



IE2 - IE3

PRODUCT CATALOGUE

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ENERTECH

INTRODUCTION

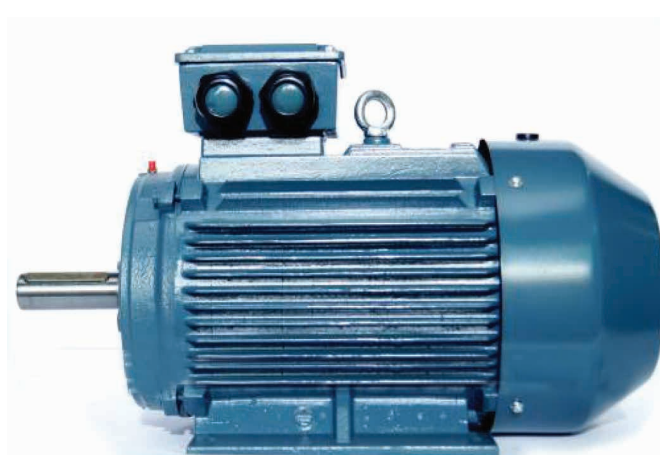
ESC motors are suitable for driving various kinds of machines or equipments. The output ratings are from 0.18kW to 355kW. The frame sizes are from 80 to 355.

The ESC motors have cast iron stator frames, end-shields and terminal boxes. The feet are 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 90°.

All motors comply with the requirements of European CE marking.

All motors are designed for high efficiency and low temperature giving a long economical service life. Motors from frame sizes 63 to 160 with aluminium stator frames, terminal boxes and cast iron end-shields are also available.



GENERAL SPECIFICATION

Cooling and ventilation

The standard cooling method is totally Enclosed fan-cooled (TEFC) in accordance with code IC411 of IEC 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.

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 $\pm 10\%$ from the rated voltage.

Noise

The permitted noise levels of electrical machines are fixed in IEC 60034 - 9 (EN 60034-9). The noise level of ESC motors is well below these limit value. For details, please refer to the performance data tables.

Quality assurance

Stringent quality procedures are observed from first design to finished products in accordance with ISO 9001 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.

Enclosure

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

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/Delta started. Motors 4kW and above can be started with Star/Delta started.

Vibration

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





STANDARD AND REGULATION

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

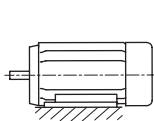
1. International Electrotechnical commission - IEC 60034 and I EC 60072.
2. British Standards - BS5000 and BS 4999.
3. Australian Standards -AS 1359.
4. The requirements of European EC marking. Low voltage Directive 73/23 (1973), modified by Directive 93/68 (1993) and the EMC - Directive 89/336. These 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).

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	---	---

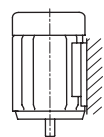
*The ESC motor range corresponds to the new international standard IEC 60034-30

Standard mounting arrangements

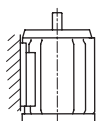
Foot mounting



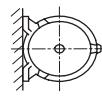
B3 (IM1001)



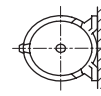
V5 (IM1011)



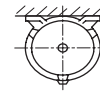
V6 (IM1031)



B6 (IM1051)

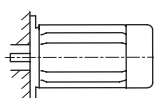


B7 (IM1061)

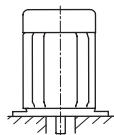


B8 (IM1071)

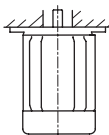
Large flange



B5 (IM3001)

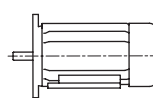


V1 (IM3011)

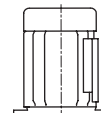


V3 (IM3031)

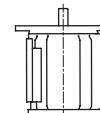
Large flange and feet



B3/B5 (IM2001)

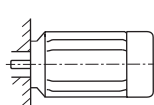


V1/V5 (IM2011)

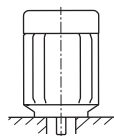


V3/V6 (IM2031)

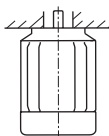
Small flange (face)



B14 (IM3601)

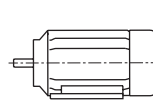


V18 (IM3611)

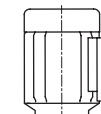


V19 (IM3631)

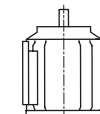
Small flange (face) and feet



B3/B14 (IM2101)

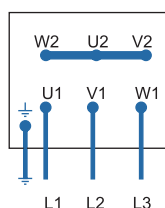


V5/V18 (IM2111)

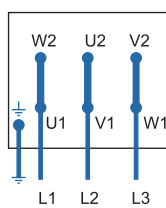


V6/V9 (IM2131)

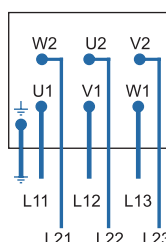
Connection diagrams three phase motors with cage rotor



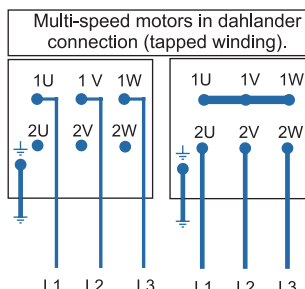
Star connection



Delta connection

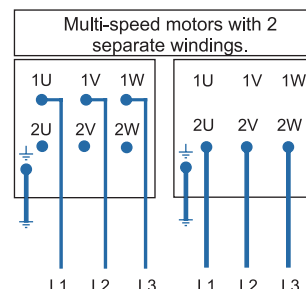


Connection to
Star-delta starter



Low speed

High speed



Low speed





High speed

Rating plates



Frame size from 80 to 132

ENERTECH ELECTRIC MOTORS(AUSTRALIA) 3 PHASE ASYNCHRONOUS MOTOR									
TYPE		SERIAL NUMBER							
INS.CL.	IP	PRODUCT CODE:							
AMB.TEMP	°C	DUTY							
BEARING DE	NDE	WEIGHT KG							
VOLTS	CONN.	Hz	kW	RPM	AMP	Cosφ	EFF.%		

Frame size from 160 to 315

 ENERTECH				ENERTECH ELECTRIC MOTORS(AUSTRALIA) 3 PHASE ASYNCHRONOUS MOTOR			
							
TYPE			SERIAL NUMBER				
AMB.TEMP	°C	kW					
Cosφ	VOLTS						
EFF.%	Hz						
DUTY	RPM						
INS.CL	AMP						
IP			DELTA Δ		STAR Y		
WEIGHT							
DE							
NDE							

Frame size 355

 ENERTECH				ENERTECH ELECTRIC MOTORS (AUSTRALIA) IE 3 PHASE ASYNCHRONOUS MOTOR			
TYPE				SERIAL NUMBER			
VOLTS							
CONN.				DUTY			
Hz				INS.CL.		IP	
kW				WEIGHT		KG	
RPM				AMB.TEMP		°C	
AMP				BEARING			
Cos ϕ				DE			
EFF.%				NDE			
				PRODUCT CODE:			



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 standard explanation

IP	5	5
	1	1

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 độ 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.

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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	Altitude above sea level	Altitude factor
30°C	1.06	1000m	1.00
35°C	1.03	1500m	0.98
40°C	1.00	2000m	0.94
45°C	0.97	2500m	0.91
50°C	0.93	3000m	0.87
55°C	0.88	3500m	0.82
60°C	0.82	4000m	0.77

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

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)

$$\text{Effective Power} = 11 \times 0.93 \times 0.98 = 10.0 \text{ kW}$$

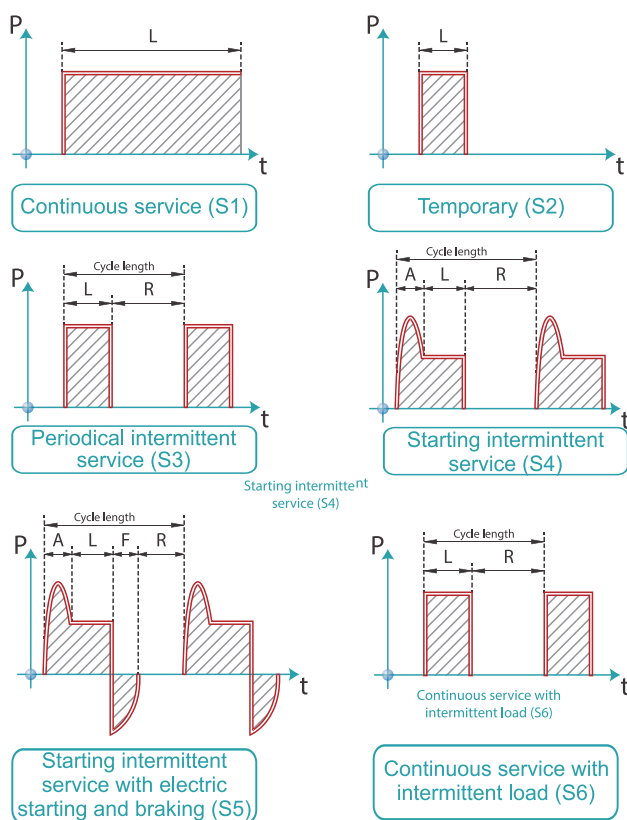
Rotation

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 operated under any other type of duty the following information should be supplied to determine the correct motor size:

- Type and frequency of switching cycles as per duty factors S3 to S7 and duty cycle factor.
- Load torque variation during motor acceleration and braking (in graphical form).
- Moment of inertia of the load 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

$$S3 = L/(D) \times 100$$

$$S4 = (A+L)/(D) \times 100$$

$$S5 = (A+L+F)/D \times 100$$

$$S6 = L/(D) \times 100$$

Permissible output

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

Poles	Duty cycle factor		
	For frames 80 to 132	For frames 160 to 250	For frames 280 to 355

Short-time duty, S2

30 min	2	1.05	1.20	1.20
	4 to 8	1.10	1.20	1.20
60 min	2 to 8	1.00	1.10	1.10

Intermittent duty, S3

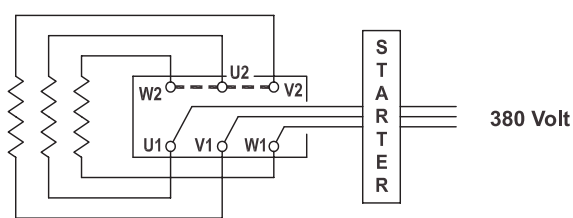
15%	2	1.15	1.45	1.40
	4 to 8	1.40	1.40	1.40
25%	2	1.10	1.30	1.30
	4 to 8	1.30	1.25	1.30
40%	2	1.10	1.10	1.20
	4 to 8	1.20	1.08	1.20
60%	2	1.05	1.07	1.10
				1.10

Connection

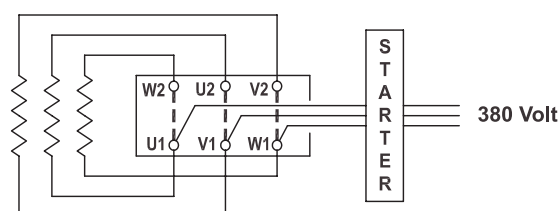
A motor's rated voltage must agree with the power supply line-to-line voltage. It is carefully to ensure the correct connection to the motor terminals.

Internal connections, voltages and VF drive selection

Standard terminal connections for motors 3kW and below is 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

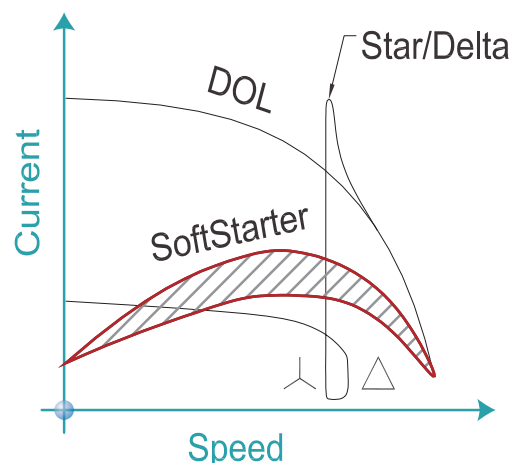
All of the following starter options are available and are the best supplied together with the motor.

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 I_L . As listed in the performance data, locked rotor current can be up to 8 times the rated current I_N of the motor. In circumstances where the motor starts under no load or where high starting torque is not required, it is preferable to reduce the starting current by one of the following means.

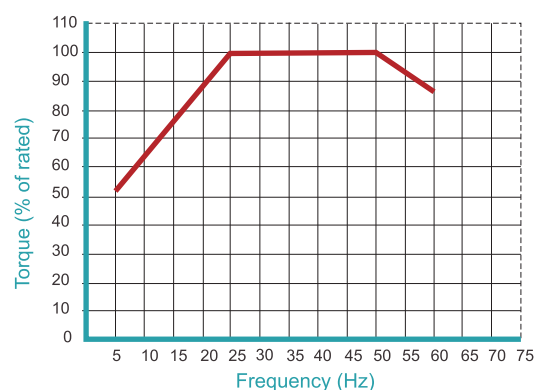
Star - Delta starting

The 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 and repeatable method of changing speeds or flow rates.



EDM Concerns

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

Insulation

The insulation system is Class F (150K) and the motors are designed to operate with Class B (80K). 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 45K 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 80K and therefore provide even greater safety margins.

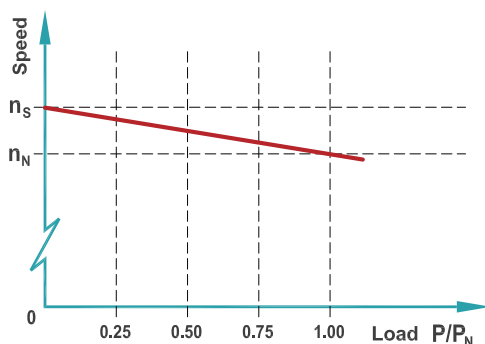
	Insulation class		
	B	F	H
Max. permissible winding temp. (°C)	130	155	180
Less ambient temp. (°C)	-40	-40	-40
Less hotspot allowance (K)	-10	-10	-15
Equals max. permissible temp.rise (K)	80	150	125
Less max. design temp.rise (K)	-80	-80	-80
Equals min. safety margin (K)	-	25	45

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 thermovaryable 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:

$$I_x = \frac{P_{out_x}}{\sqrt{3} \times U_N \times \cos \phi_x \times \eta_{lx}} \times 10^5$$

Where:

I_x = partial load current (amps)

P_{out_x} = partial load (kW)

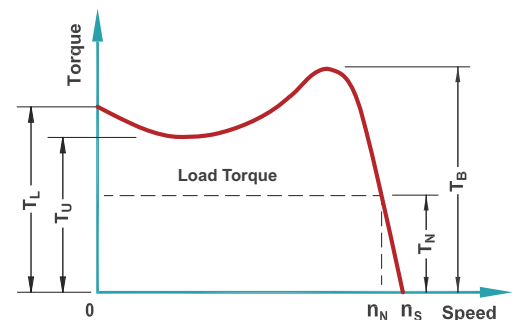
U_N = rated voltage

$\cos \phi_x$ = partial load power factor

η_{lx} = 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_B = break down torque

T_L = locked rotor torque

n_N = full load speed

T_U = pull-up torque

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



IE2 - IE3

PRODUCT CATALOGUES

ENERTECH

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 tensioners is calculated by the following formula.

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

Where:

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

F : The cross-sectional area of the belt (cm²)

α_1 : Arc of contact small (belt) pulley

$$+ \alpha_1 = 180^\circ - (d_2 - d_1) \frac{57}{a} \quad (\alpha_1 \geq 120^\circ)$$

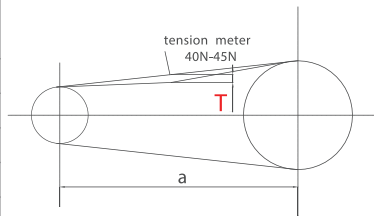
+ d_1 : Diameter of small(belt) pulley

+ 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

$$d_1 = 310\text{mm}$$

$$d_2 = 460\text{mm}$$

$$a = 1300\text{mm}$$

$$z = 8$$

The angle of the wheel hug small belt

$$\begin{aligned} \alpha_1 &= 180^\circ - (d_2 - d_1) \frac{57}{a} \\ &= 180 - (460 - 310) \times 57 / 1300 = 173.4^\circ \end{aligned}$$

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

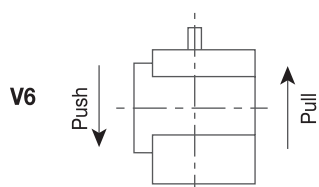
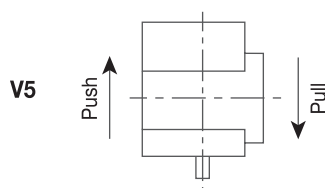
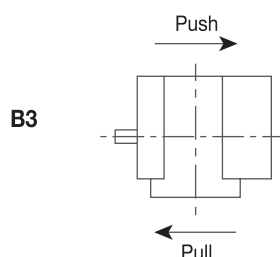
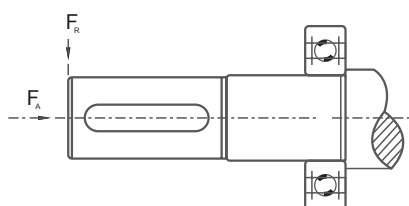
$$\begin{aligned} F_R &= 2\sigma_0 F \sin \frac{\alpha_1}{2} z \text{ (N)} \\ &= 2 \times 150 \times 2.3 \times 0.998 \times 8 = 5\,509 \text{ N} \end{aligned}$$

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	---

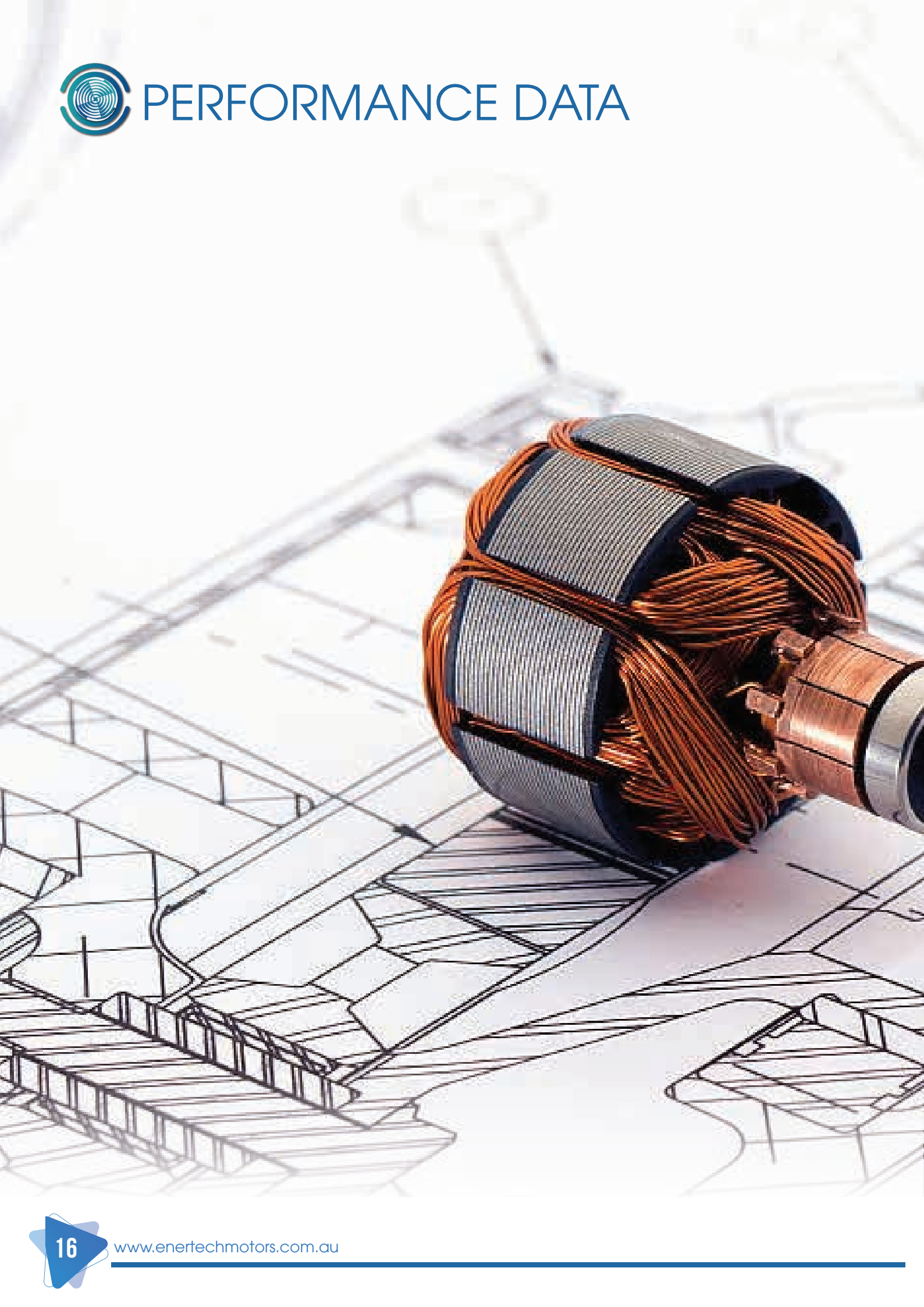
Permissible axial loads on the shaft with standard bearings

If the shaft end is loaded at X_{\max} with the permissible radial load F_R , 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	---	---



A technical line drawing of a mechanical component, possibly a pump or motor housing, is shown in the background. A grey banner is overlaid across the middle of the image.

ENERTECH



PERFORMANCE DATA IE2

2 Pole - 3000 rpm asynchronous speed 50Hz

Output (kW)	Frame Size	Full lock speed (rpm)	Current			Efficiency %	Power factor cosφ	Torque				Moment of inertia J=1/4 GD ² (kgxm ³)	Noise level at1meter dB(A)	Net weight (kg)
			Full load I _N , 50Hz					Full load T _N (Nm)	Locked rotor T _L /T _N	Pull up T _U /T _N	Break down T _B /T _N			
			380V (A)	400V (A)	415V (A)									
0.75	80M1	2850	1.7	1.6	1.6	78.4	0.83	2.5	2.3	2.4	2.6	0.0008	62	18
1.1	80M2	2855	2.5	2.4	2.3	79.6	0.84	3.7	2.3	2.6	2.6	0.0009	62	20
1.5	90S	2860	3.3	3.1	3.0	81.3	0.85	5.0	2.5	2.8	3.1	0.0012	67	26
2.2	90L	2860	4.7	4.5	4.3	83.3	0.85	7.4	2.4	2.7	3.1	0.0014	67	30
3	100L	2890	6.2	5.9	5.7	84.6	0.87	9.9	2.4	2.6	3.3	0.004	74	37
4	112M1	2895	8.0	7.6	7.3	85.8	0.88	13.3	2.3	2.4	2.9	0.0057	77	47
5.5	132S1	2910	10.9	10.4	10.0	87.0	0.88	18.2	2.2	2.7	3.3	0.0112	79	65
7.5	132S2	2925	14.7	14	13.5	88.1	0.88	24.7	2.3	2.3	3.2	0.0134	79	73
11	160M1	2940	20.5	19.5	18.8	89.4	0.91	36.1	2.2	2.3	3.5	0.0391	81	122
15	160M2	2940	27.7	26.3	25.4	90.3	0.91	48.9	2.2	2.3	3.3	0.0464	81	133
18.5	160L	2940	33.2	31.5	30.4	90.9	0.93	60.3	2.4	2.7	3.2	0.0567	81	152
22	180M	2950	40.7	38.7	37.3	91.3	0.90	71.7	2.2	2.3	3.1	0.0783	83	192
30	200L1	2960	55.1	52.3	50.5	92.0	0.90	97.8	2.4	2.6	2.8	0.1277	84	252
37	200L2	2965	67.6	64.2	61.9	92.5	0.90	119.8	2.2	2.3	2.7	0.1432	84	275
45	225M	2980	80.9	76.9	74.1	92.9	0.91	144.7	2.2	2.3	3.0	0.24	86	315
55	250M	2975	97.5	92.6	89.3	93.2	0.92	176.6	2.2	2.3	2.8	0.3214	89	417
75	280S	2975	132.2	125.6	121.1	93.8	0.92	241.2	2.0	2.3	3.4	0.5964	91	571
90	280M	2980	157.8	149.9	144.5	94.3	0.92	288.9	2.1	2.4	3.2	0.6953	91	607
110	315S	2985	194.3	184.6	177.9	94.6	0.91	352.5	2.0	2.4	2.8	1.2154	92	965
132	315M	2985	232.5	220.9	212.9	94.9	0.91	423.0	1.8	2.2	2.7	1.874	92	1067
160	315M	2990	281.5	267.4	257.8	95.0	0.91	512.8	2.1	2.4	2.7	1.8128	92	1151
185	315L1	2990	322.1	306.0	294.9	96.0	0.91	592.9	2.1	2.4	2.8	1.929	92	1205
200	315L2	2990	346.2	328.9	317.0	95.5	0.92	620.9	2.3	2.7	2.8	2.0806	92	1253
220	355M1	2990	378.9	360.0	346.9	96	0.92	705.0	1.6	2.2	2.4	2.900	100	1540
250	355M2	2990	430.5	409.0	394.2	96	0.92	801.2	1.6	2.2	2.75	3.093	100	1638
280	355L1	2990	482.2	458.1	441.5	96	0.92	801.2	2.0	2.2	2.76	3.6668	100	1798
315	355L2	2990	536.1	509.3	490.9	96.1	0.93	1009.5	2.0	2.2	2.90	4.223	100	1834



PERFORMANCE DATA

IE2

4 Pole - 1500 rpm asynchronous speed 50Hz

Output (kW)	Frame Size	Full lock speed (rpm)	Current			Efficiency %	Power factor cosφ	Torque				Moment of inertia J=1/4 GD ² (kgxm ²)	Noise level at1meter dB(A)	Net weight (kg)
			Full load I _N , 50Hz					Full load T _N (Nm)	Locked rotor T _L /T _N	Pull up T _U /T _N	Break down T _B /T _N			
			380V (A)	400V (A)	415V (A)									
0.75	80M2	1430	1.8	1.7	1.6	79.6	0.78	5.2	2.3	2.6	2.8	0.0026	56	20
1.1	90S	1420	2.6	2.5	2.4	81.4	0.79	7.5	2.5	2.5	2.7	0.0026	59	26
1.5	90L	1420	3.5	3.3	3.2	82.8	0.78	10.2	2.4	2.7	3.2	0.0031	59	29
2.2	100L1	1440	4.9	4.7	4.5	84.3	0.81	14.7	2.4	2.6	2.4	0.0073	64	37
3	100L2	1440	6.5	6.2	6.0	85.0	0.82	20.1	2.4	2.7	3.0	0.0073	64	40
4	112M	1450	8.5	8.1	7.8	86.6	0.82	26.5	2.3	2.7	3.0	0.0099	65	52
5.5	132S1	1460	11.4	10.8	10.4	88.1	0.83	36.5	2.2	2.4	3.2	0.0223	71	70
7.5	132M	1460	15.4	14.6	14.1	88.1	0.84	49.6	2.3	2.5	3.1	0.0308	71	84
11	160M	1465	22.1	21.0	20.2	89.8	0.84	72.0	2.2	2.6	3.2	0.0780	73	135
15	160L	1465	29.6	28.1	27.1	90.6	0.85	98.1	2.2	2.4	2.9	0.0957	73	156
18.5	180M	1470	35.0	33.3	32.0	91.2	0.88	120.2	2.2	2.7	3.2	0.1446	76	196
22	180L	1475	41.0	39.0	37.5	91.6	0.89	142.4	2.4	2.5	3.0	0.1643	76	215
30	200L	1480	55.5	52.7	50.8	92.3	0.89	194.2	2.2	2.5	3.3	0.2725	76	328
37	255S	1480	68.9	65.5	63.1	92.7	0.88	238.8	2.2	2.6	2.9	0.4222	78	355
45	225M	1480	82.6	78.5	75.6	93.1	0.89	290.4	2.2	2.4	2.8	0.4878	78	355
55	250M	1485	102.8	97.7	94.1	93.5	0.87	354.9	2.2	2.7	3.2	0.6864	79	453
75	280S	1485	136.3	129.5	124.8	94.0	0.89	484	2.0	2.5	2.5	1.1648	80	596
90	280M	1490	163.1	154.9	149.3	94.3	0.89	580.7	2.1	2.5	3.1	1.5185	80	693
110	315S	1490	197.9	188.0	181.2	95.0	0.89	709.8	2.0	2.6	3.2	3.2344	88	1012
132	315M	1490	237.2	225.3	217.2	95.1	0.89	851.8	2.2	2.7	2.8	3.4216	88	1147
160	315L1	1490	286.3	272.0	262.2	95.5	0.89	1032.4	2.1	2.6	3.2	3.9416	88	1224
200	315L2	1490	356.0	338.2	326.0	96.0	0.89	1286.2	2.3	2.4	2.8	4.6696	88	1331
220	355M1	1490	387.3	367.9	354.6	96.0	0.9	1410.1	2	2.2	2.9	5.374	95	1503
250	355M2	1490	440.1	418.1	403.0	96.0	0.9	1602.3	2	2.4	3.3	5.9868	95	1650
280	355L1	1490	492.9	468.3	451.3	96.0	0.9	1794.6	2	2.2	3.3	6.3260	95	1752
315	355L2	1490	554.5	526.8	507.7	96.0	0.9	2019.0	2	2.3	2.6	6.9264	95	1804



PERFORMANCE DATA

IE2

6 Pole - 1000 rpm asynchronous speed 50Hz

Output (kW)	Frame Size	Full lock speed (rpm)	Current			Efficiency %	Power factor cosφ	Torque				Moment of inertia J=1/4 GD ² (kgxm ³)	Noise level at1meter dB(A)	Net weight (kg)
			Full load I _N , 50Hz					Full load T _N (Nm)	Locked rotor T _L /T _N	Pull up T _U /T _N	Break down T _B /T _N			
			380V (A)	400V (A)	415V (A)									
0.75	90S	925	2.0	1.9	1.8	75.9	0.72	7.9	2.1	2.4	2.6	0.0032	57	24
1.1	90L	930	2.9	2.8	2.7	78.1	0.73	11.5	2.3	2.5	2.6	0.0042	57	28
1.5	100L	930	3.8	3.6	3.5	79.8	0.75	15.6	2.1	2.3	3.0	0.0074	61	34
2.2	112M	945	5.3	5.0	4.9	81.8	0.76	22.4	2.2	2.3	2.6	0.0147	65	45
3	132S	965	7.2	6.8	6.6	83.3	0.76	29.8	2.1	2.3	2.9	0.0305	69	60
4	132M1	965	9.4	8.9	8.6	84.6	0.76	39.8	2.0	2.2	2.6	0.0378	69	69
5.5	132M2	965	12.6	12.0	11.5	86.0	0.77	54.7	2.0	2.3	3.2	0.0473	69	82
7.5	160M	975	16.9	16.1	15.5	87.2	0.77	73.8	2.2	2.5	2.5	0.0924	73	116
11	160L	975	24.1	22.9	22.1	88.7	0.78	108.3	2.1	2.4	2.7	0.1218	73	143
15	180L	975	31.3	29.7	28.7	90.0	0.81	147.7	2.0	2.2	2.4	0.2174	73	181
18.5	200L1	980	38.4	36.5	35.2	90.4	0.81	182.1	2.2	2.4	2.6	0.3308	73	230
22	200L2	980	44.3	42.1	40.6	90.9	0.83	216.6	2.2	2.5	2.6	0.3780	73	239
30	225M	985	59.2	56.2	54.2	91.7	0.84	292.3	2.1	2.5	2.7	0.5744	74	301
37	250M	985	70.1	66.6	64.2	92.2	0.87	360.6	2.2	2.4	3.0	0.8757	76	387
45	280S	985	84.8	80.6	77.6	92.7	0.87	438.5	2.1	2.0	3.3	1.4700	78	501
55	280M	990	103.2	98.0	94.5	93.1	0.87	536.0	2.1	2.0	2.9	1.7325	78	547
75	315S	990	139.9	132.9	128.1	93.7	0.87	723.5	2.0	2.3	2.3	4.3155	83	976
90	315M	990	167.4	159.0	153.3	94.0	0.87	868.2	2.0	2.3	2.6	4.4940	83	1007
110	315L1	990	203.9	193.7	186.7	94.3	0.87	1061.1	2.0	2.3	3.2	5.7225	83	1097
132	315L2	990	241.2	229.1	220.9	94.6	0.88	1273.3	2.0	2.3	2.6	6.4260	83	1168
160	355M1	990	291.7	277.1	267.1	94.8	0.88	1543.4	2	2.2	2.8	9.2925	85	1554
200	355M3	990	357.9	340.0	327.7	95.5	0.89	1929.3	2.0	2.2	2.8	10.028	85	1768
220	355L1	990	393.7	374.0	360.5	95.5	0.89	2122.2	2	2	2.7	12.899	85	1838
250	355L2	990	441.9	419.8	404.6	95.6	0.9	2411.6	2	2.2	2.6	10.815	85	1902
280	355L3	990	495.0	470.3	453.3	95.6	0.9	2701.0	2	2	2.5	13.855	91	2011



PERFORMANCE DATA IE3

2 Pole - 3000 rpm asynchronous speed 50Hz

Output (kW)	Frame Size	Full lock speed (rpm)	Current			Efficiency %	Power factor cosφ	Torque				Moment of inertia J=1/4 GD ² (kgxm ²)	Noise level at1meter dB(A)	Net weight (kg)
			Full load I _N , 50Hz					Full load T _N (Nm)	Locked rotor T _L /T _N	Pull up T _U /T _N	Break down T _B /T _N			
			380V (A)	400V (A)	415V (A)									
0.75	80M1	2855	1.7	1.6	1.6	80.7	0.83	2.5	2.3	2.3	7.0	0.001	62	19
1.1	80M2	2870	2.4	2.3	2.2	82.7	0.84	3.7	2.2	2.3	7.3	0.002	62	22
1.5	90S	2885	3.1	2.9	2.8	84.2	0.85	5.0	2.2	2.3	7.6	0.002	67	30
2.2	90L	2885	4.5	4.3	4.1	85.9	0.85	7.3	2.2	2.3	7.6	0.003	67	36
3	100L	2895	6.0	5.7	5.5	87.1	0.87	9.9	2.2	2.3	7.8	0.006	74	45
4	112M1	2905	7.8	7.4	7.1	88.1	0.88	13.2	2.2	2.3	8.3	0.009	77	58
5.5	132S1	2900	10.6	10.1	9.7	89.2	0.88	18.1	2.0	2.3	8.3	0.024	79	75
7.5	132S2	2935	14.0	13.3	12.8	91.0	0.89	24.7	2.0	2.3	7.9	0.029	79	84
11	160M1	2970	20.1	19.1	18.4	91.2	0.91	35.7	2.0	2.3	8.1	0.067	81	147
15	160M2	2950	27.2	25.8	24.9	91.9	0.91	48.7	2.0	2.3	8.1	0.080	81	166
18.5	160L	2945	32.7	31.1	29.9	92.4	0.93	60.1	2.0	2.3	8.2	0.097	81	183
22	180M	2970	40.1	38.1	36.7	92.7	0.9	71.1	2.0	2.3	8.2	0.137	83	235
30	200L1	2990	54.3	51.6	49.7	93.3	0.9	96.6	2.0	2.3	7.6	0.227	84	298
37	200L2	2980	66.7	63.4	61.1	93.7	0.9	119.2	2.0	2.3	7.6	0.269	84	325
45	225M	2990	80.9	76.9	74.1	94.0	0.9	144.7	2.0	2.3	7.7	0.360	86	379
55	250M	2980	97.4	92.5	89.2	94.3	0.91	176.6	2.0	2.3	7.7	0.791	89	483
75	280S	2980	130.9	124.4	119.9	94.7	0.92	240.8	1.8	2.3	7.1	0.960	91	629
90	280M	2990	156.6	148.8	143.4	95	0.92	288.9	1.8	2.3	7.1	1.157	91	705
110	315S	2990	191.0	181.5	174.9	95.2	0.92	352.5	1.8	2.3	7.1	1.662	92	1040
132	315M	2990	231.2	219.6	211.7	95.4	0.91	423.0	1.8	2.3	7.1	1.874	92	1140
160	315M	2995	279.7	265.7	256.1	95.6	0.91	512.8	1.8	2.3	7.2	2.146	92	1293
185	315L1	2995	318.6	302.7	291.7	96.0	0.92	592.9	1.8	2.2	7.2	2.481	92	1326
200	315L2	2995	344.4	327.2	315.4	96.0	0.92	640.9	1.8	2.2	7.2	2.448	92	1358
220	355M1	2995	378.1	359.2	346.2	96.2	0.92	705.0	1.6	2.2	7.2	2.693	100	1694
250	355M1	2995	429.6	408.1	393.4	96.2	0.92	801.2	1.6	2.2	7.2	4.034	100	1802
280	355L1	2995	481.2	457.1	440.6	96.2	0.92	897.3	1.6	2.2	7.2	4.518	100	1920
315	355L2	2995	540.8	513.8	495.2	96.3	0.92	1009.5	1.6	2.2	7.2	4.645	100	2017



PERFORMANCE DATA

IE3

4 Pole - 1500 rpm asynchronous speed 50Hz

Output (kW)	Frame Size	Full lock speed (rpm)	Current			Efficiency %	Power factor cosφ	Torque				Moment of inertia J=1/4 GD ² (kgxm ²)	Noise level at1meter dB(A)	Net weight (kg)
			Full load I _N , 50Hz					Full load T _N (Nm)	Locked rotor T _L /T _N	Pull up T _U /T _N	Break down T _B /T _N			
			380V (A)	400V (A)	415V (A)									
0.75	80M2	1440	1.7	1.6	1.6	82.5	0.78	5.1	2.3	2.3	6.6	0.003	56	24
1.1	90S	1445	2.5	2.4	2.3	84.1	0.79	7.4	2.3	2.3	6.8	0.004	59	32
1.5	90L	1445	3.4	3.2	3.1	85.3	0.78	10.1	2.3	2.3	7.0	0.005	59	39
2.2	100L1	1455	4.7	4.5	4.3	86.7	0.81	14.6	2.3	2.3	7.6	0.012	64	49
3	100L2	1455	6.3	6.0	5.8	87.7	0.82	19.9	2.3	2.3	7.6	0.016	64	56
4	112M	1460	8.3	7.9	7.6	88.6	0.82	26.3	2.2	2.3	7.8	0.022	65	73
5.5	132S1	1470	10.4	9.9	9.5	89.6	0.89	36.1	2.0	2.3	7.9	0.060	71	88
7.5	132M	1470	14.1	13.4	12.9	90.4	0.89	49.2	2.0	2.3	7.5	0.071	71	108
11	160M	1470	21.5	20.4	19.7	91.4	0.85	71.7	2.2	2.3	7.7	0.137	73	150
15	160L	1470	28.8	27.4	26.4	92.1	0.86	97.8	2.2	2.3	7.8	0.171	73	180
18.5	180M	1475	34.5	32.8	31.6	92.6	0.88	120.2	2.0	2.3	7.8	0.238	76	221
22	180L	1480	40.4	38.4	37.0	93.0	0.89	142.4	2.0	2.3	7.8	0.259	76	255
30	200L	1485	54.7	52.0	50.1	93.6	0.89	194.2	2.0	2.3	7.3	0.459	76	325
37	225S	1485	67.3	63.9	61.6	93.9	0.89	238.8	2.0	2.3	7.4	0.656	78	380
45	225M	1485	81.6	77.5	74.7	94.2	0.89	290.4	2.0	2.3	7.4	0.758	78	419
55	250M	1485	101.6	96.5	93.0	94.6	0.87	354.9	2.2	2.3	7.4	1.078	79	517
75	280S	1490	133.4	126.7	122.1	95.0	0.9	482.3	2.0	2.3	6.9	1.800	80	688
90	280M	1490	161.5	153.4	147.9	95.2	0.89	578.8	2.0	2.3	6.9	2.130	80	801
110	315S	1495	197.0	187.2	180.4	95.4	0.89	707.4	2.0	2.2	7.0	3.415	88	1049
132	315M	1495	235.9	224.1	216.0	95.6	0.89	848.9	2.0	2.2	7.0	3.807	88	1160
160	315L1	1495	285.4	271.1	261.3	95.8	0.89	1029.0	2.0	2.2	7.1	3.423	88	1269
200	315L2	1495	352.1	334.5	322.4	96.0	0.90	1286.2	2.0	2.2	7.1	5.262	88	1521
220	355M1	1495	387.3	367.9	354.6	96.0	0.90	1410.1	2.0	2.2	7.1	5.449	88	1650
250	355M2	1495	440.1	418.1	403.0	96.0	0.90	1602.3	2.0	2.2	7.1	6.192	95	1815
280	355L1	1495	492.9	468.3	451.3	96.0	0.90	1794.6	2.0	2.2	7.1	6.935	95	1870
315	355L2	1495	554.5	526.8	507.7	96.0	0.90	2018.9	2.0	2.2	7.1	7.273	95	1984

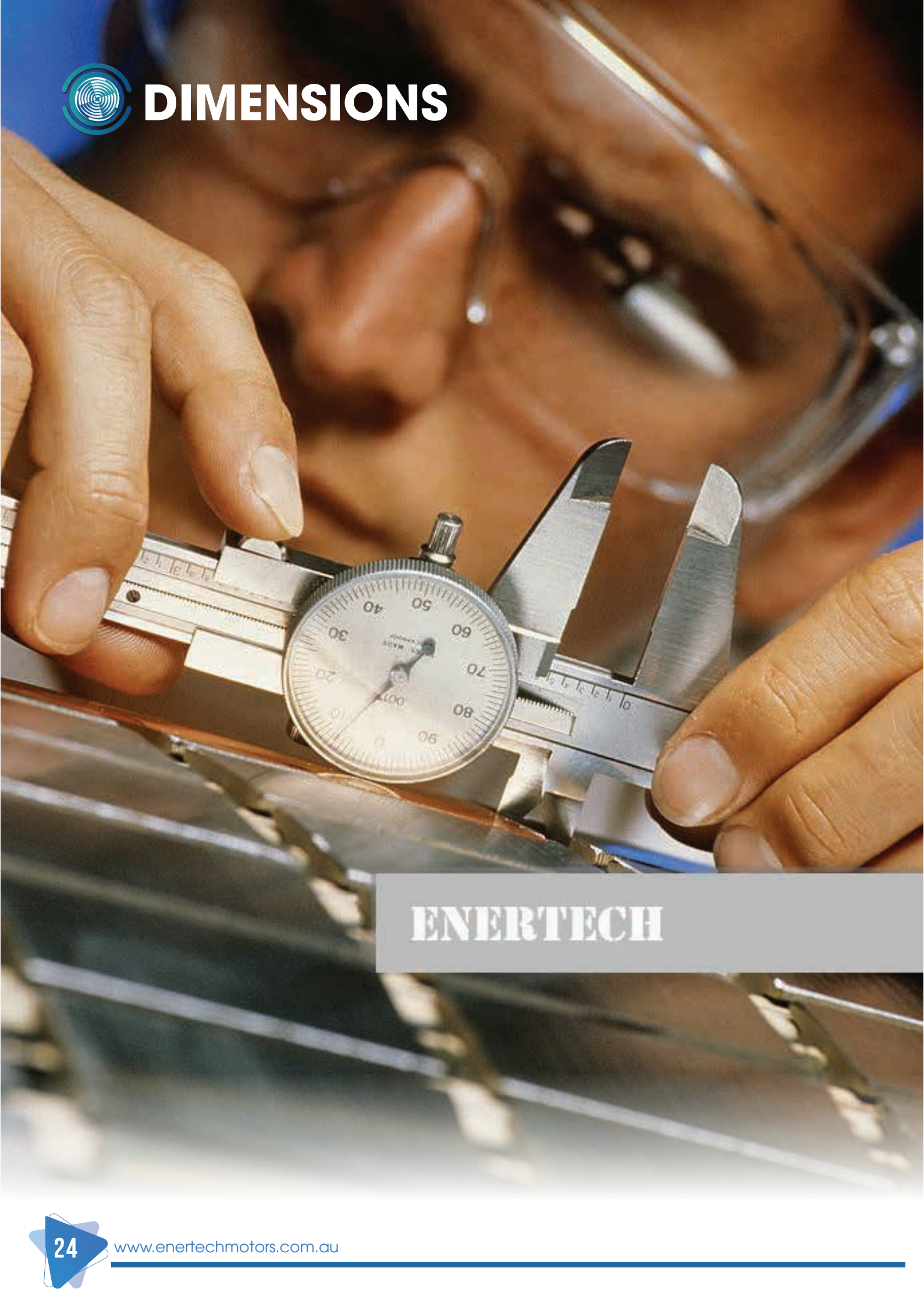


6 Pole - 1000 rpm asynchronous speed 50Hz

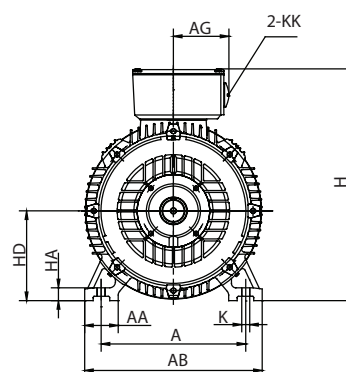
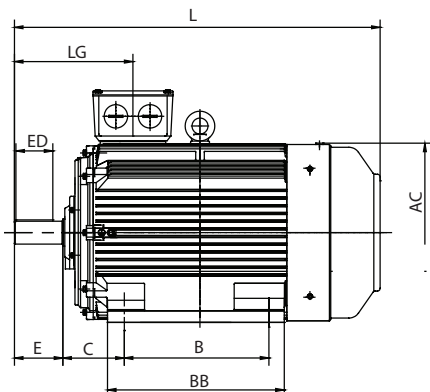
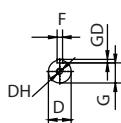
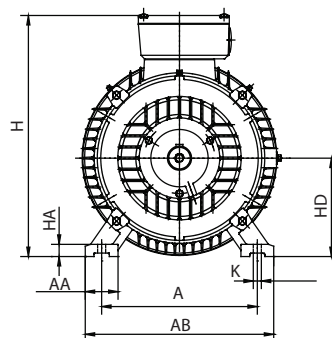
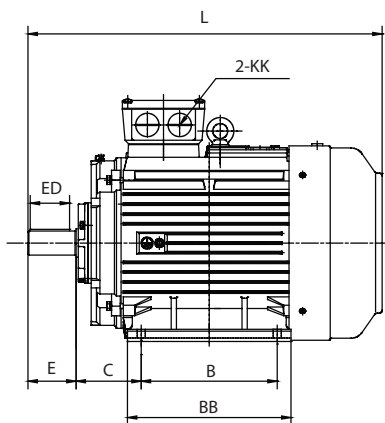
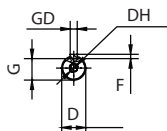
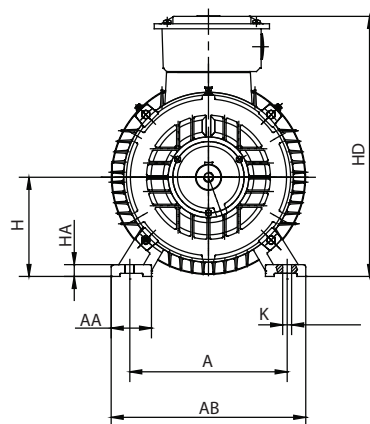
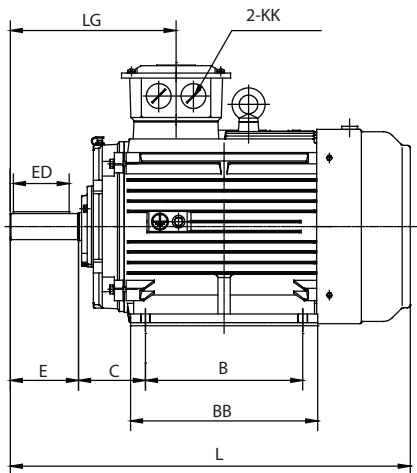
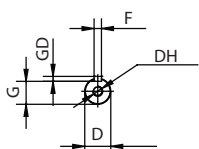
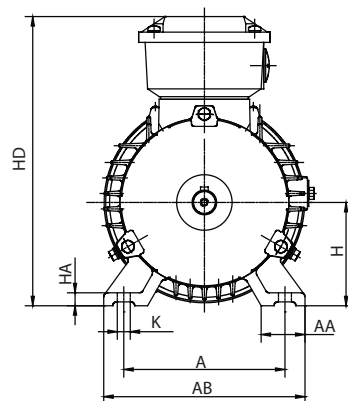
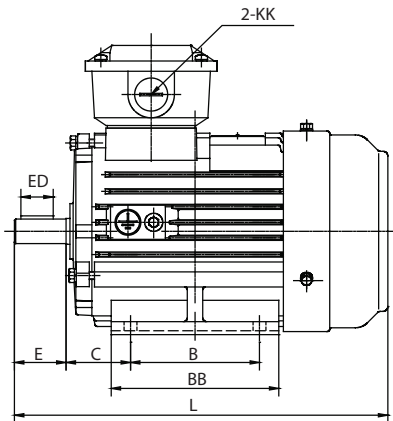
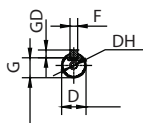
Output (kW)	Frame Size	Full lock speed (rpm)	Current			Efficiency %	Power factor cosφ	Torque				Moment of inertia J=1/4 GD ² (kgxm ²)	Nosie level at1meter dB(A)	Net weight (kg)
			Full load I _N , 50Hz					Full load T _N (Nm)	Locked rotor T _L /T _N	Pull up T _U /T _N	Break down T _B /T _N			
			380V (A)	400V (A)	415V (A)									
0.75	90S	960	2.0	1.9	1.8	78.9	0.72	7.7	2.0	2.1	6.0	0.004	57	32
1.1	90L	970	2.8	2.6	2.5	81.0	0.73	11.2	2.0	2.1	6.0	0.006	57	40
1.5	100L	970	3.6	3.4	3.3	82.5	0.75	15.2	2.0	2.1	6.5	0.016	61	47
2.2	112M	960	5.2	4.9	4.7	84.3	0.76	22.1	2.0	2.1	6.6	0.039	65	63
3	132S	970	7.0	6.6	6.4	85.6	0.76	29.8	2.0	2.1	6.8	0.035	69	75
4	132M1	970	9.2	8.7	8.4	86.8	0.76	39.8	2.0	2.1	6.8	0.043	69	92
5.5	132M2	970	12.3	11.7	11.2	88.0	0.77	54.7	2.0	2.1	7.0	0.056	69	108
7.5	160M	980	16.2	15.3	14.8	89.1	0.79	73.8	2.0	2.1	7.0	0.140	73	144
11	160L	980	23.1	21.9	21.1	90.3	0.80	108.3	2.0	2.1	7.2	0.192	73	178
15	180L	980	30.5	28.9	27.9	91.2	0.82	146.9	2.0	2.1	7.3	0.319	73	227
18.5	200L1	985	37.4	35.5	34.2	91.7	0.82	181.2	2.0	2.1	7.3	0.446	73	294
22	200L2	985	43.7	41.5	40.0	92.2	0.83	215.5	2.0	2.1	7.4	0.557	73	316
30	225M	990	58.4	55.4	53.4	92.9	0.84	290.9	2.0	2.1	6.9	0.832	74	357
37	250M	990	69.3	65.8	63.4	93.3	0.87	358.7	2.0	2.1	7.1	1.447	76	496
45	280S	990	83.9	79.7	76.8	93.7	0.87	436.3	2.0	2.0	7.3	2.252	78	613
55	280M	995	102.1	97.0	93.4	94.1	0.87	533.2	2.0	2.0	7.3	2.726	78	693
75	315S	995	138.6	131.6	126.9	94.6	0.87	723.5	2.0	2.0	6.6	3.984	83	1049
90	315M	995	165.8	157.5	151.8	94.9	0.87	868.2	2.0	2.0	6.7	4.500	83	1215
110	315L1	995	202.2	192.1	185.1	95.1	0.87	1061.1	2.0	2.0	6.7	5.607	83	1302
132	315L2	995	239.1	227.11	218.9	95.4	0.88	1273.3	2.0	2.0	6.8	6.935	83	1455
160	355M1	995	289.3	274.8	264.9	95.6	0.88	1543.4	1.8	2.0	6.8	10.222	85	1709
200	355M3	995	356.8	338.9	326.7	95.8	0.89	1929.3	1.8	2.0	6.8	11.031	85	1945
220	355L1	995	392.5	372.8	359.4	95.8	0.89	2122.2	1.8	2.0	6.8	11.072	85	2018
250	355L2	995	441.0	418.5	403.8	95.8	0.9	2411.6	1.8	2.0	6.8	11.897	85	2092
280	355L3	995	493.9	469.2	452.3	95.8	0.9	2701.0	1.8	2.0	6.8	13.692	91	2100



DIMENSIONS



ENERTECH



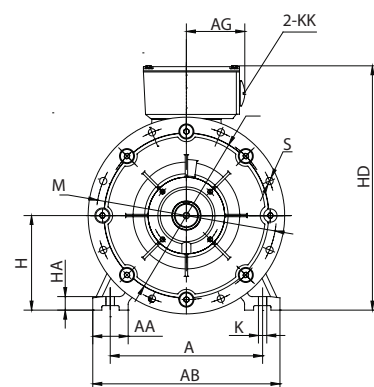
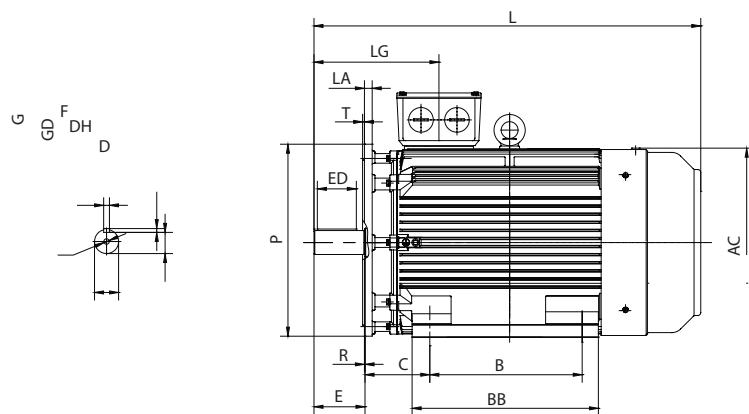
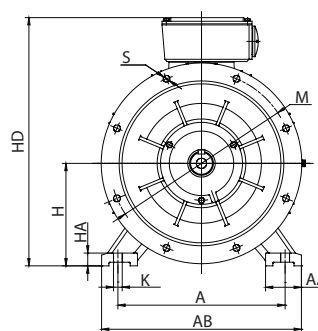
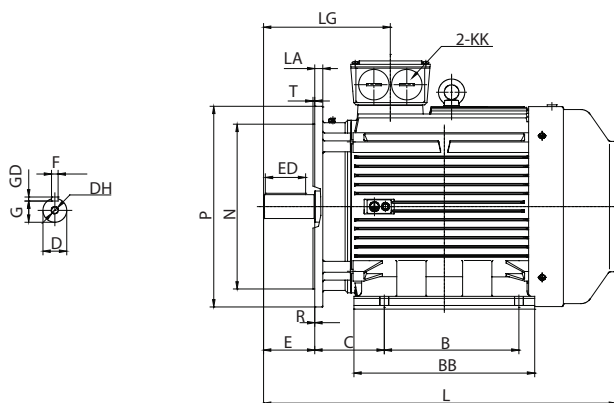
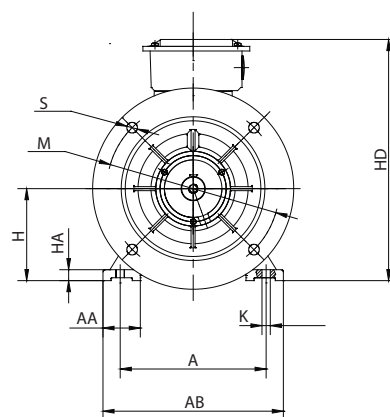
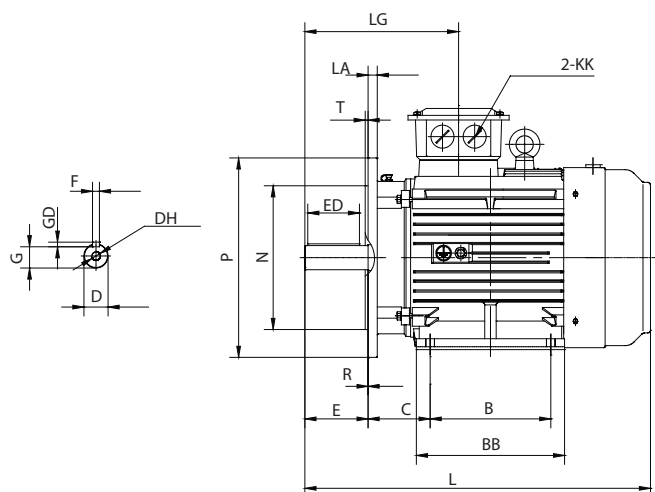
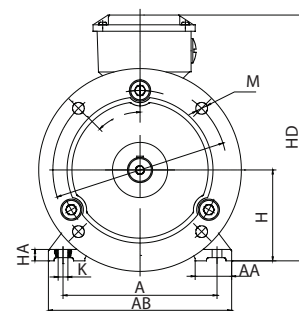
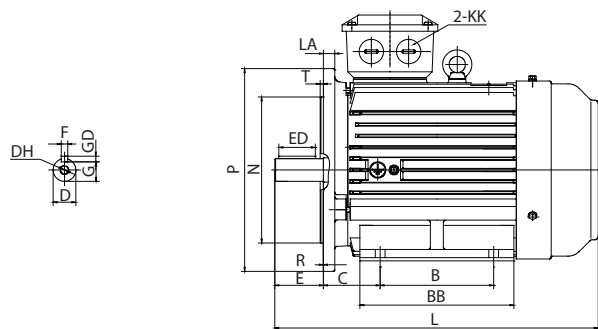
Dimensions foot mount B3

Frame size	A	AA	AB	AC	AG	B	BB	C	D	AD	E	ED	F	G	GD	H	HA	HD	K	KK	L	LG
80	125	34	165	175	51	100	142	50	19	150	40	22	6	15.5	6	80	10	225	10	M24X1.5	305	106
90S	140	36	180	195	60	100	180	56	24	170	50	32	8	20	7	90	12.5	265	10	M24X1.5	360	132
90L	140	36	180	195	60	125	210	56	24	170	50	32	8	20	7	90	12.5	265	10	M25X1.5	390	132
100L	160	40	205	215	60	140	182	63	28	175	60	40	8	24	7	100	14	275	12	M25X1.5	435	153
112M	190	45	230	236	75	140	195	70	28	198	60	40	8	24	7	112	14	300	12	M30X2	480	144
132S	216	52	265	275	75	140	205	89	38	248	80	56	10	33	8	132	16	345	12	M30X2	510	169
132M	216	52	265	275	75	178	245	89	38	248	80	56	10	33	8	132	16	345	12	M36X2	550	169
160M	254	65	320	330	95	210	260	108	42	265	100	80	12	37	8	160	19	425	14.5	M36X2	667	270
160L	254	65	320	330	95	254	305	108	42	265	100	80	12	37	8	160	19	425	14.5	M36X2	697	270
180M	279	74	355	380	95	241	297	121	48	280	100	80	14	42.5	9	180	22	460	14.5	M36X2	740	377
180L	279	74	355	380	95	279	335	121	48	280	100	80	14	42.5	9	180	22	460	14.5	M48X2	780	277
200L	318	85	395	420	120	305	368	133	55	315	100	90	16	49	10	200	25	515	18.5	M48X2	789	298
225S(4-6P)	356	80	435	465	120	286	355	149	60	335	140	100	18	53	11	225	28	560	18.5	M48X2	841	340
225M(2P)	356	80	435	465	120	311	381	149	55	335	100	80	16	49	10	225	28	560	18.5	M48X2	831	310
225M(4-6P)	356	80	435	465	120	311	381	149	60	335	140	100	18	53	11	225	28	560	18.5	M48X2	866	340
250M(2P)	406	88	495	520	160	349	440	168	60	370	140	100	18	53	11	250	33	620	24	M64X2	936	360
250M(4-6P)	406	88	495	520	160	349	440	168	65	370	140	100	18	58	11	250	33	620	24	M64X2	942	360
280S(2P)	457	90	550	570	160	368	495	190	65	405	140	100	18	58	11	280	35	685	24	M64X2	970	350
280S(4-6P)	457	90	550	570	160	368	495	190	75	405	140	100	20	67.5	12	280	35	685	24	M64X2	975	350
280M(2P)	457	90	550	570	160	419	509	190	65	405	140	100	18	58	11	280	35	685	24	M64X2	1010	350
280M(4-6P)	457	90	550	570	160	419	509	190	75	405	140	100	20	67.5	12	280	35	685	24	M64X2	1015	350
315S(2P)	508	120	635	650	195	406	515	216	65	505	140	100	18	58	11	315	45	820	28	M64X2	1160	387
315M(2P)	508	120	635	650	195	457	625	216	65	505	140	100	18	58	11	315	45	820	28	M64X2	1270	387
315L(2P)	508	120	635	650	195	508	625	216	65	505	140	100	18	58	11	315	45	820	28	M64X2	1270	387
315S(4-6P)	508	120	635	650	195	406	515	216	80	505	170	130	22	71	14	315	45	820	28	M64X2	1207	417
315M(4-6P)	508	120	635	650	195	457	625	216	80	505	170	130	22	71	14	315	45	820	28	M64X2	1317	417
315L(4-6P)	508	120	635	650	195	508	625	216	80	505	170	130	22	71	14	315	45	820	28	M64X2	1317	417
355M(2P)	610	125	735	735	330	560	775	254	75	645	140	100	20	67.5	12	355	49	1000	28	M72X2	1525	420
355L(2P)	610	125	735	735	330	630	775	254	75	645	140	100	20	67.5	12	355	49	1000	28	M72X2	1525	420
355M(4-6P)	610	125	735	735	330	560	675	254	95	645	170	140	25	86	14	355	49	1000	28	M72X2	1555	450
355L(4-6P)	610	125	735	735	330	560	775	254	95	645	170	140	25	86	14	355	49	1000	28	M72X2	1655	450

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.



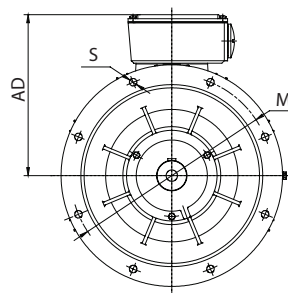
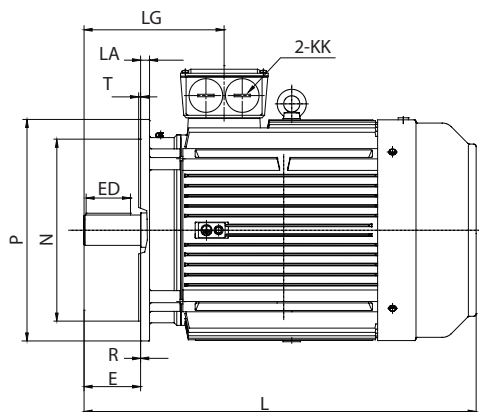
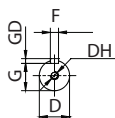
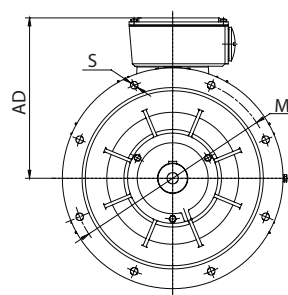
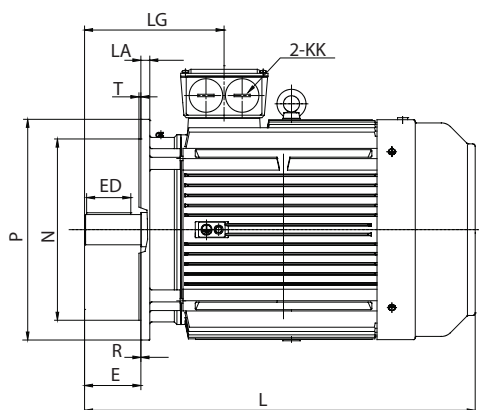
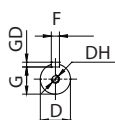
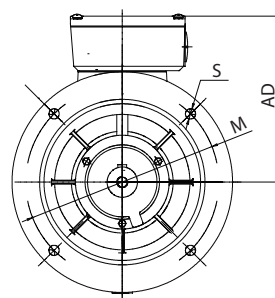
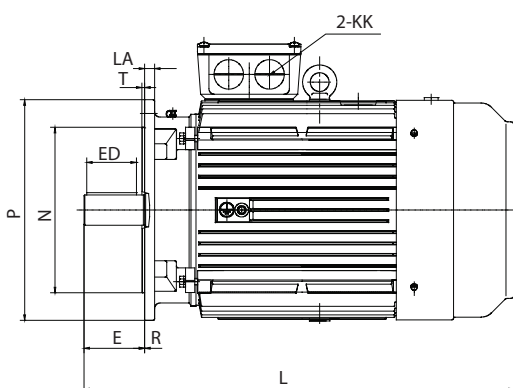
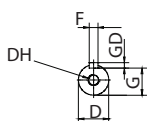
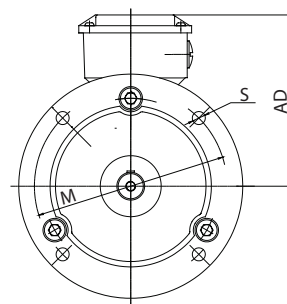
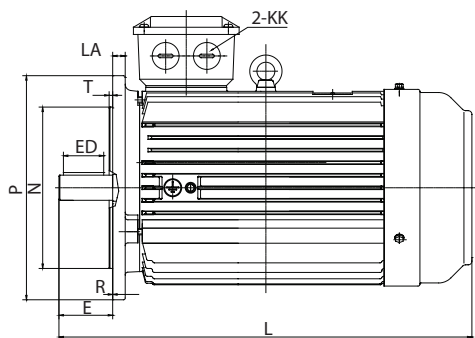
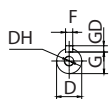
Dimensions foot mount B35

Frame size	A	AA	AB	AC	AG	B	BB	C	D	AD	E	ED	F	G	GD	H	HA	HD	K	L	LA	LG	M	N	P	S	T	KK
80	125	34	165	175	51	100	142	50	19	150	40	22	6	15.5	6	80	10	220	10	295	14	106	165	130	200	12	3.5	M24X1.5
90S	140	36	180	195	60	100	180	56	24	170	50	32	8	20	7	90	12.5	260	10	360	12	132	165	130	200	12	3.5	M24X1.5
90L	140	36	180	195	60	125	210	56	24	170	50	32	8	20	7	90	12.5	260	10	390	12	132	165	130	200	12	3.5	M25X1.5
100L	160	40	205	215	60	140	233	63	28	175	60	40	8	24	7	100	14	275	12	435	14	153	215	180	250	14.5	4	M25X1.5
112M	190	45	230	236	75	140	252	70	28	198	60	40	8	24	7	112	14	310	12	410	12	144	215	180	250	14.5	4	M30X2
132S	216	52	265	275	75	140	220	89	38	248	80	56	10	33	8	132	16	350	12	480	14	169	265	230	300	14.5	4	M30X2
132M	216	52	265	275	75	178	258	89	38	248	80	56	10	33	8	132	16	350	12	520	14	169	265	230	300	14.5	4	M36X2
160M	254	65	320	330	95	210	305	108	42	265	100	80	12	37	8	160	19	425	14.5	622	15	270	300	250	350	18.5	5	M36X2
160L	254	65	320	330	95	254	325	108	42	265	100	80	12	37	8	160	19	425	14.5	667	15	270	300	250	350	18.5	5	M36X2
180M	279	74	355	380	95	241	330	121	48	280	100	80	14	42.5	9	180	22	460	14.5	692	15	377	300	250	350	18.5	5	M36X2
180L	279	74	355	380	95	279	370	121	48	280	100	80	14	42.5	9	180	22	460	14.5	732	15	277	300	250	350	18.5	5	M48X2
200L	318	85	395	420	120	305	370	133	55	315	100	90	16	49	10	200	25	515	18.5	789	17	298	350	300	400	18.5	5	M48X2
225S(4-6P)	356	80	435	465	120	286	355	149	60	335	140	100	18	53	11	225	28	560	18.5	841	19	340	400	350	450	18.5	5	M48X2
225M(2P)	356	80	435	465	120	311	380	149	55	335	100	80	16	49	10	225	28	560	18.5	831	19	310	400	350	450	18.5	5	M48X2
225M(4-6P)	356	80	435	465	120	311	380	149	60	335	140	100	18	53	11	225	28	560	18.5	866	19	340	400	350	450	18.5	5	M48X2
250M(2P)	406	88	495	520	160	349	440	168	60	370	140	100	18	53	11	250	33	620	24	936	20	360	500	450	550	18.5	5	M64X2
250M(4-6P)	406	88	495	520	160	349	440	168	65	370	140	100	18	58	11	250	33	620	24	942	20	360	500	450	550	18.5	5	M64X2
280S(2P)	457	90	550	570	160	368	495	190	65	405	140	100	18	58	11	280	35	685	24	970	22	350	500	450	550	18.5	5	M64X2
280S(4-6P)	457	90	550	570	160	368	495	190	75	405	140	100	20	67.5	12	280	35	685	24	975	22	350	500	450	550	18.5	5	M64X2
280M(2P)	457	90	550	570	160	419	535	190	65	405	140	100	18	58	11	280	35	685	24	1010	22	350	500	450	550	18.5	5	M64X2
280M(4-6P)	457	90	550	570	160	419	535	190	75	405	140	100	20	67.5	12	280	35	685	24	1015	22	350	500	450	550	18.5	5	M64X2
315S(2P)	508	120	635	650	195	406	515	216	65	505	140	100	18	58	11	315	45	820	28	1160	24	387	600	550	660	24	6	M64X2
315M(2P)	508	120	635	650	195	457	625	216	65	505	140	100	18	58	11	315	45	820	28	1270	24	387	600	550	660	24	6	M64X2
315L(2P)	508	120	635	650	195	508	625	216	65	505	140	100	18	58	11	315	45	820	28	1270	24	387	600	550	660	24	6	M64X2
315S(4-6P)	508	120	635	650	195	406	515	216	80	505	170	130	22	71	14	315	45	820	28	1207	24	417	600	550	660	24	6	M64X2
315M(4-6P)	508	120	635	650	195	457	625	216	80	505	170	130	22	71	14	315	45	820	28	1317	24	417	600	550	660	24	6	M64X2
315L(4-6P)	508	120	635	650	195	508	625	216	80	505	170	130	22	71	14	315	45	820	28	1317	24	417	600	550	660	24	6	M64X2
355M(2P)	610	125	735	735	330	560	775	254	75	645	140	100	20	67.5	12	355	49	1000	28	1525	25	420	740	680	800	24	6	M72X2
355L(2P)	610	125	735	735	330	630	775	254	75	645	140	100	20	67.5	12	355	49	1000	28	1525	25	420	740	680	800	24	6	M72X2
355M(4-6P)	610	125	735	735	330	560	775	254	95	645	170	140	25	86	14	355	49	1000	28	1555	25	450	740	680	800	24	6	M72X2
355L(4-6P)	610	125	735	735	330	560	875	254	95	645	170	140	25	86	14	355	49	1000	28	1655	25	450	740	680	800	24	6	M72X2

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.



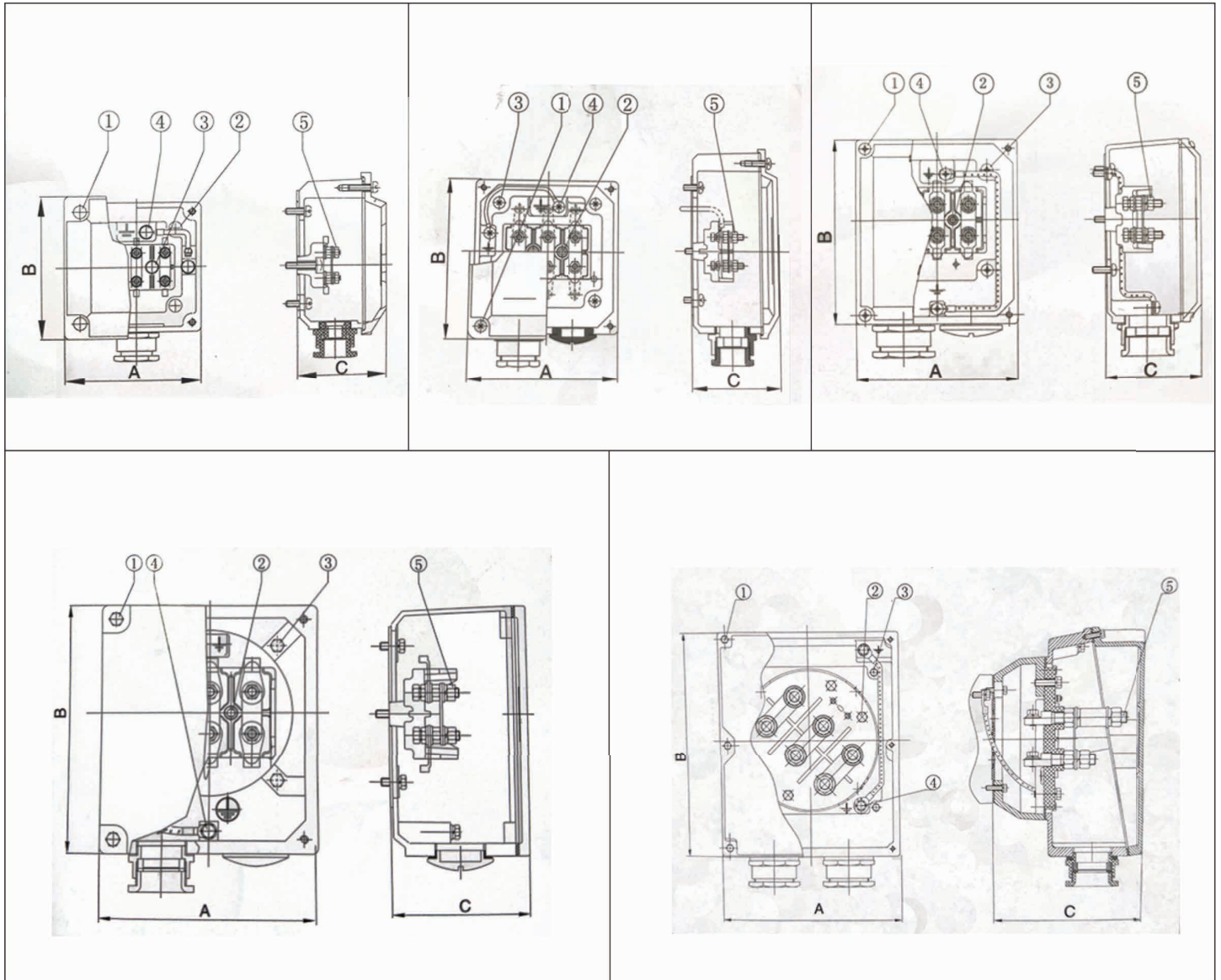
Dimensions foot mount B5 and V1

Frame size	AC	D	AD	AG	E	ED	F	G	GD	HD	R	L	LA	LG	LM	M	N	P	S	T	KK
80	175	19	155	51	40	22	6	15.5	6	225	0	305	14	112	-	165	130	200	12	3.5	M24X1.5
90S	205	24	170	60	50	32	8	20	7	265	0	360	12	126	-	165	130	200	12	3.5	M24X1.5
90L	205	24	170	60	50	32	8	20	7	265	0	390	12	126	-	165	130	200	12	3.5	M25X1.5
100L	215	28	175	60	60	40	8	24	7	275	0	435	14	153	-	215	180	250	14.5	4	M25X1.5
112M	236	28	195	75	60	40	8	24	7	300	0	480	12	144	-	215	180	250	14.5	4	M30X2
132S	275	38	215	75	80	56	10	33	8	345	0	510	14	167	-	265	230	300	14.5	4	M30X2
132M	275	38	215	75	80	56	10	33	8	345	0	550	14	167	-	265	230	300	14.5	4	M36X2
160M	330	42	265	95	110	80	12	37	8	425	0	667	15	267.5	732	300	250	350	18.5	5	M36X2
160L	330	42	265	95	110	80	12	37	8	425	0	667	15	267.5	762	300	250	350	18.5	5	M36X2
180M	380	48	280	95	110	80	14	42.5	9	460	0	740	15	277	815	300	250	350	18.5	5	M36X2
180L	380	48	280	95	110	80	14	42.5	9	460	0	780	15	277	855	300	250	350	18.5	5	M48X2
200L	420	55	315	120	110	90	16	49	10	515	0	789	17	300	864	350	300	400	18.5	5	M48X2
225S(4-6P)	465	60	335	120	140	100	18	53	11	560	0	841	19	340	910	400	350	450	18.5	5	M48X2
225M(2P)	465	55	335	120	110	80	16	49	10	560	0	831	19	310	900	400	350	450	18.5	5	M48X2
225M(4-6P)	465	60	335	120	140	100	18	53	11	560	0	866	19	340	935	400	350	450	18.5	5	M48X2
250M(2P)	520	60	375	160	140	100	18	53	11	620	0	936	20	360	1026	500	450	550	18.5	5	M64X2
250M(4-6P)	520	65	375	160	140	100	18	58	11	620	0	942	20	360	1032	500	450	550	18.5	5	M64X2
280S(2P)	570	65	405	160	140	100	18	58	11	685	0	970	22	350	1060	500	450	550	18.5	5	M64X2
280S(4-6P)	570	75	405	160	140	100	20	67.5	12	685	0	975	22	350	1065	500	450	550	18.5	5	M64X2
280M(2P)	570	65	405	160	140	100	18	58	11	685	0	1010	22	350	1100	500	450	550	18.5	5	M64X2
280M(4-6P)	570	75	405	160	140	100	20	67.5	12	685	0	1015	22	350	1105	500	450	550	18.5	5	M64X2
315S(2P)	650	65	500	195	140	100	18	58	11	820	0	1160	24	387	1258	600	550	660	24	6	M64X2
315M(2P)	650	65	500	195	140	100	18	58	11	820	0	1270	24	387	1368	600	550	660	24	6	M64X2
315L(2P)	650	65	500	195	140	100	18	58	11	820	0	1270	24	387	1368	600	550	660	24	6	M64X2
315S(4-6P)	650	80	500	195	170	130	22	71	14	820	0	1207	24	417	1307	600	550	660	24	6	M64X2
315M(4-6P)	650	80	500	195	170	130	22	71	14	820	0	1317	24	417	1417	600	550	660	24	6	M64X2
315L(4-6P)	650	80	500	195	170	130	22	71	14	820	0	1317	24	417	1417	600	550	660	24	6	M64X2
355M(2P)	735	75	645	330	140	100	20	67.5	12	1000	0	1525	25	420	1625	740	680	800	24	6	M72X2
355L(2P)	735	75	645	330	140	100	20	67.5	12	1000	0	1525	25	420	1625	740	680	800	24	6	M72X2
355M(4-6P)	735	95	645	330	170	140	25	86	14	1000	0	1555	25	450	1655	740	680	800	24	6	M72X2
355L(4-6P)	735	95	645	330	170	140	25	86	14	1000	0	1655	25	450	1755	740	680	800	24	6	M72X2

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.



Frame size	AB		C1		23		45		Gland Size	Outlet(dia)
80	107	107	67	M5X16	M5X25	M5X16	M5X12	M4	M24X1.5	ø11
90~100	115	1157	5	M5X16	M5X25	M5X16	M5X12	M4	M24X1.5	ø11
112~132	124	130	80	M5X16M	M5X25	5X20	M5X16	M5	2XM 30X22	x ø 5
160~180	184	163	95	M5X16M	6X25	M6X16N	6X12	M6	2XM 36X22	x ø 5
200~225	215	192	112	M5X25M	8X35	M8X25	M8X16	M8	2XM 48X22	x ø 6
250~280	249	220	134	M5X25	M8X35M	8X25	M8X16M	10	2XM 64X22	x ø 1
315	323	283	180	M5X25	M8X45	M10X25	M10X20	M122	XM 64X2	2 x ø51
355	365	490	285	M12X30	M12X40	M12X30	M12X25	M202	XM 72X2	2 x ø60



OPERATION AND MAINTENANCE

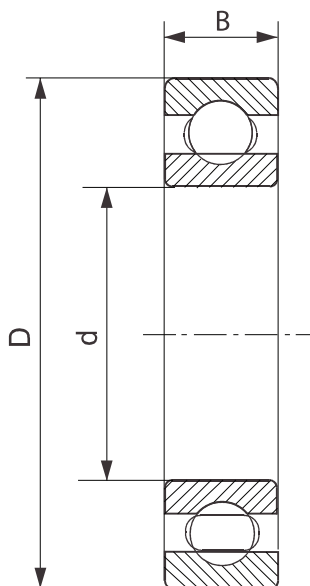


ENERTECH



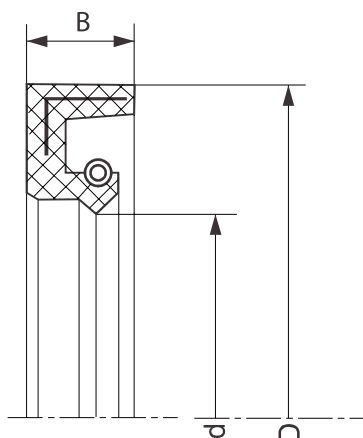
BEARING AND OIL SEAL

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 intervals for both bearings should be based on the roller bearing data. The lubrication intervals recommend are calculated on the basis of normal working conditions (operating temperatures up to 70°C). 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.

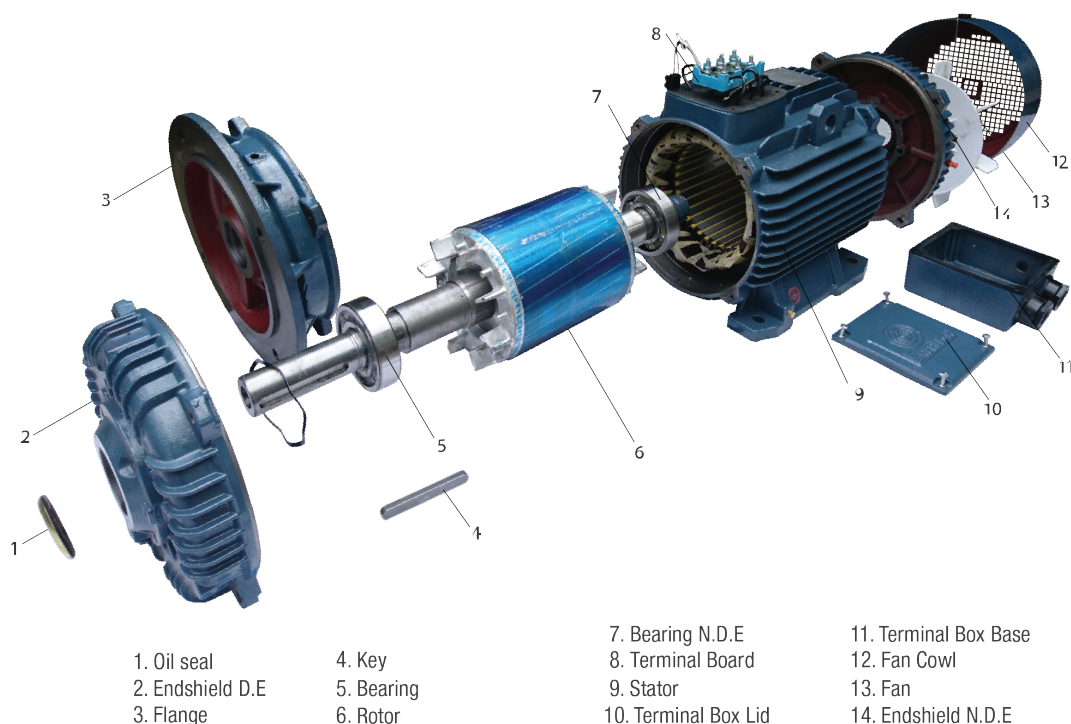
Frame size	Drive end bearing	Non-drive end bearing	Maximum regreasing period hours for operating temperatures up to 70°C			Quantity of grease in bearing chamber grams
			rpm<3600	rpm<1800	rpm<1200	
160	6309 C3	6309 C3	6000	12000	18000	13
180	6311 C3	6311 C3	4000	11000	16000	15
200	6312 C3	6312 C3	3500	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





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 AND NOISE

Vibration severity limit Level N.

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 relate to rotating machinery measured in soft suspension. (Vibration severity limit, Level N).

Balancing

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

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.

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	-	-

MAINTENANCE SCHEDULES 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



ESC MOTOR MODIFICATION OPTION

The ESC series can be modified to incorporate one or more of the Kiln timber 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.

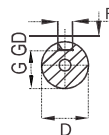
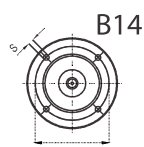
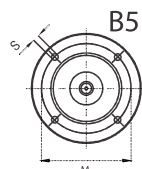
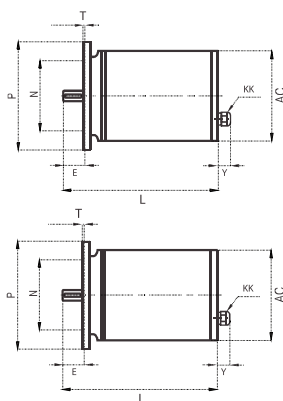
- Class H winding insulation for 180°C working environment.
- PTC and condensate heater (optional).
- Grease nipple both DE and NDE bearing for frame size 100L, 112M and 132) if required. IQF Spiral Freezer & Cooler
- Especial design for IQF tunner freezer condition.
- Working temperature -49°C max.
- 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.

Stainless Steel casting for Freezer Air Coolers 4 Pole - 1500 rpm asynchronous speed 50Hz

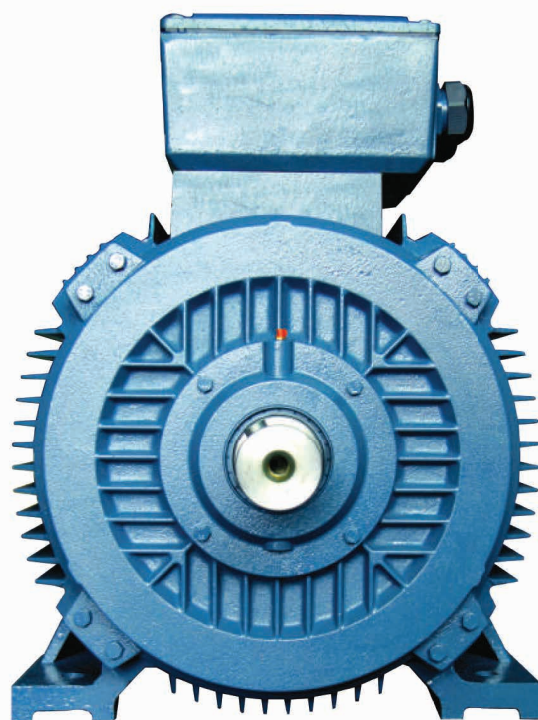
Output (Kw)	Frame Size	Full load speed (rpm)	Current			Locked rotor I_L/I_N	Efficiency %			power factor, $\cos \phi$ at 100 % full load	Torque			Moment of inertia $J=1/4 GD^2$ (kgxm ²)	Net weight (kg)
			Full load I_N 50Hz 380V (A)	400V (A)	415V (A)		at % full load	100	75	50	Full load T_N (Nm)	Locked rotor T_L/T_N	Break down T_B/T_N		

1500r/min = 4 poles

0.12	63A	1430	0.44	0.42	0.4	0.4	7.5	---	---	0.57	0.8	3.5	4.5	0.0011	10
0.18	63B	1430	0.59	0.56	0.54	0.54	7.5	---	---	0.62	1.2	3.5	4.5	0.0015	12
0.25	71A	1430	0.74	0.7	0.67	0.67	8	77	77	0.64	1.7	4	5	0.0018	13
0.37	71B	1435	1.16	1.1	1.06	1.06	8	79	79	0.64	2.5	4	5	0.0023	16
0.55	80A	1440	1.47	1.4	1.34	1.34	8	81	81	0.7	3.6	4.5	5.4	0.0041	22
0.75	80B	1440	2.1	2	1.92	1.92	9	80.9	78	0.7	5	4.8	5.6	0.0053	25
1.1	90A	1450	2.94	2.8	2.69	2.69	9	81.8	81	0.7	7.2	4.8	6	0.0075	32



L	D	E	F	G	GD	AC	Y	KK	B5					B14				
									M	N	P	nxS	T	M	N	P	nxS	T
63A 63B	11	23	4	8.5	4	131	22	M16X1.5	115	95j6	140	4x10	3	75	60j6	90	4x10	3
71A 71B	14	30	5	11	5	131	25	M20x1.5	130	110j6	160	4x10	4	85	70j6	105	4x10	4
80A 80B	19	40	6	16	6	166	25	M20x1.5	165	130j6	200	4x12	4	100	80j6	120	4x12	4
90S 90L	24	50	8	20	7	166	30	M25x1.5	165	130j6	200	4x12	4	115	95j6	140	4x12	4



IE2 - IE3

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