

# REVVO SERIES

# ELECTRIC MOTORS



**rotomotive**

looks good. performs better.





Rotomotive Powerdrives India Ltd is an Italian joint venture company operating in India since 2006. It has access to European technology and know-how from Motive srl, one of the joint venture partners and sources parts and components from Indian suppliers. We have a modern manufacturing facility in Gujarat, India. Rotomotive has the capacity to design, prototype and manufacture custom motors for various applications.

Our modern manufacturing plant has advanced machinery for automatic winding, trickle and vacuum pressure impregnation, precise balancing, conveyORIZED assembly, enclosed painting lines, automatic testing facilities with all components bar coded for traceability, consistent quality and low production time.

We also have an advanced testing facility for type testing motors and gearboxes which enables us to plot accurate speed torque curves and carry out temperature rise tests and other type tests as per IEC 60034/IS:12615.

Our Manufacturing facility in India



Lean Assembly Line



Surge Impedence Test



Precise Balancing



Motor Type Testing



Brake Motor Testing



CMM for mechanical inspection



|                                                     |            |
|-----------------------------------------------------|------------|
| Technical characteristics                           | pag. 4-5   |
| Efficiency                                          | pag. 6     |
| Protection                                          |            |
| Working conditions                                  |            |
| Rotomotive motors protection                        | pag. 7     |
| Wiring diagrams                                     | pag. 8     |
| Technical data                                      | pag. 9     |
| Performance chart                                   | pag. 10    |
| Performance chart                                   | pag. 11    |
| Performance chart                                   | pag. 12    |
| Performance chart                                   | pag. 13    |
| Performance chart                                   | pag. 14    |
| Performance chart                                   | pag. 15    |
| Performance chart                                   | pag. 16    |
| Performance chart                                   | pag. 17    |
| Performance chart                                   | pag. 18    |
| Performance chart                                   | pag. 19    |
| Optional Accessories & features                     | pag. 20    |
| Dimensions Chart                                    | pag. 21-25 |
| Rewo ATDC, ATAC & AT24                              | pag. 26    |
| Brake description                                   | pag. 27    |
| Brake operation                                     |            |
| Adjustment                                          |            |
| Switching (ATDC)                                    |            |
| Crane duty motors                                   | pag. 28    |
| Performance chart                                   | pag. 29    |
| Rewo Exd series                                     |            |
| Flame proof motors                                  | pag. 30-31 |
| Component list                                      | pag. 32    |
| Permanent Magnet Synchronous Motor & Technical Data | pag. 33    |
| Performance Chart - PMSM                            | pag. 34    |
| Performance chart                                   | pag. 35    |



## TECHNICAL CHARACTERISTICS

Rotomotive asynchronous three phase Revvo series motors are built with dimensional conformance to Indian Standard IS:1231, IS: 2223 & International standard IEC 72-1.

The mounting positions as per IS : 2253 and IEC 34-7 are B3, B5, B14 and B35.

Rotomotive motors are totally enclosed, and fan cooled. Non-standard versions in TENV construction are also available on request.

The frame sizes upto 132 are made from light weight die cast aluminium alloy and from size 160 up to 355 the frame and end-covers are made from cast iron.

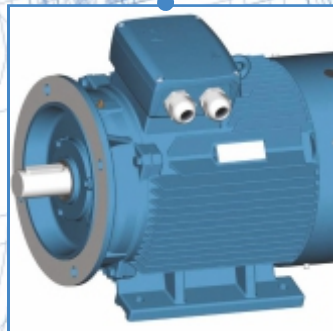
All motors are  
multiple voltage  
multi-frequency 50/60Hz,  
F class insulation, (H class on request)  
S1 continuous duty service,  
IP55 protection, (IP56, IP66 on request)  
IE2 or IE3 efficiency class (IEC 60034-30)  
tropicalized winding

IE 2

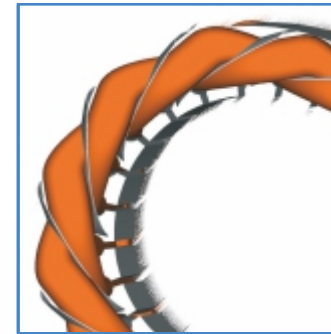
IE 3

IE 4

IE 5 (PMSM)

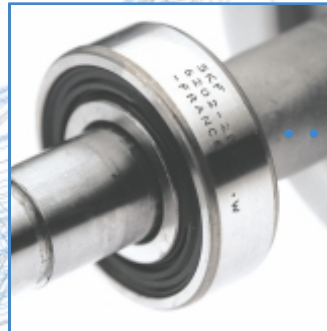


PATENTED

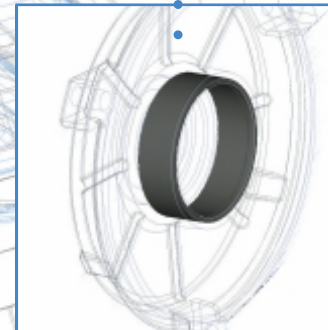
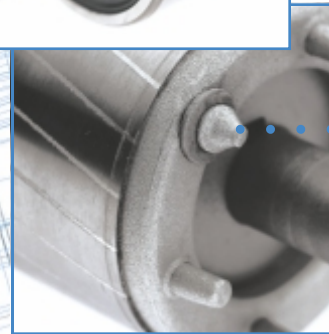


The windings are vacuum impregnated under pressure with F class insulating enamel to ensure high resistance to electrical, thermal and mechanical stresses.

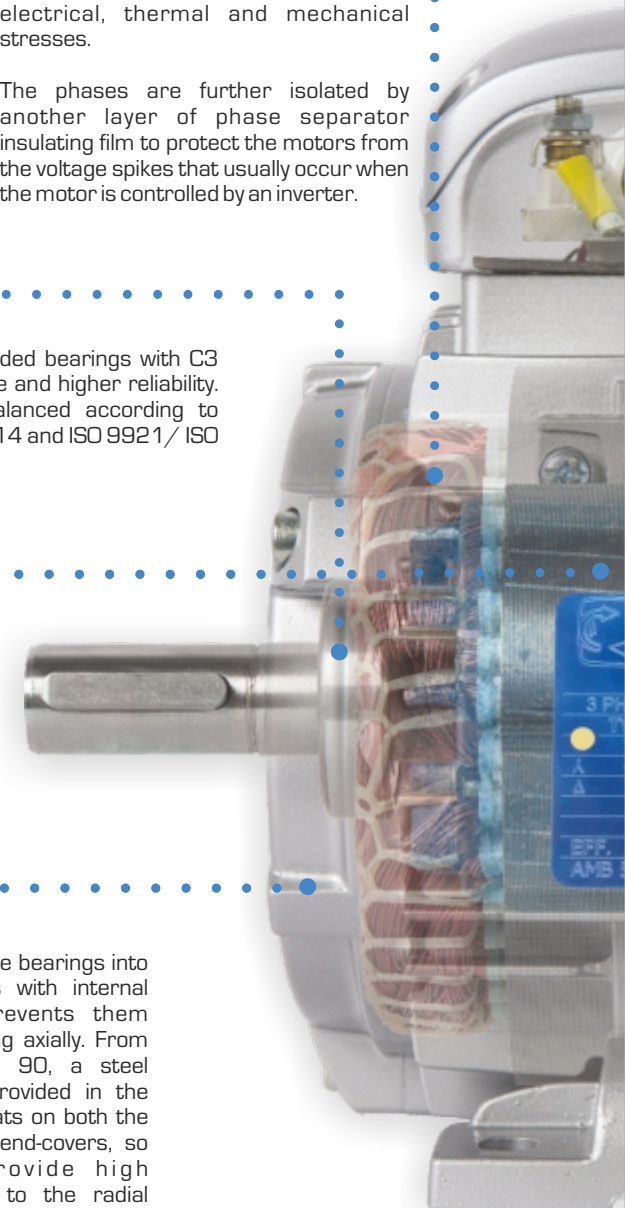
The phases are further isolated by another layer of phase separator insulating film to protect the motors from the voltage spikes that usually occur when the motor is controlled by an inverter.

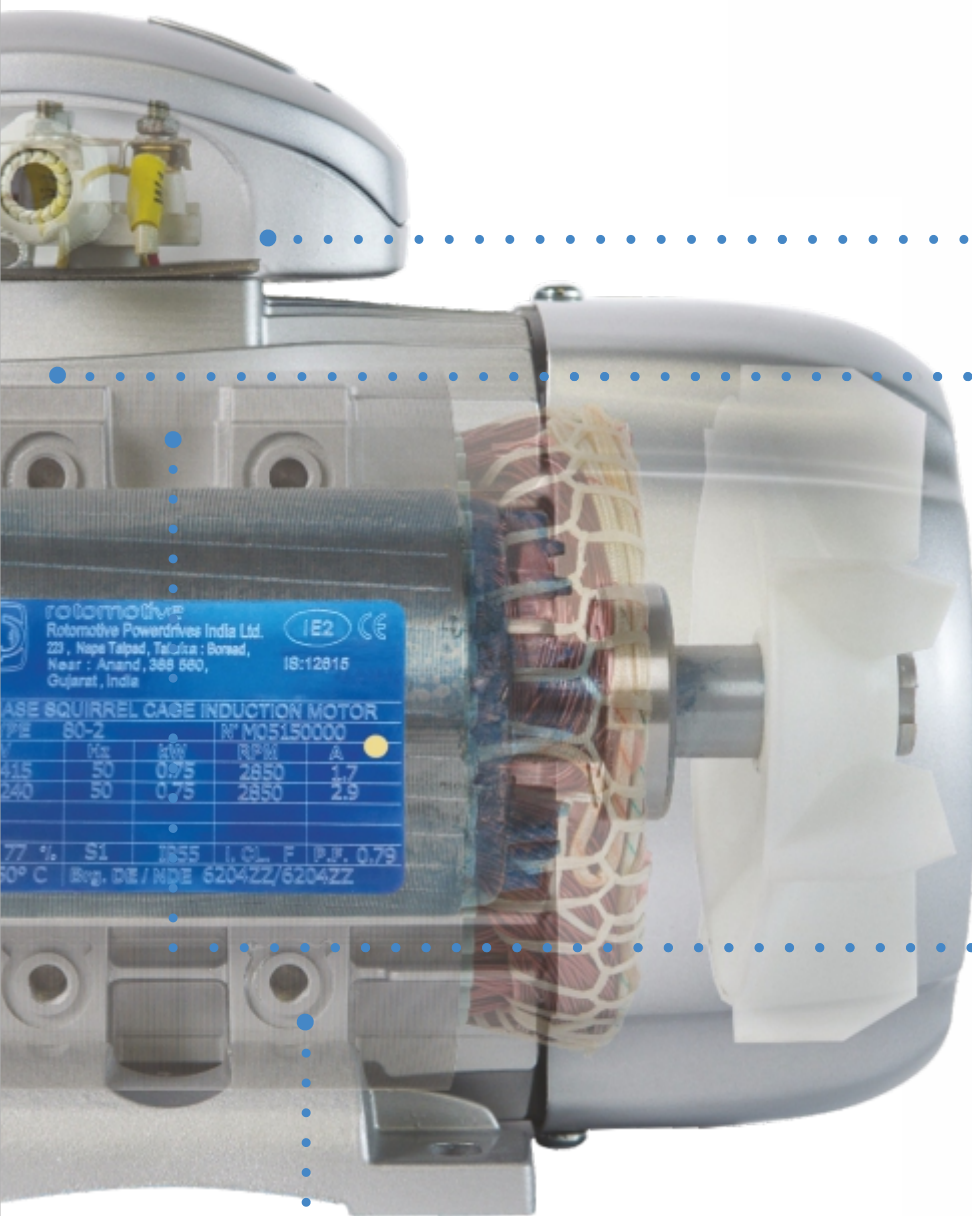


Rotomotive motors use shielded bearings with C3 clearance to ensure low noise and higher reliability. The rotor is dynamically balanced according to IS : 12075 as well as IEC 34-14 and ISO 9921/ ISO 8821 norms.

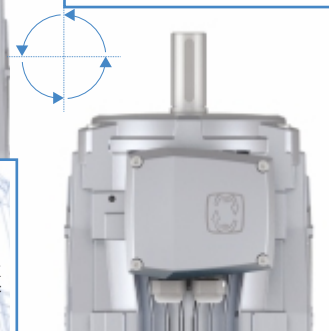


Securing the bearings into their seats with internal circlips prevents them from moving axially. From frame size 90, a steel insert is provided in the bearing seats on both the aluminium end-covers, so as to provide high resistance to the radial mechanical forces





Cable gland can be easily moved on both the sides of the terminal box, and other end can be sealed using screwed cap.



The terminal box can be rotated of 360° in steps of 90°



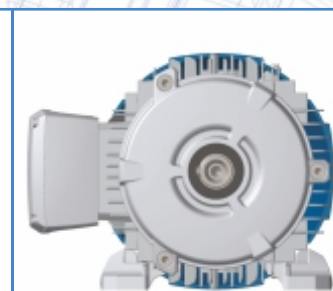
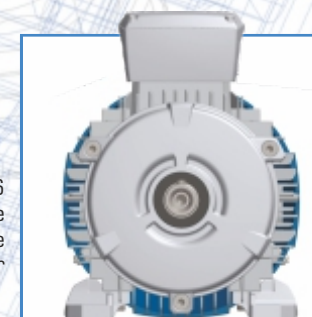
To protect against corrosion and rusting, Rotomotive motors are painted with RAL9006 silver colour upto 132 frame and from frame size 160 onwards, motors are painted with RAL 5007 blue colour.

From size 160 and up, due to the high torque, the motors are fixed by feet that are die-casted with the iron frame



Superior efficiency and performance is achieved through use of low loss **CRNO** magnetic laminations instead of the usual **Semi Processed/Decarb** material. **CRNO laminations** enable higher efficiency, lower heating, promote energy saving, age slower and reduce thermal stresses on insulation materials.

From frame size 56 to 132, Feet and the terminal box can be moved to the right or left



## EFFICIENCY

Limited energy resource and high interest cost of addition of new generation capacity is leading to an increase in the cost of electrical energy in India. The Bureau of Indian standards, with an aim to promote energy conservation has specified efficiency levels for motors termed as 'Energy Efficient motors' in its standard **IS: 12615**. These are categorized as IE2 & IE3.

Rotomotive motors are designed and manufactured to meet all the requirements of the standard IS: 12615 as well as the European agreement issued by the European commission and CEMEP (European Committee of Manufacturers of Electrical Machines and Power Electronics). The prime benefits of using Energy Efficient motors are:

### IMMEDIATE SAVING IN POWER COST:

Though actual savings may depend on type of use and duration, generally, IE3 level motors reduce the power cost by about 20%. For instance, a 15 KW motor for an operation period of 6,000 hours per year can save about 2 MWhr or more, resulting in a **direct saving of about Rupees 8000 per year**.

### HIGHER DURABILITY:

Higher efficiency motors heat less slowing down the aging of the insulating materials and thereby prolonging their reliability and life. Considering an average operation of 2500 hours/ year for motors up to 15KW and 4000 hours / year for motors rated higher than 15KW, the expected life is approximately 12 years.

### ENVIRONMENT FRIENDLY:

Efficiency IE3/IE4 motors guarantee great energy and cost savings, and consequently reduce the use of resources which generate CO<sub>2</sub> emissions. This eventually improves the quality of our environment.

### HOW TO MAKE A MORE EFFICIENT MOTOR?:

High efficiency can be seen in many ways: like the relation between output power and input power or like a measure of the losses that occur when converting the electric power into mechanical energy. From another perspective, energy efficient motors consume less energy to produce the same torque at the shaft.

An energy efficient motor is the result of use of low loss materials, precise construction, lower frictional losses, dynamically balanced rotor, and lesser air-gap between rotor and stator. **The main design factors are based on the choice of the type of lamination and windings with a higher conductor diameter.** Among all materials that compose a motor, quality of laminations have the highest influence on performance.

### SILICON MAGNETIC LAMINATIONS

Rotomotive motors are made with **CRNO** magnetic lamination sheets, rather than the usual **Semi Processed/Decarb** lamination sheets.

Apart from the choice of material, the thickness of laminations has a significant impact on performance.

In fact, thinner is the sheet higher is the performance.

The lamination sheets **Semi Processed/Decarb** can reach up to 1mm thickness.

**CRNO** magnetic lamination sheets have a 0.5mm maximum thickness

Material composition and thickness of magnetic laminations result in a very low Watts loss/kg.

**Lower specific losses mean less magnetising current for the same Power and torque (thus lesser heating)**

| EURO NORM | Watts loss/Kg at 1T | Watts loss/Kg at 1.5T |
|-----------|---------------------|-----------------------|
| 106-84    | 1.70                | 4.00                  |

data at 400V 50Hz

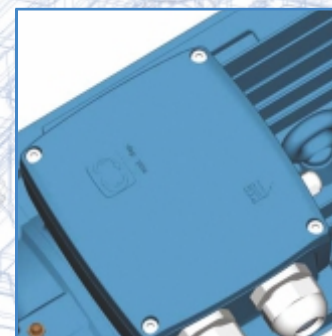
Instead, no standard prescribes a maximum watts loss factor for **Semi processed/Decarb** lamination sheets although it is considered to be generally double of **CRNO** lamination sheet.

There is ofcourse a wide variation even in these values.

Amongst all the raw materials that are used in an asynchronous electric motor, laminations have the greatest contribution in determining the performance.

The main advantages of use of silicon steel laminations are:

- Higher Efficiency
- Better guarantees on the quality consistency, and assurance of achievement of efficiency tolerances specified in International norms.



## PROTECTION TYPE

The protection against accidental human contact, ingress of dust or the entry of water is specified in IS: 4691 by an acronym of 2 letters followed by 2 numbers.

### Scheme of IP index for Protection

1<sup>st</sup> Digit. Protection against harmful ingress of solid matter and dust.

2<sup>nd</sup> Digit. Protection against harmful entry of water

Rotomotive motors are with IP55 protection

| 1 <sup>st</sup> number                                             | 2 <sup>st</sup> number                                                                                                        |
|--------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| <b>0</b> no protection                                             | no protection                                                                                                                 |
| <b>1</b> Protection against solid objects larger than 50mm         | Protection against vertical water drops (condensation)                                                                        |
| <b>2</b> Protection against solid objects larger than 12mm         | Protection against water drops fall upto <b>15</b> from the vertical                                                          |
| <b>3</b> Protection against solid objects larger than 2.5mm        | Protection against water drops upto <b>60</b> from the vertical                                                               |
| <b>4</b> Protection against solid objects larger than 1mm          | Protection against water splashes from all directions                                                                         |
| <b>5</b> Protection against dust (no deposits of harmful material) | Protection against water jet from a nozzle of 6.3mm D with a water capacity 12.5 lt/min at a distance of maximum 3m for 3 min |
| <b>6*</b> Complete protection against ingress of dust.             | Protection against jets of water comparable to heavy seas.                                                                    |

\*OPTIONAL

## WORKING CONDITIONS

### HUMIDITY:

Rotomotive motors are suitable for operating in conditions of relative humidity between 30% and 95% (without condensation). Damaging effects of occasional condensation must be avoided by adequate equipment design or if necessary by additional measures (for example built in heating or air conditioning equipment, drain holes).

### ALTITUDE AND TEMPERATURE:

The ratings indicated are at altitudes upto 1000mt above sea level and room temperature between +5°C and +50°C for motors having a rated power below 0.6KW or between -15°C and +50°C for motors having a rated power equal to or greater than 0.6KW (as per IS:12615/IEC 60034-1).

Power output decreases by 10% for every 10°C increase in ambient temperature and 8% for each 1000mt increase in altitude.

It is not necessary to reduce the rated power if at an altitude higher than 1000mt and lower than 2000mt there is a max ambient temperature of 30°C or in altitudes from 2000mt to 3000mt there is a max ambient temperature of 19°C. This also holds true when the motors are operated at higher ambients, upto 50°C but at lower altitude.

### VOLTAGE AND FREQUENCY VARIATION:

The maximum permissible variation in the supply voltage is +,-10%. Frequency variation of +,-5% is permissible and overall cumulative variation i.e the sum of variation of voltage and frequency +,-10% is allowed.

### INSULATION:

The windings are vacuum impregnated under pressure with a layer of F class insulating enamel to ensure high resistance to electrical, thermal and mechanical stresses.

Slot insulation comprising of N.P.N insulating paper warps entirely around the coil side insulating the conductor from the body.

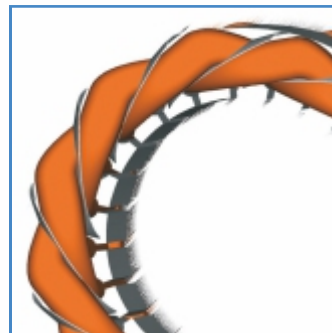
The phases are further isolated from each other by another layer of N.P.N phase separator paper to protect the motors from voltage peaks that usually occur when the motor is controlled by an inverter.

Maximum operating temperatures permitted for stator windings for each insulation class indicated on the motor name-plate.

| Class | $\Delta T$ [°C] | T max [°C] |
|-------|-----------------|------------|
| A     | 60+5°           | 105        |
| E     | 75+5°           | 120        |
| B     | 80+5°           | 130        |
| F     | 105+5°          | 155        |
| H     | 125             | 180        |

Rotomotive motors are designed to ensure that maximum temperature of the windings do not surpass the permissible temperature of their class even under S1 continuous duty service.

Almost all ratings of Rotomotive motors having class F insulation have the maximum temperature rise limited to the values permitted in Class B over an ambient of 50°C. Motors are suitable for 1.1 service factor with Class F temperature rise.



## ROTOMOTIVE MOTORS PROTECTION

Protections for the motors must be chosen based on the specific running condition according to the standard EN 60204-1

- Protection for motors with a shaft power greater than or equal to 0.5 KW with continuous S1 duty. This protection may be achieved by means of a thermal cut out relay, which can automatically cut off the supply.
- Protection against peak currents by magnetic relay that controls a contactor or by fuses. These must be set to the locked rotor current.
- If the application requires protection against excessive speed of the electric motor in situations where the mechanical load may drive the electric motor itself and thereby create a hazardous situation.
- If special conditions or synchronized operation with other machines or parts of machines require it, protection against power failures or dips by means of a minimum voltage relay that controls a contactor.

The electrical protections on the motor power line may not be sufficient to protect against overloads. If the ambient temperature increases, the motor overheats but the electrical conditions do not change which inhibits line protections. Installing built-in thermal protections on the windings solves this problem.

### PTO bimetallic device:

This is a normally closed electromechanical device that opens electrically. When the threshold temperature is reached it automatically resets when the temperature falls below the threshold level. Bimetallic devices are available with various temperature ratings and without automatic reset as per EN 60204-1

### PTC thermistor device:

This device promptly changes its resistance once the threshold temperature is reached. ROTOMOTIVE motors from frame size 180 to 355L are equipped with 3 PTC thermistors in the winding with cut-off temperature of 150°C in Class F motors (standard) or 180°C in H Class motors.

### PT100 device:

This is a device that continuously changes its resistance according to the temperature. It is useful for continuous measurement of the winding temperatures using electronic equipment.



## WIRING DIAGRAMS

Rotomotive three phase motors can be connected "Star" or "Delta".



### STAR CONNECTION:

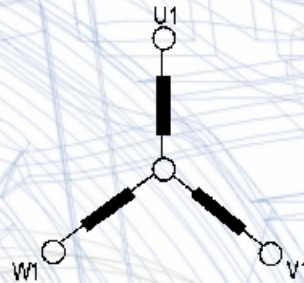
Star connection is obtained by connecting together the terminals W2, U2, V2 and supplying the terminals U1, V1, W1

The phases current and voltage are respectively

$$I_{ph}=I_n$$

$$V_{ph}=V_n/\sqrt{3}$$

Where  $I_n$  is the supply line current and  $V_n$  is the supply line voltage of star connection



The following voltages and frequencies are possible by connection the three phase Rotomotive motors having S1 duty cycle in either Star OR Delta. Typical tolerances for motors of 415V, 50Hz rating are shown.

| KW           | Hz      | Volts                                                                               |                                                                                     |             |
|--------------|---------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------|
|              |         |  |  | Tolerance   |
| Up to 2.2 KW | 50±5 %  | 230                                                                                 | 400                                                                                 | + 14/ - 7 % |
|              |         | 220                                                                                 | 380                                                                                 | + 15/ - 2 % |
|              |         | 240                                                                                 | 415                                                                                 | + 10/ -10 % |
|              | 60 ±5 % | 260                                                                                 | 440                                                                                 | + 15/ - 6 % |
|              |         | 265                                                                                 | 460                                                                                 | + 10/ -10 % |
|              |         | 280                                                                                 | 480                                                                                 | + 5/ -14 %  |
| Above 2.2 KW | 50±5 %  | 400                                                                                 | 690                                                                                 | + 14/ - 7 % |
|              |         | 380                                                                                 | 660                                                                                 | + 15/ - 2 % |
|              |         | 415                                                                                 | 720                                                                                 | + 10/ -10 % |
|              | 60 ±5 % | 440                                                                                 | 760                                                                                 | + 15/ - 6 % |
|              |         | 460                                                                                 | 795                                                                                 | + 10/ -10 % |
|              |         | 480                                                                                 | 830                                                                                 | + 5/ -14 %  |

Voltages or tolerance other than these available on request

### DELTA CONNECTION:

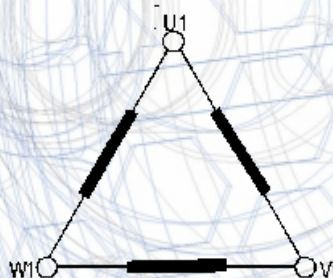
Delta connection is obtained by connecting the end of a phase with the beginning of the following one.

The phase current  $I_{ph}$  and the phase voltage  $V_{ph}$  are respectively:

$$I_{ph}=I_n/\sqrt{3}$$

$$V_{ph}=V_n$$

Where  $I_n$  and  $V_n$  are referred to Delta connection.



The general electrical specifications are listed in the performance charts that follow. To understand their contents, the following general definitions are provided.



#### Rated Power:

It is the Electrical equivalent of mechanical power measured at the shaft and expressed according to the terminology of International Standards Committees, in Watts or Kilowatts. However it is still common to refer to power in terms of Horsepower (HP).



#### Rated Voltage:

The voltage to be applied to the motor terminals in accordance with the specifications listed in the following tables



#### Frequency:

All electrical data in this catalogue refer to three phase induction motors at 50 Hz. These may be connected to 60 Hz taking into account the multiplier coefficients in the table below



#### Rated Current:

"In" is the rated current expressed in Amperes, drawn by the motor when supplied at rated voltage and delivering the rated power. In the following tables the rated currents are referred to a Voltage supply of 415V. For other voltage ratings, the absorbed rated current can be considered inversely proportional to the voltage supply. EX:

| Volt | 240  | 400  | 415 | 440  | 690  |
|------|------|------|-----|------|------|
| In   | 1.74 | 1.04 | 1.0 | 0.94 | 0.60 |



#### Over Load Current:

Rotomotive motors can also withstand temporary overloads, with current increases of 1.5 times the rated current for 2 minutes.

| rated voltage at 50Hz | Volt at 60Hz | rated power W | rpm | In   | Ia In | Ca Cn | Cmax Cn |
|-----------------------|--------------|---------------|-----|------|-------|-------|---------|
| 240                   | 240          | 1.1           | 1.2 | 1.15 | 0.9   | 0.9   | 0.9     |
| 240                   | 260          | 1.2           | 1.2 | 1    | 1     | 1     | 1       |
| 415                   | 415          | 1             | 1.2 | 1.2  | 0.8   | 0.8   | 0.8     |
| 415                   | 440          | 1.06          | 1.2 | 1.1  | 0.87  | 0.87  | 0.87    |
| 415                   | 460          | 1.2           | 1.2 | 1    | 1     | 1     | 1       |
| 415                   | 480          | 1.25          | 1.2 | 1    | 1.1   | 1.1   | 1.1     |

for further information, see chapter "wiring diagrams" at page 9



#### Starting current (or locked rotor current):

In the performance charts the starting current "Is" is indicated as a multiple value of the rated current (Is/In)



#### Synchronous Speed:

Synchronous Speed (Ns) is expressed in rpm and it is obtained by the formula  
 $N_s = (120 \times f) / P$

f = supply frequency Hz

P = number of poles pairs



#### Rated Torque:

Cn is expressed in Nm and it corresponds to the rated power and rated rpm. It is given by the multiplication of the force for the arm (distance) and it is measured in Nm because the force is expressed in Newton and the distance in meters The rated torque value is obtained by the formula

$$C_n \text{ [Nm]} = 9550 \times (P_n / n)$$

Pn = Rated Power in KW

N = Rated rotation speed in rpm



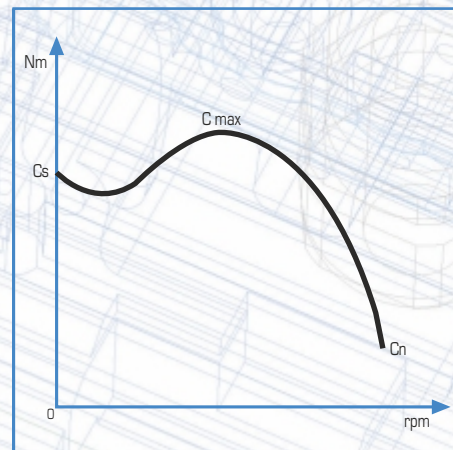
#### Starting torque (or locked rotor torque):

Cs is the torque that the motor can develop with the rotor at a standstill and the rated power supply.



#### Maximum torque (Pull out Torque):

Cmax is the maximum torque developed by the motor at the rated power supply at a certain speed.



It represents also the value of the stall torque/pull out torque after which the motor stops.

In the following performance charts, it is indicated the relation between maximum torque and rated torque and maximum torque (Cmax / Cn)



#### Efficiency:

η is expressed in % and it is given by the relation between the output power and the addition of output Power and the electric losses of the motor, that is the input power consumed by the motor. The electric motors losses are mainly of two kinds: copper losses and iron losses. These losses are lost in form of heat. Higher efficiency means energy savings, lower heating, longer life of insulating materials.



#### Power factor or cos φ:

It represents the cosine of the voltage and current gap angle



#### Noise:

The noise is expressed in dB (A). The measurement must be taken in accordance with the standard IS: 12065/ ISO 1680-2, in order to find the Sound Power level LwA measured at a distance of 1m from the machine. This standard describes the acoustic Power limits to be followed, indicating the maximum sound power level LwA. The noise values indicated in the performance charts that follow are for the motors operating in no-load condition, supplied at 50Hz and with a tolerance of +3 dB (A)



The moment of inertia can be calculated in this way:

$$J = [1/2] \times M \times R^2$$

Where M (Kg) is the mass which is rotated, while R (m) is the radius of the rotor/ rotating mass.

### TOLERANCES

The data of each motor are specified in this catalogue like requested by the norm IS: 12615. This describes in particular the following tolerance:

| Characteristic                        | Tolerance                                                                           |
|---------------------------------------|-------------------------------------------------------------------------------------|
| Efficiency (Output Power input Power) | -15% di [1 - n]                                                                     |
| Power factor                          | 1/ 6 of [1 - cos φ] min. 0.02 max 0.07                                              |
| Locked rotor torque                   | -15% of the guaranteed torque +25% of the guaranteed torque                         |
| Maximum torque                        | -10% of the guaranteed torque, if torque is not less than 1.5- 1.6 the rated torque |
| Noise                                 | +3dB(A)                                                                             |





## PERFORMANCE CHART

2 Poles asynchronous speed 3000 rpm

| Power KW             | Power HP | Type    | Frame | rpm  | Current In (A) | Current Is/In | Torque Cn (Nm) | Torque Cs/Cn | Torque Cmax/Cn | Efficiency 100% | Efficiency 75% | Power Factor 100% | Power Factor 75% | Noise Level [dB] | J Kg <sup>m</sup> ² | Kgs  |
|----------------------|----------|---------|-------|------|----------------|---------------|----------------|--------------|----------------|-----------------|----------------|-------------------|------------------|------------------|---------------------|------|
| Standard efficiency  |          |         |       |      |                |               |                |              |                |                 |                |                   |                  |                  |                     |      |
| 0.09                 | 0.12     | 63-2    | 63    | 2740 | 0.3            | 4.5           | 0.31           | 2.2          | 2.3            | 62.0            | 61.0           | 0.77              | 0.71             | 65               | 0.00031             | 4.3  |
| IE 2 high efficiency |          |         |       |      |                |               |                |              |                |                 |                |                   |                  |                  |                     |      |
| 0.12                 | 0.18     | 63-2    | 63    | 2740 | 0.3            | 4.5           | 0.42           | 2.2          | 2.3            | 64.0            | 63.0           | 0.78              | 0.72             | 65               | 0.00031             | 4.4  |
| 0.18                 | 0.25     | 63A-2   | 63    | 2740 | 0.5            | 4.5           | 0.63           | 2.4          | 2.4            | 66.0            | 66.0           | 0.80              | 0.74             | 68               | 0.00031             | 4.5  |
| 0.25                 | 0.35     | 63B-2   | 63    | 2750 | 0.6            | 4.5           | 0.87           | 2.5          | 2.6            | 70.0            | 69.0           | 0.81              | 0.75             | 68               | 0.00040             | 4.7  |
| 0.37                 | 0.5      | 71A-2   | 71    | 2810 | 0.9            | 5.5           | 1.26           | 2.6          | 3.5            | 72.2            | 71.5           | 0.79              | 0.73             | 70               | 0.00050             | 6    |
| 0.55                 | 0.75     | 71B-2   | 71    | 2780 | 1.3            | 5.5           | 1.89           | 3.0          | 3.0            | 74.8            | 73.6           | 0.79              | 0.73             | 70               | 0.00060             | 6.30 |
| 0.75                 | 1        | 80A-2   | 80    | 2850 | 1.7            | 5.5           | 2.51           | 2.8          | 3.0            | 78.0            | 77.0           | 0.79              | 0.74             | 73               | 0.00075             | 10   |
| 1.1                  | 1.5      | 80B-2   | 80    | 2850 | 2.4            | 5.5           | 3.70           | 2.6          | 2.9            | 80.0            | 79.0           | 0.80              | 0.75             | 73               | 0.00090             | 11   |
| 1.5                  | 2        | 90S-2   | 90S   | 2850 | 3.2            | 5.5           | 5.03           | 2.8          | 3.0            | 81.3            | 81.0           | 0.80              | 0.75             | 75               | 0.00120             | 13   |
| 2.2                  | 3        | 90L-2   | 90L   | 2840 | 4.3            | 5.5           | 7.40           | 2.3          | 2.6            | 83.2            | 82.5           | 0.85              | 0.80             | 75               | 0.00140             | 14   |
| 3.7                  | 5        | 100L-2  | 100L  | 2880 | 7.1            | 6.0           | 12.28          | 2.3          | 2.6            | 85.9            | 85.0           | 0.85              | 0.81             | 76               | 0.00400             | 27   |
| 5.5                  | 7.5      | 132SA-2 | 132S  | 2900 | 10.2           | 6.0           | 18.12          | 1.8          | 2.6            | 87.2            | 86.6           | 0.86              | 0.81             | 80               | 0.01190             | 40   |
| 7.5                  | 10       | 132SB-2 | 132S  | 2900 | 13.3           | 6.5           | 24.70          | 1.8          | 2.8            | 88.2            | 87.7           | 0.89              | 0.87             | 80               | 0.01260             | 45   |
| 11                   | 15       | 160MA-2 | 160M  | 2910 | 19.4           | 6.5           | 36.10          | 2.3          | 2.5            | 89.5            | 89.0           | 0.88              | 0.83             | 86               | 0.04990             | 120  |
| 15                   | 20       | 160MB-2 | 160M  | 2910 | 26.5           | 6.5           | 49.22          | 2.3          | 2.5            | 90.4            | 90.1           | 0.87              | 0.86             | 86               | 0.05500             | 135  |
| 18.5                 | 25       | 160L-2  | 160L  | 2910 | 31.7           | 6.5           | 60.71          | 2.3          | 2.5            | 91.1            | 90.7           | 0.89              | 0.86             | 86               | 0.06600             | 155  |
| 22                   | 30       | 180M-2  | 180M  | 2940 | 37.6           | 7.0           | 71.50          | 2.0          | 2.3            | 91.4            | 90.4           | 0.89              | 0.86             | 89               | 0.07500             | 165  |
| 30                   | 40       | 200LA-2 | 200L  | 2950 | 53.3           | 7.0           | 97.17          | 2.0          | 2.3            | 92.2            | 91.1           | 0.85              | 0.83             | 92               | 0.12400             | 217  |
| 37                   | 50       | 200LB-2 | 200L  | 2950 | 66.2           | 7.0           | 119.84         | 2.0          | 2.3            | 92.5            | 91.3           | 0.84              | 0.83             | 92               | 0.13900             | 243  |
| 45                   | 60       | 225M-2  | 225M  | 2970 | 75.6           | 7.0           | 144.77         | 2.0          | 2.3            | 93.0            | 91.4           | 0.89              | 0.85             | 92               | 0.23300             | 320  |
| 55                   | 75       | 250M-2  | 250M  | 2970 | 95.4           | 7.0           | 176.93         | 2.0          | 2.3            | 93.3            | 92.5           | 0.86              | 0.84             | 93               | 0.31200             | 390  |
| 75                   | 100      | 280S-2  | 280S  | 2970 | 129.2          | 7.0           | 241.27         | 2.0          | 2.3            | 93.9            | 93.3           | 0.86              | 0.84             | 94               | 0.57900             | 540  |
| 90                   | 120      | 280M-2  | 280M  | 2970 | 147.7          | 7.0           | 289.52         | 2.0          | 2.3            | 94.2            | 93.6           | 0.90              | 0.85             | 94               | 0.67500             | 590  |
| 110                  | 150      | 315S-2  | 315S  | 2975 | 178.1          | 7.0           | 353.26         | 1.8          | 2.2            | 94.4            | 93.8           | 0.91              | 0.86             | 96               | 1.18000             | 880  |
| 132                  | 180      | 315MA-2 | 315M  | 2975 | 213.1          | 7.0           | 423.91         | 1.8          | 2.2            | 94.7            | 93.9           | 0.91              | 0.86             | 96               | 1.82000             | 1000 |
| 160                  | 220      | 315LA-2 | 315M  | 2975 | 255.0          | 7.0           | 513.84         | 1.8          | 2.2            | 94.9            | 94.1           | 0.92              | 0.87             | 99               | 2.08000             | 1055 |
| 200                  | 270      | 315LB-2 | 315M  | 2975 | 318.0          | 7.0           | 642.30         | 1.8          | 2.2            | 95.1            | 94.5           | 0.92              | 0.87             | 99               | 2.38000             | 1110 |
| 250                  | 340      | 355M-2  | 355M  | 2975 | 397.5          | 7.0           | 802.87         | 1.8          | 2.2            | 95.1            | 94.6           | 0.92              | 0.88             | 103              | 3.00000             | 1900 |
| 315                  | 430      | 355L-2  | 355L  | 2975 | 500.9          | 7.0           | 1011.61        | 1.8          | 2.2            | 95.1            | 94.6           | 0.92              | 0.88             | 103              | 3.50000             | 2300 |

• Efficiency is without seals. • All these performance values are declared at: rated voltage 415 V frequency 50 Hz and are subjected to tolerances as per IS: 12615/IEC 60034



## PERFORMANCE CHART

4 Poles asynchronous speed 1500 rpm

| Power KW             | Power HP | Type    | Frame | rpm  | Current In [A] | Current Is/In | Torque Cn [Nm] | Torque Cs/Cn | Torque Cmax/Cn | Efficiency 100% | Efficiency 75% | Power Factor 100% | Power Factor 75% | Noise Level [dB] | J Kg <sup>m</sup> <sup>2</sup> | Kgs  |
|----------------------|----------|---------|-------|------|----------------|---------------|----------------|--------------|----------------|-----------------|----------------|-------------------|------------------|------------------|--------------------------------|------|
| Standard efficiency  |          |         |       |      |                |               |                |              |                |                 |                |                   |                  |                  |                                |      |
| 0.06                 | 0.09     | 63-4    | 63    | 1325 | 0.2            | 4.0           | 0.43           | 2.0          | 2.1            | 56.0            | 55.5           | 0.69              | 0.61             | 52               | 0.00030                        | 4.3  |
| 0.09                 | 0.12     | 63-4    | 63    | 1325 | 0.3            | 4.0           | 0.65           | 2.0          | 2.1            | 58.0            | 57.5           | 0.70              | 0.61             | 52               | 0.00030                        | 4.4  |
| IE-2 high efficiency |          |         |       |      |                |               |                |              |                |                 |                |                   |                  |                  |                                |      |
| 0.12                 | 0.18     | 63A-4   | 63    | 1350 | 0.4            | 4.0           | 0.85           | 2.2          | 2.2            | 60.0            | 60.0           | 0.70              | 0.64             | 52               | 0.00030                        | 4.5  |
| 0.18                 | 0.25     | 63B-4   | 63    | 1380 | 0.5            | 4.0           | 1.25           | 2.4          | 2.4            | 67.0            | 66.0           | 0.70              | 0.64             | 52               | 0.00040                        | 4.7  |
| 0.25                 | 0.35     | 71A-4   | 71    | 1350 | 0.7            | 4.0           | 1.77           | 2.3          | 2.3            | 68.5            | 67.0           | 0.70              | 0.62             | 60               | 0.00050                        | 6.0  |
| 0.37                 | 0.5      | 71B-4   | 71    | 1350 | 1.0            | 4.5           | 2.62           | 2.3          | 2.3            | 72.7            | 71.8           | 0.72              | 0.66             | 60               | 0.00080                        | 6.30 |
| 0.55                 | 0.75     | 80A-4   | 80    | 1380 | 1.4            | 4.5           | 3.81           | 2.5          | 3.0            | 77.1            | 76.4           | 0.72              | 0.65             | 65               | 0.00180                        | 10   |
| 0.75                 | 1        | 80B-4   | 80    | 1390 | 1.8            | 4.5           | 5.15           | 2.5          | 3.0            | 79.6            | 79.1           | 0.72              | 0.64             | 65               | 0.00220                        | 12.5 |
| 1.1                  | 1.5      | 90S-4   | 90S   | 1410 | 2.5            | 5.0           | 7.45           | 2.1          | 2.2            | 81.4            | 80.6           | 0.75              | 0.7              | 61               | 0.00270                        | 14   |
| 1.5                  | 2        | 90L-4   | 90L   | 1410 | 3.4            | 5.0           | 10.16          | 2.8          | 3.0            | 82.9            | 82.5           | 0.74              | 0.7              | 72               | 0.00410                        | 16   |
| 2.2                  | 3        | 100L-4  | 100L  | 1440 | 4.5            | 5.0           | 14.60          | 2.8          | 2.9            | 84.4            | 84.4           | 0.80              | 0.74             | 64               | 0.00670                        | 27   |
| 3.7                  | 5        | 112M-4  | 112M  | 1425 | 7.6            | 5.0           | 24.79          | 2.1          | 2.2            | 86.6            | 86.3           | 0.78              | 0.73             | 65               | 0.01500                        | 35   |
| 5.5                  | 7.5      | 132S-4  | 132S  | 1445 | 11.2           | 5.5           | 36.37          | 1.9          | 2.2            | 87.8            | 87.4           | 0.78              | 0.72             | 71               | 0.02140                        | 45   |
| 7.5                  | 10       | 132M-4  | 132M  | 1455 | 14.7           | 5.5           | 49.25          | 2.0          | 2.2            | 88.7            | 88.5           | 0.80              | 0.74             | 71               | 0.02960                        | 55   |
| 11                   | 15       | 160M-4  | 160M  | 1460 | 20.0           | 6.0           | 71.99          | 2.2          | 2.3            | 89.8            | 89.0           | 0.85              | 0.80             | 75               | 0.07470                        | 118  |
| 15                   | 20       | 160L-4  | 160L  | 1470 | 27.0           | 6.0           | 97.50          | 2.2          | 2.3            | 90.8            | 89.8           | 0.85              | 0.80             | 75               | 0.09180                        | 132  |
| 18.5                 | 25       | 180M-4  | 180M  | 1470 | 31.7           | 6.5           | 120.25         | 2.2          | 2.3            | 91.2            | 90.7           | 0.89              | 0.84             | 76               | 0.13900                        | 164  |
| 22                   | 30       | 180L-4  | 180L  | 1470 | 38.0           | 6.5           | 143.00         | 2.2          | 2.3            | 91.6            | 91.0           | 0.88              | 0.83             | 76               | 0.15800                        | 182  |
| 30                   | 40       | 200L-4  | 200L  | 1470 | 51.4           | 6.5           | 195.00         | 2.2          | 2.3            | 92.3            | 91.8           | 0.88              | 0.84             | 79               | 0.26200                        | 245  |
| 37                   | 50       | 225S-4  | 225S  | 1480 | 63.8           | 6.5           | 238.90         | 2.2          | 2.3            | 92.8            | 92.3           | 0.87              | 0.83             | 81               | 0.40600                        | 258  |
| 45                   | 60       | 225M-4  | 225M  | 1480 | 75.4           | 6.5           | 290.50         | 2.2          | 2.3            | 93.3            | 92.8           | 0.89              | 0.84             | 81               | 0.46900                        | 290  |
| 55                   | 75       | 250M-4  | 250M  | 1480 | 95.1           | 6.5           | 355.05         | 2.2          | 2.3            | 93.6            | 92.5           | 0.86              | 0.84             | 81               | 0.66000                        | 388  |
| 75                   | 100      | 280S-4  | 280S  | 1480 | 128.9          | 7.0           | 484.16         | 2.2          | 2.3            | 94.1            | 93.3           | 0.86              | 0.84             | 86               | 1.12000                        | 510  |
| 90                   | 120      | 280M-4  | 280M  | 1480 | 147.5          | 7.0           | 581.00         | 2.2          | 2.3            | 94.3            | 93.6           | 0.90              | 0.85             | 86               | 1.46000                        | 606  |
| 110                  | 150      | 315S-4  | 315S  | 1480 | 177.8          | 6.5           | 710.11         | 2.1          | 2.2            | 94.6            | 93.8           | 0.91              | 0.86             | 93               | 3.11000                        | 910  |
| 132                  | 180      | 315M-4  | 315M  | 1480 | 212.9          | 6.5           | 852.13         | 2.1          | 2.2            | 94.8            | 93.9           | 0.91              | 0.86             | 93               | 3.62000                        | 1000 |
| 160                  | 220      | 315LA-4 | 315L  | 1480 | 254.7          | 6.5           | 1032.88        | 2.1          | 2.2            | 95.0            | 94.1           | 0.92              | 0.87             | 97               | 4.13000                        | 1055 |
| 200                  | 270      | 315LB-4 | 315L  | 1480 | 317.7          | 6.5           | 1291.10        | 2.1          | 2.2            | 95.2            | 94.5           | 0.92              | 0.87             | 97               | 4.73000                        | 1125 |
| 250                  | 340      | 355M-4  | 355M  | 1480 | 397.1          | 6.5           | 1613.88        | 2.1          | 2.2            | 95.2            | 94.6           | 0.92              | 0.88             | 101              | 6.50000                        | 1700 |
| 315                  | 430      | 355L-4  | 355L  | 1480 | 500.4          | 6.5           | 2033.48        | 2.1          | 2.2            | 95.2            | 94.6           | 0.92              | 0.88             | 101              | 8.20000                        | 1900 |

• Efficiency is without seals. • All these performance values are declared at rated voltage 415 & frequency 50 Hz and are subjected to tolerances as per IS : 12615/IEC 60034



## PERFORMANCE CHART

6 Poles asynchronous speed 1000 rpm

| Power KW             | Power HP | Type    | Frame | rpm | Current In [A] | Current Is/In | Torque Cn [Nm] | Torque Cs/Cn | Torque Cmax/Cn | Efficiency 100% | Efficiency 75% | Power Factor 100% | Power Factor 75% | Noise Level [dB] | J Kg <sup>m</sup> <sup>2</sup> | Kgs  |
|----------------------|----------|---------|-------|-----|----------------|---------------|----------------|--------------|----------------|-----------------|----------------|-------------------|------------------|------------------|--------------------------------|------|
| IE-2 high efficiency |          |         |       |     |                |               |                |              |                |                 |                |                   |                  |                  |                                |      |
| 0.18                 | 0.25     | 71A-6   | 71    | 900 | 0.6            | 4.0           | 1.91           | 1.9          | 2.0            | 60.0            | 60.0           | 0.68              | 0.60             | 52               | 0.00110                        | 6    |
| 0.25                 | 0.35     | 71B-6   | 71    | 900 | 0.9            | 4.0           | 2.65           | 1.9          | 2.0            | 61.6            | 60.0           | 0.68              | 0.61             | 52               | 0.00140                        | 6.3  |
| 0.37                 | 0.5      | 80A-6   | 80    | 900 | 1.0            | 4.0           | 3.93           | 1.9          | 2.0            | 69.2            | 68.2           | 0.70              | 0.64             | 54               | 0.00190                        | 10   |
| 0.55                 | 0.75     | 80B-6   | 80    | 900 | 1.5            | 4.0           | 5.84           | 1.9          | 2.1            | 73.1            | 71.8           | 0.70              | 0.65             | 54               | 0.00290                        | 11   |
| 0.75                 | 1        | 90S-6   | 90S   | 930 | 1.9            | 4.0           | 7.75           | 2.1          | 2.3            | 76.0            | 75.0           | 0.71              | 0.62             | 57               | 0.00350                        | 14   |
| 1.1                  | 1.5      | 90L-6   | 90L   | 930 | 2.8            | 4.0           | 11.30          | 2.2          | 2.4            | 78.3            | 78.0           | 0.71              | 0.62             | 57               | 0.00390                        | 15   |
| 1.5                  | 2        | 100L-6  | 100L  | 940 | 3.7            | 4.5           | 15.25          | 2.1          | 2.3            | 79.9            | 79.7           | 0.71              | 0.62             | 61               | 0.00850                        | 25   |
| 2.2                  | 3        | 112M-6  | 112M  | 940 | 5.1            | 5.5           | 22.36          | 2.1          | 2.5            | 81.9            | 81.7           | 0.73              | 0.64             | 65               | 0.01600                        | 28   |
| 3.7                  | 5        | 132S-6  | 132S  | 950 | 8.3            | 5.0           | 37.21          | 1.9          | 2.1            | 85.0            | 84.0           | 0.73              | 0.65             | 69               | 0.03570                        | 44   |
| 5.5                  | 7.5      | 132M-6  | 132M  | 960 | 12.0           | 5.5           | 54.74          | 1.8          | 2.1            | 86.5            | 85.5           | 0.74              | 0.69             | 69               | 0.04490                        | 55   |
| 7.5                  | 10       | 160M-6  | 160M  | 965 | 15.9           | 5.5           | 74.26          | 2.0          | 2.1            | 87.3            | 86.8           | 0.75              | 0.69             | 69               | 0.08100                        | 78   |
| 11                   | 15       | 160L-6  | 160L  | 965 | 21.5           | 5.5           | 108.85         | 2.1          | 2.4            | 89.0            | 88.5           | 0.80              | 0.71             | 73               | 0.12860                        | 99   |
| 15                   | 20       | 180L-6  | 180L  | 970 | 28.7           | 6.5           | 147.76         | 2.0          | 2.1            | 89.8            | 89.2           | 0.81              | 0.74             | 73               | 0.20700                        | 160  |
| 18.5                 | 25       | 200LA-6 | 200L  | 970 | 35.1           | 6.5           | 182.23         | 2.0          | 2.1            | 90.6            | 90.0           | 0.81              | 0.75             | 76               | 0.31500                        | 217  |
| 22                   | 30       | 200LB-6 | 200L  | 970 | 40.5           | 6.5           | 216.71         | 2.0          | 2.1            | 91.1            | 90.6           | 0.83              | 0.75             | 76               | 0.36000                        | 244  |
| 30                   | 40       | 225M-6  | 225M  | 980 | 54.1           | 6.5           | 292.50         | 2.0          | 2.1            | 91.8            | 90.8           | 0.84              | 0.77             | 76               | 0.54700                        | 295  |
| 37                   | 50       | 250M-6  | 250M  | 980 | 65.6           | 6.5           | 360.72         | 2.0          | 2.1            | 92.3            | 92.0           | 0.85              | 0.77             | 78               | 0.84300                        | 365  |
| 45                   | 60       | 280S-6  | 280S  | 980 | 78.4           | 6.5           | 438.71         | 2.0          | 2.1            | 92.8            | 92.1           | 0.86              | 0.79             | 80               | 1.39000                        | 500  |
| 55                   | 75       | 280M-6  | 280M  | 980 | 95.5           | 6.5           | 536.20         | 2.0          | 2.1            | 93.2            | 92.4           | 0.86              | 0.80             | 85               | 1.65000                        | 545  |
| 75                   | 100      | 315S-6  | 315S  | 980 | 129.3          | 6.5           | 731.18         | 2.0          | 2.0            | 93.8            | 92.0           | 0.86              | 0.80             | 85               | 4.11000                        | 810  |
| 90                   | 120      | 315MA-6 | 315M  | 980 | 154.7          | 6.5           | 877.42         | 2.0          | 2.0            | 94.1            | 93.5           | 0.86              | 0.80             | 85               | 4.78000                        | 900  |
| 110                  | 150      | 315LA-6 | 315L  | 980 | 188.5          | 6.5           | 1072.40        | 2.0          | 2.0            | 94.4            | 93.7           | 0.86              | 0.80             | 85               | 5.45000                        | 1010 |
| 132                  | 180      | 315LB-4 | 315L  | 980 | 225.5          | 6.5           | 1286.88        | 2.0          | 2.0            | 94.7            | 93.7           | 0.86              | 0.80             | 85               | 6.12000                        | 1140 |
| 160                  | 220      | 355MA-6 | 355M  | 980 | 266.5          | 6.5           | 1559.86        | 1.9          | 2.0            | 94.9            | 94.2           | 0.88              | 0.80             | 92               | 9.50000                        | 1550 |
| 200                  | 270      | 355MB-6 | 355M  | 980 | 332.5          | 6.5           | 1949.82        | 1.9          | 2.0            | 95.1            | 94.6           | 0.88              | 0.80             | 92               | 10.40000                       | 1600 |
| 250                  | 340      | 355L-6  | 355L  | 980 | 415.6          | 6.5           | 2437.28        | 1.9          | 2.0            | 95.1            | 94.5           | 0.88              | 0.80             | 92               | 12.40000                       | 1700 |

- Efficiency is without seals.
- All these performance values are declared at rated voltage 415 & frequency 50 Hz and are subjected to tolerances as per IS :12615/IEC 60034



## PERFORMANCE CHART

IE2- high efficiency

8 Poles asynchronous speed 750 rpm

| Power KW | Power HP | Type    | Frame | rpm | Current In [A] | Current Is/In | Torque Cn [Nm] | Torque Cs/Cn | Torque Cmax/ Cn | Efficiency 100% | Efficiency 75% | Power Factor 100% | Power Factor 75% | Noise Level [dB] | J Kg <sup>m2</sup> | Kg   |
|----------|----------|---------|-------|-----|----------------|---------------|----------------|--------------|-----------------|-----------------|----------------|-------------------|------------------|------------------|--------------------|------|
| 1.5      | 2        | 112M-8  | 112M  | 690 | 3.9            | 5.0           | 20.77          | 1.8          | 2.0             | 75.5            | 74.6           | 0.70              | 0.60             | 60               | 0.00245            | 28   |
| 2.2      | 3        | 132S-8  | 132S  | 705 | 5.5            | 6.0           | 29.81          | 1.8          | 2.0             | 78.5            | 77.6           | 0.71              | 0.65             | 64               | 0.03140            | 45   |
| 3.7      | 5        | 160MA-8 | 160M  | 720 | 8.6            | 6.0           | 49.10          | 1.9          | 2.0             | 81.9            | 81.1           | 0.73              | 0.66             | 68               | 0.07530            | 105  |
| 5.5      | 7.5      | 160MA-8 | 160M  | 720 | 12.3           | 6.0           | 72.98          | 2.0          | 2.0             | 83.8            | 83.0           | 0.74              | 0.67             | 68               | 0.09310            | 115  |
| 7.5      | 10       | 160L-8  | 160L  | 720 | 16.2           | 6.0           | 99.52          | 2.0          | 2.0             | 85.9            | 85.2           | 0.75              | 0.67             | 70               | 0.12600            | 135  |
| 11       | 15       | 180L-6  | 180L  | 730 | 22.9           | 5.5           | 143.97         | 2.0          | 2.0             | 88.0            | 88.3           | 0.76              | 0.68             | 73               | 0.20300            | 160  |
| 15       | 20       | 200L-6  | 200L  | 730 | 31.0           | 6.6           | 196.32         | 2.0          | 2.0             | 88.6            | 88.3           | 0.76              | 0.68             | 73               | 0.33900            | 235  |
| 18.5     | 25       | 225S-8  | 225S  | 730 | 37.8           | 6.6           | 242.13         | 1.9          | 2.0             | 89.5            | 88.7           | 0.76              | 0.68             | 73               | 0.49100            | 242  |
| 22       | 30       | 225M-8  | 225M  | 730 | 43.1           | 6.6           | 287.93         | 1.9          | 2.0             | 91.0            | 90.2           | 0.78              | 0.70             | 73               | 0.54700            | 285  |
| 30       | 40       | 250M-8  | 250M  | 730 | 57.9           | 6.6           | 392.64         | 1.9          | 2.0             | 91.3            | 90.6           | 0.79              | 0.72             | 75               | 0.84300            | 390  |
| 37       | 50       | 280S-8  | 280S  | 730 | 71.0           | 6.6           | 484.25         | 1.9          | 2.0             | 91.8            | 91.2           | 0.79              | 0.73             | 76               | 1.93000            | 500  |
| 45       | 60       | 280M-8  | 280M  | 735 | 85.7           | 6.6           | 584.95         | 1.8          | 2.0             | 92.5            | 91.9           | 0.79              | 0.73             | 76               | 2.25000            | 580  |
| 55       | 75       | 315S-8  | 315S  | 735 | 101.6          | 6.6           | 714.94         | 1.8          | 2.0             | 93.0            | 92.3           | 0.81              | 0.75             | 82               | 4.79000            | 790  |
| 75       | 100      | 315MA-8 | 315M  | 735 | 138.2          | 6.6           | 974.91         | 1.8          | 2.0             | 93.2            | 92.5           | 0.81              | 0.75             | 82               | 5.58000            | 970  |
| 90       | 120      | 315MB-8 | 315M  | 735 | 162.4          | 6.6           | 1169.89        | 1.8          | 2.0             | 94.0            | 93.4           | 0.82              | 0.76             | 82               | 6.37000            | 1055 |
| 110      | 150      | 315MC-8 | 315M  | 735 | 198.1          | 6.6           | 1429.87        | 1.8          | 2.0             | 94.2            | 93.6           | 0.82              | 0.76             | 82               | 7.23000            | 1118 |

- Efficiency is without seals.
- All these performance values are declared at rated voltage 415 & frequency 50 Hz and are subjected to tolerances as per IS : 12615/IEC 60034



## PERFORMANCE CHART

IE3, Premium efficiency 2 Poles asynchronous speed 3000 rpm

| Power KW | Power HP | Type    | Frame | rpm  | Current In [A] | Current Is/In | Torque Cn [Nm] | Torque Cs/Cn | Torque Cmax/Cn | Efficiency 100% | Efficiency 75% | Power Factor. 100% | Power Factor 75% | Noise Level [dB] | J Kg <sup>m</sup> <sup>2</sup> | Kgs  |
|----------|----------|---------|-------|------|----------------|---------------|----------------|--------------|----------------|-----------------|----------------|--------------------|------------------|------------------|--------------------------------|------|
| 0.12     | 0.18     | 63-2    | 63    | 2740 | 0.3            | 4.5           | 0.42           | 2.2          | 2.3            | 66.0            | 65.0           | 0.78               | 0.72             | 65               | 0.00031                        | 4.4  |
| 0.18     | 0.25     | 63A-2   | 63    | 2740 | 0.5            | 4.5           | 0.63           | 2.4          | 2.4            | 68.0            | 67.0           | 0.80               | 0.74             | 68               | 0.00031                        | 4.5  |
| 0.25     | 0.35     | 63B-2   | 63    | 2750 | 0.6            | 4.5           | 0.87           | 2.5          | 2.6            | 70.0            | 69.0           | 0.81               | 0.75             | 68               | 0.00040                        | 4.7  |
| 0.37     | 0.5      | 71A-2   | 71    | 2810 | 0.8            | 5.5           | 1.26           | 2.6          | 3.5            | 75.7            | 74.1           | 0.81               | 0.75             | 70               | 0.00061                        | 7    |
| 0.55     | 0.75     | 71B-2   | 71    | 2780 | 1.2            | 5.5           | 1.89           | 3.0          | 3.0            | 78.2            | 77.4           | 0.80               | 0.74             | 70               | 0.00066                        | 8    |
| 0.75     | 1        | 80A-2   | 80    | 2850 | 1.61           | 5.5           | 2.51           | 2.8          | 3.0            | 80.9            | 79.9           | 0.80               | 0.74             | 73               | 0.00090                        | 11   |
| 1.1      | 1.5      | 80B-2   | 80    | 2810 | 2.37           | 5.5           | 3.71           | 2.8          | 3.0            | 82.9            | 81.0           | 0.78               | 0.76             | 75               | 0.00105                        | 12.5 |
| 1.5      | 2        | 90S-2   | 90S   | 2860 | 3.13           | 5.5           | 5.01           | 2.8          | 3.0            | 84.5            | 84.0           | 0.79               | 0.73             | 75               | 0.00120                        | 13   |
| 2.2      | 3        | 90L-2   | 90L   | 2860 | 4.24           | 5.5           | 7.35           | 2.3          | 2.6            | 85.9            | 85.0           | 0.84               | 0.80             | 75               | 0.00215                        | 18   |
| 3.7      | 5        | 100L-2  | 100L  | 2870 | 7.04           | 6.0           | 12.31          | 2.3          | 2.6            | 88.1            | 87.6           | 0.83               | 0.78             | 76               | 0.00420                        | 27   |
| 5.5      | 7.5      | 132SA-2 | 132S  | 2900 | 10.12          | 6.0           | 18.11          | 1.8          | 2.6            | 90.0            | 89.2           | 0.84               | 0.81             | 80               | 0.01190                        | 40   |
| 7.5      | 10       | 132SB-2 | 132S  | 2900 | 13.25          | 6.5           | 24.70          | 1.8          | 2.8            | 90.5            | 90.0           | 0.87               | 0.84             | 80               | 0.01260                        | 45   |
| 11       | 15       | 160MA-2 | 160M  | 2930 | 19.25          | 6.5           | 36.10          | 2.3          | 2.5            | 91.4            | 90.8           | 0.87               | 0.85             | 86               | 0.04990                        | 120  |
| 15       | 20       | 160MB-2 | 160M  | 2930 | 26.38          | 6.5           | 48.89          | 2.3          | 2.5            | 92.0            | 91.5           | 0.86               | 0.84             | 86               | 0.05500                        | 135  |
| 18.5     | 25       | 160L-2  | 160L  | 2930 | 31.59          | 6.5           | 60.29          | 2.3          | 2.5            | 92.6            | 92.0           | 0.88               | 0.86             | 86               | 0.06600                        | 155  |
| 22       | 30       | 180M-2  | 180M  | 2940 | 37.48          | 7.0           | 71.50          | 2.0          | 2.3            | 92.8            | 91.8           | 0.88               | 0.86             | 89               | 0.07650                        | 168  |
| 30       | 40       | 200LA-2 | 200L  | 2940 | 52.57          | 7.0           | 97.45          | 2.0          | 2.3            | 93.4            | 92.3           | 0.85               | 0.83             | 92               | 0.12640                        | 221  |
| 37       | 50       | 200LB-2 | 200L  | 2950 | 65.33          | 7.0           | 119.84         | 2.0          | 2.3            | 93.8            | 92.6           | 0.84               | 0.83             | 92               | 0.14178                        | 248  |
| 45       | 60       | 225M-2  | 225M  | 2970 | 74.75          | 7.0           | 144.77         | 2.0          | 2.3            | 94.1            | 92.5           | 0.89               | 0.85             | 92               | 0.23766                        | 326  |
| 55       | 75       | 250M-2  | 250M  | 2970 | 93.2           | 7.0           | 176.93         | 2.0          | 2.3            | 94.4            | 93.5           | 0.87               | 0.85             | 93               | 0.31800                        | 429  |
| 75       | 100      | 280S-2  | 280S  | 2970 | 128.0          | 7.0           | 241.27         | 2.0          | 2.3            | 94.8            | 93.9           | 0.86               | 0.83             | 94               | 0.59000                        | 594  |
| 90       | 120      | 280M-2  | 280M  | 2970 | 146.3          | 7.0           | 289.52         | 2.0          | 2.3            | 95.1            | 94.5           | 0.90               | 0.85             | 94               | 0.68800                        | 649  |
| 110      | 150      | 315S-2  | 315S  | 2975 | 176.5          | 7.0           | 353.26         | 1.8          | 2.2            | 95.3            | 94.6           | 0.91               | 0.85             | 96               | 1.20000                        | 968  |
| 132      | 180      | 315MA-2 | 315M  | 2975 | 211.3          | 7.0           | 423.91         | 1.8          | 2.2            | 95.5            | 94.8           | 0.91               | 0.87             | 96               | 1.85000                        | 1100 |
| 160      | 220      | 315LA-2 | 315L  | 2975 | 252.8          | 7.0           | 513.84         | 1.8          | 2.2            | 95.7            | 95.0           | 0.92               | 0.86             | 99               | 2.13000                        | 1161 |
| 200      | 270      | 315LB-2 | 315L  | 2975 | 315.4          | 7.0           | 642.30         | 1.8          | 2.2            | 95.9            | 95.0           | 0.92               | 0.87             | 99               | 2.42700                        | 1221 |
| 250      | 340      | 355M-2  | 355M  | 2975 | 394.2          | 7.0           | 802.87         | 1.8          | 2.2            | 95.9            | 95.1           | 0.92               | 0.88             | 103              | 3.06000                        | 2090 |
| 315      | 430      | 355L-2  | 355L  | 2975 | 496.7          | 7.0           | 1011.61        | 1.8          | 2.2            | 95.9            | 95.1           | 0.92               | 0.88             | 103              | 3.60500                        | 2530 |

• Efficiency is without seals. • All these performance values are declared at rated voltage 415 & frequency 50 Hz and are subjected to tolerances as per IS :12615/IEC 60034



## PERFORMANCE CHART

IE3, Premium efficiency 4 Poles asynchronous speed 1500 rpm

| Power KW | Power HP | Type    | Frame | rpm  | Current In [A] | Current Is/In | Torque Cn [Nm] | Torque Cs/Cn | Torque Cmax/Cn | Efficiency 100% | Efficiency 75% | Power Factor. 100% | Power Factor 75% | Noise Level [dB] | J Kg <sup>m</sup> <sup>2</sup> | Kgs    |
|----------|----------|---------|-------|------|----------------|---------------|----------------|--------------|----------------|-----------------|----------------|--------------------|------------------|------------------|--------------------------------|--------|
| 0.12     | 0.18     | 63A-4   | 63    | 1350 | 0.40           | 4.0           | 0.85           | 2.2          | 2.3            | 65              | 64.0           | 0.70               | 0.64             | 52               | 0.00030                        | 4.5    |
| 0.18     | 0.25     | 63B-4   | 63    | 1380 | 0.50           | 4.0           | 1.25           | 2.4          | 2.5            | 70              | 68.0           | 0.70               | 0.64             | 52               | 0.00040                        | 4.7    |
| 0.25     | 0.35     | 71A-4   | 71    | 1350 | 0.70           | 4.0           | 1.77           | 2.3          | 2.4            | 74              | 72.0           | 0.70               | 0.62             | 60               | 0.00050                        | 6.0    |
| 0.37     | 0.5      | 71B-4   | 71    | 1350 | 0.93           | 4.5           | 2.62           | 2.3          | 2.3            | 77.3            | 76.4           | 0.72               | 0.65             | 60               | 0.00092                        | 7      |
| 0.55     | 0.75     | 80A-4   | 80    | 1380 | 1.3            | 4.5           | 3.81           | 2.5          | 3.0            | 80.8            | 80.0           | 0.73               | 0.66             | 65               | 0.00201                        | 12     |
| 0.75     | 1        | 80-4    | 80    | 1390 | 1.75           | 4.5           | 5.15           | 2.5          | 3.0            | 82.6            | 82.3           | 0.72               | 0.64             | 65               | 0.00220                        | 12.5   |
| 1.1      | 1.5      | 90S-4   | 90S   | 1420 | 2.42           | 5.0           | 7.40           | 2.1          | 2.2            | 84.2            | 83.6           | 0.75               | 0.70             | 61               | 0.00270                        | 14     |
| 1.5      | 2        | 90L-4   | 90L   | 1410 | 3.26           | 5.0           | 10.16          | 2.8          | 3.0            | 85.4            | 84.7           | 0.75               | 0.71             | 72               | 0.00410                        | 16     |
| 2.2      | 3        | 100L-4  | 100L  | 1440 | 4.36           | 5.0           | 14.59          | 2.8          | 2.9            | 86.7            | 86.4           | 0.81               | 0.74             | 64               | 0.00670                        | 27     |
| 3.7      | 5        | 112M-4  | 112M  | 1430 | 7.44           | 5.0           | 24.71          | 2.1          | 2.2            | 88.7            | 88.2           | 0.78               | 0.72             | 65               | 0.01500                        | 35     |
| 5.5      | 7.5      | 132S-4  | 132S  | 1455 | 10.38          | 5.5           | 36.10          | 1.9          | 2.2            | 89.9            | 89.4           | 0.82               | 0.77             | 71               | 0.02960                        | 55     |
| 7.5      | 10       | 132M-4  | 132M  | 1460 | 14.08          | 6.0           | 49.05          | 2.6          | 3.0            | 90.4            | 90.0           | 0.82               | 0.77             | 71               | 0.03100                        | 59     |
| 11       | 15       | 160M-4  | 160M  | 1460 | 19.91          | 6.5           | 71.95          | 2.2          | 2.3            | 91.5            | 91.0           | 0.84               | 0.80             | 75               | 0.09180                        | 125    |
| 15       | 20       | 160L-4  | 160L  | 1470 | 26.63          | 6.5           | 97.44          | 2.2          | 2.3            | 92.2            | 91.5           | 0.85               | 0.83             | 75               | 0.11000                        | 140    |
| 18.5     | 25       | 180M-4  | 180M  | 1470 | 31.23          | 6.5           | 120.25         | 2.2          | 2.3            | 92.6            | 92.0           | 0.89               | 0.84             | 76               | 0.14462                        | 167    |
| 22       | 30       | 180L-4  | 180L  | 1470 | 38.19          | 6.5           | 143.00         | 2.2          | 2.3            | 93.2            | 92.6           | 0.86               | 0.82             | 76               | 0.16438                        | 189    |
| 30       | 40       | 200L-4  | 200L  | 1470 | 51.25          | 6.5           | 195.00         | 2.2          | 2.3            | 93.6            | 92.2           | 0.87               | 0.84             | 79               | 0.27258                        | 255    |
| 37       | 50       | 225S-4  | 225S  | 1480 | 63.01          | 6.5           | 238.90         | 2.2          | 2.3            | 93.9            | 93.2           | 0.87               | 0.84             | 81               | 0.42240                        | 268    |
| 45       | 60       | 225M-4  | 225M  | 1480 | 74.60          | 6.5           | 290.50         | 2.2          | 2.3            | 94.3            | 92.8           | 0.89               | 0.85             | 81               | 0.48795                        | 301    |
| 55       | 75       | 250M-4  | 250M  | 1480 | 92.9           | 6.5           | 355.05         | 2.2          | 2.3            | 94.7            | 94.1           | 0.87               | 0.85             | 81               | 0.69300                        | 426.8  |
| 75       | 100      | 280S-4  | 280S  | 1480 | 126.1          | 7.0           | 484.16         | 2.2          | 2.3            | 95.1            | 94.5           | 0.87               | 0.85             | 86               | 1.17600                        | 561    |
| 90       | 120      | 280M-4  | 280M  | 1480 | 146.0          | 7.0           | 581.00         | 2.2          | 2.3            | 95.3            | 94.6           | 0.90               | 0.86             | 86               | 1.53300                        | 666.6  |
| 110      | 150      | 315S-4  | 315S  | 1480 | 176.1          | 6.5           | 710.11         | 2.1          | 2.2            | 95.5            | 94.8           | 0.91               | 0.87             | 93               | 3.26550                        | 1001   |
| 132      | 180      | 315M-4  | 315M  | 1480 | 210.9          | 6.5           | 852.13         | 2.1          | 2.2            | 95.7            | 95.0           | 0.91               | 0.87             | 93               | 3.80100                        | 1100   |
| 160      | 220      | 315LA-4 | 315L  | 1480 | 252.3          | 6.5           | 1032.88        | 2.1          | 2.2            | 95.9            | 95.1           | 0.92               | 0.87             | 97               | 4.33650                        | 1160.5 |
| 200      | 270      | 315LB-4 | 315L  | 1480 | 314.7          | 6.5           | 1291.10        | 2.1          | 2.2            | 96.1            | 95.3           | 0.92               | 0.88             | 97               | 4.96650                        | 1240.8 |
| 250      | 340      | 355M-4  | 355M  | 1480 | 393.4          | 6.5           | 1613.88        | 2.1          | 2.2            | 96.1            | 95.3           | 0.92               | 0.88             | 101              | 6.82500                        | 1870   |
| 315      | 430      | 355L-4  | 355L  | 1480 | 495.7          | 6.5           | 2033.48        | 2.1          | 2.2            | 96.1            | 95.4           | 0.92               | 0.88             | 101              | 8.61000                        | 2090   |

• Efficiency is without seals. • All these performance values are declared at rated voltage 415 & frequency 50 Hz and are subjected to tolerances as per IS :12615/IEC 60034



## PERFORMANCE CHART

IE3, Premium efficiency 6 Poles asynchronous speed 1000 rpm

| Power KW | Power HP | Type    | Frame | rpm | Current In [A] | Current Is/In | Torque Cn [Nm] | Torque Cs/Cn | Torque Cmax/Cn | Efficiency 100% | Efficiency 75% | Power Factor. 100% | Power Factor 75% | Noise Level [dB] | J Kgm <sup>2</sup> | Kgs   |
|----------|----------|---------|-------|-----|----------------|---------------|----------------|--------------|----------------|-----------------|----------------|--------------------|------------------|------------------|--------------------|-------|
| 0.18     | 0.25     | 71A-6   | 71    | 900 | 0.60           | 4.0           | 1.91           | 1.9          | 2.0            | 65.0            | 64.0           | 0.68               | 0.60             | 52               | 0.00110            | 6.0   |
| 0.25     | 0.35     | 71B-6   | 71    | 900 | 0.90           | 4.0           | 2.65           | 1.9          | 2.0            | 69.0            | 68.0           | 0.68               | 0.61             | 52               | 0.00140            | 6.3   |
| 0.37     | 0.5      | 80A-6   | 80    | 900 | 1.02           | 4.0           | 3.93           | 1.9          | 2.0            | 73.5            | 72.6           | 0.69               | 0.64             | 54               | 0.00190            | 10    |
| 0.55     | 0.75     | 80B-6   | 80    | 900 | 1.43           | 4.0           | 5.84           | 1.9          | 2.1            | 77.2            | 76.4           | 0.70               | 0.65             | 54               | 0.00290            | 11    |
| 0.75     | 1        | 90S-6   | 90S   | 930 | 1.86           | 4.0           | 7.70           | 2.1          | 2.4            | 78.9            | 78.0           | 0.71               | 0.64             | 57               | 0.00350            | 14    |
| 1.1      | 1.5      | 90L-6   | 90L   | 930 | 2.62           | 4.0           | 11.29          | 2.2          | 2.4            | 81.0            | 79.8           | 0.72               | 0.63             | 57               | 0.00390            | 15    |
| 1.5      | 2        | 100L-6  | 100L  | 940 | 3.56           | 4.5           | 15.24          | 2.1          | 2.3            | 82.5            | 81.0           | 0.71               | 0.62             | 61               | 0.00850            | 25    |
| 2.2      | 3        | 112M-6  | 112M  | 940 | 4.97           | 5.5           | 22.35          | 2.1          | 2.5            | 84.3            | 83.3           | 0.73               | 0.64             | 65               | 0.01600            | 28    |
| 3.7      | 5        | 132S-6  | 132S  | 960 | 8.12           | 6.0           | 36.80          | 2.0          | 2.4            | 86.8            | 86.0           | 0.73               | 0.65             | 69               | 0.03920            | 49    |
| 5.5      | 7.5      | 132M-6  | 132M  | 965 | 11.75          | 5.5           | 54.43          | 2.3          | 2.5            | 88.0            | 87.0           | 0.74               | 0.69             | 69               | 0.04900            | 59    |
| 7.5      | 10       | 160M-6  | 160M  | 965 | 15.6           | 5.5           | 74.25          | 2.0          | 2.1            | 89.2            | 88.5           | 0.75               | 0.70             | 69               | 0.08503            | 85    |
| 11       | 15       | 160L-6  | 160L  | 965 | 21.2           | 5.5           | 108.91         | 2.1          | 2.4            | 90.4            | 89.8           | 0.80               | 0.75             | 73               | 0.13500            | 110   |
| 15       | 20       | 180L-6  | 180L  | 970 | 28.2           | 6.5           | 147.74         | 2.0          | 2.1            | 91.3            | 90.6           | 0.81               | 0.76             | 73               | 0.21735            | 176   |
| 18.5     | 25       | 200LA-6 | 200L  | 970 | 34.6           | 6.5           | 182.22         | 2.0          | 2.1            | 91.8            | 91.0           | 0.81               | 0.76             | 76               | 0.33075            | 238   |
| 22       | 30       | 200LB-6 | 200L  | 970 | 40.0           | 6.5           | 216.69         | 2.0          | 2.1            | 92.3            | 91.6           | 0.83               | 0.77             | 76               | 0.37800            | 265   |
| 30       | 40       | 225M-6  | 225M  | 980 | 53.4           | 6.5           | 292.47         | 2.0          | 2.1            | 93.0            | 92.6           | 0.84               | 0.77             | 76               | 0.57400            | 330   |
| 37       | 50       | 250M-6  | 250M  | 980 | 64.8           | 6.5           | 360.72         | 2.0          | 2.1            | 93.4            | 92.6           | 0.85               | 0.78             | 78               | 0.85986            | 401.5 |
| 45       | 60       | 280S-6  | 280S  | 980 | 77.6           | 6.5           | 438.71         | 2.0          | 2.1            | 93.8            | 93.1           | 0.86               | 0.79             | 80               | 1.41780            | 550   |
| 55       | 75       | 280M-6  | 280M  | 980 | 94.5           | 6.5           | 536.20         | 2.0          | 2.1            | 94.2            | 93.5           | 0.86               | 0.80             | 85               | 1.68300            | 599.5 |
| 75       | 100      | 315S-6  | 315S  | 980 | 128.0          | 6.5           | 731.18         | 2.0          | 2.0            | 94.8            | 94.0           | 0.86               | 0.80             | 85               | 4.19220            | 891   |
| 90       | 120      | 315MA-6 | 315M  | 980 | 153.3          | 6.5           | 877.42         | 2.0          | 2.0            | 95.0            | 94.2           | 0.86               | 0.80             | 85               | 4.87560            | 990   |
| 110      | 150      | 315LA-6 | 315L  | 980 | 186.9          | 6.5           | 1072.40        | 2.0          | 2.0            | 95.2            | 94.5           | 0.86               | 0.80             | 85               | 5.55900            | 1111  |
| 132      | 180      | 315LB-4 | 315L  | 980 | 223.6          | 6.5           | 1286.88        | 2.0          | 2.0            | 95.5            | 94.7           | 0.86               | 0.80             | 85               | 6.24240            | 1254  |
| 160      | 220      | 355MA-6 | 355M  | 980 | 264.3          | 6.5           | 1559.86        | 1.9          | 2.0            | 95.7            | 94.9           | 0.88               | 0.80             | 92               | 9.69000            | 1705  |
| 200      | 270      | 355MB-6 | 355M  | 980 | 329.7          | 6.5           | 1949.82        | 1.9          | 2.0            | 95.9            | 95.1           | 0.88               | 0.80             | 92               | 10.60800           | 1760  |
| 250      | 340      | 355L-6  | 355L  | 980 | 412.1          | 6.5           | 2437.28        | 1.9          | 2.0            | 95.9            | 95.1           | 0.88               | 0.80             | 92               | 12.64800           | 1870  |

• Efficiency is without seals. • All these performance values are declared at rated voltage 415 & frequency 50 Hz and are subjected to tolerances as per IS :12615/IEC 60034



## PERFORMANCE CHART

IE4, Super Premium efficiency 2 poles asynchronous speed 3000 RPM

| Power KW | Power HP | Type    | Frame | rpm  | Current In [A] | Current Is/In | Torque Cn [Nm] | Torque Cs/Cn | Torque Cmax/Cn | Efficiency 100% | Efficiency 75% | Power Factor. 100% | Power Factor 75% | Noise Level [dB] | J Kg <sup>m</sup> <sup>2</sup> | Kgs  |
|----------|----------|---------|-------|------|----------------|---------------|----------------|--------------|----------------|-----------------|----------------|--------------------|------------------|------------------|--------------------------------|------|
| 0.18     | 0.25     | 63A-2   | 63    | 2740 | 0.44           | 7.3           | 0.63           | 2.3          | 2.3            | 70.8            | 66.0           | 0.80               | 0.74             | 61               | 0.00023                        | 4.7  |
| 0.25     | 0.35     | 63B-2   | 63    | 2740 | 0.58           | 7.3           | 0.87           | 2.3          | 2.3            | 74.3            | 69.0           | 0.81               | 0.75             | 61               | 0.00026                        | 4.9  |
| 0.37     | 0.50     | 71A-2   | 71    | 2780 | 0.81           | 7.8           | 1.27           | 2.2          | 2.3            | 78.1            | 74.1           | 0.81               | 0.75             | 62               | 0.00055                        | 7.1  |
| 0.55     | 0.75     | 71B-2   | 71    | 2795 | 1.1            | 7.8           | 1.88           | 2.3          | 2.3            | 81.5            | 77.4           | 0.82               | 0.74             | 62               | 0.00066                        | 7.4  |
| 0.75     | 1        | 80A-2   | 80    | 2890 | 1.5            | 7.8           | 2.48           | 2.2          | 2.3            | 83.5            | 79.9           | 0.83               | 0.74             | 62               | 0.00159                        | 11   |
| 1.1      | 1.5      | 80B-2   | 80    | 2890 | 2.2            | 7.8           | 3.63           | 2.2          | 2.3            | 85.2            | 81.0           | 0.83               | 0.76             | 62               | 0.00179                        | 11   |
| 1.5      | 2        | 90S-2   | 90S   | 2890 | 2.8            | 7.8           | 4.96           | 2.2          | 2.3            | 86.5            | 84.0           | 0.85               | 0.73             | 67               | 0.00291                        | 17   |
| 2.2      | 3        | 90L-2   | 90L   | 2895 | 4.0            | 8.9           | 7.26           | 2.2          | 2.3            | 88.0            | 85.0           | 0.86               | 0.80             | 67               | 0.00341                        | 21   |
| 3        | 4        | 100L-2  | 100L  | 2895 | 5.4            | 8.9           | 9.90           | 2.2          | 2.3            | 89.1            | 87.6           | 0.87               | 0.78             | 74               | 0.00687                        | 27   |
| 4        | 5.5      | 112M-2  | 112M  | 2915 | 7.0            | 8.9           | 13.10          | 2.2          | 2.3            | 90.0            | 88.2           | 0.88               | 0.72             | 77               | 0.01065                        | 35   |
| 5.5      | 7.5      | 132SA-2 | 132S  | 2940 | 9.6            | 8.9           | 17.87          | 2.0          | 2.3            | 90.9            | 89.2           | 0.88               | 0.81             | 79               | 0.02140                        | 47   |
| 7.5      | 10       | 132SB-2 | 132S  | 2940 | 12.8           | 8.9           | 24.36          | 2.0          | 2.3            | 91.7            | 90.0           | 0.89               | 0.84             | 79               | 0.02428                        | 53   |
| 11       | 15       | 160MA-2 | 160M  | 2950 | 18.6           | 8.9           | 35.61          | 2.0          | 2.3            | 92.6            | 90.8           | 0.89               | 0.85             | 81               | 0.07927                        | 129  |
| 15       | 20       | 160MB-2 | 160M  | 2950 | 25.1           | 8.9           | 48.56          | 2.0          | 2.3            | 93.3            | 91.5           | 0.89               | 0.84             | 81               | 0.08520                        | 140  |
| 18.5     | 25       | 160L-2  | 160L  | 2950 | 30.9           | 8.9           | 59.89          | 2.0          | 2.3            | 93.7            | 92.0           | 0.89               | 0.86             | 81               | 0.09845                        | 165  |
| 22       | 30       | 180M-2  | 180M  | 2960 | 36.6           | 8.9           | 70.98          | 2.0          | 2.3            | 94.0            | 91.8           | 0.89               | 0.86             | 83               | 0.14664                        | 208  |
| 30       | 40       | 200LA-2 | 200L  | 2970 | 49.6           | 8.9           | 96.46          | 2.0          | 2.3            | 94.5            | 92.3           | 0.89               | 0.83             | 84               | 0.22508                        | 265  |
| 37       | 50       | 200LB-2 | 200L  | 2970 | 61.0           | 8.9           | 119.0          | 2.0          | 2.3            | 94.8            | 92.6           | 0.89               | 0.83             | 84               | 0.23411                        | 283  |
| 45       | 60       | 225M-2  | 225M  | 2970 | 74.0           | 8.9           | 144.7          | 2.0          | 2.3            | 95.0            | 92.5           | 0.89               | 0.85             | 86               | 0.44463                        | 366  |
| 55       | 75       | 250M-2  | 250M  | 2980 | 90.2           | 8.9           | 176.3          | 2.0          | 2.3            | 95.3            | 93.5           | 0.89               | 0.85             | 89               | 0.58754                        | 404  |
| 75       | 100      | 280S-2  | 280S  | 2980 | 123            | 8.9           | 240.4          | 1.8          | 2.3            | 95.6            | 93.9           | 0.89               | 0.83             | 91               | 0.92667                        | 548  |
| 90       | 120      | 280M-2  | 280M  | 2980 | 147            | 8.9           | 288.4          | 1.8          | 2.3            | 95.8            | 94.5           | 0.89               | 0.85             | 91               | 1.00615                        | 595  |
| 110      | 150      | 315S-2  | 315S  | 2980 | 179            | 8.9           | 352.5          | 1.8          | 2.3            | 96.0            | 94.6           | 0.89               | 0.85             | 92               | 2.08075                        | 875  |
| 132      | 180      | 315MA-2 | 315M  | 2980 | 214            | 8.9           | 423.0          | 1.8          | 2.3            | 96.2            | 94.8           | 0.89               | 0.87             | 92               | 2.21879                        | 965  |
| 160      | 220      | 315LA-2 | 315L  | 2980 | 260            | 8.9           | 512.8          | 1.8          | 2.2            | 96.3            | 95.0           | 0.89               | 0.86             | 92               | 2.46286                        | 1040 |
| 200      | 270      | 315LB-2 | 315L  | 2980 | 324            | 8.9           | 640.9          | 1.8          | 2.2            | 96.5            | 95.0           | 0.89               | 0.87             | 92               | 2.68282                        | 1132 |
| 250      | 340      | 355M-2  | 355M  | 2980 | 396            | 8.9           | 801.2          | 1.6          | 2.2            | 96.5            | 95.2           | 0.91               | 0.88             | 100              | 4.24681                        | 1675 |
| 315      | 430      | 355L-2  | 355L  | 2980 | 499            | 8.5           | 1009           | 1.6          | 2.2            | 96.5            | 95.1           | 0.91               | 0.88             | 100              | 4.61558                        | 1870 |

• Efficiency is without seals. • All these performance values are declared at rated voltage 415 & frequency 50 Hz and are subjected to tolerances as per IS :12615/IEC 60034



## PERFORMANCE CHART

IE4, Super Premium efficiency 4 poles asynchronous speed 1500 RPM

| Power KW | Power HP | Type    | Frame | rpm  | Current In [A] | Current Is/In | Torque Cn [Nm] | Torque Cs/Cn | Torque Cmax/Cn | Efficiency 100% | Efficiency 75% | Power Factor. 100% | Power Factor 75% | Noise Level [dB] | J Kg <sup>m</sup> <sup>2</sup> | Kgs  |
|----------|----------|---------|-------|------|----------------|---------------|----------------|--------------|----------------|-----------------|----------------|--------------------|------------------|------------------|--------------------------------|------|
| 0.12     | 0.18     | 63A-4   | 63    | 1330 | 0.33           | 6.5           | 0.86           | 2.1          | 2.2            | 69.8            | 60.0           | 0.72               | 0.64             | 52               | 0.00045                        | 4.7  |
| 0.18     | 0.25     | 63B-4   | 63    | 1330 | 0.46           | 6.5           | 1.29           | 2.1          | 2.2            | 74.7            | 66.0           | 0.73               | 0.64             | 52               | 0.00051                        | 4.9  |
| 0.25     | 0.35     | 71A-4   | 71    | 1360 | 0.60           | 6.5           | 1.76           | 2.1          | 2.2            | 77.9            | 67.0           | 0.74               | 0.62             | 55               | 0.00097                        | 7.1  |
| 0.37     | 0.5      | 71B-4   | 71    | 1360 | 0.86           | 7.0           | 2.60           | 2.1          | 2.2            | 81.1            | 76.4           | 0.74               | 0.65             | 55               | 0.00115                        | 7.4  |
| 0.55     | 0.75     | 80A-4   | 80    | 1420 | 1.2            | 7.0           | 3.70           | 2.3          | 2.4            | 83.9            | 80.0           | 0.74               | 0.66             | 56               | 0.00248                        | 12   |
| 0.75     | 1        | 80B-4   | 80    | 1430 | 1.6            | 7.0           | 5.01           | 2.2          | 2.3            | 85.7            | 82.3           | 0.74               | 0.64             | 56               | 0.00270                        | 13   |
| 1.1      | 1.5      | 90S-4   | 90S   | 1445 | 2.3            | 7.0           | 7.27           | 2.2          | 2.3            | 87.2            | 83.6           | 0.75               | 0.70             | 59               | 0.00445                        | 16   |
| 1.5      | 2        | 90L-4   | 90L   | 1445 | 3.1            | 7.0           | 9.91           | 2.2          | 2.3            | 88.2            | 84.7           | 0.76               | 0.71             | 59               | 0.00546                        | 20   |
| 2.2      | 3        | 100L-4  | 100L  | 1460 | 4.3            | 8.3           | 14.39          | 2.2          | 2.3            | 89.5            | 86.4           | 0.79               | 0.74             | 64               | 0.01243                        | 29   |
| 3        | 4        | 100L-4  | 100L  | 1460 | 5.8            | 8.3           | 19.62          | 2.2          | 2.3            | 90.4            | 86.4           | 0.80               | 0.74             | 64               | 0.01468                        | 33.5 |
| 4        | 5.5      | 112M-4  | 112M  | 1460 | 7.6            | 8.3           | 26.16          | 2.2          | 2.3            | 91.1            | 88.2           | 0.80               | 0.72             | 65               | 0.02015                        | 41   |
| 5.5      | 7.5      | 132S-4  | 132S  | 1470 | 10.4           | 8.3           | 35.73          | 2.0          | 2.3            | 91.9            | 89.4           | 0.80               | 0.77             | 71               | 0.04041                        | 57   |
| 7.5      | 10       | 132M-4  | 132M  | 1470 | 13.9           | 8.3           | 48.72          | 2.0          | 2.3            | 92.6            | 90.0           | 0.81               | 0.77             | 71               | 0.04826                        | 67   |
| 11       | 15       | 160M-4  | 160M  | 1470 | 19.8           | 8.3           | 71.46          | 2.2          | 2.3            | 93.3            | 91.0           | 0.83               | 0.80             | 73               | 0.13266                        | 139  |
| 15       | 20       | 160L-4  | 160L  | 1470 | 26.5           | 8.3           | 97.45          | 2.0          | 2.3            | 93.9            | 91.5           | 0.84               | 0.83             | 73               | 0.15849                        | 163  |
| 18.5     | 25       | 180M-4  | 180M  | 1475 | 32.1           | 8.3           | 119.80         | 2.2          | 2.3            | 94.2            | 92.0           | 0.85               | 0.84             | 76               | 0.21976                        | 199  |
| 22       | 30       | 180L-4  | 180L  | 1475 | 38.1           | 8.3           | 142.4          | 2.0          | 2.3            | 94.5            | 92.6           | 0.85               | 0.82             | 76               | 0.25333                        | 224  |
| 30       | 40       | 200L-4  | 200L  | 1480 | 51.7           | 8.3           | 193.60         | 2.0          | 2.3            | 94.9            | 92.2           | 0.85               | 0.84             | 76               | 0.42837                        | 283  |
| 37       | 50       | 225S-4  | 225S  | 1485 | 63.6           | 8.3           | 237.9          | 2.0          | 2.3            | 95.2            | 93.2           | 0.85               | 0.84             | 78               | 0.76400                        | 350  |
| 45       | 60       | 225M-4  | 225M  | 1485 | 77.2           | 8.3           | 289.4          | 2.0          | 2.3            | 95.4            | 92.8           | 0.85               | 0.84             | 78               | 0.86725                        | 380  |
| 55       | 75       | 250M-4  | 250M  | 1485 | 93.0           | 8.3           | 353.7          | 2.0          | 2.3            | 95.7            | 94.1           | 0.86               | 0.85             | 79               | 1.10125                        | 440  |
| 75       | 100      | 280S-4  | 280S  | 1485 | 125            | 8.9           | 482.3          | 2.0          | 2.3            | 96.0            | 94.5           | 0.87               | 0.85             | 80               | 1.97711                        | 610  |
| 90       | 120      | 280M-4  | 280M  | 1485 | 148            | 8.9           | 578.8          | 2.0          | 2.3            | 96.1            | 94.6           | 0.88               | 0.86             | 80               | 2.21474                        | 693  |
| 110      | 150      | 315S-4  | 315S  | 1485 | 179            | 8.9           | 707.4          | 1.8          | 2.2            | 96.3            | 93.8           | 0.89               | 0.86             | 88               | 4.42115                        | 935  |
| 132      | 180      | 315M-4  | 315M  | 1485 | 214            | 8.9           | 848.9          | 1.8          | 2.2            | 96.4            | 93.9           | 0.89               | 0.86             | 88               | 4.45565                        | 1035 |
| 160      | 220      | 315LA-4 | 315L  | 1485 | 256            | 8.9           | 1029           | 1.8          | 2.2            | 96.6            | 94.1           | 0.90               | 0.87             | 88               | 4.52914                        | 1135 |
| 200      | 270      | 315LB-4 | 315L  | 1485 | 320            | 8.9           | 1286           | 1.8          | 2.2            | 96.7            | 94.5           | 0.90               | 0.87             | 88               | 5.06000                        | 1210 |
| 250      | 340      | 355M-4  | 355M  | 1490 | 400            | 8.9           | 1602           | 1.8          | 2.2            | 96.7            | 94.6           | 0.90               | 0.88             | 92               | 8.23690                        | 1650 |
| 315      | 430      | 355L-4  | 355L  | 1490 | 504            | 8.9           | 2019           | 1.8          | 2.2            | 96.7            | 94.7           | 0.90               | 0.88             | 92               | 8.94755                        | 1805 |



## PERFORMANCE CHART

IE4, Super Premium efficiency 6 poles asynchronous speed 1000 RPM

| Power KW | Power HP | Type    | Frame | rpm | Current In [A] | Current Is/In | Torque Cn [Nm] | Torque Cs/Cn | Torque Cmax/Cn | Efficiency 100% | Efficiency 75% | Power Factor. 100% | Power Factor 75% | Noise Level [dB] | J Kg <sup>m</sup> <sup>2</sup> | Kgs  |
|----------|----------|---------|-------|-----|----------------|---------------|----------------|--------------|----------------|-----------------|----------------|--------------------|------------------|------------------|--------------------------------|------|
| 0.18     | 0.25     | 71A-6   | 71    | 880 | 0.54           | 7.0           | 1.95           | 1.9          | 2.0            | 70.1            | 68.9           | 0.66               | 0.61             | 52               | 0.00119                        | 6.3  |
| 0.25     | 0.35     | 71B-6   | 71    | 880 | 0.69           | 7.0           | 2.71           | 1.9          | 2.0            | 74.1            | 73.2           | 0.68               | 0.64             | 52               | 0.00151                        | 6.3  |
| 0.37     | 0.5      | 80A-6   | 80    | 890 | 0.94           | 7.3           | 3.97           | 2            | 2.1            | 78.0            | 77.1           | 0.70               | 0.65             | 54               | 0.00173                        | 12.5 |
| 0.55     | 0.75     | 80B-6   | 80    | 890 | 1.4            | 7.3           | 5.90           | 2.1          | 2.2            | 80.9            | 80.0           | 0.70               | 0.65             | 54               | 0.00205                        | 13.5 |
| 0.75     | 1        | 90S-6   | 90S   | 955 | 1.8            | 7.3           | 7.50           | 2.1          | 2.2            | 82.7            | 81.8           | 0.70               | 0.64             | 57               | 0.00447                        | 17   |
| 1.1      | 1.5      | 90L-6   | 90L   | 955 | 2.6            | 7.3           | 11.00          | 2.1          | 2.2            | 84.5            | 83.4           | 0.70               | 0.63             | 57               | 0.00622                        | 21.5 |
| 1.5      | 2        | 100L-6  | 100L  | 955 | 3.4            | 7.3           | 15.00          | 2.1          | 2.2            | 85.9            | 84.5           | 0.71               | 0.64             | 61               | 0.01257                        | 28   |
| 2.2      | 3        | 112M-6  | 112M  | 970 | 4.9            | 8.3           | 21.66          | 2.1          | 2.2            | 87.4            | 86.4           | 0.71               | 0.65             | 65               | 0.01774                        | 34   |
| 3        | 4        | 132S-6  | 132S  | 970 | 6.6            | 8.3           | 29.54          | 2.0          | 2.1            | 88.6            | 87.9           | 0.71               | 0.66             | 69               | 0.03736                        | 47   |
| 4        | 5.5      | 132MA-6 | 132M  | 970 | 8.6            | 8.3           | 39.38          | 2.0          | 2.1            | 89.5            | 88.3           | 0.72               | 0.65             | 69               | 0.04629                        | 59   |
| 5.5      | 7.5      | 132MB-6 | 132M  | 970 | 11.7           | 8.3           | 54.15          | 2.0          | 2.1            | 90.5            | 89.6           | 0.72               | 0.67             | 69               | 0.05804                        | 65   |
| 7.5      | 10       | 160M-6  | 160M  | 980 | 15.7           | 8.3           | 73.09          | 2.0          | 2.1            | 91.3            | 90.7           | 0.73               | 0.68             | 73               | 0.11495                        | 128  |
| 11       | 15       | 160L-6  | 160L  | 980 | 21.5           | 8.3           | 107.19         | 2.0          | 2.1            | 92.3            | 91.6           | 0.77               | 0.72             | 73               | 0.15149                        | 168  |
| 15       | 20       | 180L-6  | 180L  | 980 | 28.1           | 8.3           | 146.17         | 2.0          | 2.1            | 92.9            | 92.0           | 0.80               | 0.75             | 73               | 0.27046                        | 220  |
| 18.5     | 25       | 200LA-6 | 200L  | 985 | 34.4           | 8.3           | 179.37         | 2.0          | 2.1            | 93.4            | 92.6           | 0.80               | 0.75             | 73               | 0.39948                        | 268  |
| 22       | 30       | 200LB-6 | 200L  | 985 | 40.3           | 8.3           | 213.30         | 2.0          | 2.1            | 93.7            | 92.9           | 0.81               | 0.76             | 73               | 0.45435                        | 290  |
| 30       | 40       | 225M-6  | 225M  | 985 | 54.0           | 8.3           | 290.86         | 2.0          | 2.1            | 94.2            | 93.7           | 0.82               | 0.77             | 74               | 0.67349                        | 403  |
| 37       | 50       | 250M-6  | 250M  | 990 | 65.6           | 8.3           | 356.9          | 2.0          | 2.1            | 94.5            | 93.8           | 0.83               | 0.77             | 76               | 1.04601                        | 426  |
| 45       | 60       | 280S-6  | 280S  | 990 | 79.6           | 8.3           | 434.1          | 2.0          | 2.1            | 94.8            | 94.0           | 0.83               | 0.77             | 78               | 2.06482                        | 533  |
| 55       | 75       | 280M-6  | 280M  | 990 | 95.8           | 8.3           | 530.6          | 2.0          | 2.1            | 95.1            | 94.3           | 0.84               | 0.77             | 78               | 2.52840                        | 596  |
| 75       | 100      | 315S-6  | 315S  | 990 | 130            | 8.9           | 723.5          | 1.6          | 2.0            | 95.4            | 94.7           | 0.84               | 0.78             | 83               | 4.94926                        | 803  |
| 90       | 125      | 315MA-6 | 315M  | 990 | 154            | 8.9           | 868.2          | 1.6          | 2.0            | 95.6            | 94.9           | 0.85               | 0.79             | 83               | 5.75608                        | 912  |
| 110      | 150      | 315LA-6 | 315L  | 990 | 188            | 8.9           | 1061.1         | 1.6          | 2.0            | 95.8            | 95.1           | 0.85               | 0.79             | 83               | 6.56289                        | 1020 |
| 132      | 180      | 315LB-6 | 315L  | 990 | 222            | 8.9           | 1273.3         | 1.6          | 2.0            | 96.0            | 95.2           | 0.86               | 0.80             | 83               | 7.36970                        | 1115 |
| 160      | 220      | 315MA-6 | 355M  | 990 | 269            | 8.9           | 1543.4         | 1.6          | 2.0            | 96.2            | 95.4           | 0.86               | 0.80             | 85               | 11.43990                       | 1505 |
| 200      | 270      | 355MB-6 | 355M  | 990 | 336            | 8.9           | 1929.3         | 1.6          | 2.0            | 96.3            | 95.5           | 0.86               | 0.80             | 85               | 12.52368                       | 1645 |
| 250      | 340      | 355L-6  | 355L  | 990 | 419            | 8.9           | 2411.6         | 1.6          | 2.0            | 96.5            | 95.6           | 0.86               | 0.80             | 85               | 14.93208                       | 1825 |

• Efficiency is without seals. • All these performance values are declared at rated voltage 415 & frequency 50 Hz and are subjected to tolerances as per IS :12615/IEC 60034

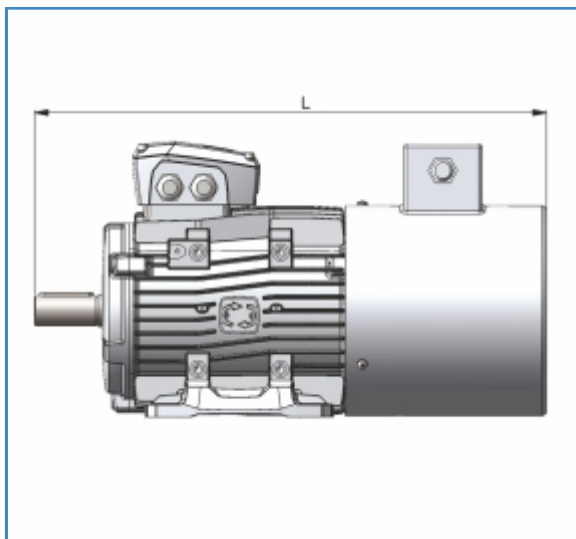
## OPTIONAL ACCESSORIES & FEATURES

### ASSISTED POWER COOLING

Three-phase 415/50, 415/60, IP 55, with separate terminal box



For applications where the motor will be operated below a frequency of 25Hz and above 60 Hz, the appropriate assisted power cooling must be mounted as there are too many variables involved to determine the various possible thermal duties, and thus the temperatures reached by the motors



| TYPE | POWER W | CAPACITY<br>m <sup>3</sup> /h | L (IE2) | L (IE3) |
|------|---------|-------------------------------|---------|---------|
| 63   | 21      | 140                           | 300     | -       |
| 71   | 30      | 300                           | 320     | -       |
| 80   | 35      | 350                           | 366     | -       |
| 90S  | 50      | 500                           | 400     | 420     |
| 90L  | 50      | 500                           | 425     | 445     |
| 100  | 65      | 650                           | 468     | 488     |
| 112  | 65      | 1000                          | 450     | 470     |
| 132S | 90      | 880                           | 570     | 590     |
| 132M | 90      | 880                           | 610     | 630     |
| 160M | 90      | 1100                          | 710     | 710     |
| 160L | 90      | 1100                          | 765     | 765     |
| 180M | 100     | 1200                          | 805     | 805     |
| 180L | 100     | 1200                          | 845     | 845     |
| 200L | 180     | 2500                          | 910     | 910     |
| 225S | 200     | 3800                          | 1035    | 1035    |
| 225M | 200     | 3800                          | 1040    | 1040    |
| 250M | 320     | 4200                          | 1210    | 1210    |
| 280S | 370     | 5000                          | 1160    | 1160    |
| 280M | 370     | 5000                          | 1210    | 1210    |
| 315S | 500     | 6000                          | 1410    | 1410    |
| 315M | 500     | 6000                          | 1440    | 1440    |
| 315L | 500     | 6000                          | 1550    | 1550    |
| 355M | 600     | 6500                          | 1735    | 1735    |
| 355L | 600     | 6500                          | 1765    | 1765    |

### ENCODER

Motors with encoder or special shaft configurations for encoder mounting are available upon request. In this case assisted power cooling is also available, supported by brackets on the fan cover

### OPTIONAL FEATURES OFFERED IN IE2 & IE3 MOTORS.

| Mechanical                                                 |                                                              |
|------------------------------------------------------------|--------------------------------------------------------------|
| Special mounting                                           | Non standard mounting dimensions                             |
| C.I. Body                                                  | 100, 112 & 132 Frame size                                    |
| Non Standard shaft material                                | EN24                                                         |
| Non Standard shaft extension                               |                                                              |
| Non Standard T. Box location                               | RHS/LHS or TOP                                               |
| Non Standard Cable entries                                 |                                                              |
| Motors with Thermal protection                             | PTC Thermistors, BTD Thermostat, RTD etc.                    |
| Non standard bearings                                      | Roller bearings on driving end side                          |
| Higher Degree of protection than IP55                      | IP56, IP65, IP66                                             |
| Low vibration motors                                       | Precision class vibration levels(A,B or C) as per IS : 12075 |
| Non standard paint                                         | Epoxy paint, Poly urethane paint                             |
| Special accessories like arrow plate, Aux. name plate etc. |                                                              |
| Forced cooling arrangement 71 frame onwards                |                                                              |
| Surface cooled motors (TENV)                               |                                                              |
| Motors with clean flow cowl arrangement                    |                                                              |
| Motors with flying leads                                   |                                                              |
| Space heater                                               | 160 Frame onwards                                            |

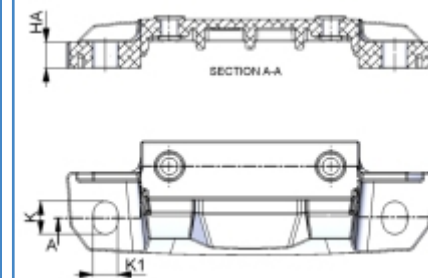
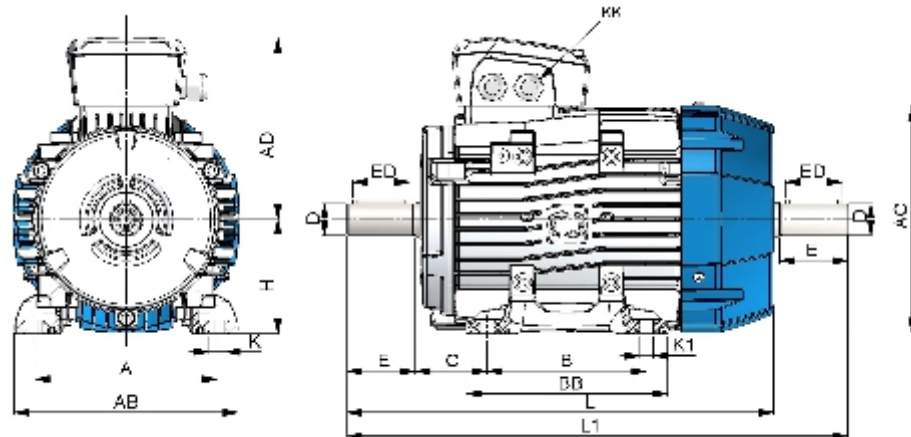
| Electrical                                         |                                                                                                                                       |
|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| Non standard voltage                               | 27 to 720V                                                                                                                            |
| Non standard Frequency                             | 50 to 150 Hz                                                                                                                          |
| Motors with wide variation in following parameters |                                                                                                                                       |
| a. Voltage variation                               | >10%                                                                                                                                  |
| b. Frequency Variation                             | >5%                                                                                                                                   |
| c. Motors with higher than 8 pole                  | 10pole,12pole etc.                                                                                                                    |
| d. Dual speed motors                               | 2 / 4 Pole & 4 / 8 Pole                                                                                                               |
| Class H insulation scheme                          |                                                                                                                                       |
| Motors for high inertia load                       |                                                                                                                                       |
| Motors with high slip                              |                                                                                                                                       |
| Motors with intermittent duties                    |                                                                                                                                       |
| Motors with service factor higher than 1           | i.e. 1.2 service factor with Class F temperature rise of 50°C as a special construction against specific orders only for few ratings. |

# DIMENSIONS CHART FOR IE2/IE3/IE5

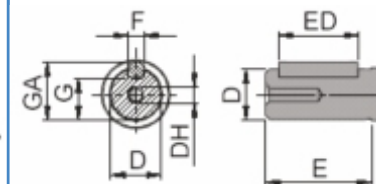


|      |       |     |     |     |       | IE2<br>IE5 | IE3  | IE2<br>IE5 | IE3 |    |        |     |     |    |      | B3   |     |     |     |     |     |    |     |     |     | B5, B3/B5 |     |   |    |     |    |     |     |     |   | B14 |     |  |  |  |  |
|------|-------|-----|-----|-----|-------|------------|------|------------|-----|----|--------|-----|-----|----|------|------|-----|-----|-----|-----|-----|----|-----|-----|-----|-----------|-----|---|----|-----|----|-----|-----|-----|---|-----|-----|--|--|--|--|
| TYPE | POLES | AC  | AD  | H   | KK    | L          |      | L1         |     | D  | DH     | E   | ED  | F  | G    | GA   | A   | AB  | B   | BB  | C   | HA | K   | K1  | M   | N         | P   | R | S  | T   | LA | M   | N   | P   | R | S   | T   |  |  |  |  |
| 56   | 2-8   | 115 | 108 | 56  | M16   | 198        | -    | 223        | -   | 9  | M4x12  | 20  | 16  | 3  | 7.2  | 10.2 | 90  | 111 | 71  | 90  | 36  | 8  | 6   | 5.8 | 100 | 80        | 120 | 0 | 7  | 3   | 8  | 65  | 50  | 80  | 0 | M5  | 2,5 |  |  |  |  |
| 63   | 2-8   | 122 | 109 | 63  | M20   | 220        | -    | 240        | -   | 11 | M4x12  | 23  | 16  | 4  | 8.5  | 12.5 | 100 | 124 | 80  | 105 | 40  | 8  | 9.5 | 7   | 115 | 95        | 140 | 0 | 10 | 3   | 10 | 75  | 60  | 90  | 0 | M5  | 2,5 |  |  |  |  |
| 71   | 2-8   | 139 | 119 | 71  | M20   | 244        | -    | 281        | -   | 14 | M5X12  | 30  | 25  | 5  | 11.0 | 16.0 | 112 | 138 | 90  | 115 | 45  | 9  | 11  | 7   | 130 | 110       | 160 | 0 | 10 | 3.5 | 10 | 85  | 70  | 105 | 0 | M6  | 2,5 |  |  |  |  |
| 80   | 2-8   | 157 | 131 | 80  | M20   | 292        | -    | 322        | -   | 19 | M6X16  | 40  | 30  | 6  | 15.5 | 21.5 | 125 | 157 | 100 | 130 | 50  | 9  | 14  | 10  | 165 | 130       | 200 | 0 | 12 | 3.5 | 12 | 100 | 80  | 120 | 0 | M6  | 3,0 |  |  |  |  |
| 90S  | 2-8   | 176 | 145 | 90  | M20   | 309        | 329  | 367        | 387 | 24 | M8X19  | 50  | 40  | 8  | 20.0 | 27.0 | 140 | 173 | 100 | 130 | 56  | 11 | 14  | 10  | 165 | 130       | 200 | 0 | 12 | 3.5 | 12 | 115 | 95  | 140 | 0 | M8  | 3,0 |  |  |  |  |
| 90L  | 2-8   | 176 | 145 | 90  | M20   | 334        | 354  | 392        | 412 | 24 | M8X19  | 50  | 40  | 8  | 20.0 | 27.0 | 140 | 173 | 125 | 155 | 56  | 11 | 14  | 10  | 165 | 130       | 200 | 0 | 12 | 3.5 | 12 | 115 | 95  | 140 | 0 | M8  | 3,0 |  |  |  |  |
| 100L | 2-8   | 197 | 159 | 100 | M20   | 375        | 395  | 439        | 459 | 28 | M10X22 | 60  | 50  | 8  | 24.0 | 31.0 | 160 | 196 | 140 | 180 | 63  | 12 | 16  | 12  | 215 | 180       | 250 | 0 | 15 | 4   | 13 | 130 | 110 | 160 | 0 | M8  | 3,5 |  |  |  |  |
| 112M | 2-8   | 221 | 177 | 112 | M25   | 388        | 408  | 454        | 474 | 28 | M10X22 | 60  | 50  | 8  | 24.0 | 31.0 | 190 | 227 | 140 | 185 | 70  | 12 | 16  | 12  | 215 | 180       | 250 | 0 | 15 | 4   | 14 | 130 | 110 | 160 | 0 | M8  | 3,5 |  |  |  |  |
| 132S | 2-8   | 260 | 197 | 132 | M32   | 460        | 480  | 547        | 567 | 38 | M12X28 | 80  | 65  | 10 | 33.0 | 41.0 | 216 | 260 | 140 | 185 | 89  | 15 | 16  | 12  | 265 | 230       | 300 | 0 | 15 | 4   | 14 | 165 | 130 | 200 | 0 | M10 | 3,5 |  |  |  |  |
| 132M | 2-8   | 260 | 197 | 132 | M32   | 498        | 518  | 585        | 605 | 38 | M12X28 | 80  | 65  | 10 | 33.0 | 41.0 | 216 | 260 | 178 | 225 | 89  | 15 | 16  | 12  | 265 | 230       | 300 | 0 | 15 | 4   | 14 | 165 | 130 | 200 | 0 | M10 | 3,5 |  |  |  |  |
| 160M | 2-8   | 315 | 255 | 160 | 2xM40 | 620        | 620  | 725        | 725 | 42 | M16X36 | 110 | 90  | 12 | 37.0 | 45.0 | 254 | 320 | 210 | 260 | 108 | 20 | 15  | 15  | 300 | 250       | 350 | 0 | 19 | 5   | 14 |     |     |     |   |     |     |  |  |  |  |
| 160L | 2-8   | 315 | 255 | 160 | 2xM40 | 665        | 665  | 770        | 770 | 42 | M16X36 | 110 | 90  | 12 | 37.0 | 45.0 | 254 | 320 | 254 | 305 | 108 | 20 | 15  | 15  | 300 | 250       | 350 | 0 | 19 | 5   | 14 |     |     |     |   |     |     |  |  |  |  |
| 180M | 2-8   | 380 | 280 | 180 | 2xM40 | 700        | 700  | -          |     | 48 | M16X36 | 110 | 90  | 14 | 42.5 | 51.5 | 279 | 355 | 241 | 300 | 121 | 24 | 15  | 15  | 300 | 250       | 350 | 0 | 19 | 5   | 15 |     |     |     |   |     |     |  |  |  |  |
| 180L | 2-8   | 380 | 280 | 180 | 2xM40 | 740        | 740  | -          |     | 48 | M16X36 | 110 | 90  | 14 | 42.5 | 51.5 | 279 | 355 | 279 | 350 | 121 | 24 | 15  | 15  | 300 | 250       | 350 | 0 | 19 | 5   | 15 |     |     |     |   |     |     |  |  |  |  |
| 200L | 2-8   | 420 | 305 | 200 | 2xM50 | 770        | 770  | -          |     | 55 | M20X42 | 110 | 90  | 16 | 49.0 | 59.0 | 318 | 395 | 305 | 370 | 133 | 24 | 19  | 19  | 350 | 300       | 400 | 0 | 19 | 5   | 16 |     |     |     |   |     |     |  |  |  |  |
| 225S | 4-8   | 470 | 335 | 225 | 2xM50 | 815        | 815  | -          |     | 60 | M20X42 | 140 | 110 | 18 | 53.0 | 64.0 | 356 | 435 | 286 | 375 | 149 | 28 | 19  | 19  | 400 | 350       | 450 | 0 | 19 | 5   | 22 |     |     |     |   |     |     |  |  |  |  |
| 225M | 2     | 470 | 335 | 225 | 2xM50 | 820        | 820  | -          |     | 55 | M20X42 | 110 | 90  | 16 | 49.0 | 59.0 | 356 | 435 | 311 | 390 | 149 | 28 | 19  | 19  | 400 | 350       | 450 | 0 | 19 | 5   | 22 |     |     |     |   |     |     |  |  |  |  |
| 225M | 4-8   | 470 | 335 | 225 | 2xM50 | 850        | 850  | -          |     | 60 | M20X42 | 140 | 110 | 18 | 53.0 | 64.0 | 356 | 435 | 311 | 390 | 149 | 28 | 19  | 19  | 400 | 350       | 450 | 0 | 19 | 5   | 22 |     |     |     |   |     |     |  |  |  |  |
| 250M | 2     | 510 | 370 | 250 | 2xM63 | 1021       | 1021 | -          |     | 60 | M20X42 | 140 | 110 | 18 | 53.0 | 64.0 | 406 | 490 | 349 | 440 | 168 | 32 | 24  | 24  | 500 | 450       | 550 | 0 | 19 | 5   | 25 |     |     |     |   |     |     |  |  |  |  |
| 250M | 4-8   | 510 | 370 | 250 | 2xM63 | 1021       | 1021 | -          |     | 65 | M20X42 | 140 | 110 | 18 | 58.0 | 69.0 | 406 | 490 | 349 | 440 | 168 | 32 | 24  | 24  | 500 | 450       | 550 | 0 | 19 | 5   | 25 |     |     |     |   |     |     |  |  |  |  |
| 280S | 2     | 580 | 410 | 280 | 2xM63 | 985        | 985  | -          |     | 65 | M20X42 | 140 | 110 | 18 | 58.0 | 69.0 | 457 | 550 | 368 | 460 | 190 | 36 | 24  | 24  | 500 | 450       | 550 | 0 | 19 | 5   | 28 |     |     |     |   |     |     |  |  |  |  |
| 280S | 4-8   | 580 | 410 | 280 | 2xM63 | 985        | 985  | -          |     | 75 | M20X42 | 140 | 110 | 20 | 67.5 | 79.5 | 457 | 550 | 368 | 460 | 190 | 36 | 24  | 24  | 500 | 450       | 550 | 0 | 19 | 5   | 28 |     |     |     |   |     |     |  |  |  |  |
| 280M | 2     | 580 | 410 | 280 | 2xM63 | 1035       | 1035 | -          |     | 65 | M20X42 | 140 | 110 | 18 | 58.0 | 69.0 | 457 | 550 | 419 | 510 | 190 | 36 | 24  | 24  | 500 | 450       | 550 | 0 | 19 | 5   | 28 |     |     |     |   |     |     |  |  |  |  |
| 280M | 4-8   | 580 | 410 | 280 | 2xM63 | 1035       | 1035 | -          |     | 75 | M20X42 | 140 | 110 | 20 | 67.5 | 79.5 | 457 | 550 | 419 | 510 | 190 | 36 | 24  | 24  | 500 | 450       | 550 | 0 | 19 | 5   | 28 |     |     |     |   |     |     |  |  |  |  |
| 315S | 2     | 615 | 530 | 315 | 2xM63 | 1160       | 1160 | -          |     | 65 | M20X42 | 140 | 110 | 18 | 58.0 | 69.0 | 508 | 635 | 406 | 500 | 216 | 42 | 28  | 28  | 600 | 550       | 660 | 0 | 24 | 6   | 30 |     |     |     |   |     |     |  |  |  |  |
| 315S | 4-8   | 615 | 530 | 315 | 2xM63 | 1270       | 1270 | -          |     | 80 | M20X42 | 170 | 140 | 22 | 71.0 | 85.0 | 508 | 635 | 406 | 500 | 216 | 42 | 28  | 28  | 600 | 550       | 660 | 0 | 24 | 6   | 30 |     |     |     |   |     |     |  |  |  |  |
| 315M | 2     | 615 | 530 | 315 | 2xM63 | 1190       | 1190 | -          |     | 65 | M20X42 | 140 | 110 | 18 | 58.0 | 69.0 | 508 | 635 | 457 | 550 | 216 | 42 | 28  | 28  | 600 | 550       | 660 | 0 | 24 | 6   | 30 |     |     |     |   |     |     |  |  |  |  |
| 315M | 4-8   | 615 | 530 | 315 | 2xM63 | 1350       | 1350 | -          |     | 80 | M20X42 | 170 | 140 | 22 | 71.0 | 85.0 | 508 | 635 | 457 | 550 | 216 | 42 | 28  | 28  | 600 | 550       | 660 | 0 | 24 | 6   | 30 |     |     |     |   |     |     |  |  |  |  |
| 315L | 2     | 615 | 530 | 315 | 2xM63 | 1190       | 1190 | -          |     | 65 | M20X42 | 140 | 110 | 18 | 58.0 | 69.0 | 508 | 635 | 508 | 600 | 216 | 42 | 28  | 28  | 600 | 550       | 660 | 0 | 24 | 6   | 30 |     |     |     |   |     |     |  |  |  |  |
| 315L | 4-8   | 615 | 530 | 315 | 2xM63 | 1350       | 1350 | -          |     | 80 | M20X42 | 170 | 140 | 22 | 71.0 | 85.0 | 508 | 635 | 508 | 600 | 216 | 42 | 28  | 28  | 600 | 550       | 660 | 0 | 24 | 6   | 30 |     |     |     |   |     |     |  |  |  |  |
| 355M | 2     | 710 | 655 | 355 | 2xM63 | 1500       | 1500 | -          |     | 75 | M20X42 | 140 | 110 | 20 | 67.5 | 79.5 | 610 | 730 | 560 | 590 | 254 | 45 | 28  | 28  | 740 | 680       | 800 | 0 | 24 | 6   | 32 |     |     |     |   |     |     |  |  |  |  |
| 355M | 4-8   | 710 | 655 | 355 | 2xM63 | 1530       | 1530 | -          |     | 95 | M20X42 | 170 | 140 | 25 | 86.0 | 100  | 610 | 730 | 560 | 590 | 254 | 45 | 28  | 28  | 740 | 680       | 800 | 0 | 24 | 6   | 32 |     |     |     |   |     |     |  |  |  |  |
| 355L | 2     | 710 | 655 | 355 | 2xM63 | 1500       | 1500 | -          |     | 75 | M20X42 | 140 | 110 | 20 | 67.5 | 79.5 | 610 | 730 | 630 | 720 | 254 | 45 | 28  | 28  | 740 | 680       | 800 | 0 | 24 | 6   | 32 |     |     |     |   |     |     |  |  |  |  |
| 355L | 4-8   | 710 | 655 | 355 | 2xM63 | 1530       | 1530 | -          |     | 95 | M20X42 | 170 | 140 | 25 | 86.0 | 100  | 610 | 730 | 630 | 720 | 254 | 45 | 28  | 28  | 740 | 680       | 800 | 0 | 24 | 6   | 32 |     |     |     |   |     |     |  |  |  |  |

B3

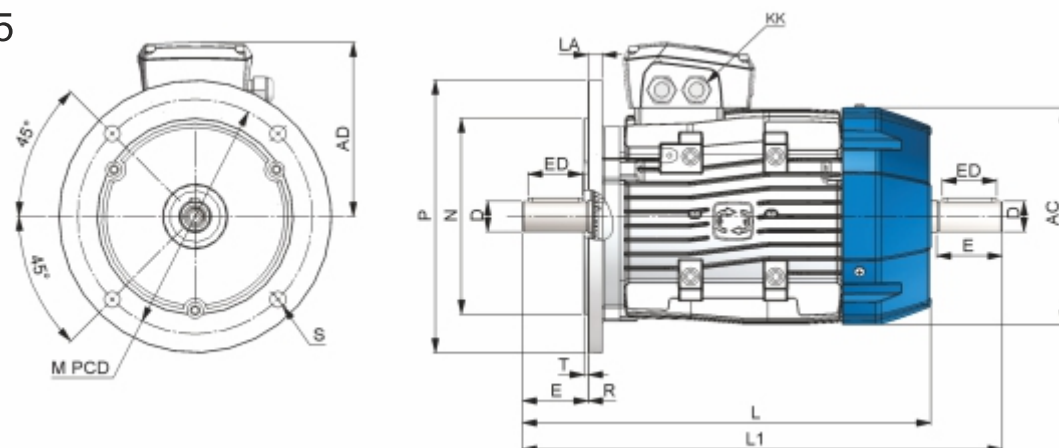


DETAILS OF FOOT



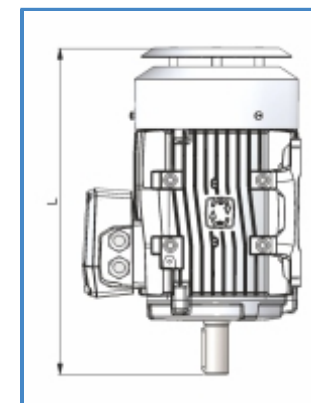
DE / NDE SIDE  
EXTENSION

B5 / B35



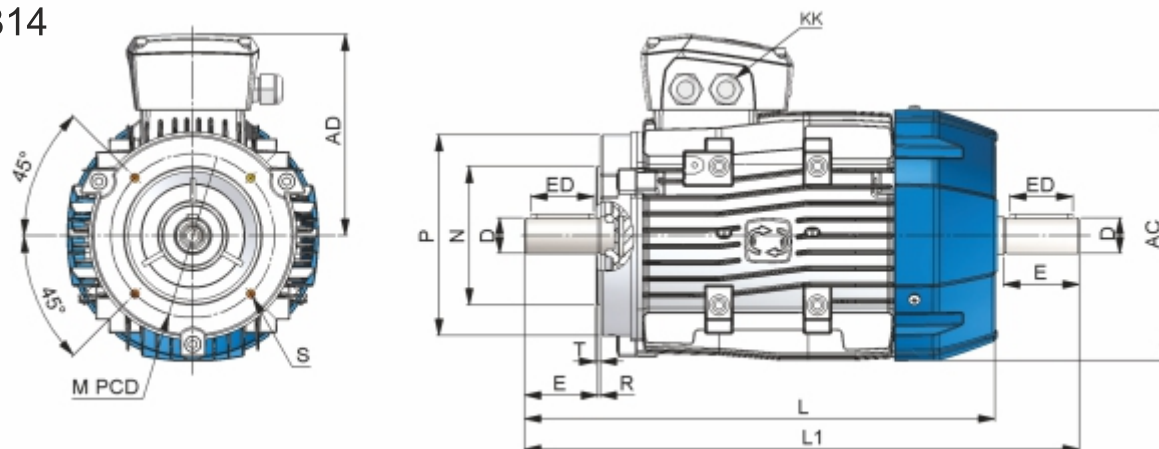
Rain Shield and Clean-flow fan cover:

For outdoor applications with V5-V18-V1-V15 installation position, we recommend the use of rain shield. This configuration may also be used in textiles processing industry having lot of fibers in the atmosphere which can clog the fan if not used with a clean flow fan cover.



| TYPE | L (IE2) | L (IE3) |
|------|---------|---------|
| 63   | 215     | -       |
| 71   | 323     | -       |
| 80   | 369     | -       |
| 90S  | 403     | 423     |
| 90L  | 428     | 448     |
| 100  | 469     | 489     |
| 112  | 453     | 473     |
| 132S | 573     | 593     |
| 132M | 613     | 623     |
| 160M | 770     | 770     |
| 160L | 825     | 825     |
| 180M | 915     | 915     |
| 180L | 955     | 955     |
| 200L | 1025    | 1025    |
| 225S | 1155    | 1155    |
| 225M | 1160    | 1160    |
| 250M | 1320    | 1320    |
| 280S | 1265    | 1265    |
| 280M | 1315    | 1315    |
| 315S | 1540    | 1540    |
| 315M | 1570    | 1570    |
| 315L | 1680    | 1680    |
| 355M | 1840    | 1840    |
| 355L | 1870    | 1870    |

B14



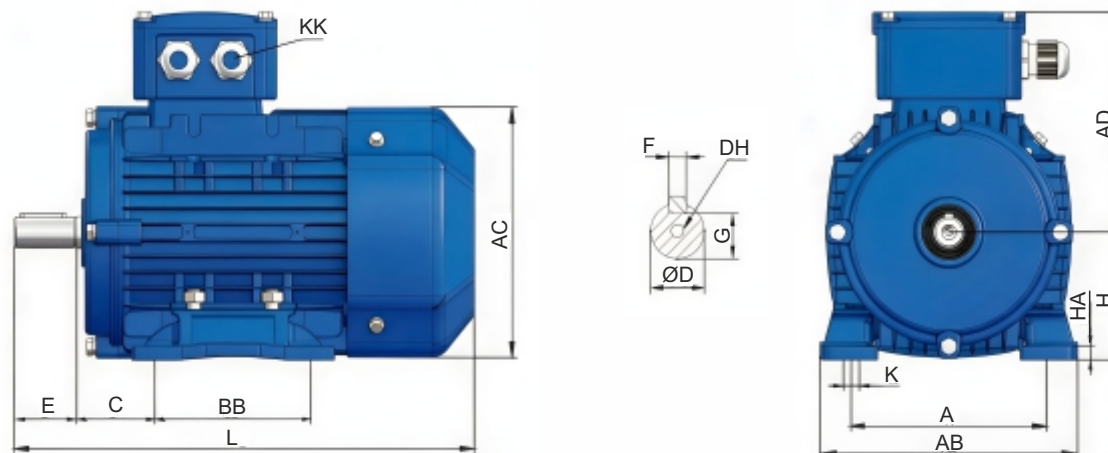
## DIMENSIONS CHART FOR IE4

|      |       |     |     |     |       |      |    |        |     |    |      | B3  |     |     |     |    | B5,B3/B5 |     |     |    |     | B14                  |     |     |     |     |
|------|-------|-----|-----|-----|-------|------|----|--------|-----|----|------|-----|-----|-----|-----|----|----------|-----|-----|----|-----|----------------------|-----|-----|-----|-----|
| TYPE | POLES | AC  | AD  | H   | KK    | L    | D  | DH     | E   | F  | G    | A   | AB  | B   | C   | K  | M        | N   | P   | S  | T   | M                    | N   | P   | S   | T   |
| 63   | 2-8   | 123 | 111 | 63  | M20   | 221  | 11 | M4X12  | 23  | 4  | 8.5  | 100 | 137 | 80  | 40  | 7  | 115      | 95  | 140 | 10 | 3   | 75                   | 60  | 90  | M5  | 2.5 |
| 71   | 2-8   | 137 | 127 | 71  | M20   | 247  | 14 | M5X12  | 30  | 5  | 11   | 112 | 133 | 90  | 45  | 7  | 130      | 110 | 160 | 10 | 3.5 | 85                   | 70  | 105 | M6  | 2.5 |
| 80   | 2-8   | 158 | 140 | 80  | 2XM20 | 295  | 19 | M6X16  | 40  | 6  | 15.5 | 125 | 141 | 100 | 50  | 10 | 165      | 130 | 200 | 12 | 3.5 | 100                  | 80  | 120 | M6  | 3   |
| 90S  | 2-8   | 177 | 160 | 90  | 2XM25 | 353  | 24 | M8X19  | 50  | 8  | 20   | 140 | 180 | 100 | 56  | 10 | 165      | 130 | 200 | 12 | 3.5 | 115                  | 95  | 140 | M8  | 3   |
| 90L  | 2-8   | 177 | 160 | 90  | 2XM25 | 373  | 24 | M8X19  | 50  | 8  | 20   | 140 | 180 | 125 | 56  | 10 | 165      | 130 | 200 | 12 | 3.5 | 115                  | 95  | 140 | M8  | 3   |
| 100L | 2-8   | 198 | 172 | 100 | 2XM25 | 433  | 28 | M10X22 | 60  | 8  | 24   | 160 | 205 | 140 | 63  | 12 | 215      | 180 | 250 | 15 | 4   | 130                  | 110 | 160 | M8  | 3.5 |
| 112M | 2-8   | 235 | 193 | 112 | 2XM32 | 461  | 28 | M10X22 | 60  | 8  | 24   | 190 | 226 | 140 | 70  | 12 | 215      | 180 | 250 | 15 | 4   | 130                  | 110 | 160 | M8  | 3.5 |
| 132S | 2-8   | 293 | 225 | 132 | 2XM32 | 499  | 38 | M12X28 | 80  | 10 | 33   | 216 | 262 | 140 | 89  | 12 | 265      | 230 | 300 | 15 | 4   | 165                  | 130 | 200 | M10 | 3.5 |
| 132M | 2-8   | 293 | 225 | 132 | 2XM32 | 521  | 38 | M12X28 | 80  | 10 | 33   | 216 | 262 | 178 | 89  | 12 | 265      | 230 | 300 | 15 | 4   | 165                  | 130 | 200 | M10 | 3.5 |
| 160M | 2-6   | 315 | 255 | 160 | 2XM40 | 660  | 42 | M16X36 | 110 | 12 | 37   | 254 | 320 | 210 | 108 | 15 | 300      | 250 | 350 | 19 | 5   | BEARING SIZE FOR IE4 |     |     |     |     |
| 160L | 2-6   | 315 | 255 | 160 | 2XM40 | 730  | 42 | M16X36 | 110 | 12 | 37   | 254 | 320 | 254 | 108 | 15 | 300      | 250 | 350 | 19 | 5   |                      |     |     |     |     |
| 180M | 2-6   | 355 | 280 | 180 | 2XM40 | 740  | 48 | M16X36 | 110 | 14 | 42.5 | 279 | 355 | 241 | 121 | 15 | 300      | 250 | 350 | 19 | 5   |                      |     |     |     |     |
| 180L | 2-6   | 355 | 280 | 180 | 2XM40 | 810  | 48 | M16X36 | 110 | 14 | 42.5 | 279 | 355 | 279 | 121 | 15 | 300      | 250 | 350 | 19 | 5   |                      |     |     |     |     |
| 200L | 2-6   | 397 | 305 | 200 | 2XM50 | 852  | 48 | M20X42 | 110 | 16 | 49   | 318 | 395 | 305 | 133 | 19 | 350      | 300 | 400 | 19 | 5   |                      |     |     |     |     |
| 225S | 4     | 445 | 335 | 225 | 2XM50 | 874  | 60 | M20X42 | 140 | 18 | 53   | 356 | 435 | 286 | 149 | 19 | 400      | 350 | 450 | 19 | 5   |                      |     |     |     |     |
| 225M | 2     | 445 | 335 | 225 | 2XM50 | 890  | 55 | M20X42 | 110 | 16 | 49   | 356 | 435 | 311 | 149 | 19 | 400      | 350 | 450 | 19 | 5   |                      |     |     |     |     |
| 225M | 4-6   | 445 | 335 | 225 | 2XM50 | 915  | 60 | M20X42 | 140 | 18 | 53   | 356 | 435 | 311 | 149 | 19 | 400      | 350 | 450 | 19 | 5   |                      |     |     |     |     |
| 250M | 2     | 485 | 370 | 250 | 2XM63 | 985  | 60 | M20X42 | 140 | 18 | 53   | 406 | 490 | 349 | 168 | 24 | 500      | 450 | 550 | 19 | 5   |                      |     |     |     |     |
| 250M | 4-6   | 485 | 370 | 250 | 2XM63 | 985  | 65 | M20X42 | 140 | 18 | 58   | 406 | 490 | 349 | 168 | 24 | 500      | 450 | 550 | 9  | 5   |                      |     |     |     |     |
| 280S | 2     | 547 | 410 | 280 | 2XM63 | 1045 | 65 | M20X42 | 140 | 18 | 58   | 457 | 550 | 368 | 190 | 24 | 500      | 450 | 550 | 19 | 5   |                      |     |     |     |     |
| 280S | 4-6   | 547 | 410 | 280 | 2XM63 | 1045 | 75 | M20X42 | 140 | 20 | 67.5 | 457 | 550 | 368 | 190 | 24 | 500      | 450 | 550 | 19 | 5   |                      |     |     |     |     |
| 280M | 2     | 547 | 410 | 280 | 2XM63 | 1095 | 65 | M20X42 | 140 | 18 | 58   | 457 | 550 | 419 | 190 | 24 | 500      | 450 | 550 | 19 | 5   |                      |     |     |     |     |
| 280M | 4-6   | 547 | 410 | 280 | 2XM63 | 1095 | 75 | M20X42 | 140 | 20 | 67.5 | 457 | 550 | 419 | 190 | 24 | 500      | 450 | 550 | 19 | 5   |                      |     |     |     |     |
| 315S | 2     | 620 | 530 | 315 | 2XM63 | 1185 | 65 | M20X42 | 140 | 18 | 58   | 508 | 635 | 406 | 216 | 28 | 600      | 550 | 660 | 24 | 6   |                      |     |     |     |     |
| 315S | 4-6   | 620 | 530 | 315 | 2XM63 | 1220 | 80 | M20X42 | 170 | 22 | 71   | 508 | 635 | 406 | 216 | 28 | 600      | 550 | 660 | 24 | 6   |                      |     |     |     |     |
| 315M | 2     | 260 | 530 | 315 | 2XM63 | 1290 | 65 | M20X42 | 140 | 18 | 58   | 508 | 635 | 457 | 216 | 28 | 600      | 550 | 660 | 24 | 6   |                      |     |     |     |     |
| 315M | 4-6   | 260 | 530 | 315 | 2XM63 | 1325 | 80 | M20X42 | 170 | 22 | 71   | 508 | 635 | 457 | 216 | 28 | 600      | 550 | 660 | 24 | 6   |                      |     |     |     |     |
| 315L | 2     | 260 | 530 | 315 | 2XM63 | 1290 | 65 | M20X42 | 140 | 18 | 58   | 508 | 635 | 508 | 216 | 28 | 600      | 550 | 660 | 24 | 6   |                      |     |     |     |     |
| 315L | 4-6   | 260 | 530 | 315 | 2XM63 | 1325 | 80 | M20X42 | 170 | 22 | 71   | 508 | 635 | 508 | 216 | 28 | 600      | 550 | 660 | 24 | 6   |                      |     |     |     |     |
| 355M | 2     | 698 | 655 | 355 | 2XM63 | 1500 | 75 | M20X42 | 140 | 20 | 67.5 | 610 | 730 | 560 | 254 | 28 | 740      | 680 | 800 | 24 | 6   |                      |     |     |     |     |
| 355M | 4-6   | 698 | 655 | 355 | 2XM63 | 1530 | 95 | M20X42 | 170 | 25 | 86   | 610 | 730 | 560 | 254 | 28 | 740      | 680 | 800 | 24 | 6   |                      |     |     |     |     |
| 355L | 2     | 698 | 655 | 355 | 2XM63 | 1500 | 75 | M20X42 | 140 | 20 | 67.5 | 610 | 730 | 630 | 254 | 28 | 740      | 680 | 800 | 24 | 6   |                      |     |     |     |     |
| 355L | 4-6   | 698 | 655 | 355 | 2XM63 | 1530 | 95 | M20X42 | 170 | 25 | 86   | 610 | 730 | 630 | 254 | 28 | 740      | 680 | 800 | 24 | 6   |                      |     |     |     |     |

| Frame size | Poles | Drive End | Non Drive End |
|------------|-------|-----------|---------------|
| 63         | 2-6   | 6201-2RZ  | 6201-2RZ      |
| 71         | 2-6   | 6202-2RZ  | 6202-2RZ      |
| 80         | 2-4   | 6204-2RZ  | 6204-2RZ      |
| 90         | 2-6   | 6205-2RZ  | 6205-2RZ      |
| 100        | 2-6   | 6206-2RZ  | 6206-2RZ      |
| 112        | 2-6   | 6306-2RZ  | 6306-2RZ      |
| 132        | 2-6   | 6308-2RZ  | 6308-2RZ      |
| 160        | 2-6   | 6309-2RZ  | 6309-2RZ      |
| 180        | 2-6   | 6311 C3   | 6311 C3       |
| 200        | 2-6   | 6312 C3   | 6312 C3       |
| 225        | 2-6   | 6313 C3   | 6313 C3       |
| 250        | 2-6   | 6314 C3   | 6314 C3       |
| 280        | 2     | 6314 C3   | 6314 C3       |
| 280        | 4-6   | 6317 C3   | 6317 C3       |
| 315        | 2     | 6317 C3   | 6317 C3       |
| 315        | 4-6   | NU319 C3  | 6319 C3       |
| 355        | 2     | 6319 C3   | 6319 C3       |
| 355        | 4-6   | NU322 C3  | NU322 C3      |

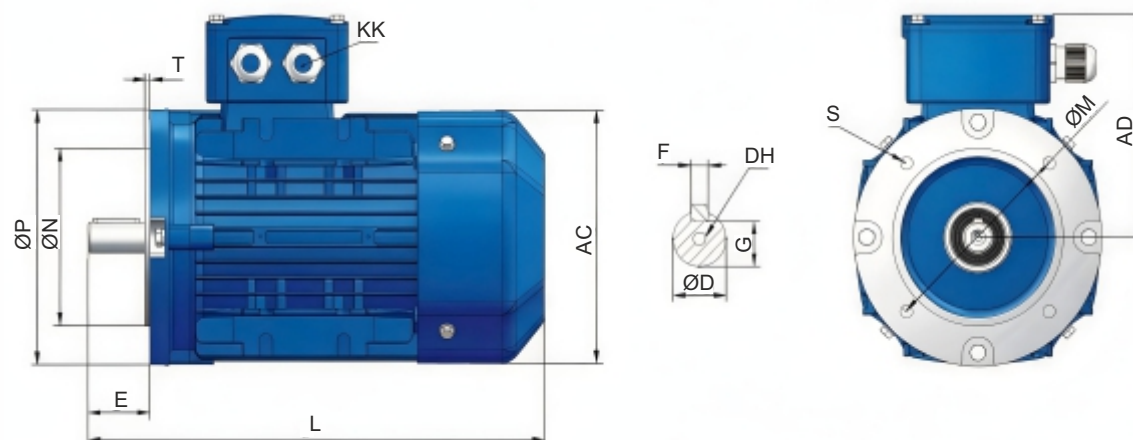
**FRAME WITH FEET AND  
END-SHIELD WITHOUT  
FLANGE (IM B3)**

**63-132 Aluminium**



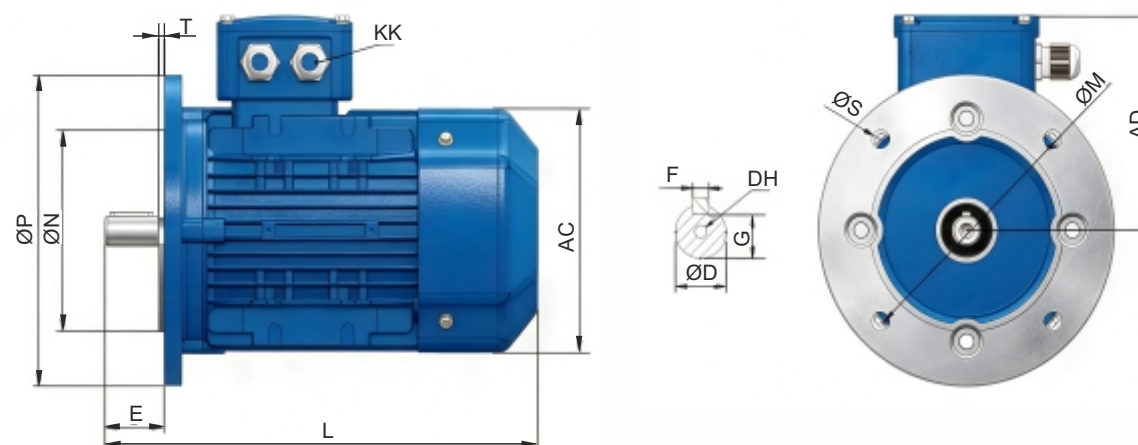
**FRAME WITHOUT FEET  
AND END-SHIELD WITH  
FLANGE (IM B14)**

**63-132 Aluminium**



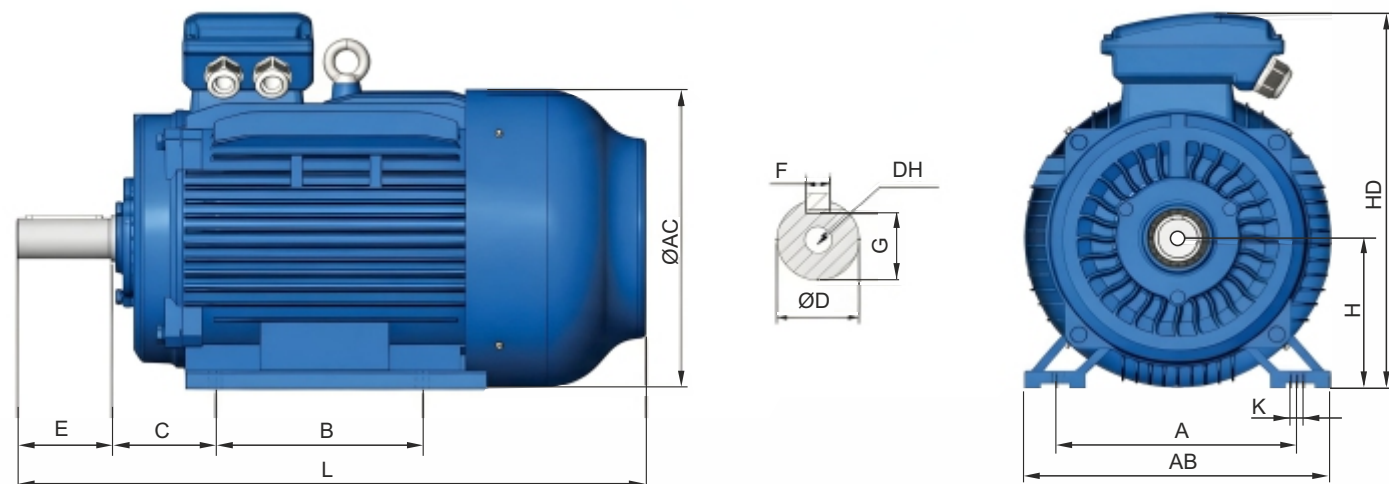
**FRAME WITHOUT FEET  
AND END-SHIELD WITH  
FLANGE (IM B5)**

**63-132 Aluminium**



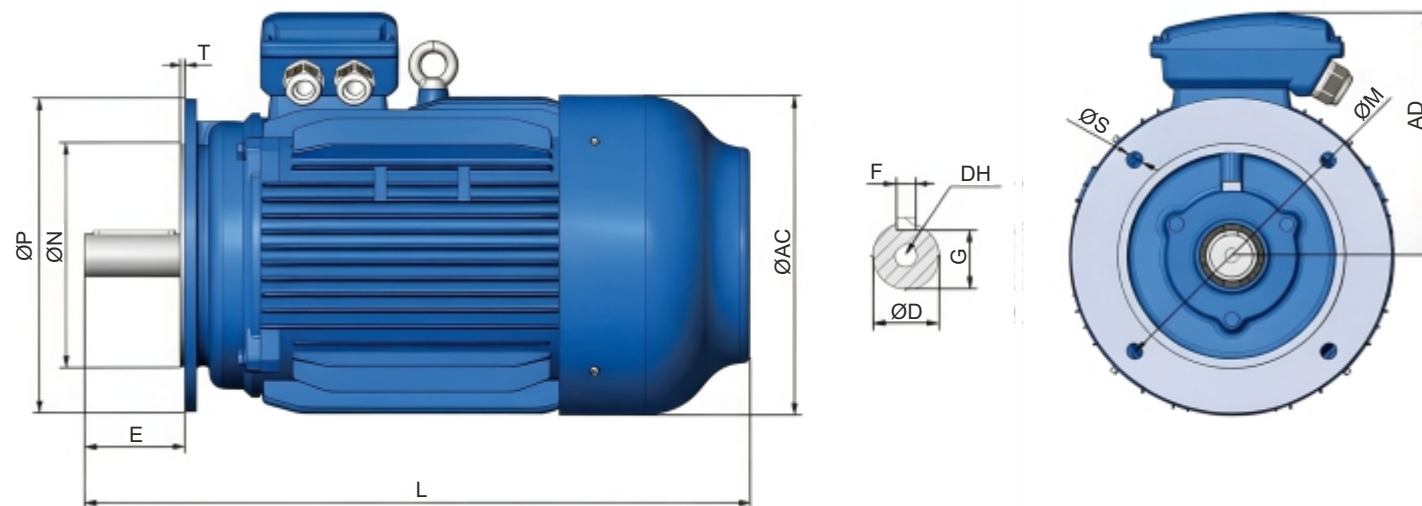
**FRAME WITH FEET AND  
END-SHIELD WITHOUT  
FLANGE (IM B3)**

**160-355 Cast Iron**



**FRAME WITHOUT FEET  
AND END-SHIELD WITH  
FLANGE (M B5)**

**160-355 Cast Iron**



## REVVO ATDC / AT24

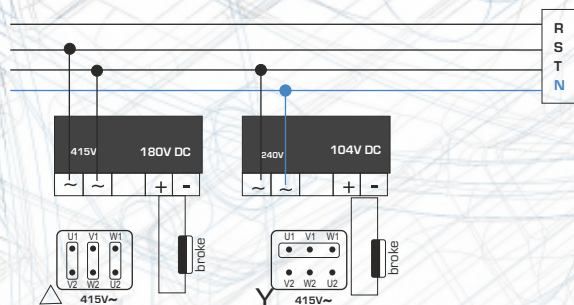
Revvo AT..... series self-braking motors use spring pressure brakes, firmly spliced on to a cast iron shield fixed on to the non-driving end of the motor.

These motors include following features as standard unlike other brands which consider these features as optional:  
**The hand release lever** : permits the release the brake, making it possible to rotate the shaft.  
**The brake can be energized by connecting** the supply to its terminals which are located inside the motor terminal box.  
**3 PTCS, one per phase**, duly connected in series, This is a standard feature from frame size 160 and onwards.

Rotomotive also offer PTO thermal protection on request.To enable automatic switching of power cooling fan the PTO can have as NO contact.

Revvo ATDC series motors use DC brakes power supplied by a rectifier installed inside the motor main terminal box. Unless there is a different request of the client, Rotomotive supplies ATDC rake motors with the rectifier already connected to the main terminal block of the motor, in order to permit to the motor switching to act as the same time on the brake.

In case that the motor is power supplied by a frequency inverter, or in case that the motor is used to move loads which can have an inertial movement, like lifted weights (such inertial movement can move the motor when the power is switched off, and the motor can act like a generator on the rectifier avoiding brake locking), disconnect the motor main terminal board from the rectifier, and connect separately the rectifier (ATDC).



Revvo AT24 series motors use DC electromagnetic brakes with 24V DC input type which can be operated through an inverter (usually having 24Vdc port.) Brake coil insulation class H & brake lining is asbestos-free.The rectifier is MOSFET type, with protection varistors at the entry and exit. All brake assemblies are protected against corrosion by painting or hot galvanizing and resin impregnated winding. The parts most subject to wear are treated in special atmospheres that provided considerable wear resistance to the parts.

The performance of all brakes, in terms of Watt, Nm and time in Sec are shown in table given below

| EC Type | ATDC                           |                            |                                  |                               |               | AT24                           |                                |                            |               | Extra Kg on Std |
|---------|--------------------------------|----------------------------|----------------------------------|-------------------------------|---------------|--------------------------------|--------------------------------|----------------------------|---------------|-----------------|
|         | Static max braking torque [Nm] | Braking time no-load [Sec] | Input voltage on rectifier [Vac] | Output voltage to brake [Vdc] | Brake power W | Static max braking torque [Nm] | Static min braking torque [Nm] | Braking time no-load [Sec] | Brake power W |                 |
| AT..63  | 4,5                            | 0,15                       | 240                              | 104                           | 22            | 7,0                            | 4,5                            | 0,06                       | 20            | +4              |
| AT..71  | 8,0                            | 0,15                       | 240                              | 104                           | 28            | 7,0                            | 4,5                            | 0,06                       | 20            | +5              |
| AT..80  | 12,5                           | 0,20                       | 240                              | 104                           | 30            | 14,0                           | 9,5                            | 0,09                       | 25            | +5,5            |
| AT..90  | 25,0                           | 0,25                       | 240                              | 104                           | 45            | 24,0                           | 12,0                           | 0,11                       | 30            | +6              |
| AT..100 | 38,0                           | 0,30                       | 240                              | 104                           | 60            | 60,0                           | 28,0                           | 0,14                       | 45            | +7              |
| AT..112 | 70,0                           | 0,35                       | 415                              | 180                           | 65            | 80,0                           | 60,0                           | 0,15                       | 65            | +10             |
| AT..132 | 140,0                          | 0,40                       | 415                              | 180                           | 88            | 120,0                          | 110,0                          | 0,16                       | 85            | +12             |
| AT..160 | 210,0                          | 0,50                       | 415                              | 180                           | 110           | 160,0                          | 130,0                          | 0,21                       | 105           | +22             |

## REVVO ATAC

Revvo ATAC series self-braking motors use brake similar in working with DC electromagnetic type but operated on AC power supply. As these brakes are operated on AC supply, no need of rectifier.

The torque value offered for ATAC series motors are as under.

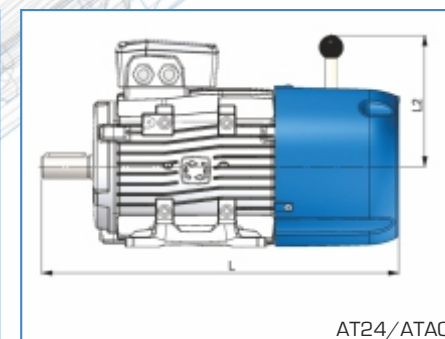
| Type    | Static Braking Torque Nm | Input Power W | Input Voltage to brake Vac | extra Kg on std. |
|---------|--------------------------|---------------|----------------------------|------------------|
| ATAC63  | 4,5                      | 40            | 415                        | 4,2              |
| ATAC71  | 8                        | 70            | 415                        | 5,2              |
| ATAC80  | 12                       | 85            | 415                        | 5,8              |
| ATAC90  | 16                       | 120           | 415                        | 6,3              |
| ATAC100 | 45                       | 160           | 415                        | 7,4              |
| ATAC112 | 70                       | 300           | 415                        | 10,6             |
| ATAC132 | 140                      | 500           | 415                        | 13               |

## Dimensions ATDC / AT24 / ATAC

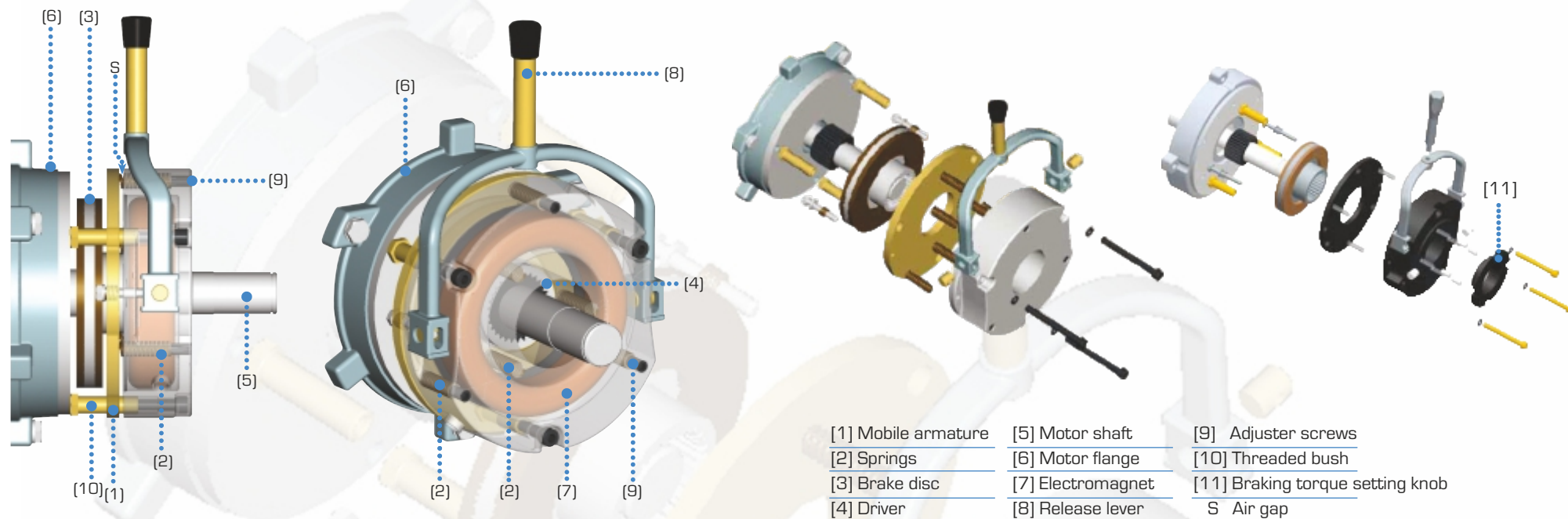
| Type | ATDC/AT24 |         |     | ATAC    |         |     |
|------|-----------|---------|-----|---------|---------|-----|
|      | L (IE2)   | L (IE3) | L2  | L (IE2) | L (IE3) | L2  |
| 63   | 275       | -       | 120 | 300     | -       | 105 |
| 71   | 300       | -       | 130 | 334     | -       | 115 |
| 80   | 340       | -       | 140 | 360     | -       | 140 |
| 90S  | 385       | 405     | 140 | 387     | 407     | 163 |
| 90L  | 410       | 430     | 140 | 412     | 432     | 163 |
| 100L | 445       | 465     | 165 | 474     | 494     | 194 |
| 112M | 472       | 492     | 174 | 494     | 514     | 203 |
| 132S | 550       | 570     | 214 | 577     | 597     | 230 |
| 132M | 590       | 610     | 214 | 615     | 635     | 230 |
| 160M | 715       | 735     | 220 | -       | -       | -   |
| 160L | 760       | 780     | 220 | -       | -       | -   |



ATDC



AT24/ATAC



- |                     |                   |                                  |
|---------------------|-------------------|----------------------------------|
| [1] Mobile armature | [5] Motor shaft   | [9] Adjuster screws              |
| [2] Springs         | [6] Motor flange  | [10] Threaded bush               |
| [3] Brake disc      | [7] Electromagnet | [11] Braking torque setting knob |
| [4] Driver          | [8] Release lever | S Air gap                        |

## BRAKE DESCRIPTION

The brakes used in Rewo ATDC, AT24 and ATAC series are of electromagnetic type and normally OFF i.e. the braking action occurs in the absence of power supply. The brake insulation class is F.

The brake lining is asbestos free as per most recent EEC Directives pertaining to Workplace Hygiene and Safety.

All brake assemblies are protected against corrosion by painting or heat galvanizing and resined winding. The parts most subjected to wear are specially treated to ensure they become wear resistance.

## BRAKE OPERATION

When the power supply is interrupted the excitation coil (7) is no longer powered and therefore doesn't exert the magnetic force necessary to restrain the mobile armature (1) which, pushed by the pressure springs (2) compresses the brake disk (3) against the motor flange (6) on one side and the armature itself on the other thereby creating a braking action.

## ADJUSTMENT

Two different types of adjustment are possible.

### S air gap adjustment

For proper operation the air gap S between electromagnet (7) and the mobile armature (1) must be between the following indicated limits.

| MOTOR TYPE<br>[ATDC/AT24] | S AIR GAP<br>[mm] | MOTOR TYPE<br>[ATAC] | S AIR GAP<br>[mm] |
|---------------------------|-------------------|----------------------|-------------------|
| 63 -71                    | 0.40-0.50         | 63 -90               | 0.2               |
| 80 -160                   | 0.50-0.60         | 100-132              | 0.3               |

The adjustment is made by using the threaded bushes (10) and using a thickness gauge to ensure that the required air gap is maintained.

### Braking Torque Adjustment

The braking torque is set to its maximum value by Rotomotive. But it can be decreased by acting on the adjuster screws (9) [ATDC/ ATAC motor] or on the knob (11) [AT24 motor]

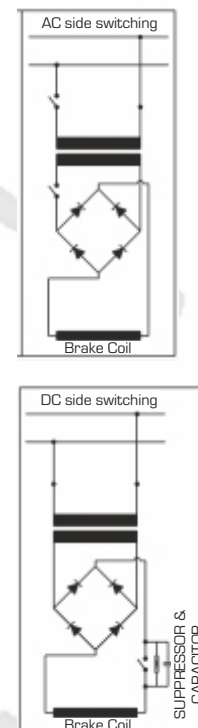
## SWITCHING (ATDC)

Two type of switching possible for brake coils operated with DC voltage, one is AC side switching and another is DC side switching.

Generally when braking time is not critical AC side switching is done. AC side switching is often used with brake motors, where brake is connected with motor's main terminal block. Due to the inductance of the brake coil, engagement time can be 3 to 6 times longer than with DC switching. Therefore this arrangement is not suitable for hoist applications.

DC side switching is necessary when there is motor subjected to inertial movement, like lifted weights such as hoist, lifts and cranes, a brake motor regenerate the supply upto some extent and hold off the brake. DC side switching requires provision of universal spark suppressor and capacitor to protect the coil and switches against inductive voltage.

Rotomotive supply rectifier of Mosfet type, with protection varistors at the entry and the exit.





**Revo CR series motors** are compact asynchronous squirrel cage induction motors specially designed for use in cranes and hoists. They can also be used for other applications like material handling, weirs and sluices and lifts of all types. These motors can serve as auxiliary motors in rolling mills or wherever intermittent drives are required.



These motors are typically in one frame size lower than S1 duty motors and are of S3/S4/S5 duty, developing high starting torque with low starting current. The Motors are suitable for frequent starts/stops and reversals and conform to IS:325 for three phase induction motors and IS:4722 for rotating electrical Machines as well as IEC-34.1. These motors are available in frame sizes from 71 to 160 in 4 or 6 poles.



#### Enclosures, Cooling, Mounting and Supply conditions :

The enclosures, cooling, mounting and voltage supply conditions and tolerances are similar to Revo Series IE2/IE3 motors.



#### Types of Intermittent Duty Ratings :

The basis of these ratings is that of thermal capability, taking into account:

- Frequency of starting (starting class).
- Percentage of time during each operating cycle the motor is energized, (CDF- Cyclic duration factor).
- The number and type of operating cycles per hour, (duty class).
- And the inertia of the motor and the load.



#### Motors with Integral Brakes:

These motors can be supplied with integral fail safe D.C. Brakes, with built in rectifiers. Brakes of 24 Volts for direct use with VFD drives are also available.

For braking torque values, refer to the section on Brake motors.



#### Definitions :

The terms used frequently in intermittent duty drive and hoisting are as bellow :

##### 1. Cyclic duration factor : (CDF)

The ratio between the period of loading including starting and electric braking and the total duration of the duty-cycle expressed as a percentage.

##### 2. Jogging or inching :

This is an incomplete start during which the motor does not attain more than 25% of the rated speed.

##### 3. Electric braking :

A system in which a braking action is applied to an electric motor by causing it to act as a generator

##### 4. D.C. Injection braking :

A form of braking of an induction motor in which a separate dc supply is used to magnetize the motor.

##### 5. Plug braking :

A form of electric braking of an induction motor obtained by reversing the phase sequence of its any two lines.

##### 6. Regenerative braking :

A system of electric braking in which energy is returned to the supply system.

##### Duty type :

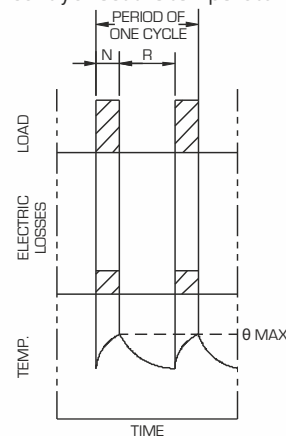
Crane duty applications can be classified into duty types S3 to S5



#### Intermittent periodic duty

##### Duty type S3 :

A sequence of identical duty cycle, each including a period of operation at constant load and a rest & de-energized period. These periods being too short to attain thermal equilibrium during one duty cycle. In this duty type, the starting current does not significantly affect the temperature rise.



$\theta_{MAX}$  = MAX. TEMP. ATTAINED DURING DUTY CYCLE

N = OPERATION AT CONSTANT LOAD

R = AT REST & DE - ENERGISED

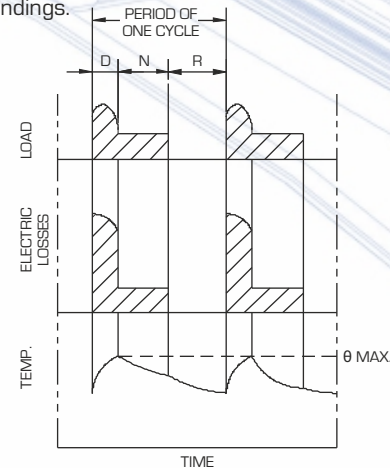
$$\text{CYCLIC DURATION FACTOR} = \frac{N}{N+R} \times 100\%$$



#### Intermittent periodic duty with starting

**Duty type S4 :**  
A sequence of identical duty cycles, each cycle including a significant period of starting. A period of operation at constant load and a rest de-energized period. These period being too short to attain thermal equilibrium during one duty cycle.

In this duty, the stopping of the motor is obtained either by natural de-acceleration after disconnection of the supply or by means of braking such as a mechanical brake which does not cause additional heating of the windings.



$\theta_{MAX}$  = MAX. TEMP. ATTAINED DURING DUTY CYCLE

N = OPERATION AT CONSTANT LOAD

R = AT REST & DE - ENERGISED

D = STARTING TIME

$$\text{CYCLIC DURATION FACTOR} = \frac{D+N}{D+N+R} \times 100\%$$

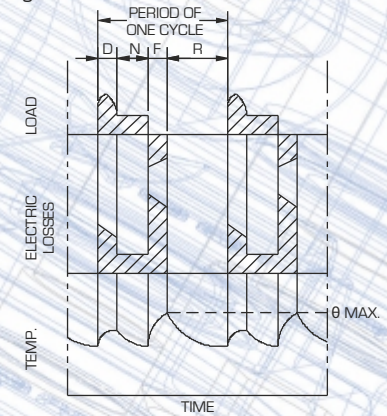


#### Intermittent periodic duty with starting and braking

##### Duty type : S5

A sequence of identical duty cycles, each cycle consisting of a period of starting, a period of operation at constant load, a period of rapid electric braking and rest and de-energized period. The operating and rest and de-energized periods being too short, to attain thermal equilibrium during one duty cycle.

**Note :** In all above type of duties, the loading period and rest period of the cycle are so short that the steady state temperature is not reached. While working on these identical cycles continuously, the motor temperature rise must not exceed the permissible values for a given class of insulation.



$\theta_{MAX}$  = MAX. TEMP. ATTAINED DURING DUTY CYCLE

N = OPERATING AT CONSTANT LOAD

R = AT REST & DE - ENERGISED

D = STARTING TIME

F = ELECTRIC BRAKING

$$\text{CYCLIC DURATION FACTOR} = \frac{D+N+F}{D+N+F+R} \times 100\%$$

The common cyclic duration factors (CDF) for the duties S3, S4 and S5 are 25%, 40%, and 60%. Motors with CDFs other than these values can also be supplied on request.



#### How to select motors for hoisting and similar duties.

The formula to establish the rated  $P_n$  in Kw

$$P_n > \frac{FXV}{102 \times \text{Eff}} \text{ Kw}$$

Where F = Maximum load in Kg.

V = Hoisting speed in mtr/sec

Eff. = Overall mechanical efficiency of the driving unit.

For Horizontal motion ensure that the rated output  $P_n$  of the motor is greater than the power necessary to move the equipment given by:

$$P_n > \frac{M \times n}{974 \times \text{Eff}} \text{ Kw}$$

Where M = Torque reqd. for movement in Kg.m

n = Motor RPM



## PERFORMANCE CHART

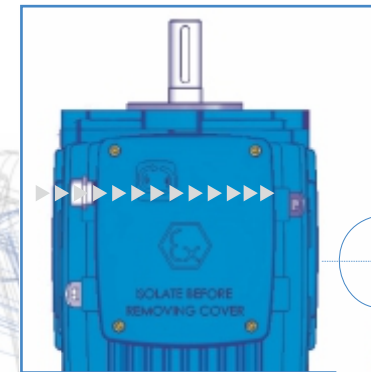
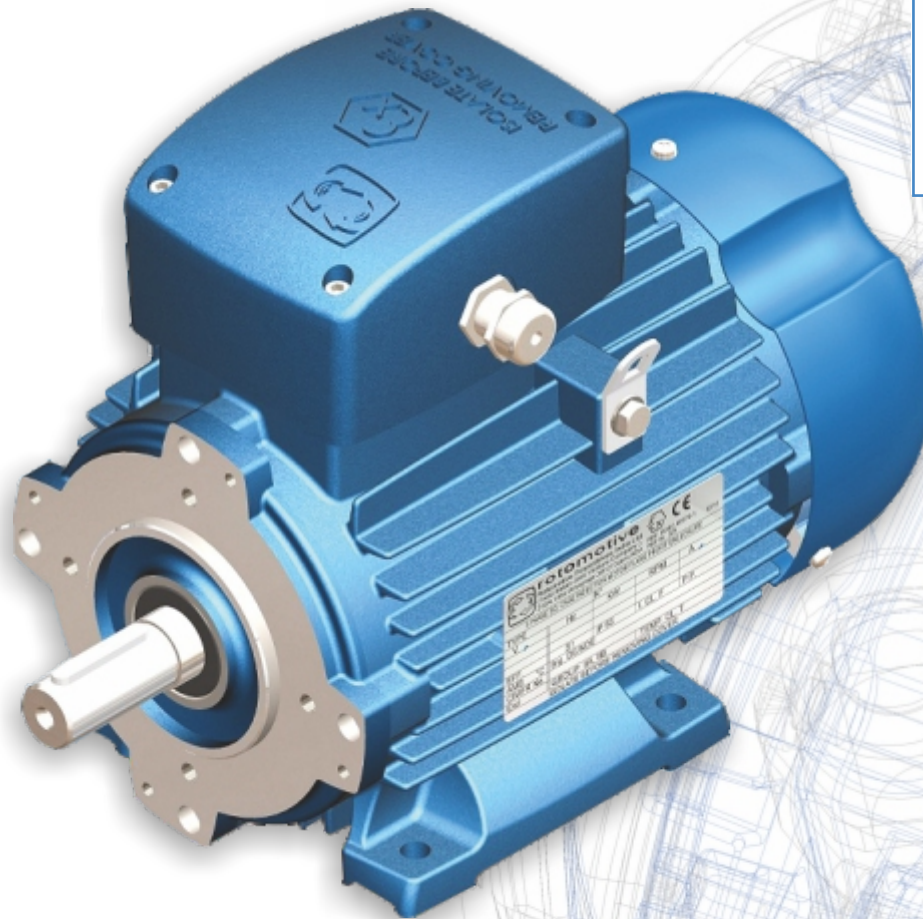
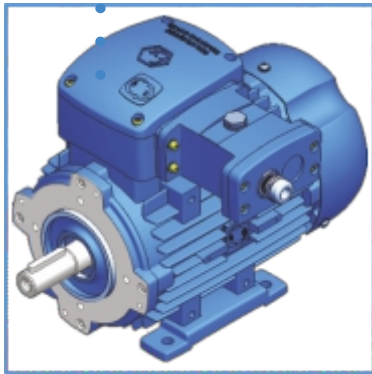
| 4 Pole asynchronous speed 1500 rpm |           |                 |               |              |                | S3 Duty        |      | S4 & S5 Duty |      |                |      |         |      |                |      |         |      |
|------------------------------------|-----------|-----------------|---------------|--------------|----------------|----------------|------|--------------|------|----------------|------|---------|------|----------------|------|---------|------|
|                                    |           |                 |               |              |                | 60 Starts      |      |              |      | 150 Starts     |      |         |      | 300 Starts     |      |         |      |
| Type                               | Rated RPM | Current [Is/In] | Torque Cn(Nm) | Torque Cs/Cn | Torque Cmax/Cn | 25% OR 40% CDF |      | 60% CDF      |      | 25% OR 40% CDF |      | 60% CDF |      | 25% OR 40% CDF |      | 60% CDF |      |
|                                    |           |                 |               |              |                | Rated          |      | Rated        |      | Rated          |      | Rated   |      | Rated          |      | Rated   |      |
|                                    |           |                 |               |              |                | KW             | Amp  | KW           | Amp  | KW             | Amp  | KW      | Amp  | KW             | Amp  | KW      | Amp  |
| 71                                 | 1315      | 3.7             | 4.00          | 2.3          | 2.8            | 0.55           | 1.55 | 0.55         | 1.55 | 0.55           | 1.55 | 0.55    | 1.55 | 0.55           | 1.55 | 0.55    | 1.55 |
| 80                                 | 1385      | 4.5             | 5.20          | 2.3          | 2.8            | 0.75           | 1.9  | 0.75         | 1.9  | 0.75           | 1.9  | 0.75    | 1.9  | 0.75           | 1.9  | 0.75    | 1.9  |
| 80                                 | 1385      | 4.5             | 7.60          | 2.8          | 3.0            | 1.1            | 2.8  | 1.1          | 2.8  | 1.1            | 2.8  | 1.1     | 2.8  | 1.1            | 2.8  | 1.1     | 2.8  |
| 90S                                | 1400      | 4.7             | 10.20         | 2.3          | 2.8            | 1.5            | 3.7  | 1.5          | 3.7  | 1.5            | 3.7  | 1.5     | 3.7  | 1.5            | 3.7  | 1.5     | 3.7  |
| 90L                                | 1380      | 5.2             | 15.30         | 2.7          | 3.2            | 2.2            | 4.95 | 2.2          | 4.95 | 2.2            | 4.95 | 2.2     | 4.95 | 2.2            | 4.95 | 2.2     | 4.95 |
| 100L                               | 1380      | 6.0             | 25.60         | 2.7          | 3.2            | 3.7            | 8.0  | 3.7          | 8.0  | 3.7            | 8.0  | 3.7     | 8.0  | 3.7            | 8.0  | 3.7     | 8.0  |
| 112M                               | 1425      | 6.0             | 36.90         | 2.6          | 3.0            | 5.5            | 11.6 | 5.5          | 11.6 | 5.5            | 11.6 | 5.5     | 11.6 | 5.5            | 11.6 | 5.5     | 11.6 |
| 132S                               | 1410      | 6.0             | 50.80         | 2.5          | 3.0            | 7.5            | 15.5 | 7.5          | 15.5 | 7.5            | 15.5 | 7.5     | 15.5 | 7.5            | 15.5 | 7.5     | 15.5 |
| 132M                               | 1440      | 6.5             | 61.60         | 2.7          | 3.0            | 9.3            | 18.0 | 9.3          | 18.0 | 9.3            | 18.0 | 9.3     | 18.0 | 9.3            | 18.0 | 9.3     | 18.0 |
| 160M                               | 1450      | 6.0             | 72.44         | 2.25         | 2.7            | 11             | 22.0 | 11           | 22.0 | 11             | 22.0 | 11      | 22.0 | 11             | 22.0 | 11      | 22.0 |
| 160M                               | 1430      | 6.0             | 100.17        | 2.3          | 2.7            | 15             | 30.5 | 15           | 30.5 | 15             | 30.5 | 15      | 30.5 | 15             | 30.5 | 15      | 30.5 |
| 160L                               | 1440      | 6.5             | 122.68        | 2.5          | 3.0            | 18.5           | 36.0 | 18.5         | 36.0 | 18.5           | 36.0 | 18.5    | 36.0 | 18.5           | 36.0 | 18.5    | 36.0 |

| 6 Pole asynchronous speed 1000 rpm |           |                 |               |              |                | S3 Duty        |      | S4 & S5 Duty |      |                |      |         |      |                |      |         |      |
|------------------------------------|-----------|-----------------|---------------|--------------|----------------|----------------|------|--------------|------|----------------|------|---------|------|----------------|------|---------|------|
|                                    |           |                 |               |              |                | 60 Starts      |      |              |      | 150 Starts     |      |         |      | 300 Starts     |      |         |      |
| Type                               | Rated RPM | Current [Is/In] | Torque Cn(Nm) | Torque Cs/Cn | Torque Cmax/Cn | 25% OR 40% CDF |      | 60% CDF      |      | 25% OR 40% CDF |      | 60% CDF |      | 25% OR 40% CDF |      | 60% CDF |      |
|                                    |           |                 |               |              |                | Rated          |      | Rated        |      | Rated          |      | Rated   |      | Rated          |      | Rated   |      |
|                                    |           |                 |               |              |                | KW             | Amp  | KW           | Amp  | KW             | Amp  | KW      | Amp  | KW             | Amp  | KW      | Amp  |
| 71                                 | 870       | 3.0             | 4.00          | 2.3          | 2.6            | 0.37           | 1.4  | 0.37         | 1.4  | 0.37           | 1.4  | 0.37    | 1.4  | 0.37           | 1.4  | 0.37    | 1.4  |
| 80                                 | 900       | 4.0             | 5.84          | 2.3          | 2.6            | 0.55           | 1.55 | 0.55         | 1.55 | 0.55           | 1.55 | 0.55    | 1.55 | 0.55           | 1.55 | 0.55    | 1.55 |
| 80                                 | 885       | 4.0             | 8.10          | 2.3          | 2.6            | 0.75           | 2.4  | 0.75         | 2.4  | 0.75           | 2.4  | 0.75    | 2.4  | 0.75           | 2.4  | 0.75    | 2.4  |
| 90S                                | 910       | 4.0             | 11.55         | 2.3          | 2.6            | 1.1            | 2.9  | 1.1          | 2.9  | 1.1            | 2.9  | 1.1     | 2.9  | 1.1            | 2.9  | 1.1     | 2.9  |
| 90L                                | 895       | 4.5             | 16.00         | 2.3          | 2.8            | 1.5            | 4.2  | 1.5          | 4.2  | 1.5            | 4.2  | 1.5     | 4.2  | 1.5            | 4.2  | 1.5     | 4.2  |
| 100L                               | 925       | 4.5             | 22.70         | 2.3          | 2.8            | 2.2            | 6.4  | 2.2          | 6.4  | 2.2            | 6.4  | 2.2     | 6.4  | 2.2            | 6.4  | 2.2     | 6.4  |
| 112M                               | 925       | 4.6             | 38.20         | 2.3          | 2.8            | 3.7            | 8.9  | 3.7          | 8.9  | 3.7            | 8.9  | 3.7     | 8.9  | 3.7            | 8.9  | 3.7     | 8.9  |
| 132S                               | 930       | 6.0             | 56.50         | 2.3          | 2.8            | 5.5            | 14.2 | 5.5          | 14.2 | 5.5            | 14.2 | 5.5     | 14.2 | 5.5            | 14.2 | 5.5     | 14.2 |
| 132M                               | 930       | 6.0             | 77.00         | 2.3          | 2.8            | 7.5            | 18.0 | 7.5          | 18.0 | 7.5            | 18.0 | 7.5     | 18.0 | 7.5            | 18.0 | 7.5     | 18.0 |
| 160M                               | 950       | 6.0             | 93.48         | 2.3          | 2.7            | 9.3            | 20.0 | 9.3          | 20.0 | 9.3            | 20.0 | 9.3     | 20.0 | 9.3            | 20.0 | 9.3     | 20.0 |
| 160L                               | 960       | 6.0             | 109.42        | 2.3          | 2.7            | 11             | 24.0 | 11           | 24.0 | 11             | 24.0 | 11      | 24.0 | 11             | 24.0 | 11      | 24.0 |
| 160L                               | 950       | 6.5             | 150.78        | 2.3          | 2.6            | 15             | 33.0 | 15           | 33.0 | 15             | 33.0 | 15      | 33.0 | 15             | 33.0 | 15      | 33.0 |

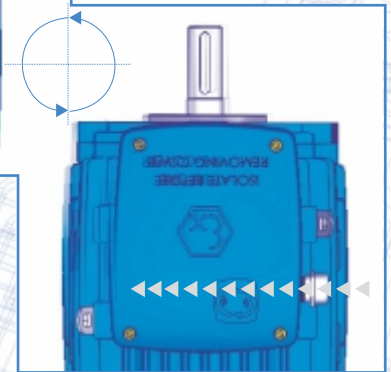
• All performance are declared at rated voltage 415 & Frequency 50Hz and are subjected to tolerances as per IS:12615. For dimensions refer chart on page no: 18 - 19

IE 1

IE 2



The terminal box can be rotated at every 180° steps.



Epoxy paint



Upto 132 frame convertibility from B3 construction to B35 or B34 without dismantling the drive end cover.

- The use of electrical motors in potentially explosive atmospheres is quite frequent these days. These motors must be constructed in a manner to contain the spark within the enclosure in event of any explosion within the body/enclosure of the motor. An Explosion occurs when the following situations occur:
- i) Presence of potentially explosive atmosphere
  - ii) Existence of a source of ignition
  - iii) Possibility of transmission of the explosion

**Revvo Exd series** asynchronous 3 Phase squirrel cage induction motors are manufactured as per IS/IEC 60079-1:2007 for operation in hazardous locations classified as zone 1 and zone 2 areas as per IS:5572. These motors are available in frame sizes of 80 to 160 in 2, 4, 6 and 8 pole ratings. For specifications and performance parameters, refer to tables on page 10-13. The motor enclosure has been designed in a way to prevent the transmission of internal explosion to the explosive atmosphere surrounding the machine. The enclosure is designed to with stand, without damage, any pressure levels caused by an internal explosion. Care has been taken to ensure the shape, length and gap of assembly joints, at shaft opening, cable entries, etc are suitable for throttling and cooling of hot gases before they escape outside.

**Classification of Hazardous Environment :**  
According to IS: 5572, Hazardous area are classified in the following ways depending on the probability of the presence of hazardous atmosphere.

**Zone :** Criteria presence of gas  
Zone 1 Present in normal operations  
Zone 2 Unlikely, but if present, only for a short time

**Application Groups :**  
Depending on the intended use, explosion-proof electrical operating equipment is divided into two major groups:

- Group I Equipment for coal mines (Only specially designed motors for mines can be use)
- Group II Electrical equipment for use other than mines (surface industry)

Group II Motors with flameproof enclosures are further divided into gas groups :

- II A Propane
- II B Ethylene

**Temperature Classes :**  
Combustible gas of Vapour and explosion-protected electrical equipments are divided into temperature of the gas T4 to T6 with regard to the ignition temperature of the gas or vapour and the maximum surface temperature of the component. Revvo Exd series motors are suitable for Temperature class T4, T5 and T6.

| Temperature class | Maximum permitted surface Temperature of electrical equipment °C |
|-------------------|------------------------------------------------------------------|
| T4                | 135                                                              |
| T5                | 100                                                              |
| T6                | 85                                                               |

**Zone 2**

Abnormal Conditions

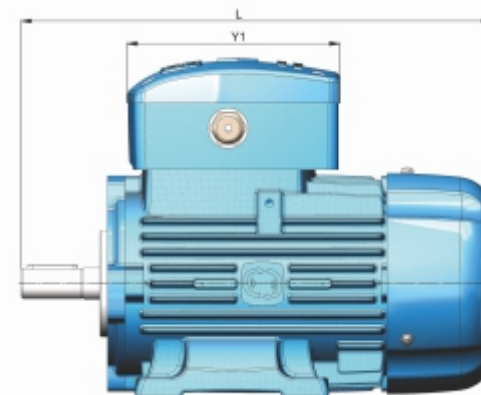
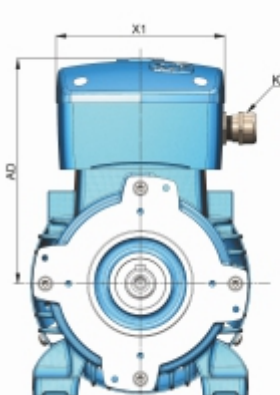
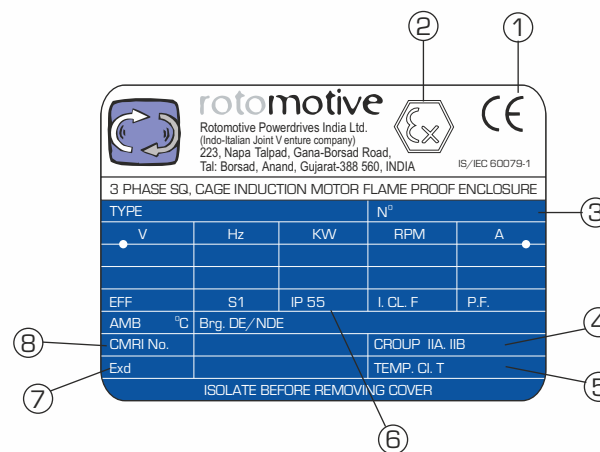
Presence of explosive atmosphere only by accident, but not during normal duty (< 10 H per year)

**Zone 1**

Occasionally

Incidental Presence of explosive atmosphere during normal duty (10-1000 H per year)

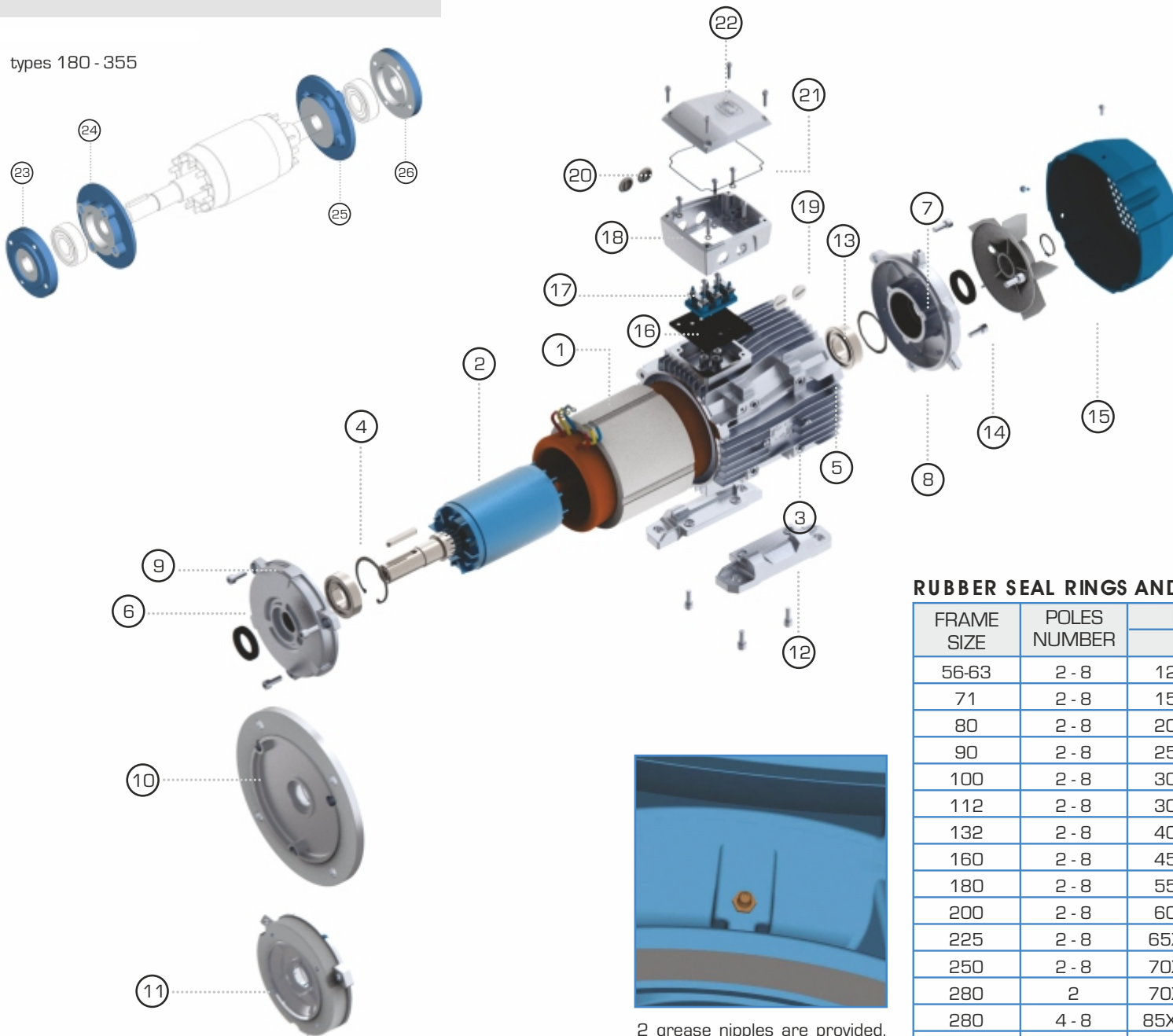
**Description of the marking on motor Nameplate :**



| FRAME  | L   | AD  | X1  | Y1  | KK  |
|--------|-----|-----|-----|-----|-----|
| Ex80   | 315 | 160 | 100 | 138 | M20 |
| Ex90   | 380 | 180 | 133 | 170 | M20 |
| Ex100  | 410 | 195 | 133 | 170 | M20 |
| Ex112  | 430 | 216 | 158 | 190 | M25 |
| Ex132M | 495 | 236 | 158 | 190 | M32 |
| Ex160M | 605 | 310 | 185 | 208 | M40 |
| Ex160L | 650 | 310 | 185 | 208 | M40 |

## COMPONENTS LIST

types 180 - 355



| Sr. No. | Description                      |
|---------|----------------------------------|
| 1       | Wound stator with motor body     |
| 2       | Diecast rotor with shaft         |
| 3       | Name plate                       |
| 4       | Bearing (DE side)                |
| 5       | Bearing (NDE side)               |
| 6       | Oil seal                         |
| 7       | V seal                           |
| 8       | NDE cover                        |
| 9       | DE cover                         |
| 10      | B5 flange                        |
| 11      | B14 flange                       |
| 12      | Foot                             |
| 13      | Wave washer                      |
| 14      | Fan                              |
| 15      | Fan cover (cowl)                 |
| 16      | Rubber gasket                    |
| 17      | Terminal block                   |
| 18      | Terminal box                     |
| 19      | Cable gland                      |
| 20      | Plug                             |
| 21      | O ring                           |
| 22      | Terminal box cover               |
| 23      | Outside bearing cover (DE side)  |
| 24      | Inside bearing cover (DE side)   |
| 25      | Inside bearing cover (NDE side)  |
| 26      | Outside bearing cover (NDE side) |

### RUBBER SEAL RINGS AND BEARINGS

| FRAME SIZE | POLES NUMBER | RUBBER SEAL RING |            | BEARINGS |         |
|------------|--------------|------------------|------------|----------|---------|
|            |              | 6                | 7          | 4        | 5       |
| 56-63      | 2 - 8        | 12X25X7          | 12X25X7    | 6201 ZZ  | 6201 ZZ |
| 71         | 2 - 8        | 15X30X7          | 15X30X7    | 6202 ZZ  | 6202 ZZ |
| 80         | 2 - 8        | 20X35X7          | 20X35X7    | 6204 ZZ  | 6204 ZZ |
| 90         | 2 - 8        | 25X40X7          | 25X40X7    | 6205 ZZ  | 6205 ZZ |
| 100        | 2 - 8        | 30X47X7          | 30X47X7    | 6206 ZZ  | 6206 ZZ |
| 112        | 2 - 8        | 30X47X7          | 30X47X7    | 6206 ZZ  | 6206 ZZ |
| 132        | 2 - 8        | 40X62X7          | 40X62X7    | 6208 ZZ  | 6208 ZZ |
| 160        | 2 - 8        | 45X62X8          | 45X62X8    | 6309 ZZ  | 6309 ZZ |
| 180        | 2 - 8        | 55X72X8          | 55X72X8    | 6311-C3  | 6311-C3 |
| 200        | 2 - 8        | 60X80X8          | 60X80X8    | 6312-C3  | 6312-C3 |
| 225        | 2 - 8        | 65X80X10         | 65X80X10   | 6313-C3  | 6313-C3 |
| 250        | 2 - 8        | 70X90X10         | 70X90X10   | 6314-C3  | 6314-C3 |
| 280        | 2            | 70X90X10         | 70X90X10   | 6314-C3  | 6314-C3 |
| 280        | 4 - 8        | 85X100X12        | 85X100X12  | 6317-C3  | 6317-C3 |
| 315        | 2            | 85X110X12        | 85X110X12  | 6317-C3  | 6317-C3 |
| 315        | 4 - 8        | 95X120X12        | 95X120X12  | NU319-C3 | 6319-C3 |
| 355        | 2            | 95X120X12        | 95X120X12  | 6319-C3  | 6319-C3 |
| 355        | 4 - 8        | 110X130X12       | 110X130X12 | NU322-C3 | 6322-C3 |

We recommend the use of SKF shielded bearings with LHT23 grease suitable for -40°C to +140°C.

2 grease nipples are provided, one on each end-cover from frame size 180 and up. Other motors till frame size 160 have shielded bearings, pre-lubricated for life.



### Introduction of Permanent magnet synchronous motor

The Permanent Magnet Synchronous Motor (PMSM) is an AC synchronous motor whose field excitation is provided by permanent magnets, and has a sinusoidal back EMF waveform. The PMSM is a cross between an induction motor and brushless DC motor. Like a brushless DC motor, it has a permanent magnet rotor and windings on the stator. However, the stator structure with windings constructed to produce a sinusoidal flux density in the air gap of the machine resembles that of an induction motor. Its power density is higher than induction motors with the same ratings since there is no stator power dedicated to magnetic field production. With permanent magnets the PMSM can generate torque at zero speed, it requires digitally controlled inverter for operations. PMSM are typically used for high-performance and high-efficiency (IE5) motor drives. High-performance motor control is characterized by smooth rotation over the entire speed range of the motor, full torque control at zero speed, and fast acceleration and deceleration



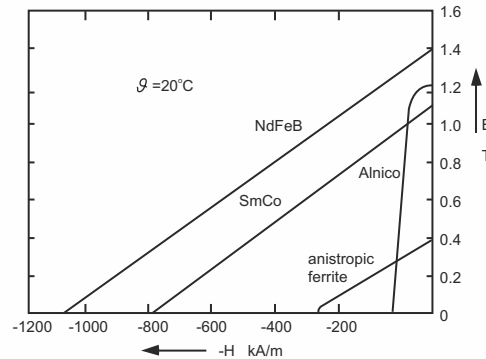
### Properties of permanent magnets

There are three classes of PMs currently used for electric motors:

- Alnicos [Al, Ni, Co, Fe];
- Ceramics (ferrites), e.g., barium ferrite  $\text{BaO} \times 6\text{Fe}_2\text{O}_3$  and strontium ferrite  $\text{SrO} \times 6\text{Fe}_2\text{O}_3$
- Rare-earth materials, i.e., samarium-cobalt  $\text{SmCo}$  and neodymium-iron-boro  $\text{NdFeB}$ .

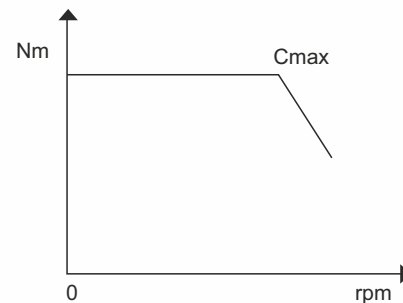
Demagnetization curves of the above PM materials are given in Figure 1.

The latest grades of  $\text{NdFeB}$  have a higher remanent magnetic flux density and better thermal stability. Metallic or resin coating is employed to improve resistance to corrosion.



### Pull out Torque

$C_{max}$  is the maximum torque developed by the motor at the Rated power supply at a certain speed represents also the value of the stall torque/pull out torque after which the motor stops. In the following performance charts, it is indicated the relation between maximum torque and rated torque and maximum torque [ $C_{max}/C_n$ ]



### Connection

PMSM motors are connected in STAR only. For connection details please refer page 8 - Star connection



### Interior-type PM motors

The interior-magnet rotor has radially magnetized and alternately poled magnets. Because the magnet pole area is smaller than the pole area at the rotor surface, the air gap flux density on open circuit is less than the flux density in the magnet. The synchronous reactance in d-axis is smaller than that in q-axis since the q-axis magnetic flux can pass through the steel pole pieces without crossing the PMs. The magnet is very well protected against centrifugal forces. Such a design is recommended for high frequency high speed motors.



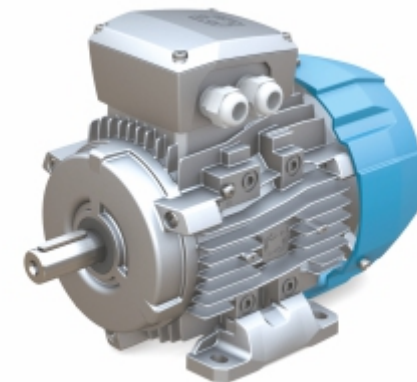
### Advantages of Permanent magnet synchronous motor on Induction motor

- High air gap flux density
- High power-to-weight ratio
- Large torque-to-inertia ratio Smooth torque operation (also at low speeds)
- Accurate torque control at zero speed



### Permanent magnet synchronous motors must operate with a drive

AC induction motors can be used without a VFD to drive a pump or fan, but are often installed with variable frequency drives (VFD) in pump systems or fan systems in an effort to improve system efficiency. Permanent magnet synchronous motors require a drive to operate. PMSMs cannot run without a drive. A VFD is required to precisely control the speed of the PMSM to meet the application requirements for pressure, flow, volume, etc. Some new VFDs already come with permanent magnet motor control options as a standard feature, allowing operators to control the permanent magnet motor to drive the fan and/or pump more efficiently. We recommended Fuji-ace and Yaskawa A-1000 drives for PMSM for our motor



For dimensions chart refer page 21-22

For performance chart refer page 34-35



## PERFORMANCE CHART

IE5, Ultra premium efficiency 4 Pole Permanent magnet synchronous motor (Induction motor standard frame)

| Power kW | Power HP | Type   | Frame | Speed (rpm) | Current (A) | Torque Cn (Nm) | Torque Cmax/Cn | Efficiency (%) | Power Factor |
|----------|----------|--------|-------|-------------|-------------|----------------|----------------|----------------|--------------|
| 0.55     | 0.75     | 80A-4  | 80    | 1500        | 0.92        | 3.5            | 2.0            | 86.7           | 0.96         |
| 0.75     | 1        | 80B-4  | 80    | 1500        | 1.23        | 4.78           | 2.0            | 88.2           | 0.96         |
| 1.1      | 1.5      | 90S-4  | 90S   | 1500        | 1.78        | 7.01           | 2.0            | 89.5           | 0.96         |
| 1.5      | 2        | 90L-4  | 90L   | 1500        | 2.41        | 9.55           | 2.0            | 90.4           | 0.96         |
| 2.2      | 3        | 100L-4 | 100L  | 1500        | 3.49        | 14.01          | 2.0            | 91.4           | 0.96         |
| 3.7      | 5        | 112M-4 | 112M  | 1500        | 5.80        | 23.57          | 2.0            | 92.6           | 0.96         |
| 5.5      | 7.5      | 132S-4 | 132S  | 1500        | 8.54        | 35.03          | 2.0            | 93.4           | 0.96         |
| 7.5      | 10       | 132M-4 | 132M  | 1500        | 11.58       | 47.77          | 2.0            | 94.0           | 0.96         |
| 11       | 15       | 160M-4 | 160M  | 1500        | 17.01       | 70.06          | 2.0            | 94.6           | 0.96         |
| 15       | 20       | 160L-4 | 160L  | 1500        | 22.88       | 95.54          | 2.0            | 95.1           | 0.96         |
| 18.5     | 25       | 180M-4 | 180M  | 1500        | 28.17       | 117.83         | 2.0            | 95.3           | 0.96         |
| 22       | 30       | 180L-4 | 180L  | 1500        | 33.42       | 140.13         | 2.0            | 95.5           | 0.96         |
| 30       | 40       | 200L-4 | 200L  | 1500        | 45.39       | 191.08         | 2.0            | 95.9           | 0.96         |
| 37       | 50       | 225S-4 | 225S  | 1500        | 55.86       | 235.67         | 2.0            | 96.1           | 0.96         |
| 45       | 60       | 225M-4 | 225M  | 1500        | 67.80       | 286.62         | 2.0            | 96.3           | 0.96         |
| 55       | 75       | 250M-4 | 250M  | 1500        | 82.69       | 350.32         | 2.0            | 96.5           | 0.96         |
| 75       | 100      | 280S-4 | 280S  | 1500        | 112.53      | 477.71         | 2.0            | 96.7           | 0.96         |
| 90       | 120      | 280M-4 | 280M  | 1500        | 134.76      | 573.25         | 2.0            | 96.9           | 0.96         |

• Efficiency is without seals. • All these performance values are declared at rated voltage 415 & frequency 50 Hz and are subjected to tolerances as per IS :12615/IEC 60034



## PERFORMANCE CHART

IE5, Ultra premium efficiency 6 Pole Permanent magnet synchronous motor (Induction motor standard frame)

| Power kW | Power HP | Type    | Frame | Speed (rpm) | Current (A) | Torque Cn (Nm) | Torque Cmax/Cn | Efficiency (%) | Power Factor |
|----------|----------|---------|-------|-------------|-------------|----------------|----------------|----------------|--------------|
| 0.37     | 0.5      | 80A-6   | 80    | 1000        | 0.66        | 3.54           | 2.0            | 81.6           | 0.96         |
| 0.55     | 0.75     | 80B-6   | 80    | 1000        | 0.95        | 5.25           | 2.0            | 84.2           | 0.96         |
| 0.75     | 1        | 90S-6   | 90S   | 1000        | 1.27        | 7.17           | 2.0            | 85.7           | 0.96         |
| 1.1      | 1.5      | 90L-6   | 90L   | 1000        | 1.83        | 10.51          | 2.0            | 87.2           | 0.96         |
| 1.5      | 2        | 100L-6  | 100L  | 1000        | 2.46        | 14.33          | 2.0            | 88.4           | 0.96         |
| 2.2      | 3        | 112M-6  | 112M  | 1000        | 3.56        | 21.02          | 2.0            | 89.7           | 0.96         |
| 3.7      | 5        | 132S-6  | 132S  | 1000        | 5.89        | 35.35          | 2.0            | 91.2           | 0.96         |
| 5.5      | 7.5      | 132M-6  | 132M  | 1000        | 8.65        | 52.55          | 2.0            | 92.2           | 0.96         |
| 7.5      | 10       | 160M-6  | 160M  | 1000        | 11.71       | 71.66          | 2.0            | 92.9           | 0.96         |
| 11       | 15       | 160LB-6 | 160L  | 1000        | 17.03       | 105.1          | 2.0            | 93.7           | 0.96         |
| 15       | 20       | 180L-6  | 180L  | 1000        | 23.03       | 143.31         | 2.0            | 94.3           | 0.96         |
| 18.5     | 25       | 200LA-6 | 200L  | 1000        | 28.37       | 176.75         | 2.0            | 94.6           | 0.96         |
| 22       | 30       | 200L-6  | 200L  | 1000        | 33.63       | 210.19         | 2.0            | 94.9           | 0.96         |
| 30       | 40       | 225M-6  | 225M  | 1000        | 45.67       | 286.62         | 2.0            | 95.3           | 0.96         |

• Efficiency is without seals. • All these performance values are declared at rated voltage 415 & frequency 50 Hz and are subjected to tolerances as per IS :12615/IEC 60034

## **Regional Sales Offices:**

### **Rotomotive Ahmedabad**

Rotomotive Powerdrives India Ltd.  
Regional Office: Shridhar Bunglows  
No.14, Nr. Mansarovar Tenament  
Nr. Arpan School, Nirang Cross Rd.  
PO. Vastral, Ahmedabad - 382 418  
Tel/Fax No: +91-79-29093837  
Cell No.: +91 93746 31145  
E-mail: sales.ahd@rotomotive.com

### **Rotomotive Delhi**

305, 3rd Floor, Nipun Tower,  
Plot no. 15, Karkardooma Community Center,  
Delhi - 110092  
Tel No. : 011447007139  
Cell No. : 93123 54230  
Email : sales.delhi@rotomotive.com

### **Rotomotive Mumbai**

Rotomotive Powerdrives India Ltd.  
303 Swastik Disa Corporate Park,  
Lal Bahadur Shastri Marg,  
Opposite Shreyas Cinema,  
Ghatkopar (W), Mumbai - 4000086  
Cell No.: +91 90237 27849  
E-mail: sales.mum@rotomotive.com

### **Rotomotive Secunderabad**

Rotomotive Powerdrives India Ltd.  
No 6013, VI Floor, Emerald House  
S.D. Road, Secunderabad - 500 003  
Cell No.: 093466 16807  
E-mail: sales.sec@rotomotive.com

### **Rotomotive Bangalore**

Rotomotive Powerdrives India Ltd.  
Asha Chambers, F15, #2 (Old # 33)  
Venkataswamy Raju road, Kumarapark West  
Bangalore - 560020  
Tel:+91-80 - 23465240/23465241  
Fax: +91 - 80 - 4147 9547  
Cell No.: +91 93437 04949 / 93421 61610  
E-mail: sales.blr@rotomotive.com

### **Rotomotive Pune**

Rotomotive Powerdrives India Ltd.  
Plot No 425/77, T.M.V Colony,  
Opposite Katariya High School  
Gultekdi, Pune - 411037  
Cell No.: +91 87888 32719 / 90288 60832  
E-mail: sales.pune@rotomotive.com



### **Rotomotive Powerdrives India Ltd.**

223, Napa Talpad, Gana-Borsad Road,  
Tal: Borsad, Anand, Gujarat - 388 560, INDIA.  
Ph.: +91 - 9227110030  
Fax: +91 - 2692 - 235209  
E-mail: info@rotomotive.com  
Website: www.rotomotive.com

Authorised Dealer