9	0.76	0.74	0.6	22.5	2.2	2.5	0.014	65	45
3	132S	960	7.4	7.0	6.7	5.8	81	79.4	78.5	0.76	0.7	0.57	29.8	2.1	3	0.029	66	63
4	132M1	960	9.8	9.3	8.9	6.4	82	83.9	82.4	0.76	0.7	0.57	39.8	2.1	2.7	0.036	66	73
5.5	132M2	960	12.9	12.3	11.7	6.5	84	82.6	81.5	0.77	0.74	0.58	54.7	2	2.5	0.045	67	84
7.5	160M	970	17.2	16.3	15.7	5.4	86	84.9	83.6	0.77	0.74	0.67	74.2	2	2.3	0.088	71	119
11	160L	970	24.5	23.3	22.4	5.5	87.5	89.1	87.5	0.78	0.77	0.67	108.3	2	2.3	0.115	72	150
15	180L	970	31.6	30.0	28.9	6.2	89	89.4	87.9	0.81	0.78	0.66	147.7	2.1	2.5	0.207	72	185
18.5	200L1	975	38.6	36.6	35.3	6.2	90	91.5	90.4	0.81	0.76	0.64	181.2	2	2.8	0.315	73	260
22	200L2	975	44.7	42.5	41.0	5.9	90	88.9	87.8	0.83	0.81	0.71	215.5	2	2.5	0.360	73	270
30	225M	980	59.3	56.3	54.3	6.4	91.5	91.8	90.6	0.84	0.84	0.74	292.3	2	2.5	0.545	71	340
37	250M	980	71.1	67.5	65.1	6.7	92	91.7	90	0.86	0.82	0.75	360.6	2.3	2.6	0.834	76	430
45	280S	980	85.9	81.7	78.7	6.7	92.5	92.5	91.7	0.86	0.84	0.76	438.5	2.1	3	1.390	76	525
55	280M1	980	104.7	99.5	95.9	6.3	92.8	93	92.2	0.86	0.86	0.81	536.0	2.1	2.5	1.650	76	580
75	315S	985	141.7	134.6	129.8	7	93.5	94	93	0.86	0.84	0.81	727.2	2	2.7	4.100	80	1060
90	315M	985	169.5	161.0	155.2	6.2	93.8	94.5	93	0.86	0.84	0.77	872.6	2	2.4	4.300	80	1170
110	315L1	990	206.7	196.4	189.3	6.7	94	94.5	93.2	0.86	0.85	0.8	1061.1	2.4	2.8	5.450	82	1220
132	315L2	990	244.7	232.5	224.1	6.8	94.2	94.5	93.8	0.87	0.85	0.81	1273.3	2.3	2.9	6.120	82	1280
160	355M1	990	292.3	277.7	267.7	6.5	94.5	94.9	93	0.88	0.87	0.85	1543.4	1.9	2.5	8.850	85	1800
200	355M2	990	365.4	347.1	334.6	6.3	94.5	95.8	94.2	0.88	0.87	0.81	1929.3	2	2.5	9.550	85	1900
250	355L	990	456.8	433.9	418.2	6	94.5	95.9	94	0.88	0.88	0.84	2411.6	1.9	2.4	10.40	87	2050

High Output Design*

75	280M2	980	141.0	134.0	129.1	6.8	92.6	92.5	91.8	0.86	0.85	0.8	730.9	2.8	2.9	3.210	79	610

* The motor is increased output (kW) in a reduced frame size electric motor.

8 Pole - 750 rpm asynchronous speed 50Hz

Output (kW)	Frame Size	Full lock speed (rpm)	Current Full load I_N, 50Hz 380V (A)	400V (A)	415V (A)	Locked rotor I_L/I_N	Efficiency % at % full load 100	75	50	power factor, cos φ at % full load 100	75	50	Torque Full load T_N (Nm)	Locked rotor T_L/T_N	Break down T_B/T_N	Moment of inertia J=1/4 GD^2 (kgxm^2)	Noise level at 1 meter dB(A)	Net weight (kg)
0.18	80M1	630	0.9	0.8	0.8	3.2	51	50	45	0.61	0.55	0.46	2.5	2.1	2.4	0.002	50	17
0.25	80M2	640	1.2	1.1	1.1	3.3	54	52.3	45.1	0.61	0.55	0.47	3.5	2	2.2	0.003	50	19
0.37	90S	660	1.5	1.4	1.4	3.6	62	61.2	56.2	0.61	0.53	0.44	5.0	1.9	2.5	0.004	53	23
0.55	90L	660	2.2	2.1	2.0	3.5	63	62	59.3	0.61	0.51	0.42	7.5	1.9	2.3	0.004	54	25
0.75	100L1	690	2.4	2.3	2.2	4	71	70.2	62.5	0.67	0.57	0.46	10.2	2.1	2.4	0.008	56	33
1.1	100L2	690	3.3	3.2	3.0	3.7	73	71.6	68.8	0.69	0.59	0.47	15.0	2.2	2.4	0.010	59	38
1.5	112M1	690	4.4	4.2	3.9	4.2	75	73.7	70.2	0.69	0.6	0.5	20.5	2.2	2.7	0.017	61	50
2.2	132S	710	6.0	5.7	5.4	4.7	78	77.3	74.6	0.71	0.63	0.51	29.8	2.1	2.5	0.030	65	63
3	132M1	710	7.9	7.5	7.1	4.6	79	77.4	75.1	0.73	0.67	0.55	40.6	2.1	2.6	0.040	65	79
4	160M1	720	10.3	9.8	9.3	4.5	81	79.8	78.5	0.73	0.66	0.56	53.8	2.1	2.7	0.075	67	118
5.5	160M2	720	13.6	12.9	12.4	5	83	81.6	78.6	0.74	0.67	0.55	73.5	2.3	2.8	0.093	68	119
7.5	160L	720	17.8	16.9	16.2	6	85.5	83.8	81.5	0.75	0.69	0.55	99.5	2.2	2.6	0.125	69	145
11	180L	730	25.1	23.9	23.0	5.5	87.5	87.5	85.9	0.76	0.67	0.56	143.9	2.2	2.5	0.202	70	178
15	200L	730	34.1	32.4	31.2	5.8	88	89.6	88.2	0.76	0.72	0.59	196.2	2.1	2.8	0.338	71	233
18.5	225S	731	41.1	39.0	37.6	6.3	90	89.5	88.8	0.76	0.73	0.65	241.7	2.1	2.5	0.490	73	283
22	225M	735	47.4	45.0	43.4	6.2	90.5	90.6	89.9	0.78	0.74	0.63	285.9	2.2	2.5	0.550	73	323
30	250M	735	63.4	60.2	58.1	5.9	91	90.5	88.6	0.79	0.76	0.65	389.8	2.3	3	0.830	74	400
37	280S	735	77.8	73.9	71.2	6.3	91.5	91.2	90.1	0.79	0.77	0.69	480.7	2.1	2.8	1.390	75	515
45	280M1	740	94.1	89.4	86.1	6.4	92	91.3	89.5	0.79	0.76	0.64	580.7	1.9	2.5	1.650	76	566
55	315S	740	111.2	105.6	101.8	6.8	92.8	93.2	92.5	0.81	0.78	0.7	709.8	1.9	2.7	4.790	78	790
75	315M	740	151.3	143.7	138.5	7	93	93.9	91.6	0.81	0.8	0.72	967.9	2	2.4	5.580	78	970
90	315L1	740	177.8	168.9	162.8	6.7	93.8	94	92	0.82	0.76	0.69	1161.5	2.4	2.8	6.370	80	1060
110	315L2	740	216.8	206.0	198.5	6.4	94	94.3	92.5	0.82	0.8	0.72	1419.6	2.4	2.5	7.230	81	1170
132	355M1	740	261.0	248.0	239.0	5.8	93.7	94.9	93.6	0.82	0.81	0.72	1703.5	1.7	2.3	10.54	82	1560
160	355M2	743	314.7	299.0	288.2	5.5	94.2	95.1	94.2	0.82	0.83	0.75	2056.5	1.5	2.3	11.72	86	1650
200	355L	743	387.4	368.1	354.8	6	94.5	95.5	94.6	0.83	0.86	0.78	2570.7	1.3	3.3	12.85	87	1940

High Output Design*

2.2	112M2	710	5.9	5.6	5.4	4.5	75	73.5	70.5	0.69	0.62	0.51	30.0	2	2.6	0.018	62	55
4	132M2	705	10.3	9.8	9.4	4.6	81	80.2	79.2	0.73	0.69	0.57	54.2	1.9	2.4	0.040	67	74
55	280M2	740	108.5	103.1	99.3	6.9	92.8	91.6	90.5	0.82	0.77	0.67	709.8	2.3	2.9	3.650	77	613

PERFORMANCE DATA FOR DUAL SPEED MOTORS

Dual speed series of three phase asynchronous motors are constructed Totally Enclosed Fan Cooled (TEFC), and is available in both cast iron and aluminium housing. This series of motors has the capability of operation at multiple power output and/or multiple speeds with a wide selection of variation. Dual Speed motors utilises very special winding technology to achieve its flexible capabilities, reliable operation and professional appearance, easy to maintain, while low on noise and little vibration. This series of motors is used widely for fan and pump industry.

2/4 Poles - 3000/1500 rpm - Single Winding

Model	Power (kW)		Speed (r/min)		Current A	
	2P	4P	2P	4P	2P	4P
80B	0.8	0.16	2955	1480	1.9	0.72
90S	1.2	0.24	2955	1480	2.91	0.81
90L	1.7	0.34	2955	1480	3.91	1.09
100L	2.4	0.48	2955	1480	5.52	1.35
112M	3.3	0.66	2955	1480	7.48	1.66
132S1	4.4	0.88	2955	1480	9.92	2.23
132S2	6.1	1.2	2955	1480	13.05	3.1
160M1	8.3	1.7	2955	1480	17.53	4.26
160M2	12	2.4	2955	1480	24.23	5.56
160L	17	3.4	2955	1480	34.1	7.27
180M	20	4	2955	1480	39.84	8.5
200L1	24	4.8	2955	1480	46.22	10.13
200L2	33	6.6	2955	1480	59.15	13.09
225M	41	8.2	2955	1480	77.48	17.5
250M	50	10	2955	1480	90.74	19.09
280S	61	12	2955	1480	118.95	24.84
280M	83	17	2955	1480	150.5	34.32
315S	99	20	2955	1480	172.36	39.7
315M1	121	24	2955	1480	219.87	46.99
315L1	145	29	2955	1480	262.84	57.5
315L2	176	35	2955	1480	321.58	67.9

4/6 Poles - 1500/1000 rpm - Separate Winding

Model	Power (kW)		Speed (rpm)		Current A	
	4P	6P	4P	6P	4P	6P
80B	0.55	0.18	1480	990	1.64	0.67
90S	0.75	0.25	1480	990	2.12	0.86
90L	1.1	0.36	1480	990	2.96	1.3
100L1	1.5	0.5	1480	990	3.81	1.8
100L2	2.2	0.75	1480	990	5.11	2.32
112M	3	1	1480	990	6.84	3
132S	4	1.3	1480	990	8.88	3.91
132M	5.5	1.8	1480	990	11.76	4.78
160M	7.5	2.5	1480	990	15.65	6.21
160L	11	3.5	1480	990	22.56	9
180L	15	5	1480	990	30.32	12.5
200L1	18.5	6.1	1480	990	36.26	13.01
200L2	22	7.3	1480	990	42.9	17.1
225M	33	11	1480	990	63.48	24.52
250M	45	15	1480	990	84.59	31.66
280M	55	18	1480	990	103	37.02
315S	75	25	1480	990	138.11	51.09
315M1	90	30	1480	990	165.95	59.3
315L1	110	36	1480	990	201	70.1
315L2	132	44	1480	990	240.06	86.61

4/8 Poles - 1500/750 rpm - Single Winding

Model	Power (kW)		Speed (rpm)		Current A	
	4P	8P	4P	8P	4P	8P
80B	0.6	0.12	1480	735	1.66	0.6
90S	0.8	0.16	1480	735	2.23	0.92
90L	1.2	0.24	1480	735	3.1	1.25
100L1	1.7	0.34	1480	735	4.26	1.4
100L2	2.4	0.5	1480	735	5.56	1.72
112M	3.3	0.7	1480	735	7.27	2.19
132S	4.4	0.9	1480	735	9.1	3.24
132M	6.1	1.2	1480	735	13.09	4.31
160M	8.3	1.7	1480	735	17.5	5.8
160L	12	2.4	1480	735	24.84	6.95
180M	17	3.4	1480	735	34.32	8.85
180L	20	4	1480	735	39.7	10.87
200L	24	5	1480	735	46.99	11.71
225S	33	6.6	1480	735	65.5	15.58
225M	41	8.2	1480	735	81.24	19.11
250M	50	10	1480	735	89.32	22.79
280S	61	12	1480	735	114.69	28.88
280M	83	17	1480	735	147.2	36.5
315S	99	20	1480	735	191.82	45
315M1	121	24	1480	735	224.3	47.1
315L1	145	29	1480	735	277.11	58.53
315L2	176	35	1480	735	324.89	72.15

6/8 Poles - 1000/750 rpm - Separate Winding

Model	Power (kW)		Speed (rpm)		Current A	
	6P	8P	6P	8P	6P	8P
90S	0.55	0.24	990	735	1.87	1.25
90L	0.75	0.32	990	735	2.32	1.4
100L	1.1	0.47	990	735	3.28	1.7
112M	1.5	0.65	990	735	4.14	1.91
132S	2.2	0.95	990	735	5.61	3.58
132M1	3	1.3	990	735	7.47	4.81
132M2	4	1.7	990	735	9.76	5.8
160M	5.5	2.4	990	735	12.8	6.95
160L	7.5	3.2	990	735	17.15	8.85
180L	11	4.7	990	735	24.52	11.5
200L	13	5.5	990	735	28.99	13.6
225S	15	6.5	990	735	31.6	15.58
225M	21	9	990	735	44.71	21.09
250M	26	11	990	735	52.11	25.43
280S	30	13	990	735	59.35	30.02
280M	37	16	990	735	70.15	38.22
315S	53	23	990	735	104	49.85
315M1	65	28	990	735	122.84	58.58
315L1	80	34	990	735	162.05	71.88
315L2	92	40	990	735	170.25	82.41

ESC Motor Modification Option

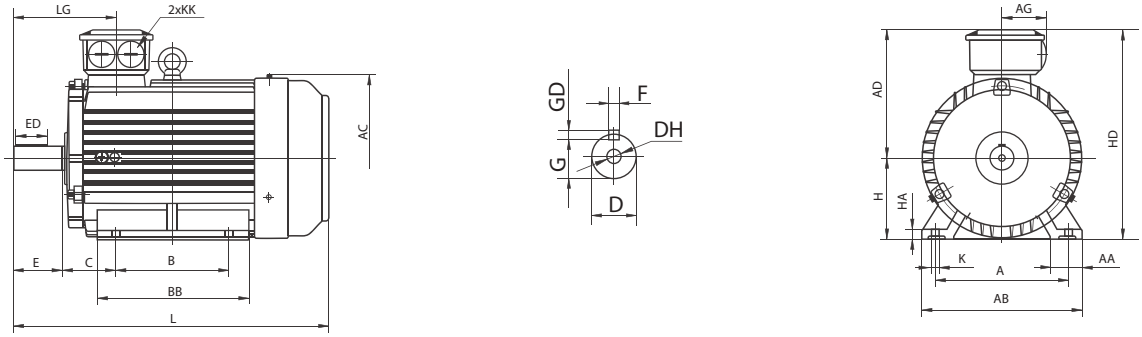
The ESC series can be modified to incorporate one or more of the following options, please contact your nearest. Please contact to Enertech Electric motor (Australia) branch for more details.

- Socket head cap screws, Grades 8.8, 10.9 or 12.9 to replace all external bolts and/or screws.
- Anti-condensation heater terminated in the main terminal box.
- Stainless steel shafts.
- Alternative shaft diameters and/or shaft length.
- Double shaft extensions.
- Alternative conduit entry dimensions.
- Alternative bearing arrangements (ball, roller, angular contact or four point contact types).
- Force ventilation for frame size 200 and above.
- Low noise fan and cowl in steel or cowl only in stainless steel.
- Rain canopy for vertical mount (V1) in steel or stainless steel.
- Class H winding insulation.
- Nonstandard paint color in RAL standard.
- Two pack epoxy paint finish.
- Class H winding insulation for 180°C working environment.
- PTC and condensate heater (optional).
- Grease nipple both DE and NDE bearing for frame size 100L, 112M and 132) if required. IQF Spiral Freezer & Cooler
- Especial design for IQF tunner freezer condition.
- Working temperature -50°C max.
- IPSS with Anti-condensation heater terminated in main terminal box.
- IP 66 (optional).
- Double shaft extension.
- Anodizing of aluminium or enhanced performance cast iron units.
- Stainless steel external shaft (optional).
- Air Blast Freezer
- Stainless steel external in grades AISI 316L. Working in temperature from -18°C to 22°C.
- IP 67.
- Premium efficiency IE3.
- Smokespill application motors are designed to withstand the extreme environmental conditions associated with a building fire. Ventilation systems within public buildings are required to continue providing smoke extraction for 2 hours at smokespill air temperature of 200°C or for 30 minutes at 300°C

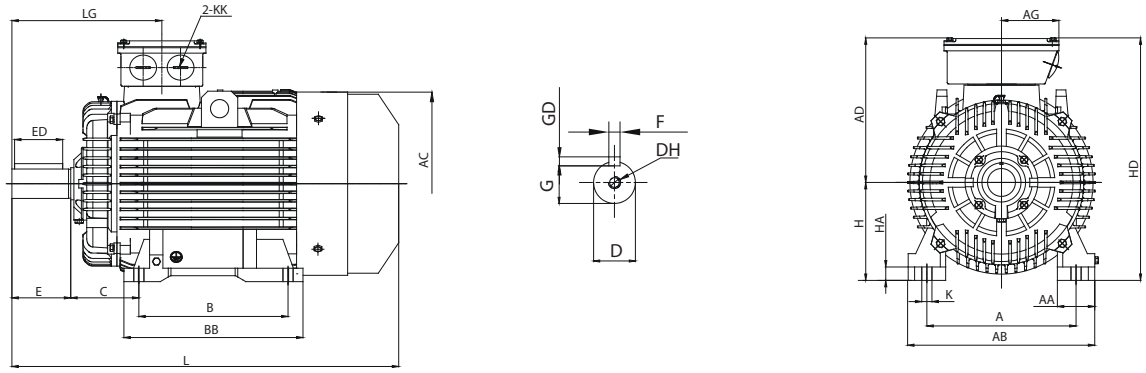
Dimensions

Dimension foot mount B3

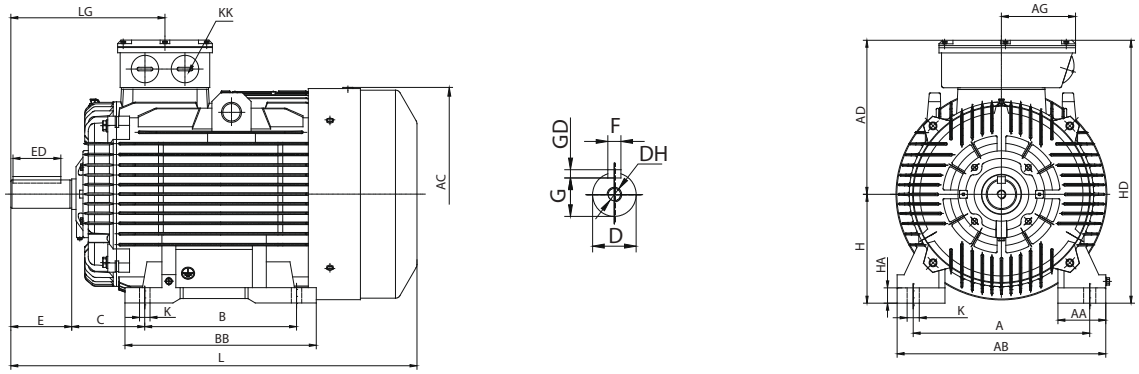
Frame size from 80 to 132



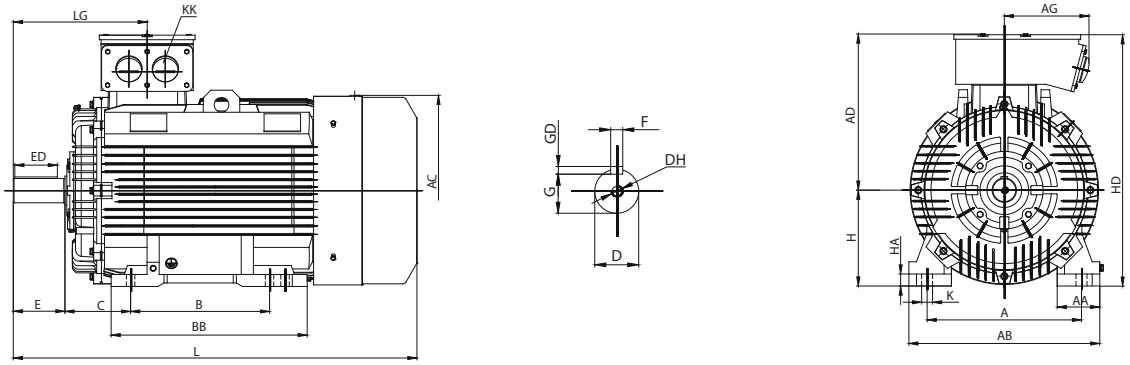
Frame size from 160 to 200



Frame size from 225 to 280



Frame size from 315 to 355



Frame size	A	AA	AB	AC	AD	AG	B	BB	C	D	DH	E	ED	F	G	GD	H	HA	HD	K	KK	L	LG
80	125	34	160	175	150	51	100	130	50	19	*M6X16	40	25	6	15.5	6	80	10	230	10	M25X1.5	295	106
90S	140	36	180	190	170	60	100	135	56	24	*M8X19	50	40	8	20	7	90	12.5	260	10	M25X1.5	320	124
90L	140	36	180	190	170	60	125	160	56	24	*M8X19	50	40	8	20	7	90	12.5	260	10	M25X1.5	345	124
100L	160	40	200	215	175	60	140	182	63	28	*M10X22	60	45	8	24	7	100	14	275	12	M32X1.5	385	140
112M	190	45	230	236	198	75	140	195	70	28	M10X22	60	45	8	24	7	112	14	310	12	M32X1.5	415	145
132S	216	52	265	275	218	75	140	205	89	38	M12X28	80	63	10	33	8	132	16	350	12	M32X1.5	480	169
132M	216	52	265	275	218	75	178	245	89	38	M12X28	80	63	10	33	8	132	16	350	12	M32X1.5	520	169
160M	254	65	314	314	255	95	210	268	108	42	M16X36	110	90	12	37	8	160	20	415	14.5	M40X1.5	625	256
160L	254	65	314	314	255	95	254	312	108	42	M16X36	110	90	12	37	8	160	20	415	14.5	M40X1.5	670	256
180M	279	70	349	355	275	95	241	296	121	48	M16X36	110	90	14	42.5	9	180	22	455	14.5	M40X1.5	700	274
180L	279	70	349	352	270	95	279	335	121	48	M16X36	110	90	14	42.5	9	180	22	450	14.5	M40X1.5	740	274
200L	318	72	380	399.7	307	165.5	305	366	133	55	M20X42	110	90	16	49	10	200	23	507	18.5	M50X1.5	780	293
225S	356	85	430	460	335	165.5	286	356	149	60	M20X42	140	110	18	53	11	225	24	560	18.5	M50X1.5	820	329
225M[1]	356	85	430	460	335	165.5	311	381	149	55	M20X42	110	90	16	49	10	225	24	560	18.5	M50X1.5	820	299
225M	356	85	430	460	335	165.5	311	381	149	60	M20X42	140	110	18	53	11	225	24	560	18.5	M50X1.5	850	329
250M[1]	406	110	480	500	370	185	349	440	168	60	M20X42	140	110	18	53	11	250	35	620	24	M63X1.5	945	355
250M	406	110	480	500	354	170	349	440	168	65	M20X42	140	110	18	58	11	250	35	620	24	M63X1.5	925	355
280S[1]	457	130	542	560	395	185	368	458	190	65	M20X42	140	110	18	58	11	280	33	675	24	M63X1.5	1020	360
280S	457	130	542	560	395	185	368	458	190	75	M20X42	140	110	20	67.5	12	280	33	675	24	M63X1.5	1020	360
280M[1]	457	130	542	560	395	185	419	509	190	65	M20X42	140	110	18	58	11	280	33	675	24	M63X1.5	1070	360
280M	457	130	542	560	395	185	419	509	190	75	M20X42	140	110	20	67.5	12	280	33	675	24	M63X1.5	1070	360
315S[1]	508	140	628	623	520	275	406	590	216	65	M20X42	140	110	18	58	11	315	40	835	28	M63X1.5	1195	385
315M[1]	508	140	628	623	520	275	457	645	216	65	M20X42	140	110	18	58	11	315	40	835	28	M63X1.5	1305	385
315L[1]	508	140	628	623	520	275	508	645	216	65	M20X42	140	110	18	58	11	315	40	835	28	M63X1.5	1305	385
315S	508	140	628	623	520	275	406	590	216	80	M20X42	170	140	22	71	14	315	40	835	28	M63X1.5	1225	415
315M	508	140	628	623	520	275	457	645	216	80	M20X42	170	140	22	71	14	315	40	835	28	M63X1.5	1335	415
315L	508	140	628	623	520	275	508	645	216	80	M20X42	170	140	22	71	14	315	40	835	28	M63X1.5	1335	415
355M[1]	610	160	740	698	645	330	560	850	254	75	M20X50	140	110	20	67.5	12	355	55	1000	28	M63X1.5	1600	415
355L[1]	610	160	740	698	645	330	630	850	254	75	M24X50	140	110	20	67.5	12	355	55	1000	28	M63x1.5	1600	415
355M	610	160	740	698	645	330	560	850	254	95	M24X50	170	140	25	86	14	355	55	1000	28	M63X1.5	1625	445
355M[2]	610	160	740	698	645	330	560	850	254	100	M24X50	210	160	28	90	16	355	55	1000	28	M63X1.5	1670	490
355L	610	160	740	698	645	330	630	850	254	95	M24X50	170	140	25	86	14	355	55	1000	28	M63X1.5	1625	445
355L[2]	610	160	740	698	645	330	560	850	254	100	M24X50	210	160	28	90	16	355	55	1000	28	M63X1.5	1670	490

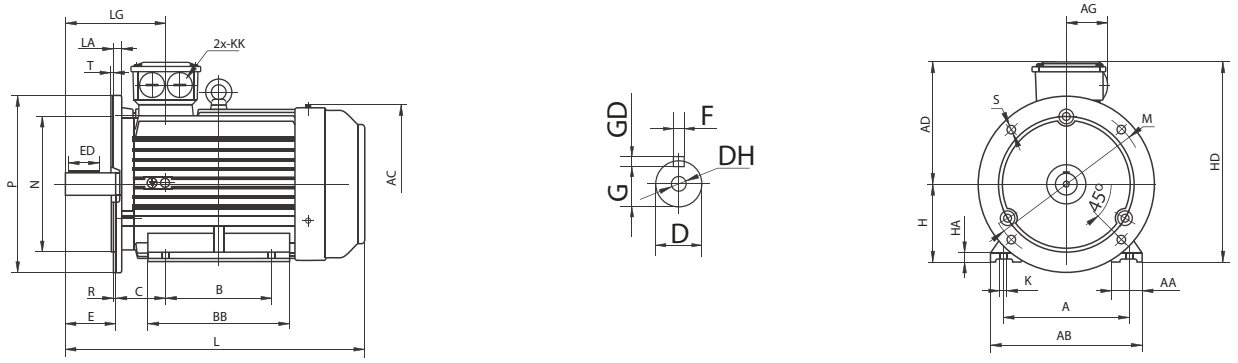
1) 2 Pole motors only .

2) These motor can also be supplied. Please state the dimensions of the shaft extension on order .

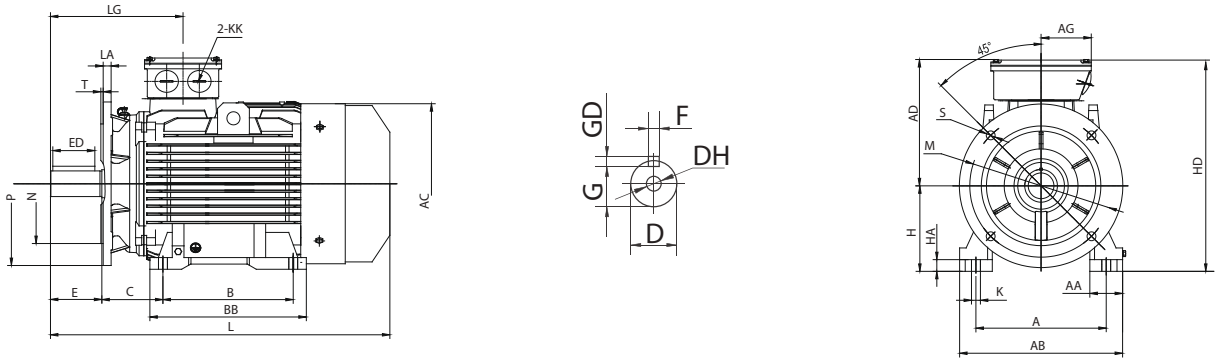
'*' Means that the cable gland is only one.
The "R" dimension is zero.

Dimension foot mount B35

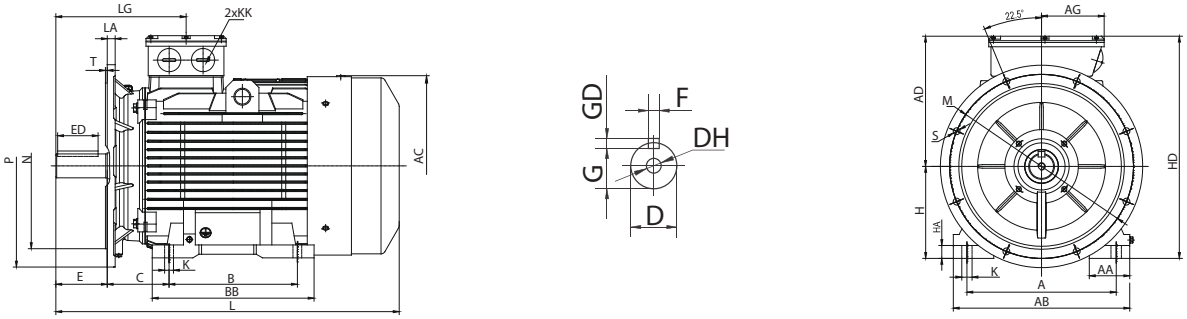
Frame size from 80 to 132



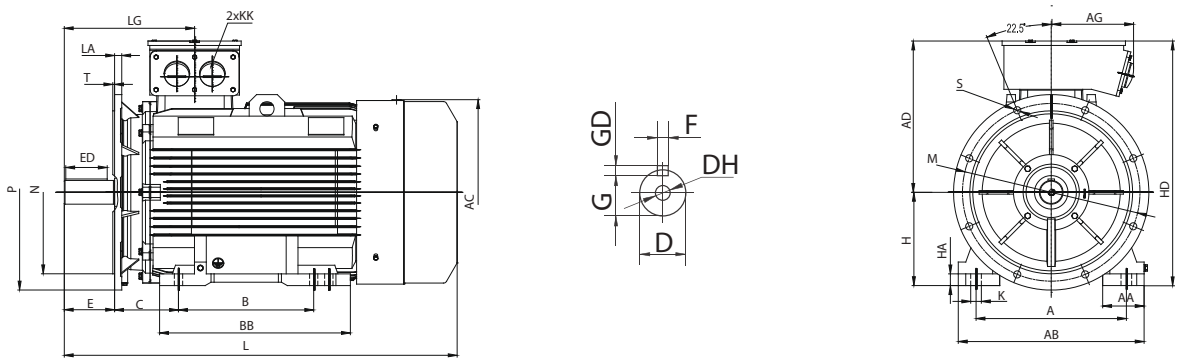
Frame size from 160 to 200



Frame size from 225 to 280



Frame size from 315 to 355



Frame size	A	AA	AB	AC	AD	AG	B	BB	C	D	DH	E	ED	F	G	GD	H	HA	HD	K	KK	L	LA	LG	M	N	P	S	T
80	125	34.1	156	175	150	51	100	130	50	19	*M6X16	40	25	6	15.5	6	80	10	230	10	M25X1.5	295	12	106	165	130	200	12	3.5
90S	140	36	180	190	170	60	100	135	56	24	*M8X19	50	40	8	20	7	90	12.5	260	10	M25X1.5	320	12	124	165	130	200	12	3.5
90L	140	36	180	190	150	60	125	165	56	24	*M8X19	50	40	8	20	7	90	12.5	245	10	M25X1.5	345	12	124	165	130	200	12	3.5
100L	160	40	200	215	175	60	140	182	63	28	*M10X22	60	45	8	24	7	100	14	275	12	M32X1.5	385	12	140	215	180	250	14.5	4
112M	190	45	226	236	198	75	140	195	70	28	M10X22	60	45	8	24	7	112	14	310	12	M32X1.5	415	12	145	215	180	250	14.5	4
132S	216	52	265	275	218	75	140	205	89	38	M12X28	80	63	10	33	8	132	16	350	12	M32X1.5	480	14	169	265	230	300	14.5	4
132M	216	52	265	275	218	75	178	245	89	38	M12X28	80	63	10	33	8	132	16	350	12	M32X1.5	520	14	169	265	230	300	14.5	4
160M	254	65	314	330	255	95	210	268	108	42	M16X36	110	90	12	37	8	160	20	415	14.5	M40X1.5	625	16	256	300	250	350	18.5	5
160L	254	65	314	330	255	95	254	312	108	42	M16X36	110	90	12	37	8	160	20	415	14.5	M40X1.5	670	16	256	300	250	350	18.5	5
180M	279	70	349	355	275	95	279	335	121	48	M16X36	110	90	14	42.5	9	180	22	455	14.5	M40X1.5	740	18	274	300	250	350	18.5	5
180L	279	70	349	355	275	95	279	335	121	48	M16X36	110	90	14	42.5	9	180	22	455	14.5	M40X1.5	740	18	274	300	250	350	18.5	5
200L	318	72	380	405	245	165.5	305	366	133	55	M20X42	110	90	16	49	10	200	23	445	18.5	M50X1.5	780	18	296	350	300	400	18.5	5
225S	356	85	430	460	335	165.5	286	356	149	60	M20X42	140	110	18	53	10	225	24	560	18.5	M50X1.5	820	20	329	400	350	450	18.5	5
225M[1]	356	85	430	460	335	165.5	311	381	149	55	M20X42	110	90	16	49	10	225	24	560	18.5	M50X1.5	820	20	299	400	350	450	18.5	5
225M	356	85	430	460	335	165.5	311	381	149	60	M20X42	140	110	18	53	10	225	24	560	18.5	M50X1.5	850	20	329	400	350	450	18.5	5
250M[1]	406	110	480	500	370	185	349	440	168	60	M20X42	140	110	18	53	11	250	35	620	24	M63X1.5	945	22	355	500	450	550	18.5	5
250M	406	110	480	500	370	185	349	440	168	65	M20X42	140	110	18	58	11	250	35	620	24	M63X1.5	945	22	355	500	450	550	18.5	5
280S[1]	457	130	542	560	395	185	368	458	190	65	M20X42	140	110	18	58	11	280	33	675	24	M63X1.5	1020	22	359	500	450	550	18.5	5
280S	457	130	542	560	395	185	368	458	190	75	M20X42	140	110	20	67.5	11	280	33	675	24	M63X1.5	1020	22	359	500	450	550	18.5	5
280M[1]	457	130	542	560	395	185	419	509	190	65	M20X42	140	110	18	58	11	280	33	675	24	M63X1.5	1070	22	359	500	450	550	18.5	5
280M	457	130	542	560	395	185	419	509	190	75	M20X42	140	110	20	67.5	12	280	33	675	24	M63X1.5	1070	22	359	500	450	550	18.5	5
315S[1]	508	140	628	625	520	275	406	594	216	65	M20X42	140	110	18	58	11	315	40	835	28	M63X1.5	1195	24	385	600	550	660	24	6
315M[1]	508	140	628	625	520	275	457	645	216	65	M20X42	140	110	18	58	11	315	40	835	28	M63X1.5	1305	24	385	650	550	660	24	6
315L[1]	508	140	628	625	520	275	508	645	216	65	M20X42	140	110	18	58	11	315	40	835	28	M63X1.5	1305	24	385	600	550	660	24	6
315S	508	140	628	625	520	275	406	594	216	80	M20X42	170	140	22	71	14	315	40	835	28	M63X1.5	1225	24	415	600	550	660	24	6
315M	508	140	628	625	520	275	457	645	216	80	M20X42	170	140	22	71	14	315	40	835	28	M63X1.5	1335	24	415	600	550	660	24	6
315L	508	140	628	625	520	275	508	645	216	80	M20X42	170	140	22	71	14	315	40	835	28	M63X1.5	1335	24	415	600	550	660	24	6
355M[1]	610	160	740	698	645	330	560	850	254	75	M20X50	140	110	20	67.5	12	355	55	1000	28	M63X1.5	1600	25	415	740	680	800	24	6
355L[1]	610	160	740	698	645	330	630	850	254	75	M24X50	140	110	20	67.5	12	355	55	1000	28	M63x1.5	1600	25	415	740	680	800	24	6
355M	610	160	740	698	645	330	560	850	254	95	M24X50	170	140	25	86	14	355	55	1000	28	M63X1.5	1625	25	445	740	680	800	24	6
355M[2]	610	160	740	698	645	330	560	850	254	100	M24X50	210	160	28	90	16	355	55	1000	28	M63X1.5	1670	25	490	740	680	800	24	6
355L	610	160	740	698	645	330	630	850	254	95	M24X50	170	140	25	86	14	355	55	1000	28	M63X1.5	1625	25	445	740	680	800	24	6
355L[2]	610	160	740	698	645	330	560	850	254	100	M24X50	210	160	28	90	16	355	55	1000	28	M63X1.5	1670	25	490	740	680	800	24	6

1) 2 Pole motors only .

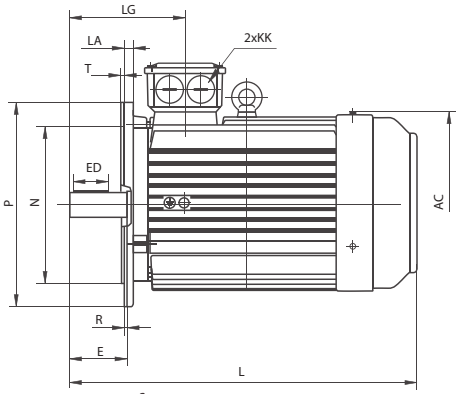
2) These motor can also be supplied. Please state the dimensions of the shaft extension on order .

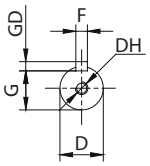
'*' Means that the cable gland is only one.

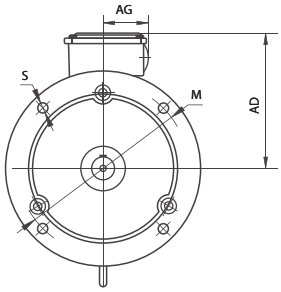
The "R" dimension is zero.

Dimension foot mount B5 and V1

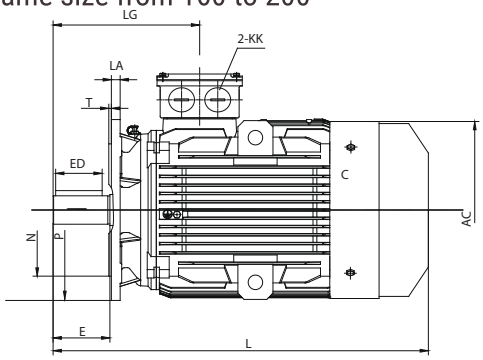
Frame size from 80 to 132

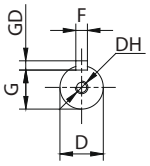


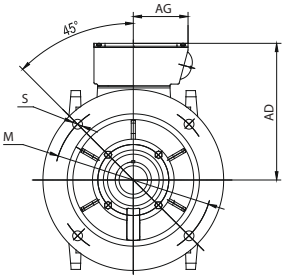




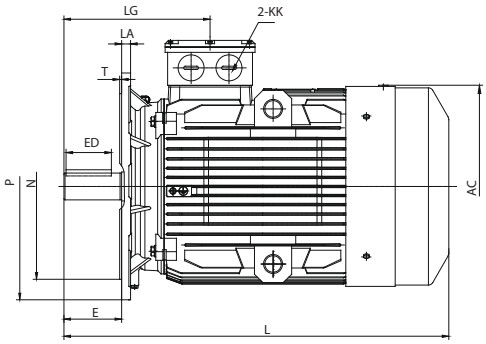
Frame size from 160 to 200

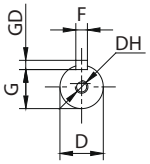


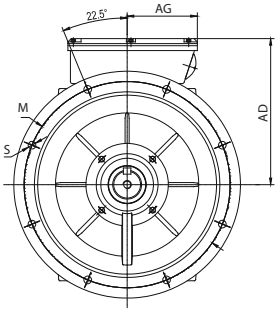




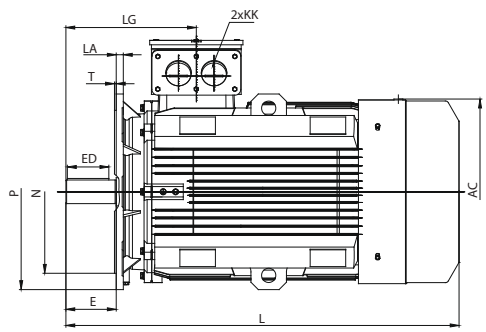
Frame size from 225 to 280

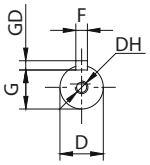


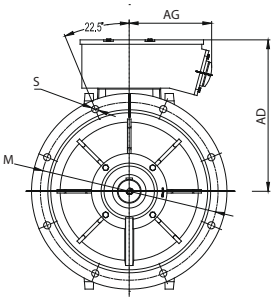




Frame size from 315 to 355







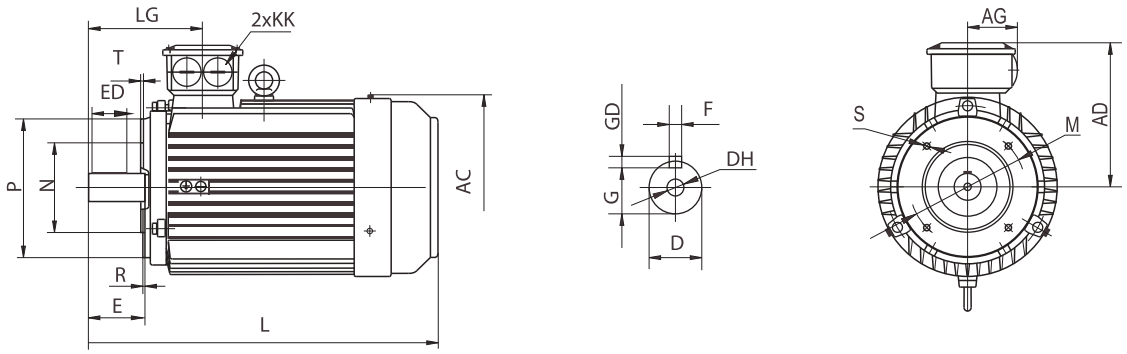
Frame size	AC	AD	AG	D	DH	E	ED	F	G	GD	KK	L	LA	LG	M	N	P	S	T
80	175	150	51	19	*M6X16	40	25	6	15.5	6	M25X1.5	295	12	106	165	130	200	12	3.5
90S	190	165	60	24	*M8X19	50	40	8	20	7	M25X1.5	320	12	124	165	130	200	12	3.5
90L	190	165	60	24	*M8X19	50	40	8	20	7	M25X1.5	320	12	124	165	130	200	12	3.5
100L	215	175	60	28	*M10X22	60	45	8	24	7	M32X1.5	385	12	140	215	180	250	14.5	4
112M	236	198	75	28	M10X22	60	45	8	24	7	M32X1.5	415	12	145	215	180	250	14.5	4
132S	275	215	75	38	M12X28	80	63	10	33	8	M32X1.5	480	14	169	265	230	300	14	4
132M	275	215	75	38	M12X28	80	63	10	33	8	M32X1.5	520	14	169	265	230	300	14.5	4
160M	330	255	95	42	M16X36	110	90	12	37	8	M40X1.5	625	16	256	256	250	350	18.5	5
160L	314	255	95	42	M16X36	110	90	12	37	8	M40X1.5	670	16	256	300	250	350	18.5	5
180M	355	275	95	48	M16X36	110	90	14	42.5	9	M40X1.5	700	18	274	300	250	350	18.5	5
180L	355	275	95	48	M16X36	110	90	14	42.5	9	M40X1.5	740	18	274	300	250	350	18.5	5
200L	405	307	165.5	55	M20X42	110	90	16	49	10	M50X1.5	780	18	296	350	300	400	18.5	5
225S	460	330	165.5	60	M20X42	140	110	18	53	11	M50X1.5	820	20	329	400	350	450	18.5	5
225M[1)]	460	330	165.5	55	M20X42	110	90	16	49	10	M50X1.5	820	20	299	400	350	450	18.5	5
225M	449	330	165.5	60	M20X42	140	110	18	53	11	M50X1.5	850	20	329	400	350	450	18.5	5
250M[1)]	500	370	185	60	M20X42	140	110	18	53	11	M63X1.5	945	22	355	500	450	550	18.5	5
250M	500	370	170	65	M20X42	140	110	18	58	11	M63X1.5	945	22	355	500	450	550	18.5	5
280S[1)]	560	395	185	65	M20X42	140	110	18	58	11	M63X1.5	1020	22	360	500	450	550	18.5	5
280S	560	395	185	75	M20X42	140	110	20	67.5	12	M63X1.5	1020	22	360	500	450	550	18.5	5
280M[1)]	560	395	185	65	M20X42	140	110	18	58	11	M63X1.5	1070	22	360	500	450	550	18.5	5
280M	560	395	185	75	M20X42	140	110	20	67.5	12	M63X1.5	1070	22	360	500	450	550	18.5	5
315S[1)]	625	520	275	65	M20X42	140	110	18	58	11	M63X1.5 1	1195	24	385	600	550	660	24	6
315M[1)]	625	520	275	65	M20X42	140	110	18	58	11	M63X1.5	1305	24	385	600	550	660	24	6
315L[1)]	625	520	275	65	M20X42	140	110	18	58	11	M63X1.5	1305	24	385	600	450	550	24	6
315S	625	520	275	80	M20X42	170	140	22	71	14	M63X1.5 1	1225	24	415	600	550	660	24	6
315M	625	520	275	80	M20X42	170	140	22	71	14	M63X1.5	1335	24	415	600	550	660	24	6
315L	625	520	275	80	M20X42	170	140	22	71	14	M63X1.5	1335	24	415	600	550	660	24	6
355M[1)]	698	645	330	75	M20X50	140	110	20	67.5	12	M63X1.5	1600	25	415	740	680	800	24	6
355L[1)]	698	645	330	75	M24X50	140	110	20	67.5	12	M63x1.5	1600	25	415	740	680	800	24	6
355M	698	645	330	95	M24X50	170	140	25	86	14	M63X1.5	1625	25	445	740	680	800	24	6
355M[2)]	698	645	330	100	M24X50	210	160	28	90	16	M63X1.5	1670	25	490	740	680	800	24	6
355L	698	645	330	95	M24X50	170	140	25	86	14	M63X1.5	1625	25	445	740	680	800	24	6
355L[2)]	698	645	330	100	M24X50	210	160	28	90	16	M63X1.5	1670	25	490	740	680	800	24	6

1) 2 Pole motors only
2) These motor can also be supplied. Please state the dimensions of the shaft extension on order.

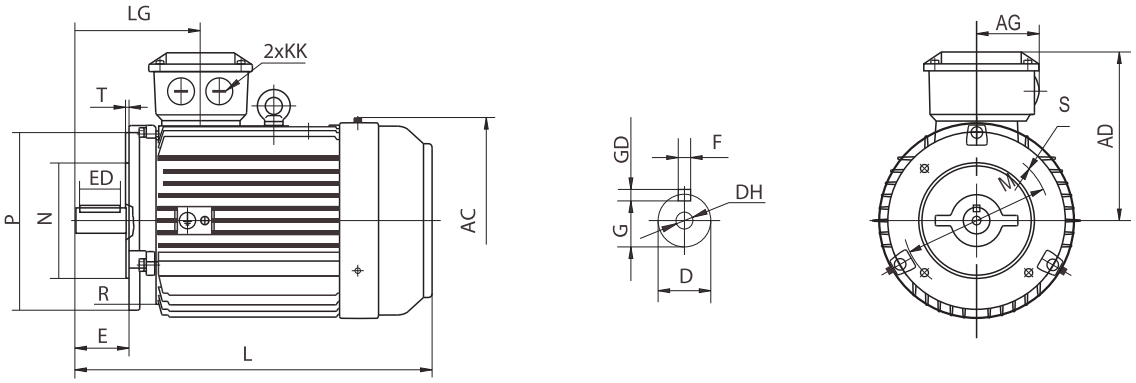
'*' Means that the cable gland is only one.
The "R" dimension is zero.

Dimension face-flange mount B14A and B14B

Frame size from 80 to 160 B14A



Frame size from 80 to 112 B14B

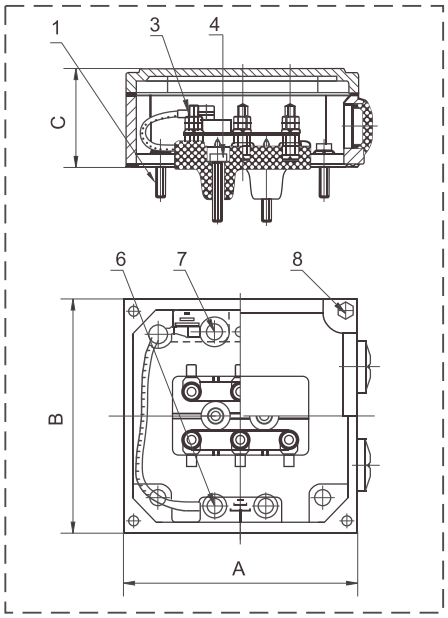


														B14A					B14B				
Frame size	AC	AD	AG	D	DH	E	ED	F	G	GD	KK	L	LG	M	N	P	S	T	M	N	P	S	T
80	175	150	51	19	M6X16	40	25	6	15.5	6	*M25X1.5	295	140	100	80	120	M6	3	130	110	160	M8	3.5
90S	190	165	60	24	M8X19	50	32	8	20	7	*M25X1.5	320	156	115	95	140	M8	3	130	110	160	M8	3.5
90L	190	165	60	24	M8X19	50	32	8	20	7	*M25X1.5	345	168.5	115	95	140	M8	3	130	110	160	M8	3.5
100L	215	170	60	28	M10X22	60	45	8	24	7	*M32X1.5	385	193	130	110	160	M8	3.5	165	130	200	M10	3.5
112M	236	195	75	28	M10X22	60	45	8	24	7	M32X1.5	410	200	130	110	160	M8	3.5	165	130	200	M10	3.5
132S	275	215	75	38	M12X28	80	63	10	33	8	M32X1.5	480	239	165	130	200	M10	3.5	215	180	250	M12	4
132M	275	215	75	38	M12X28	80	56	10	33	8	M32X1.5	520	258	165	130	200	M10	3.5	215	180	250	M12	4
160M	330	265	95	42	M16X36	110	90	12	37	8	M40X1.5	610	270	215	180	250	M12	4	265	230	300	M12	4
160L	330	265	95	42	M16X36	110	90	12	37	8	M40X1.5	655	270	215	180	250	M12	4	265	230	300	M12	4

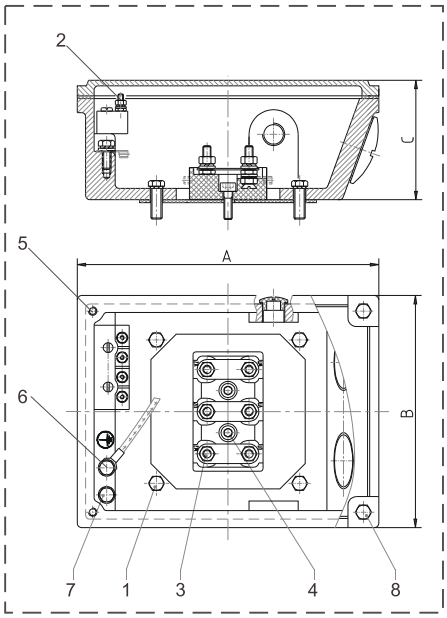
'*' Means that the cable gland is only one.
The "R" dimension is zero.

Terminal box

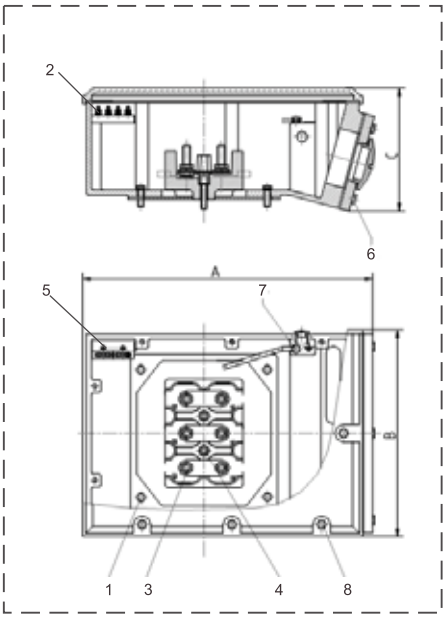
Frame size from 80 to 132



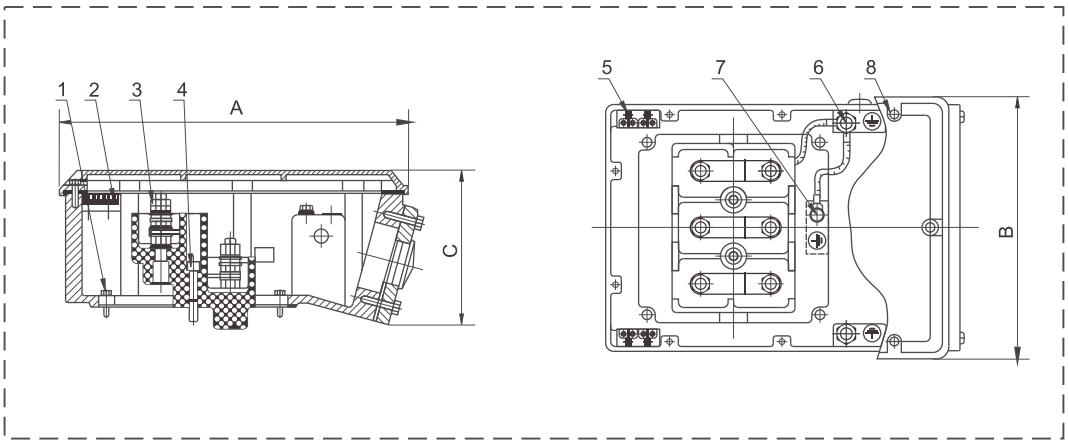
Frame size from 160 to 280



Frame size 315



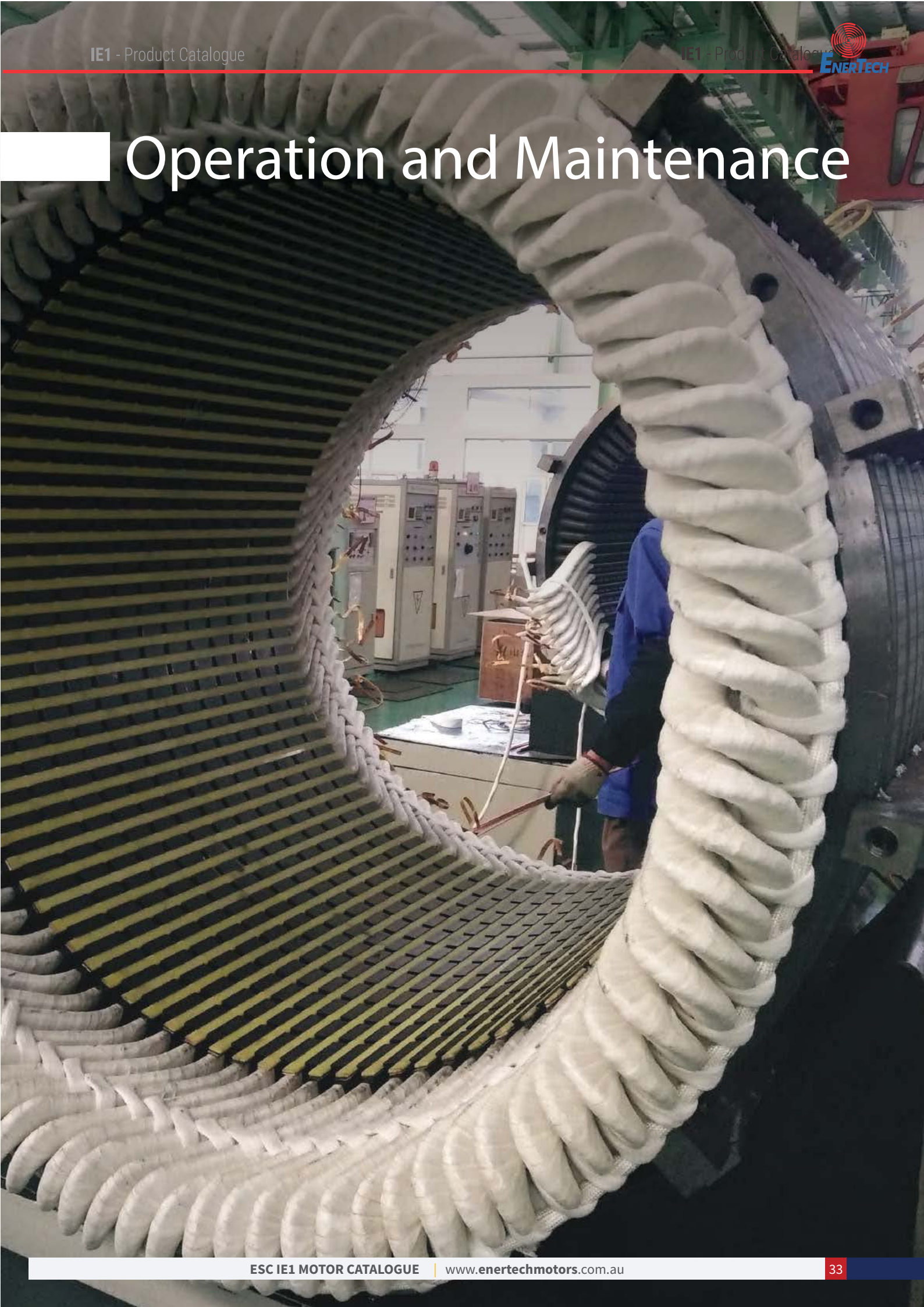
Frame size 355



Frame size	A	B	C	1	2	3	4	5	6	7	8	Metric Gland Sizes	PG Gland Sizes
80~90	104	104	48	M6X16	–	M4	M6X25	–	M6X12	M6X12	M5X16	2XM25X1.5	2XPG16
100~132	18	181	62	M6X16	–	M5	M6X25	–	M6X12	M6X12	M5X16	2XM32X1.5	2XPG21
160~180	183	185	85	M6X20	M6X20	M6	M6X25	M6X16	M8X16	M8X16	M5X16	2XM40X1.5	2XPG29
200~225	249	210	102	M6X16	M8X25	M8	M8X25	M8X16	M8X16	M8X16	M6X20	2XM50X1.5	2XPG36
250~280	275	238	110	M6X20	M10X30	M10	M8X25	M10X20	M10X20	M10X20	M6X25	2XM63X1.5	2XPG42
315	460	317	190	M8X25	M10X55	M12	M12X30	M10X25	M8X30	M10X20	M8X30	2XM63X1.5	2XPG42
355	490	365	220	M8X30	M3	M16	M10X25	M4X25	M10X25	M10X25	M8X30	2XM63X1.5	2XPG48

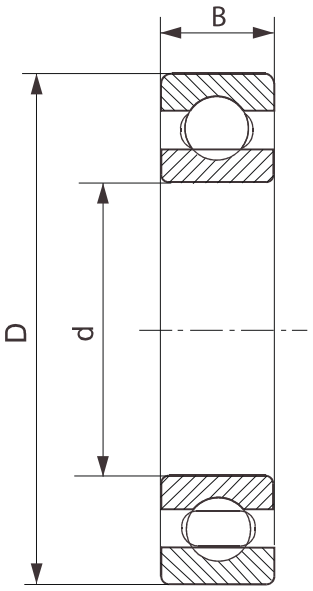
IE1 - Product Catalogue

Operation and Maintenance



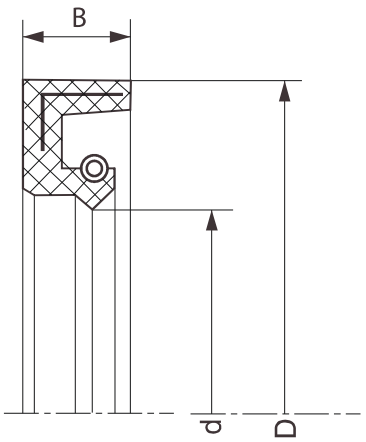
Bearing and oil seal

Bearing data



Frame size		DE	NDE	d	D	B
80		6204 ZZ C3	6204 ZZ C3	20	47	14
90		6205 ZZ C3	6205 ZZ C3	25	52	15
100		6206 ZZ C3	6206 ZZ C3	30	62	16
112		6306 ZZ C3	6306 ZZ C3	30	72	19
132		6308 ZZ C3	6308 ZZ C3	40	90	23
160		6309 C3	6309 C3	45	100	25
180		6311 C3	6311 C3	55	120	29
200		6312 C3	6312 C3	60	130	31
225		6313 C3	6313 C3	65	140	33
250		6314 C3	6314 C3	70	150	35
280 2P		6314 C3	6314 C3	70	150	35
280 4-8P		6317 C3	6317 C3	85	180	39
315 2P	(Horizontal)	6316 C3	6316 C3	80	170	39
315 2P	(Vertical)	6316 C3/ 7316	7316/ 6316	80	170	39
315 4-8P	(Horizontal)	NU319 C3	6319 C3	95	200	45
315 4-8P	(Vertical)	6319 C3/ 7319	7319/ 6319	95	200	45
355 2P	(Horizontal)	6319 C3	6319 C3	95	200	45
355 2P	(Vertical)	6319 C3/ 7319	7319/ 6319	95	200	45
355 4-8P	(Horizontal)	NU322 C3	6322 C3	110	240	50
355 4-8P	(Vertical)	6322 C3/7322	7322/ 6322	110	240	50

Oil seal data (Option)



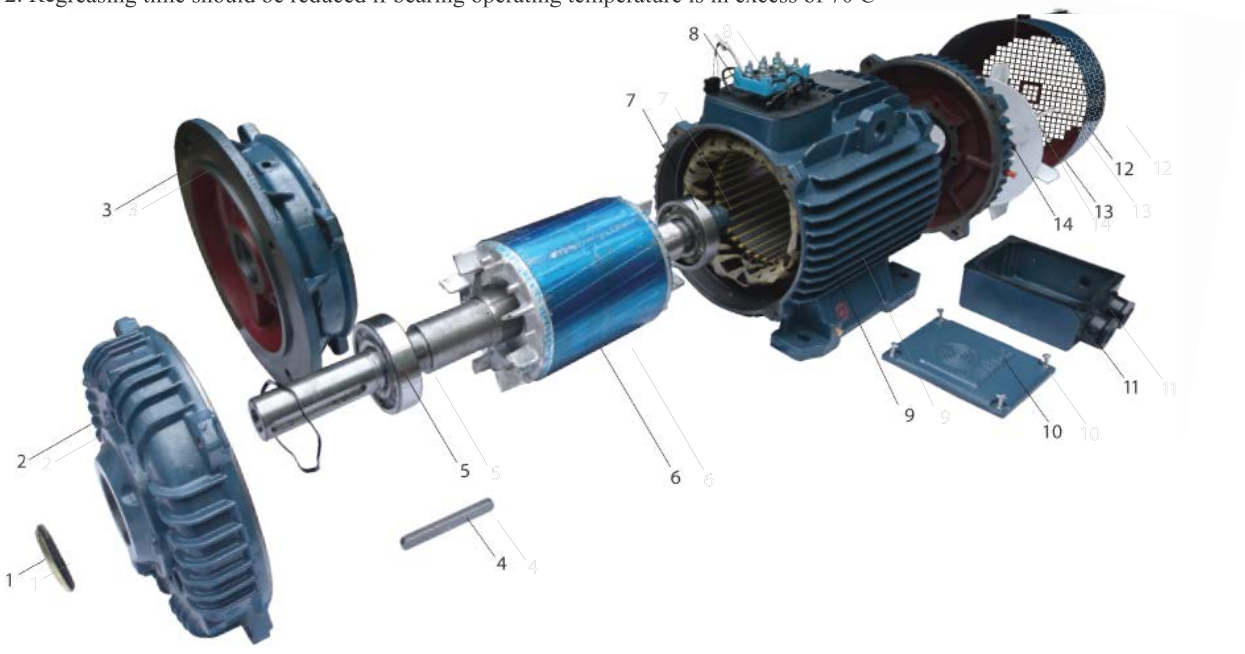
Frame size	DE			NDE		
	d	D	B	d	D	B
80	20	35	5	20	35	5
90	25	45	5	25	45	5
100	30	55	7	30	55	7
112	30	55	7	30	55	7
132	40	65	5	40	65	5
160	45	70	8	45	70	8
180	55	80	8	55	80	8
200	60	90	8	60	90	8
225	65	90	10	65	90	10
250	70	100	10	70	100	10
280 2P	70	100	10	70	100	10
280 4-8P	85	115	10	85	115	10
315-2P	80	100	10	80	100	10
315 4-8P	95	120	12	95	120	12
355 2P	95	120	12	95	120	12
355 4-8P	110	140	12	110	140	12

Bearing lubrication

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

Frame size	Drive end bearing	Non–drive end bearing	Maximum regreasing period hours for operating temperatures up to 70°C			Quantity of grease in bearing chamber
			rpm<3600	rpm<1800	rpm<1200	grams
160	6309 C3	6309 C3	6000	12000	18000	13
180	6311 C3	6311 C3	4000	11000	16000	15
200	6312 C3	6312 C3	3500	8500	13000	20
225	6313 C3	6313 C3	3000	6000	9000	22
250	6314 C3	6314 C3	2000	5000	8000	23
280*	6314 C3	6314 C3	1200	–	–	30
280	6316 C3	6316 C3	–	4000	6000	30
315*	6316 C3	6316 C3	1200	–	–	30
315	NU319 C3	6319 C3	–	2000	3000	45
355*	6319 C3	6319 C3	1200	–	–	45
355	NU322 C3	6322 C3	–	1400	2200	60

Notes:
* 2 Pole motors only
1. Vertical motors should be greased twice as often as horizontal motors.
2. Regreasing time should be reduced if bearing operating temperature is in excess of 70 C



1. Oil seal
2. Endshield D.E
3. Flange
4. Key
5. Bearing
6. Rotor
7. Bearing N.D.E
8. Terminal Board
9. Stator
10. Terminal Box Lid
11. Terminal Box Base
12. Fan Cowl
13. Fan
14. Endshield N.D.E

Operation and Maintenance

OPERATION

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

VIBRATION, BALANCING ANH NOISE

Vibration severity limit Level.

Motor frame size	Maximum RMS vibration velocity [mm/s]
71	1.6
80	1.6
90	1.6
100	1.6
112	1.6
132	1.6
160	2.2
180	2.2
200	2.2
225	2.2
250	2.2
280	2.2
315	2.8
355	2.8

Vibration

ESC motor fall within the limits of vibration severity set out in standard IEC 60034-14 which are listed below. As specified in the standard, these values ralate to rotating machinery measured in soft suspension.
Vibration severity limit Level.B

Balancing

Rotors have been dynamically balanced with a haft key. Pulleys or couplings used with motors must also be appropriate

Sound pressure level

Output [kW]	Sound pressure level dB(A) at 1 metre			
	3000 r/min	1500 r/min	1000 r/min	750 r/min
0.37	-	61	57	-
0.55	-	61	57	-
0.75	65	61	59	-
1.1	65	61	60	56
1.5	69	61	60	56
2.2	69	63	60	56
3.0	72	63	64	59
4.0	72	67	64	59
5.5	76	68	68	65
7.5	76	71	68	65
11	80	72	70	65
15	80	74	70	67
18.5	80	74	70	67
22	85	74	70	68
30	87	76	73	70
37	87	76	73	70
45	89	76	76	70
55	89	78	76	74
75	91	81	78	76
90	91	81	78	76
110	92	84	79	76
132	92	86	80	77
160	92	87	85	82
200	92	89	85	82
220	95	92	88	-
250	95	92	88	-
250	95	92	88	-
315	95	92	-	-

Noise

Noise levels for ESC motor comply with limits set by IEC 60034.9 and AS1359.109. ESC sound pressure levels at 1 metre (Data relate to motor tested at no load) are set out in the.)

MAINTENANCE SCHEDULE FOR MOTORS

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

IE1

Three phase asynchronous

ESC Series Motors

Enhanced performance cast iron units

HEAD OFFICE
Address: 5 Kintyre Court, Greenvale 3059, Victoria, Australia.
Tel: + 61 3 9333 6605
Fax: + 61 3 9333 6603
Email: info@enertechmotors.com.au
Website: www.enertechmotors.com.au

Edition 9.2

CONTACT US

5 Kintyre Court, Greenvale 3059, Victoria, Australia

Tel: +61 39333 6605 - **Fax:** +61 39333 6603

info@enertechmotors.com.au

www.enertechmotors.com.au