

# TOSHIBA

21<sup>ST</sup>  
CENTURY  
MOTOR



With Ex-n Options For Hazardous Areas

## HIGH EFFICIENCY HE SERIES...

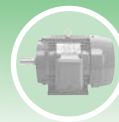
HEAVY DUTY ELECTRIC MOTORS

S O L U T I O N S • S E R V I C E • S U P P O R T



N1971

TOSHIBA INTERNATIONAL CORPORATION PTY LTD



## SAVE POWER! SAVE ENVIRONMENT!



1

### ENERGY SAVING

Peak efficiencies provide maximum energy savings for each output

2

### INFINITE CUSTOMISATION FLEXIBILITY

Extensive range of customisation options

3

### HEAVY DUTY CONSTRUCTION

High grade cast iron frame & cast iron / steel fan & covers

4

### LOW NOISE DESIGN

Low audible noise in operation

5

### CORROSION RESISTANT FINISH

Full paint system and colour flexibility

6

### PRODUCT RELIABILITY BACKED BY TOSHIBA'S RELIABLE PEOPLE!

Toshiba's great product backing and support

7

### Ex-n OPTION

Fully certified as Ex-n (non - sparking) for hazardous area application



## TOSHIBA HIGH EFFICIENCY 21<sup>ST</sup> CENTURY MOTOR ADVANTAGES...

### SAVE ENERGY! SAVE ENVIRONMENT!

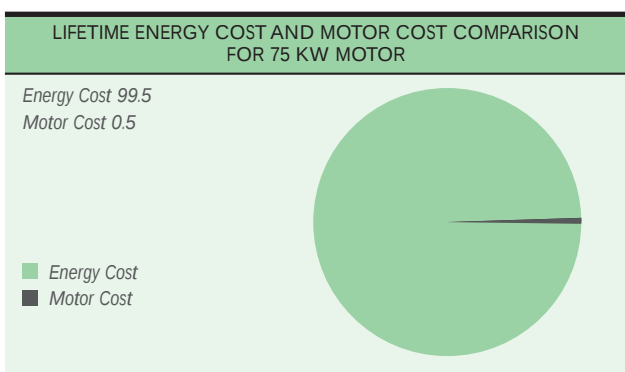
### ENERGY CONSUMPTION & RUNNING COST

Purchase price of any motor is generally insignificant when compared to its running costs over a 20 year life cycle.

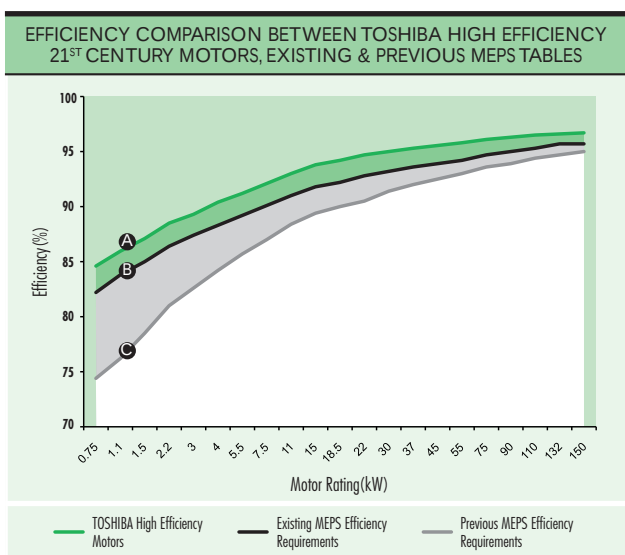
For example:

- Typical 75kW, 4P Motor Price \$4,500
- Typical Motor Efficiency @ 75% F/L 95.6%
- Estimated Annual Hours of Use 8200 hrs
- Average Energy Price \$0.14/kWh
- Hence, Annual Cost of Energy Consumption at 75% Full Load \$67,500
- Cost of Energy Consumed over 20 year Service Life \$1,350,000

The purchase price represents just 0.5% of the energy cost of running the motor!!!



The following graph shows the difference in efficiency of (A) Toshiba High Efficiency 21st Century motors, (B) Standard MEPS 2006 compliant motors and (C) typical motors over 5 years old (MEPS 2002) over a range of outputs.



### EFFICIENCY COMPARISON

Motor efficiency is one factor that can significantly affect running costs of any motor under given set of conditions. Small improvements in efficiencies can result in big savings in annual running costs. Consider following comparison of running costs between previous MEPS# compliant Standard Efficiency motors versus High Efficiency motors complying with MEPS 2006. (#Minimum Energy Performance Standards requirement as per AS1359.5)

Using a typical 75kW 4 pole motor as an example, the cost saving estimates can be as follows:

|                                     | Typical Motor | Toshiba HE Motor |
|-------------------------------------|---------------|------------------|
| Power                               | 75            | 75               |
| Operating Hours                     | 8200          | 8200             |
| Energy Cost                         | \$0.14 / kWhr | \$0.14 / kWhr    |
| Efficiency (%)                      | 92.4          | 95.6             |
| Load Factor (%)                     | 100           | 100              |
| Annual Running Cost*                | \$93,182      | \$90,062         |
| Annual Savings                      |               | \$ 3,120         |
| Annual CO <sub>2</sub> Saving (kgs) |               | 20,500           |

$$(*) \text{ Running Cost} = \frac{\text{kW} \times \text{Load factor} \times \text{Energy Rate} \times \text{Op. Hours}}{\text{Efficiency}}$$

Thus,

**LIFETIME COST SAVINGS\* = \$ 62,400**

**LIFETIME CO<sub>2</sub> SAVINGS\* = 410,000 Kgs**

\*for 20 yr service

### PAY-BACK

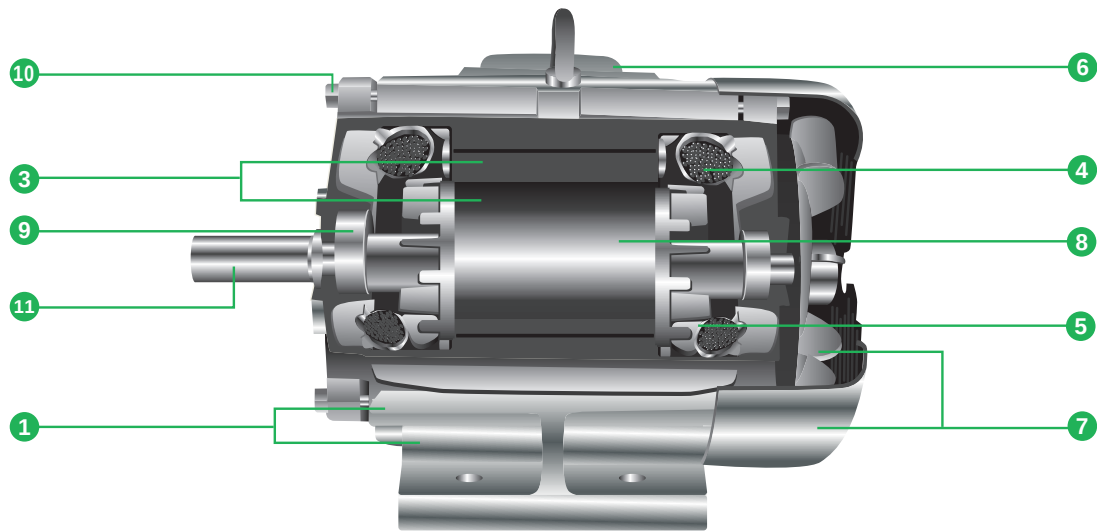
- Typical cost of Toshiba 75kW, 4P HE motor = \$4,500
- Yearly Power Cost Saving (at 8200 Hrs) = \$3,120
- Purchase Price Pay-Back Period = < 1.5 years

### CONCLUSION

When evaluating motors for purchasing, motor users should place a high value on the running cost saving advantages as compared to purchase price. Any higher initial purchase price will be quickly recovered by the reduced running costs of the TOSHIBA High Efficiency 21st Century motors.



## STANDARD HIGH EFFICIENCY MOTOR FEATURES INCLUDE



### 1 | HEAVY DUTY CONSTRUCTION

- Frames are high grade cast iron.
  - Machined with close tolerances to ensure accurate alignment and fits in accordance with our high standards.
  - Exceptional corrosion resistance and high structural rigidity are inherent in Toshiba High Efficiency motor construction.
- Steel fan covers are standard with cast iron as an option.
- Sintered bronze drain plugs are fitted as standard for frames D160 and above. Available as an option on smaller frames.

### 2 | STANDARDS

- Toshiba High Efficiency 21st Century motors comply with AS1359 and MEPS 2006 High Efficiency standard.
- Special motors to other Standards are also available eg NEMA, CENELEC or other national standards.

### 3 | PREMIUM EFFICIENCY LAMINATIONS

- Premium-grade silicon steel and longer cores lower operating flux densities and losses thus achieving optimum overall efficiency.

### 4 | LOW LOSS WINDINGS

- Toshiba's use of greater cross sectional area of copper lowers winding resistance, reduces losses and gives improved thermal reserve for cooler operation.
- All windings are insulated with non-hydroscopic materials, ensuring reliable motor operation in humid, corrosive and abrasive industrial environment.

### 5 | INSULATION & THERMAL ADVANTAGE

- Toshiba High Efficiency motors are insulated with class F materials and feature excellent thermal reserve, offering low temperature rise characteristics generally below class E.
- These characteristics allow optimal flexibility in regards to variable frequency drives, higher altitude & higher ambient applications, and are also forgiving for intermittent current overloads.

### 6 | FLEXIBLE TERMINAL BOX DESIGN

- Cast iron terminal boxes are diagonally split, and have flanges and neoprene gaskets. Larger frames have oversize fabricated steel boxes.
- All terminal boxes are fitted with removable gland plates, drilled and tapped to dimensions specified on page 8 to 11. Blank or customized gland plates are available as an option.
- Terminal boxes may be rotated by 90° into four positions for conduit entry on frames smaller than D315.
- Terminal boxes are mounted right hand side, viewed from drive end, and can be mounted on the opposite side by reversing the stator on frames up to D225. On frames D250 and above for non-standard terminal box positions contact Toshiba office at time of order.

### 7 | LOW NOISE LEVELS

- Special attention to the fan and cowl design achieves quiet operation with efficient cooling. Toshiba can supply motors with special low noise level fans and/or acoustic covers.
- Fans are cast iron or fabricated steel depending on frame size.

### 8 | HIGH TORQUE ROTOR

- Pressure cast aluminum rotors with integrally cast bars, end rings and cooling fans, provide reliable operation. Specially designed rotors give Toshiba High Efficiency motors advantageous torque characteristics and minimise losses.

### 9 | LONG LIFE BEARINGS

- The use of oversized bearings assures long life and quiet operation. Motors in frame sizes up to D132 have sealed bearings. Larger sizes have regreaseable bearings.

### 10 | HARDWARE

- All fastenings are zinc passivated for resistance to corrosion.
- Threads are metric.



## 11 | OUTPUT SHAFTS

- Output shafts are fitted with water/dust excluder.

## 12 | DURABLE NAMEPLATE

- Stainless steel nameplate provides complete motor ratings including bearing sizes for quick reference.

## 13 | CORROSION RESISTANT FINISH

- Toshiba High Efficiency motors are Alkyd Resin primed and finished with Alkyd Resin semi-gloss. Standard colour is Moss Grey RAL 7003. Customer specified colours and paint finishes available.

## 14 | CONNECTIONS

- All motors are fitted with stud type terminal blocks with 6 (terminations) winding leads. Motors in frames D112 and below can be configured for 240V DELTA operation suitable for VVVF Drives. Motors in larger frames are suitable for direct on line, auto transformer, star delta, soft starters, and 415V VVVF Drives operation.
- Thermistors are fitted as standard on motors from frame D160 and above and can be fitted on smaller sizes if specified. Thermistor terminals are marked T1, T2.
- An earthing terminal is provided inside the main terminal box, with an additional external earthing facility on all frames.
- Toshiba motors can be supplied wound for up to 1100 volts.

## 15 | DEGREE OF PROTECTION

- Toshiba High Efficiency motors have IP56 degree of protection as standard with enclosure options up to IP66 available, conforming to AS 60529-2004 and IEC 60034.5.
- Degrees of protection laid down in the standards are designated by means of the letters IP followed by two figures. The first digit states the degree of protection against contact and the penetration of solid objects. The second digit states the degree of protection against water.

|      |                                                                           |
|------|---------------------------------------------------------------------------|
| IP56 | Dust protected<br>Protection against heavy seas<br>or strong jet of water |
| IP65 | Dust tight<br>Hose proof (low pressure jet)                               |
| IP66 | Dust tight<br>Protected against heavy seas<br>or strong jet of water      |

### Other Notes

- The design of motors is such that they can be operated in all mounting positions provided consideration is given to the location of drain holes. In wet or outside surroundings, additional protection is recommended (such as IP66).

## 16 | ORDERING

- When ordering please nominate: kW, rpm, enclosure classification (IP rating), mountings type, e.g. foot, flange or foot and flange, horizontal or vertical, shaft (shaft direction up or down etc).
- If in doubt about motor selection, please provide starting and application details.
- Give details of any additional specification or requirements.

## 17 | DRIVE APPLICATIONS

- All motors up to 1500rpm are suitable for normal belt drive. Motors of higher speeds are generally for direct coupling only. For conformation of application suitability, please contact Toshiba.

## 21<sup>ST</sup> CENTURY HE SERIES MOTORS

### – TOSHIBA'S COMPETITIVE EDGE

- Commitment to Ongoing Improvement and Manufacturing Excellence in line with TOSHIBA's Corporate Philosophy
- Quality and Consistency from a renowned brand
- Outstanding Motor Performance under ALL Conditions
- Unsurpassed Ongoing Operating Reliability
- Superior Thermal Reserve
- Backed up in Australia by the TOSHIBA network of Branches and Service Alliances
- World Wide Representation
- REAL 24 hour, 7 day Customer Service and NO COST Technical Support & Backup
- Can be easily Modified to Customers Specification with a Large Range of Certified Accessories
- Superior Quality of Materials – from Casting and Die-casting to Bearings, Varnishing and Painting
- Oversized Terminal Box and Block
- Full Availability of Spare Parts and Accessories
- One of the Largest Stocks of Electric Motors in the Australasia Pacific Region.



## PERFORMANCE DATA

HIGH EFFICIENCY PERFORMANCE DATA AT 415V – 50Hz

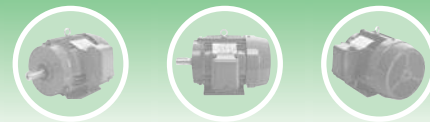
| Output kW | RPM  | Model No  | Frame Number | Full Load Current (A) |        | No Load Current (A) | Locked Rotor Current (A) | Locked Rotor Torque (%) | Pull Up Torque (%) | Break Down Torque (%) | Efficiency (%) |          | Power Factor |          | Rotor GD <sup>2</sup> (kg.m <sup>2</sup> ) | Sound Pressure dB(A) at 1 metre* | NET Weight (kg) |
|-----------|------|-----------|--------------|-----------------------|--------|---------------------|--------------------------|-------------------------|--------------------|-----------------------|----------------|----------|--------------|----------|--------------------------------------------|----------------------------------|-----------------|
|           |      |           |              | @ 415V                | @ 400V |                     |                          |                         |                    |                       | Full Load      | 75% Load | Full Load    | 75% Load |                                            |                                  |                 |
| 0.75      | 2850 | 813-A0007 | D80          | 1.62                  | 1.99   | 1.17                | 18.4                     | 657                     | 540                | 611                   | 84.7           | 84.3     | 0.71         | 0.63     | 0.01                                       | 67.0                             | 26              |
|           | 1430 | 813-B0007 | D80          | 1.9                   | 1.88   | 1.31                | 12.4                     | 350                     | 275                | 384                   | 84.6           | 84.6     | 0.65         | 0.56     | 0.01                                       | 54.2                             | 21              |
|           | 945  | 813-C0007 | D90SL        | 1.99                  | 1.98   | 1.40                | 10.1                     | 215                     | 201                | 304                   | 81.1           | 81.5     | 0.65         | 0.55     | 0.02                                       | 55.0                             | 28              |
| 1.1       | 2850 | 813-A0011 | D80          | 2.18                  | 2.20   | 1.17                | 18.4                     | 444                     | 365                | 483                   | 84.7           | 84.8     | 0.83         | 0.76     | 0.01                                       | 67.0                             | 26              |
|           | 1445 | 813-B0011 | D90SL        | 2.70                  | 2.70   | 1.92                | 23.0                     | 489                     | 416                | 526                   | 86.0           | 85.3     | 0.66         | 0.56     | 0.02                                       | 63.9                             | 28              |
|           | 925  | 813-C0011 | D90LL        | 2.70                  | 2.70   | 1.73                | 13.0                     | 275                     | 183                | 275                   | 81.5           | 82.6     | 0.69         | 0.60     | 0.03                                       | 52.0                             | 31              |
| 1.5       | 2875 | 813-A0015 | D90SL        | 2.73                  | 2.80   | 1.04                | 21.9                     | 303                     | 235                | 379                   | 87.4           | 88.2     | 0.87         | 0.83     | 0.01                                       | 64.0                             | 28              |
|           | 1420 | 813-B0015 | D90LL        | 3.26                  | 3.29   | 1.92                | 22.0                     | 358                     | 286                | 390                   | 86.2           | 87.1     | 0.74         | 0.66     | 0.02                                       | 53.0                             | 31              |
|           | 945  | 813-C0015 | D100L        | 3.50                  | 3.50   | 2.16                | 20.0                     | 300                     | 282                | 350                   | 85.0           | 85.3     | 0.70         | 0.62     | 0.05                                       | 51.0                             | 49              |
| 2.2       | 2875 | 813-A0020 | D90LL        | 3.90                  | 4.01   | 1.38                | 35.7                     | 351                     | 276                | 362                   | 88.7           | 89.4     | 0.89         | 0.84     | 0.01                                       | 63.0                             | 31              |
|           | 1445 | 813-B0020 | D100L        | 4.50                  | 4.55   | 2.43                | 34.6                     | 322                     | 252                | 381                   | 88.8           | 89.1     | 0.77         | 0.69     | 0.04                                       | 58.5                             | 38              |
|           | 960  | 813-C0020 | D112ML       | 4.60                  | 4.70   | 2.84                | 30.0                     | 325                     | 263                | 481                   | 88.2           | 88.4     | 0.75         | 0.67     | 0.08                                       | 59.0                             | 57              |
| 3         | 2905 | 813-A0030 | D100L        | 5.40                  | 5.50   | 1.98                | 50.4                     | 321                     | 273                | 361                   | 88.5           | 88.6     | 0.88         | 0.85     | 0.03                                       | 72.0                             | 49              |
|           | 1440 | 813-B0030 | D100L        | 6.10                  | 6.15   | 3.20                | 43.8                     | 314                     | 250                | 358                   | 88.5           | 89.2     | 0.77         | 0.71     | 0.05                                       | 58.8                             | 41              |
|           | 970  | 813-C0030 | D132S        | 6.70                  | 6.51   | 3.62                | 45.6                     | 237                     | 233                | 381                   | 89.0           | 89.5     | 0.73         | 0.65     | 0.16                                       | 53.0                             | 85              |
| 4         | 2905 | 813-A0040 | D112ML       | 7.04                  | 7.23   | 2.47                | 60.6                     | 258                     | 210                | 365                   | 89.4           | 90.2     | 0.88         | 0.84     | 0.03                                       | 67.1                             | 57              |
|           | 1450 | 813-B0040 | D112ML       | 8.00                  | 8.00   | 3.04                | 55.0                     | 274                     | 231                | 326                   | 89.1           | 90.2     | 0.84         | 0.80     | 0.08                                       | 54.0                             | 57              |
|           | 965  | 813-C0040 | D132M        | 8.14                  | 8.30   | 3.86                | 52.3                     | 224                     | 221                | 322                   | 88.7           | 89.5     | 0.77         | 0.71     | 0.18                                       | 57.0                             | 117             |
| 5.5       | 2915 | 813-A0050 | D132S        | 10.0                  | 10.0   | 2.92                | 67.9                     | 263                     | 254                | 308                   | 91.3           | 91.5     | 0.86         | 0.84     | 0.07                                       | 64.0                             | 85              |
|           | 1460 | 813-B0050 | D132S        | 10.2                  | 10.4   | 3.80                | 75.0                     | 264                     | 211                | 319                   | 90.5           | 90.7     | 0.83         | 0.79     | 0.16                                       | 52.6                             | 85              |
|           | 965  | 813-C0050 | D132M        | 11.7                  | 11.5   | 5.76                | 80.6                     | 263                     | 260                | 374                   | 89.6           | 90.3     | 0.76         | 0.69     | 0.22                                       | 58.0                             | 117             |
| 7.5       | 2915 | 813-A0070 | D132S        | 12.9                  | 13.3   | 3.46                | 104                      | 242                     | 194                | 355                   | 91.7           | 91.7     | 0.88         | 0.86     | 0.08                                       | 60.8                             | 85              |
|           | 1455 | 813-B0070 | D132M        | 14.7                  | 14.8   | 6.45                | 102                      | 288                     | 230                | 317                   | 91.1           | 91.5     | 0.78         | 0.73     | 0.19                                       | 54.7                             | 117             |
|           | 970  | 813-C0070 | D160M        | 14.6                  | 15.0   | 6.30                | 76.5                     | 198                     | 184                | 276                   | 91.1           | 91.9     | 0.79         | 0.74     | 0.51                                       | 58                               | 144             |
| 11        | 2925 | 813-A0110 | D160M        | 18.1                  | 18.8   | 4.07                | 127                      | 216                     | 147                | 311                   | 92.6           | 92.9     | 0.91         | 0.90     | 0.18                                       | 79.4                             | 144             |
|           | 1465 | 813-B0110 | D160M        | 20.4                  | 20.8   | 8.08                | 132                      | 247                     | 198                | 308                   | 92.3           | 92.4     | 0.81         | 0.77     | 0.34                                       | 58.0                             | 144             |
|           | 970  | 813-C0110 | D160L        | 21.1                  | 21.6   | 8.77                | 126                      | 215                     | 197                | 295                   | 91.4           | 92.2     | 0.79         | 0.74     | 0.59                                       | 65.2                             | 166             |
| 15        | 2925 | 813-A0150 | D160M        | 24.9                  | 25.8   | 6.10                | 174                      | 205                     | 136                | 307                   | 92.3           | 92.7     | 0.91         | 0.89     | 0.20                                       | 73.0                             | 144             |
|           | 1465 | 813-B0150 | D160L        | 27.4                  | 27.8   | 10.9                | 180                      | 257                     | 218                | 274                   | 93.0           | 93.3     | 0.82         | 0.78     | 0.40                                       | 64.4                             | 166             |
|           | 975  | 813-C0150 | D180L        | 27.7                  | 28.5   | 11.5                | 181                      | 234                     | 216                | 408                   | 92.1           | 92.7     | 0.82         | 0.77     | 1.11                                       | 61.0                             | 227             |



## PERFORMANCE DATA

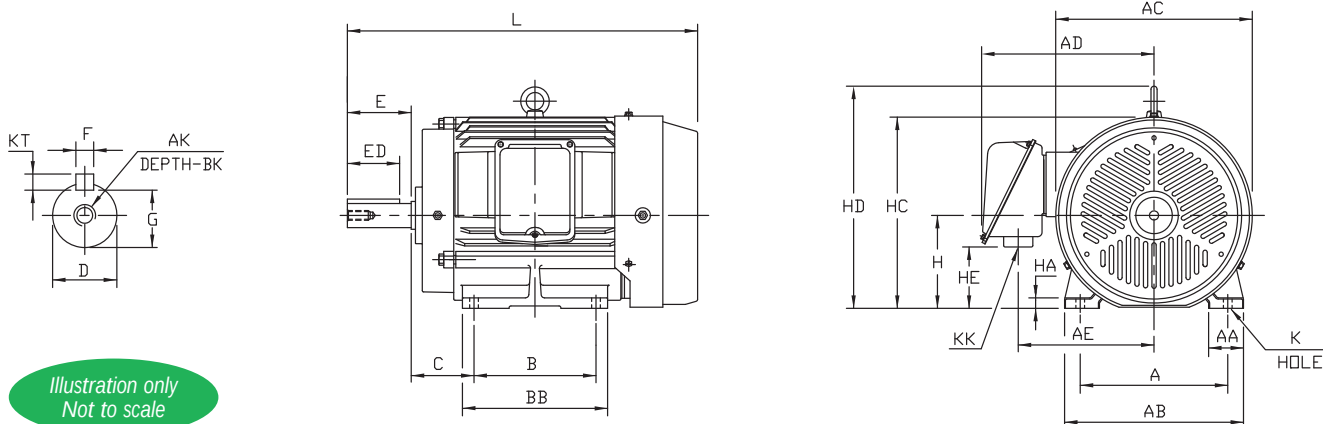
HIGH EFFICIENCY PERFORMANCE DATA AT 415V – 50Hz

| Output kW | RPM  | Model No  | Frame Number | Full Load Current (A) |        | No Load Current (A) | Locked Rotor Current (A) | Locked Rotor Torque (%) | Pull Up Torque (%) | Break Down Torque (%) | Efficiency (%) |          | Power Factor |          | Rotor GD <sup>2</sup> (kg.m <sup>2</sup> ) | Sound Pressure dB(A) at 1 metre* | NET Weight (kg) |
|-----------|------|-----------|--------------|-----------------------|--------|---------------------|--------------------------|-------------------------|--------------------|-----------------------|----------------|----------|--------------|----------|--------------------------------------------|----------------------------------|-----------------|
|           |      |           |              | @ 415V                | @ 400V |                     |                          |                         |                    |                       | Full Load      | 75% Load | Full Load    | 75% Load |                                            |                                  |                 |
| 18.5      | 2940 | 813-A0180 | D160L        | 30.8                  | 31.7   | 7.05                | 260                      | 292                     | 252                | 343                   | 93.6           | 93.6     | 0.89         | 0.86     | 0.23                                       | 80.0                             | 166             |
|           | 1470 | 813-B0180 | D180M        | 34.4                  | 35.0   | 13.5                | 201                      | 205                     | 164                | 217                   | 93.6           | 93.8     | 0.80         | 0.77     | 0.76                                       | 65.5                             | 215             |
|           | 975  | 813-C0180 | D200L        | 32.1                  | 33.2   | 11.6                | 200                      | 346                     | 299                | 372                   | 92.5           | 93.3     | 0.87         | 0.83     | 1.99                                       | 65.0                             | 330             |
| 22        | 2955 | 813-A0220 | D180M        | 36.8                  | 37.9   | 9.93                | 289                      | 282                     | 226                | 308                   | 93.9           | 93.9     | 0.89         | 0.86     | 0.46                                       | 65.2                             | 215             |
|           | 1480 | 813-B0220 | D180L        | 41.3                  | 41.9   | 17.5                | 258                      | 262                     | 210                | 274                   | 94.1           | 93.7     | 0.79         | 0.74     | 0.82                                       | 56.1                             | 227             |
|           | 980  | 813-C0220 | D200L        | 39.6                  | 40.6   | 15.9                | 248                      | 319                     | 288                | 358                   | 93.4           | 93.8     | 0.83         | 0.78     | 2.29                                       | 59.0                             | 332             |
| 30        | 2960 | 813-A0300 | D200L        | 50.6                  | 52.1   | 15.4                | 428                      | 275                     | 225                | 347                   | 93.9           | 93.5     | 0.88         | 0.85     | 0.85                                       | 83.7                             | 330             |
|           | 1480 | 813-B0300 | D200L        | 52.1                  | 53.3   | 18.1                | 410                      | 226                     | 192                | 312                   | 94.8           | 94.7     | 0.85         | 0.81     | 1.75                                       | 68.9                             | 330             |
|           | 980  | 813-C0300 | D225M        | 53.2                  | 54.8   | 17.9                | 332                      | 260                     | 229                | 391                   | 94.3           | 94.7     | 0.83         | 0.80     | 3.57                                       | 67.0                             | 430             |
| 37        | 2960 | 813-A0370 | D200L        | 63.0                  | 65.0   | 20.7                | 532                      | 265                     | 216                | 354                   | 94.2           | 93.8     | 0.87         | 0.84     | 1.02                                       | 81.4                             | 330             |
|           | 1480 | 813-B0370 | D225S        | 68.1                  | 69.1   | 27.3                | 480                      | 210                     | 168                | 314                   | 94.6           | 94.5     | 0.80         | 0.75     | 2.27                                       | 67.0                             | 417             |
|           | 985  | 813-C0370 | D250S        | 67.0                  | 69.1   | 23.0                | 376                      | 277                     | 252                | 336                   | 94.5           | 94.8     | 0.81         | 0.78     | 5.95                                       | 71.0                             | 597             |
| 45        | 2975 | 813-A0450 | D225M        | 74.5                  | 76.6   | 21.0                | 710                      | 285                     | 234                | 569                   | 94.7           | 94.4     | 0.89         | 0.86     | 1.70                                       | 84.0                             | 430             |
|           | 1480 | 813-B0450 | D225M        | 79.9                  | 82.3   | 27.2                | 519                      | 219                     | 180                | 346                   | 95.1           | 95.3     | 0.82         | 0.80     | 2.56                                       | 66.4                             | 430             |
|           | 985  | 813-C0450 | D250M        | 82.5                  | 84.3   | 33.4                | 552                      | 353                     | 282                | 354                   | 94.9           | 94.9     | 0.80         | 0.75     | 7.28                                       | 66.0                             | 712             |
| 55        | 2965 | 813-A0550 | D250S        | 95.0                  | 98.0   | 31.2                | 666                      | 202                     | 176                | 320                   | 95.2           | 94.9     | 0.85         | 0.81     | 3.18                                       | 80.3                             | 597             |
|           | 1480 | 813-B0550 | D250S        | 95.2                  | 97.2   | 34.0                | 703                      | 196                     | 167                | 293                   | 95.0           | 95.1     | 0.85         | 0.81     | 4.17                                       | 73.9                             | 597             |
|           | 990  | 813-C0550 | D280S        | 98.6                  | 102    | 34.4                | 663                      | 231                     | 218                | 380                   | 95.4           | 95.5     | 0.81         | 0.78     | 10.8                                       | 67.0                             | 844             |
| 75        | 2970 | 813-A0750 | D250M        | 125                   | 131    | 37.6                | 885                      | 174                     | 152                | 321                   | 95.5           | 95.4     | 0.86         | 0.84     | 3.97                                       | 80.5                             | 712             |
|           | 1485 | 813-B0750 | D250M        | 131                   | 134    | 44.1                | 971                      | 200                     | 175                | 280                   | 95.6           | 95.9     | 0.84         | 0.80     | 5.36                                       | 68.3                             | 712             |
|           | 990  | 813-C0750 | D280M        | 139                   | 143    | 43.1                | 889                      | 227                     | 215                | 405                   | 95.6           | 95.9     | 0.78         | 0.76     | 14.8                                       | 69.0                             | 963             |
| 90        | 2980 | 813-A0900 | D280S        | 149                   | 150    | 31.5                | 1095                     | 161                     | 150                | 276                   | 96.0           | 95.7     | 0.90         | 0.89     | 4.57                                       | 82.0                             | 844             |
|           | 1485 | 813-B0900 | D280S        | 151                   | 156    | 41.2                | 1065                     | 195                     | 164                | 269                   | 95.9           | 95.9     | 0.87         | 0.85     | 8.77                                       | 76.0                             | 844             |
|           | 985  | 813-C0900 | D315S        | 158                   | 163    | 52.0                | 1041                     | 248                     | 210                | 263                   | 95.6           | 95.8     | 0.83         | 0.80     | 18.0                                       | 70.0                             | 1143            |
| 110       | 2980 | 813-A1100 | D280M        | 176                   | 181    | 43.2                | 1591                     | 212                     | 201                | 347                   | 96.2           | 96.0     | 0.91         | 0.88     | 5.81                                       | 82.3                             | 963             |
|           | 1485 | 813-B1100 | D280M        | 184                   | 184    | 38.9                | 1215                     | 182                     | 148                | 267                   | 96.3           | 96.4     | 0.89         | 0.88     | 10.6                                       | 76.0                             | 963             |
|           | 985  | 813-C1100 | D315M        | 193                   | 199    | 60.4                | 1282                     | 197                     | 180                | 296                   | 95.7           | 95.8     | 0.83         | 0.80     | 20.6                                       | 73.5                             | 1355            |
| 132       | 2975 | 813-A1320 | D315S        | 213                   | 220    | 46.2                | 1510                     | 165                     | 135                | 258                   | 96.2           | 96.1     | 0.90         | 0.89     | 6.80                                       | 87.6                             | 1143            |
|           | 1485 | 813-B1320 | D315S        | 216                   | 222    | 46.5                | 1550                     | 175                     | 146                | 252                   | 96.4           | 96.5     | 0.89         | 0.88     | 13.1                                       | 78.0                             | 1143            |
|           | 990  | 813-C1320 | D315M        | 236                   | 236    | 82.8                | 1756                     | 265                     | 171                | 265                   | 96.3           | 96.5     | 0.82         | 0.79     | 22.8                                       | 75.0                             | 1355            |
| 150       | 2970 | 813-A1500 | D315M        | 242                   | 248    | 49.7                | 1620                     | 158                     | 130                | 272                   | 96.5           | 96.4     | 0.90         | 0.90     | 7.10                                       | 87.6                             | 1355            |
|           | 1485 | 813-B1500 | D315M        | 243                   | 250    | 49.1                | 1710                     | 192                     | 165                | 264                   | 96.2           | 96.3     | 0.90         | 0.89     | 15.0                                       | 76.0                             | 1355            |
|           | 990  | 813-C1500 | D315M        | 255                   | 271    | 86.7                | 2077                     | 190                     | 142                | 236                   | 96.0           | 96.2     | 0.84         | 0.81     | 19.1                                       | 75.0                             | 1355            |



## DIMENSIONS - HIGH EFFICIENCY

FOOT MOUNTED



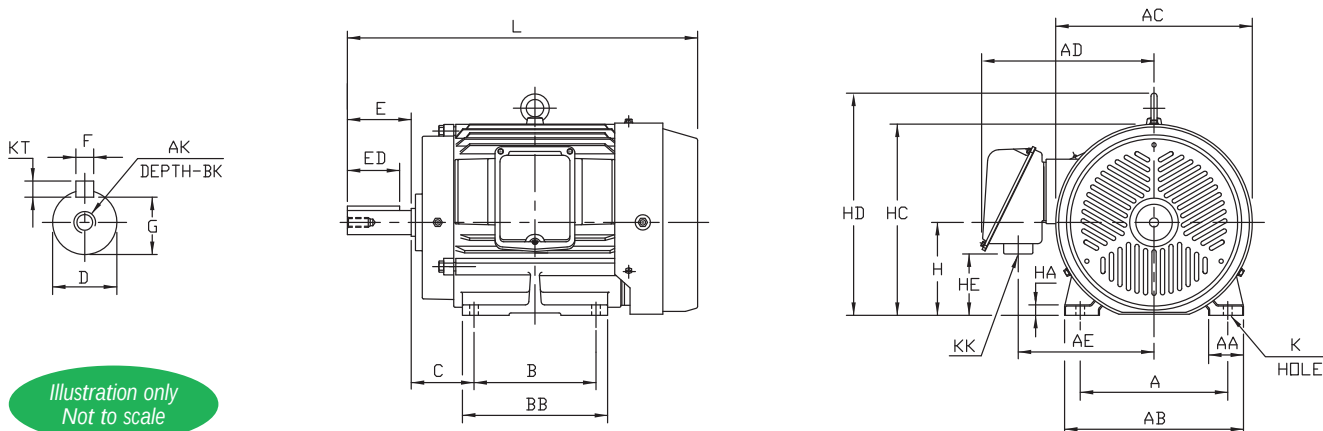
### 2, 4, 6 POLE

| DIMENSIONS | FRAME |       |       |       |       |        |       |       |       |       |
|------------|-------|-------|-------|-------|-------|--------|-------|-------|-------|-------|
|            | D71   | D80   | D90SL | D90LL | D100L | D112ML | D132S | D132M | D160M | D160L |
| A          | 112   | 125   | 140   | 140   | 160   | 190    | 216   | 216   | 254   | 254   |
| AA         | 35    | 35    | 40    | 40    | 45    | 40     | 50    | 50    | 60    | 60    |
| AB         | 140   | 155   | 176   | 176   | 196   | 220    | 260   | 260   | 308   | 308   |
| AC         | 160   | 180   | 207   | 207   | 223   | 242.5  | 284.5 | 284.5 | 324   | 324   |
| AD         | 178   | 185   | 192.5 | 192.5 | 295   | 205    | 239   | 239   | 293   | 293   |
| AE         | 135   | 144.5 | 142   | 142   | 166   | 158    | 181   | 181   | 220   | 220   |
| AK         | M5    | M6    | M8    | M8    | M10   | M10    | M12   | M12   | M16   | M16   |
| B          | 90    | 100   | 125   | 154   | 140   | 159    | 140   | 178   | 210   | 254   |
| BB         | 114   | 130   | 149   | 178   | 176   | 187    | 175   | 213   | 250   | 294   |
| BK         | 18    | 20    | 25    | 25    | 28    | 28     | 28    | 28    | 36    | 36    |
| C          | 45    | 50    | 56    | 56    | 63    | 70     | 89    | 89    | 108   | 108   |
| D          | 14    | 19    | 24    | 24    | 28    | 28     | 38    | 38    | 42    | 42    |
| E          | 30    | 40    | 50    | 50    | 60    | 60     | 80    | 80    | 110   | 110   |
| ED         | 22    | 30    | 40    | 40    | 50    | 50     | 65    | 65    | 90    | 90    |
| F          | 5     | 6     | 8     | 8     | 8     | 8      | 10    | 10    | 12    | 12    |
| G          | 11    | 15.5  | 20    | 20    | 24    | 24     | 33    | 33    | 37    | 37    |
| H          | 71    | 80    | 90    | 90    | 100   | 112    | 132   | 132   | 160   | 160   |
| HA         | 8     | 8     | 10    | 10    | 12    | 12     | 15    | 15    | 18    | 18    |
| HC         | 162   | 175   | 198   | 198   | —     | —      | —     | —     | —     | —     |
| HD         | —     | —     | —     | —     | 246   | 274    | 316   | 316   | 373   | 373   |
| HE         | 31.5  | 43.5  | 27.3  | 27.3  | 69    | 55     | 67.5  | 67.5  | 92.5  | 92.5  |
| K          | 7     | 10    | 10    | 10    | 12    | 12     | 12    | 12    | 14.5  | 14.5  |
| KK         | M20   | M20   | M20   | M20   | M20   | M20    | M25   | M25   | M32   | M32   |
| KT         | 5     | 6     | 7     | 7     | 7     | 7      | 8     | 8     | 8     | 8     |
| L          | 234   | 274   | 327   | 356   | 376   | 401    | 450   | 488   | 603   | 647   |



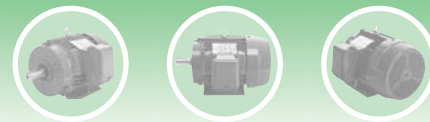
## DIMENSIONS - HIGH EFFICIENCY

FOOT MOUNTED



### 2, 4, 6 POLE

| DIMENSIONS |      | FRAME |       |       |       |       |       |       |        |        |        |        |
|------------|------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|
|            |      | D180M | D180L | D200L | D225S | D225M | D250S | D250M | D280S  | D280M  | D315S  | D315M  |
| A          |      | 279   | 279   | 318   | 356   | 356   | 406   | 406   | 457    | 457    | 508    | 508    |
| AA         |      | 60    | 60    | 80    | 80    | 80    | 100   | 100   | 110    | 110    | 140    | 140    |
| AB         |      | 324   | 324   | 378   | 416   | 416   | 486   | 486   | 560    | 560    | 630    | 630    |
| AC         |      | 390   | 390   | 441   | 484   | 484   | 547   | 547   | 621    | 621    | 680    | 680    |
| AD         |      | 360   | 360   | 385   | 410   | 410   | 520   | 520   | 545    | 545    | 552    | 552    |
| AE         |      | 275   | 275   | 300   | 325   | 325   | 403   | 403   | 428    | 428    | 443    | 443    |
| AK         | 2    | M16   | M16   | M20   | M20   | M20   | M20   | M20   | M20    | M20    | M20    | M20    |
|            | 4, 6 | M16   | M16   | M20   | M20   | M20   | M20   | M20   | M20    | M20    | M20    | M20    |
| B          |      | 241   | 279   | 305   | 286   | 311   | 311   | 349   | 368    | 419    | 406    | 457    |
| BB         |      | 286   | 324   | 360   | 366   | 391   | 415   | 449   | 440    | 490    | 480    | 530    |
| BK         |      | 36    | 36    | 42    | 42    | 42    | 42    | 42    | 42     | 42     | 42     | 42     |
| C          |      | 121   | 121   | 133   | 149   | 149   | 168   | 168   | 190    | 190    | 216    | 216    |
| D          | 2    | 48    | 48    | 55    | —     | 55    | 60    | 60    | 65     | 65     | 65     | 65     |
|            | 4, 6 | 48    | 48    | 55    | 60    | 60    | 70    | 70    | 80     | 80     | 85     | 85     |
| E          | 2    | 110   | 110   | 110   | —     | 110   | 140   | 140   | 140    | 140    | 140    | 140    |
|            | 4, 6 | 110   | 110   | 110   | 140   | 140   | 140   | 140   | 170    | 170    | 170    | 170    |
| ED         | 2    | 90    | 90    | 90    | 110   | 90    | 110   | 110   | 110    | 110    | 110    | 110    |
|            | 4, 6 | 90    | 90    | 90    | 110   | 110   | 110   | 110   | 140    | 140    | 140    | 140    |
| F          | 2    | 14    | 14    | 16    | —     | 16    | 18    | 18    | 18     | 18     | 18     | 18     |
|            | 4, 6 | 14    | 14    | 16    | 18    | 18    | 20    | 20    | 22     | 22     | 22     | 22     |
| G          | 2    | 42.5  | 42.5  | 49    | —     | 49    | 53    | 53    | 58     | 58     | 58     | 58     |
|            | 4, 6 | 42.5  | 42.5  | 49    | 53    | 53    | 62.5  | 62.5  | 71     | 71     | 76     | 76     |
| H          |      | 180   | 180   | 200   | 225   | 225   | 250   | 250   | 280    | 280    | 315    | 315    |
| HA         |      | 20    | 20    | 20    | 22    | 22    | 30    | 30    | 30     | 30     | 35     | 35     |
| HC         |      | —     | —     | —     | —     | —     | —     | —     | —      | —      | —      | —      |
| HD         |      | 440   | 440   | 486   | 538   | 538   | 618   | 618   | 675    | 695    | 738    | 738    |
| HE         |      | 98    | 98    | 143   | 173   | 173   | 81    | 81    | 127    | 127    | 63     | 63     |
| K          |      | 14.5  | 14.5  | 18.5  | 18.5  | 18.5  | 24    | 24    | 24     | 24     | 28     | 28     |
| KK         |      | M40   | M40   | M50   | M50   | M50   | M63   | M63   | M63    | M63    | M63    | M63    |
| KT         | 2    | 9     | 9     | 10    | —     | 10    | 11    | 11    | 11     | 11     | 11     | 11     |
|            | 4, 6 | 9     | 9     | 10    | 11    | 11    | 12    | 12    | 14     | 14     | 14     | 14     |
| L          | 2    | 676.5 | 714.5 | 772.5 | —     | 812   | 946.5 | 984.5 | 1083.5 | 1134.5 | 1224   | 1275   |
|            | 4, 6 | 676.5 | 714.5 | 772.5 | 817   | 842   | 946.5 | 984.5 | 1113.5 | 1164.5 | 1341.5 | 1392.5 |



## DIMENSIONS - HIGH EFFICIENCY

FOOT & FLANGE MOUNTED

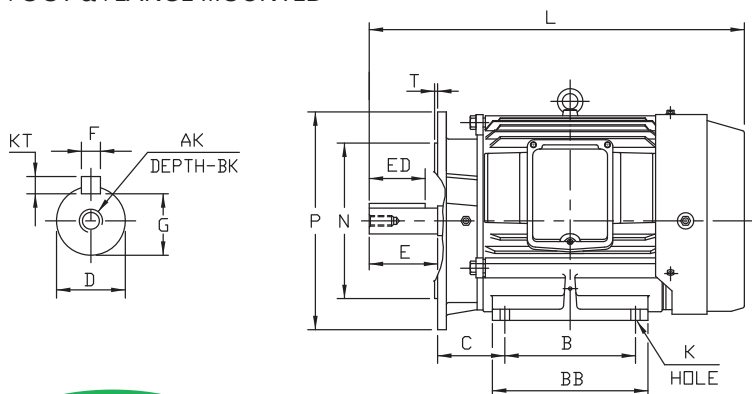
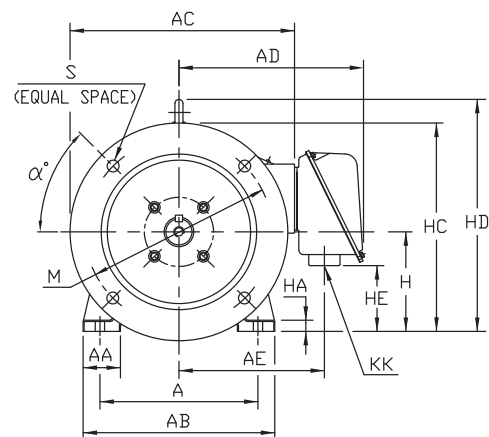


Illustration only  
Not to scale



Flanges D71–D200 4 hole fixing  
Flanges D225–D315 8 hole fixing

| DIMENSIONS | FRAME |       |       |       |       |        |       |       |       |       |
|------------|-------|-------|-------|-------|-------|--------|-------|-------|-------|-------|
|            | D71   | D80   | D90SL | D90LL | D100L | D112ML | D132S | D132M | D160M | D160L |
| A          | 112   | 125   | 140   | 140   | 160   | 190    | 216   | 216   | 254   | 254   |
| AA         | 35    | 35    | 40    | 40    | 45    | 40     | 50    | 50    | 60    | 60    |
| AB         | 140   | 155   | 176   | 176   | 196   | 220    | 260   | 260   | 308   | 308   |
| AC         | —     | 184   | 207   | 207   | 223   | 243    | 285   | 285   | 324   | 324   |
| AD         | 178   | 185   | 192.5 | 192.5 | 210   | 205    | 239   | 239   | 293   | 293   |
| AE         | 135   | 144.5 | 142   | 142   | 167   | 158    | 181   | 181   | 220   | 220   |
| AK         | M5    | M6    | M8    | M8    | M10   | M10    | M12   | M12   | M16   | M16   |
| B          | 90    | 100   | 125   | 154   | 140   | 159    | 140   | 178   | 210   | 254   |
| BB         | 114   | 130   | 149   | 178   | 176   | 187    | 175   | 213   | 250   | 294   |
| BK         | 18    | 20    | 25    | 25    | 28    | 28     | 28    | 28    | 36    | 36    |
| C          | 74    | 50    | 56    | 56    | 63    | 70     | 89    | 89    | 108   | 108   |
| D          | 14    | 19    | 24    | 24    | 28    | 28     | 38    | 38    | 42    | 42    |
| E          | 30    | 40    | 50    | 50    | 60    | 60     | 80    | 80    | 110   | 110   |
| ED         | 22    | 30    | 40    | 40    | 50    | 50     | 65    | 65    | 90    | 90    |
| F          | 5     | 6     | 8     | 8     | 8     | 8      | 10    | 10    | 12    | 12    |
| G          | 11    | 15.5  | 20    | 20    | 24    | 24     | 33    | 33    | 37    | 37    |
| H          | 71    | 80    | 90    | 90    | 100   | 112    | 132   | 132   | 160   | 160   |
| HA         | 8     | 8     | 10    | 10    | 12    | 12     | 15    | 15    | 18    | 18    |
| HC         | 162   | 175   | 198   | 198   | —     | —      | —     | —     | —     | —     |
| HD         | —     | —     | —     | —     | 246   | 274    | 316   | 316   | 373   | 373   |
| HE         | 31.5  | 44    | 41    | 41    | 58    | 61     | 67.5  | 67.5  | 92.5  | 92.5  |
| K          | 7     | 10    | 10    | 10    | 12    | 12     | 12    | 12    | 14.5  | 14.5  |
| KK         | M20   | M20   | M20   | M20   | M20   | M20    | M25   | M25   | M32   | M32   |
| KT         | 5     | 6     | 7     | 7     | 7     | 7      | 8     | 8     | 8     | 8     |
| L          | 273   | 274   | 327   | 356   | 369   | 401    | 450   | 488   | 603   | 647   |
| M          | 130   | 165   | 165   | 165   | 215   | 215    | 265   | 265   | 300   | 300   |
| N          | 110   | 130   | 130   | 130   | 180   | 180    | 230   | 230   | 250   | 250   |
| P          | 160   | 200   | 200   | 200   | 250   | 250    | 300   | 300   | 350   | 350   |
| S          | 10    | 12    | 12    | 12    | 14.5  | 14.5   | 14.5  | 14.5  | 18.5  | 18.5  |
| T          | 3.5   | 3.5   | 3.5   | 3.5   | 4     | 4      | 4     | 4     | 5     | 5     |
| HOLES      | 4     | 4     | 4     | 4     | 4     | 4      | 4     | 4     | 4     | 4     |



## DIMENSIONS - HIGH EFFICIENCY

FOOT & FLANGE MOUNTED

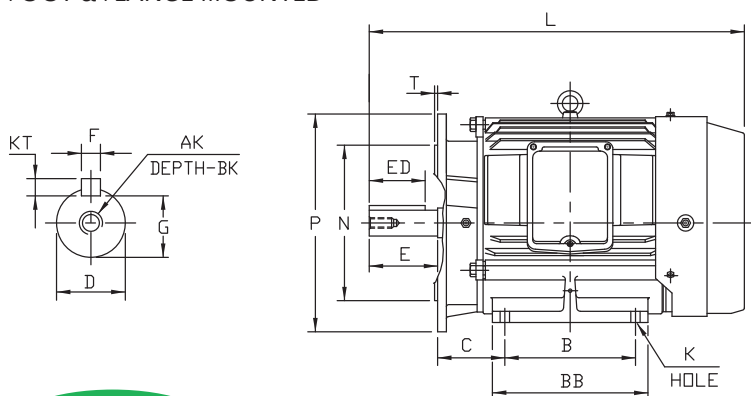
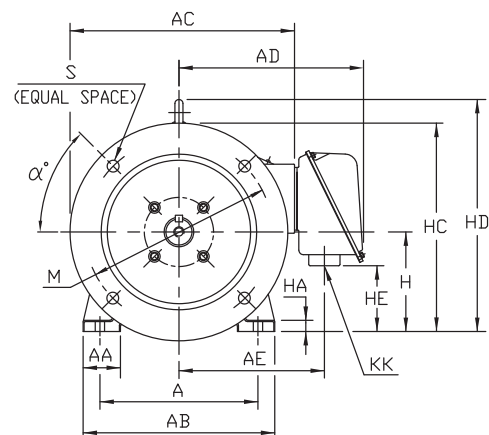


Illustration only  
Not to scale



Flanges D71–D200 4 hole fixing  
Flanges D225–D315 8 hole fixing

## 2, 4, 6 POLE

| DIMENSIONS |      | FRAME |       |       |       |       |       |       |       |       |       |       |
|------------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|            |      | D180M | D180L | D200L | D225S | D225M | D250S | D250M | D280S | D280M | D315S | D315M |
| A          |      | 279   | 279   | 318   | 356   | 356   | 406   | 406   | 457   | 457   | 508   | 508   |
| AA         |      | 60    | 60    | 80    | 80    | 80    | 100   | 100   | 110   | 110   | 140   | 140   |
| AB         |      | 324   | 324   | 378   | 416   | 416   | 486   | 486   | 560   | 560   | 630   | 630   |
| AC         |      | 390   | 390   | 441   | 484   | 484   | 547   | 547   | 621   | 621   | 680   | 680   |
| AD         |      | 360   | 360   | 385   | 410   | 410   | 520   | 520   | 545   | 545   | 552   | 552   |
| AE         |      | 275   | 275   | 300   | 325   | 325   | 403   | 403   | 428   | 428   | 443   | 443   |
| AK         | 2    | M16   | M16   | M20   | —     | M20   | M20   | M20   | M20   | M20   | M20   | M20   |
|            | 4, 6 | M16   | M16   | M20   | M20   | M20   | M20   | M20   | M20   | M20   | M20   | M20   |
| B          |      | 241   | 279   | 305   | 286   | 311   | 311   | 349   | 368   | 419   | 406   | 457   |
| BB         |      | 286   | 324   | 360   | 366   | 391   | 415   | 449   | 440   | 490   | 480   | 530   |
| BK         |      | 36    | 36    | 42    | 42    | 42    | 42    | 42    | 42    | 42    | 42    | 42    |
| C          |      | 121   | 121   | 133   | 149   | 149   | 168   | 168   | 242   | 242   | 324   | 324   |
| D          | 2    | 48    | 48    | 55    | —     | 55    | 60    | 60    | 65    | 65    | 65    | 65    |
|            | 4, 6 | 48    | 48    | 55    | 60    | 60    | 70    | 70    | 80    | 80    | 85    | 85    |
| E          | 2    | 110   | 110   | 110   | —     | 110   | 140   | 140   | 140   | 140   | 140   | 140   |
|            | 4, 6 | 110   | 110   | 110   | 140   | 140   | 140   | 140   | 170   | 170   | 170   | 170   |
| ED         | 2    | 90    | 90    | 90    | —     | 90    | 110   | 110   | 110   | 110   | 110   | 110   |
|            | 4, 6 | 90    | 90    | 90    | 110   | 110   | 110   | 110   | 140   | 140   | 140   | 140   |
| F          | 2    | 14    | 14    | 16    | —     | 16    | 18    | 18    | 18    | 18    | 18    | 18    |
|            | 4, 6 | 14    | 14    | 16    | 18    | 18    | 20    | 20    | 22    | 22    | 22    | 22    |
| G          | 2    | 42.5  | 42.5  | 49    | —     | 49    | 53    | 53    | 58    | 58    | 58    | 58    |
|            | 4, 6 | 42.5  | 42.5  | 49    | 53    | 53    | 62.5  | 62.5  | 71    | 71    | 76    | 76    |
| H          |      | 180   | 180   | 200   | 225   | 225   | 250   | 250   | 280   | 280   | 315   | 315   |
| HA         |      | 20    | 20    | 20    | 22    | 22    | 30    | 30    | 30    | 30    | 35    | 35    |
| HC         |      | —     | —     | —     | —     | —     | —     | —     | —     | —     | —     | —     |
| HD         |      | 440   | 440   | 486   | 538   | 538   | 618   | 618   | 675   | 695   | 738   | 738   |
| HE         |      | 106   | 106   | 143   | 173   | 173   | 81    | 81    | 127   | 127   | 63    | 63    |
| K          |      | 14.5  | 14.5  | 18.5  | 18.5  | 18.5  | 24    | 24    | 24    | 24    | 28    | 28    |
| KK         |      | M40   | M40   | M50   | M50   | M50   | M63   | M63   | M63   | M63   | M63   | M63   |
| KT         | 2    | 9     | 9     | 10    | —     | 10    | 11    | 11    | 11    | 11    | 11    | 11    |
|            | 4, 6 | 9     | 9     | 10    | 11    | 11    | 12    | 12    | 14    | 14    | 14    | 14    |
| L          | 2    | 676.5 | 714.5 | 772.5 | —     | 812   | 946.5 | 984.5 | 1135  | 1186  | 1330  | 1410  |
|            | 4, 6 | 676.5 | 714.5 | 772.5 | 817   | 842   | 946.5 | 984.5 | 1165  | 1216  | 1342  | 1500  |
| M          |      | 300   | 300   | 350   | 400   | 400   | 500   | 500   | 500   | 500   | 600   | 600   |
| N          |      | 250   | 250   | 300   | 350   | 350   | 450   | 450   | 450   | 450   | 550   | 550   |
| P          |      | 350   | 350   | 400   | 450   | 450   | 550   | 550   | 550   | 550   | 660   | 660   |
| S          |      | 18.5  | 18.5  | 18.5  | 18.5  | 18.5  | 18.5  | 18.5  | 18.5  | 18.5  | 24    | 24    |
| T          |      | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 6     | 6     |
| HOLES      |      | 4     | 4     | 4     | 8     | 8     | 8     | 8     | 8     | 8     | 8     | 8     |

\* Tolerance on dimensions 'H', 'D' and 'F' to IEC 60072-2



## PERFORMANCE DATA

### BEARINGS FOR HIGH EFFICIENCY MOTORS

| Frame Number  | D71     | D80     | D90S    | D90L    | D100L   | D112M   | D132S, M | D160M, L |      | D180M, L |      | D200L  |      |
|---------------|---------|---------|---------|---------|---------|---------|----------|----------|------|----------|------|--------|------|
| Poles         | 2, 4, 6 | 2, 4, 6 | 2, 4, 6 | 2, 4, 6 | 2, 4, 6 | 2, 4, 6 | 2, 4, 6  | 2        | 4, 6 | 2        | 4, 6 | 2      | 4, 6 |
| Drive End     | 6203ZZ  | 6204ZZ  | 6205ZZ  | 6205ZZ  | 6206ZZ  | 6207ZZ  | 6308ZZ   | 6310C3   | 6310 | 6310C3   | 6310 | 6312C3 | 6312 |
| Non-Drive End | 6203ZZ  | 6204ZZ  | 6205ZZ  | 6205ZZ  | 6206ZZ  | 6206ZZ  | 6208ZZ   | 6208C3   | 6208 | 6210C3   | 6210 | 6212C3 | 6212 |

| Frame Number  | D225S, M |       | D250S, M |       | D280S, M |       | D315S, M |       | D315M  |        | D315LL |        | D355LL |
|---------------|----------|-------|----------|-------|----------|-------|----------|-------|--------|--------|--------|--------|--------|
| Poles         | 2        | 4, 6  | 2        | 4, 6  | 2        | 4, 6  | 2        | 4, 6  | 2      | 4, 6   | 2      | 4, 6   | 4, 6   |
| Drive End     | 6312C3   | NU215 | 6313C3   | NU218 | 6314C3   | NU220 | 6314C3   | NU320 | 6314C3 | NU2224 | 6314C3 | NU2224 | NU2224 |
| Non-Drive End | 6312C3   | 6312  | 6313C3   | 6313  | 6313C3   | 6315  | 6313C3   | 6318  | 6313C3 | 6318   | 6313C3 | 6318   | 6320   |

| Bearing No. | Grease Qty (Grams) | Replenish Intervals (days) |     |     |
|-------------|--------------------|----------------------------|-----|-----|
|             |                    | 2P                         | 4P  | 6P  |
| 6208        | 25                 | 70                         | 130 | 130 |
| 6209        | 25                 | 70                         | 130 | 130 |
| 6210        | 30                 | 70                         | 130 | 130 |
| 6211        | 30                 | 70                         | 130 | 130 |
| 6212        | 30                 | 70                         | 130 | 130 |
| 6213        | 30                 | 50                         | 130 | 130 |
| 6214        | 30                 | 50                         | 130 | 130 |
| 6310        | 30                 | 50                         | 130 | 130 |
| 6311        | 30                 | 50                         | 130 | 130 |
| 6312        | 30                 | 50                         | 130 | 130 |
| 6313        | 30                 | 50                         | 130 | 130 |
| 6314        | 50                 | 40                         | 100 | 130 |
| 6315        | 50                 | N/A                        | 100 | 130 |
| 6316        | 50                 | N/A                        | 100 | 130 |

| Bearing No. | Grease Qty (Grams) | Replenish Intervals (days) |     |     |
|-------------|--------------------|----------------------------|-----|-----|
|             |                    | 2P                         | 4P  | 6P  |
| 6317        | 80                 | N/A                        | 100 | 130 |
| 6318        | 80                 | N/A                        | 100 | 130 |
| 6319        | 80                 | N/A                        | 100 | 130 |
| 6320        | 80                 | N/A                        | 100 | 130 |
| NU214       | 30                 | N/A                        | 100 | 130 |
| NU215       | 30                 | N/A                        | 100 | 130 |
| NU216       | 30                 | N/A                        | 100 | 130 |
| NU216       | 30                 | N/A                        | 100 | 130 |
| NU218       | 30                 | N/A                        | 100 | 130 |
| NU219       | 50                 | N/A                        | 100 | 130 |
| NU220       | 50                 | N/A                        | 100 | 130 |
| NU318       | 80                 | N/A                        | 70  | 130 |
| NU320       | 80                 | N/A                        | 50  | 130 |
| NU2224      | 100                | N/A                        | 50  | 130 |

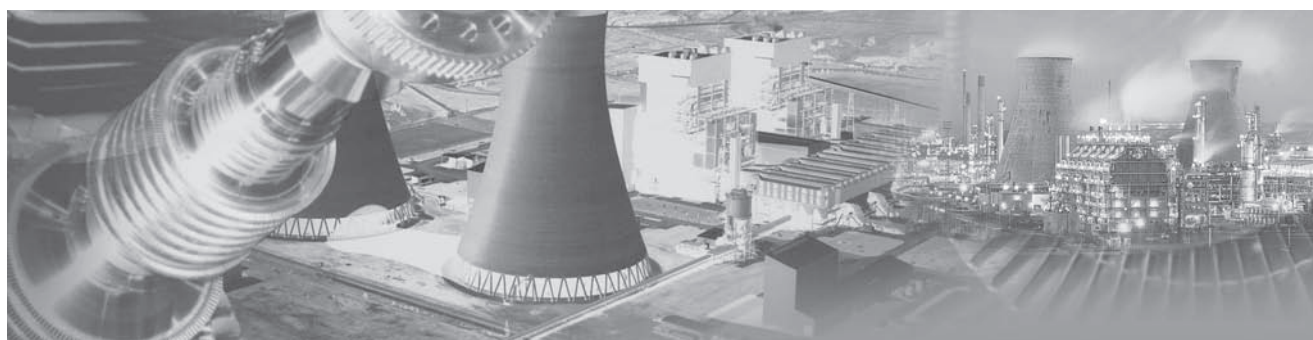
Motors with grease nipples will require periodic re-greasing. When re-greasing, use only recommended grease indicated below. The motor must be running and have grease exit ports opened during lubrication. For motors requiring special types of lubricant, the specification and quantity of grease to be used are noted on the nameplate. Motors without greasing facilities are fitted with sealed bearings. Sealed bearings are pre-lubricated for the life of the bearing but should be monitored by the user and replaced when necessary.

Toshiba recommends the use of Shell Alvania RL 2 lithium based grease. Always regrease bearings with the same grease type.

**Note:** Excess lubrication and/or incorrect grease type may cause an increase in bearing temperature. This may lead to an increased risk of premature bearing failure.

**Note:** When regreasing a running motor ensure all safety precautions are observed. Ensure that the motor runs for a sufficient time to allow the used grease to purge before the exit ports are reclosed.

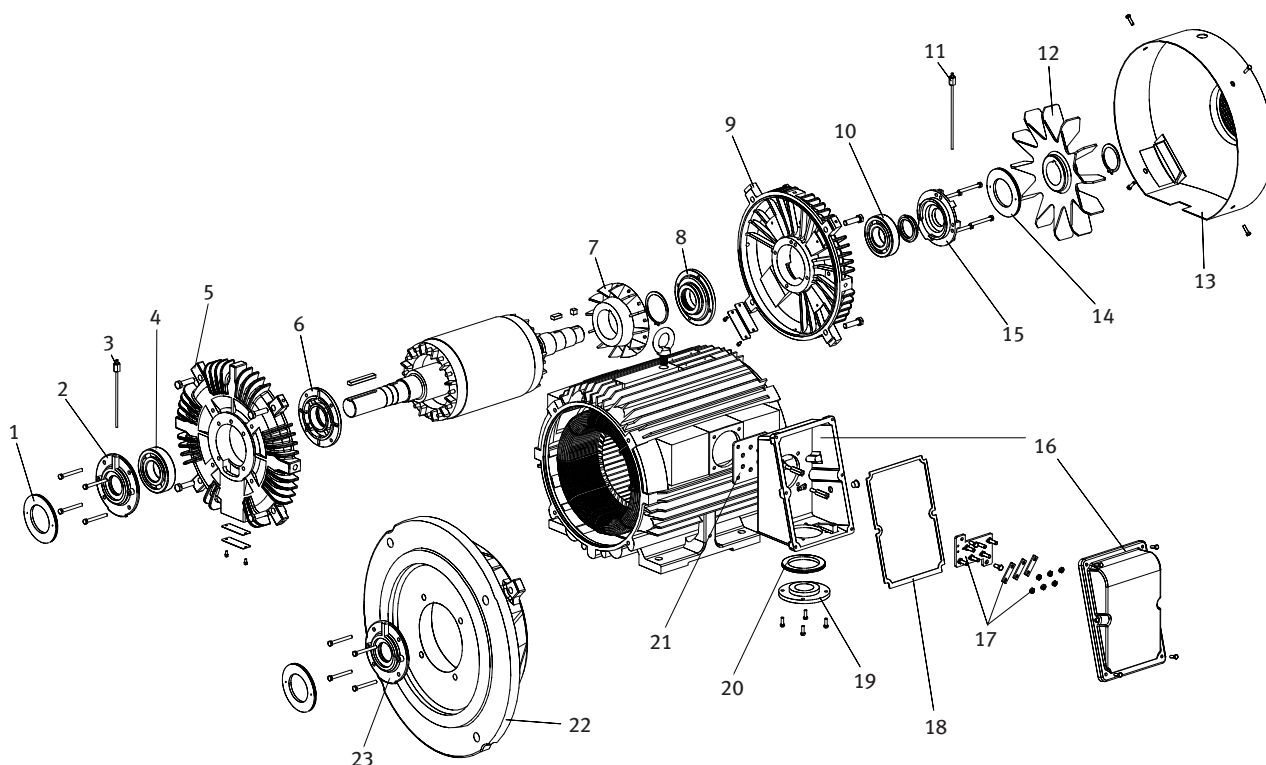
**Note:** the above table is based on a motor running for 24 hours per day. For an 8-hour duty cycle multiply the interval by 3.





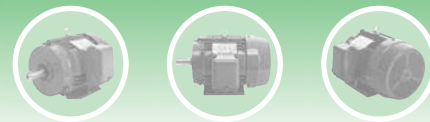
## TYPICAL PARTS LIST

| TYPICAL PARTS LIST |           | Example: Toshiba High Efficiency Motor |   |        |       |
|--------------------|-----------|----------------------------------------|---|--------|-------|
| Model Number       | 813-B1100 | Exploded View Drawing                  |   |        |       |
| Output kW:         | 110       | Poles:                                 | 4 | Frame: | D280M |



| No. | Description                        | Product Code                          | No. | Description                          | Product Code                       |
|-----|------------------------------------|---------------------------------------|-----|--------------------------------------|------------------------------------|
| 1   | Flinger Drive End                  | FLINGD2803154TSHDE<br>*(434-11101-01) | 13  | Fan Cover<br>(Steel Std)             | PMD280TSH<br>(433-32520-03)        |
| 2   | Bearing Cap Outer Drive End        | DEBCD2804TSHO<br>(434-70831-01)       | 14  | Flinger Non Drive End                | FLINGD2804TSHNDE<br>(434-11101-06) |
| 3   | Drive End Grease Pipe              | GPAD280TSHDE<br>(433-02924-93)        | 15  | Bearing Cap Outer Non Drive End      | NDEBCD2804TSHO<br>(433-21188-07)   |
| 4   | Bearing, Drive End                 | NU220                                 | 16  | Terminal Box<br>(includes 18,19,20)  | TBOXD250315TSH<br>(433-70886)      |
| 5   | Drive End Endshield                | DEESD2804TSH<br>(432-07293-07)        | 17  | Terminal Block<br>Assembly           | TBD250315TSH<br>(433-70277-91)     |
| 6   | Bearing Cap Inner<br>Drive End     | DEBCD2804TSHI<br>(434-21155-01)       | 18  | Gasket, between<br>T/box lid & base  | TBGD250315TSH<br>(434-10342-01)    |
| 7   | Internal Alloy Fan                 | FAD2804TSHINT<br>(433-07944-01)       | 19  | Gland Plate<br>(M63 Entry)           | TBGPD250315TSH<br>(434-70237-06)   |
| 8   | Bearing Cap Inner<br>Non Drive End | NDEBCD2804TSHI<br>(434-21430-01)      | 20  | Gasket, gland plate                  | TBGPGD250315TSH<br>(434-70466-04)  |
| 9   | N.D.E. Endshield                   | NDEESD2804TSH<br>(432-07293-01)       | 21  | Gasket, between<br>Frame & term. box | TBGM250315TSH<br>(434-06348-10)    |
| 10  | Bearing, Non Drive End             | 6315CM                                | 22  | D-Face Flange                        | FLD2804THE                         |
| 11  | Non Drive End Grease Pipe          | GPAD280TSHNDE<br>(434-34257-91)       | 23  | Bearing Cap Outer Drive End (Flange) | DEBCD2804TSHFLGO                   |
| 12  | Fan (C.I. as Std.)                 | FCD2502804TSH<br>(433-24260-02)       |     |                                      |                                    |

Note: \* Drawing number of part shown in brackets.



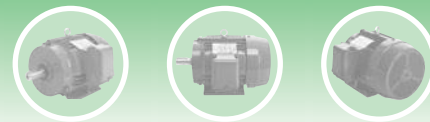
## GENERAL INFORMATION

### TESTING

Routine testing is the typical test record for a customised motor, which can include following:

- Thermistor Insulation Test
- Heater Insulation Test
- Winding Insulation Resistance Test
- Winding Hi-Pot Test
- Surge Test
- Thermistor Resistance Test
- Bearing RTD Test
- Winding RTD Test
- Heater Resistance Test
- Winding Resistance Test
- No Load Test Run
- Bearing Condition Test

| Available Customisation Options                                        |                                             |
|------------------------------------------------------------------------|---------------------------------------------|
| Anti Condensation heaters                                              | Left hand side terminal box                 |
| Bearing change on Non drive – end                                      | Lifting lugs – Special fittings             |
| Bearing change on Drive – end                                          | Low noise fans                              |
| Bearing RTDs                                                           | Oil seals                                   |
| Bearing sensors                                                        | Painting to special colours – Enamel        |
| Brass gland plate                                                      | Painting to special colours – Epoxy         |
| Blank identification nameplate                                         | Painting to special colours – Polyurethane  |
| Captive screws for terminal box lids                                   | Porous (sintered bronze) drain plugs        |
| Cast iron fan cover                                                    | Rain hats                                   |
| Constant velocity cooling fan                                          | Re-nameplate                                |
| Dual hand terminal boxes                                               | Routine test (non-witnessed)                |
| Earth brush and Insulated Non – drive end housing for VSD applications | Routine test (witnessed)                    |
| Encoders                                                               | Shaft down application modifications        |
| Earth studs – Additional                                               | Shaft up application modifications          |
| Feet removal                                                           | Separate terminal box auxiliary connections |
| Flange fitting                                                         | Special non standard shafts and extensions  |
| Hazardous areas upgrades – Dust-excluding Ignition Proof (DIP)         | Special voltage applications                |
| Hazardous areas upgrades – Increased Safety (Ex-e)                     | Stainless steel coal shield                 |
| Hazardous areas upgrades – Non Sparking (Ex-n)                         | Stainless steel fan covers                  |
| Fail safe brake motors                                                 | Stainless steel sunshield                   |
| High grade balancing                                                   | Stainless steel fasteners                   |
| Isonel Winding (tropic proofing)                                       | Thermistors terminated in auxiliary box     |
| IP65/IP66 protection rating upgrades                                   | Winding RTDs terminated in auxiliary box    |
| B14A Flanges available                                                 |                                             |



## GENERAL INFORMATION

### HAZARDOUS AREAS

Toshiba offers a range of IEC certified Ex-n standard and customised High Efficiency motors.

Motors are certified to internationally recognized standards and are explosion protected in Australia under an independently audited quality system to MP87.1:2009 / IEC Ex OD005/V2.

| Certification         | Protection          | Standard                              | Group                    | Gas Group | Temp Class | Zone             |
|-----------------------|---------------------|---------------------------------------|--------------------------|-----------|------------|------------------|
| IECEx<br>TSA 09.0034X | n<br>(non-sparking) | IEC 60034/<br>AS 1359<br>IEC 60079.15 | 2<br>(other than mining) | IIC       | T3         | 2<br>(typically) |



The IEC Ex Certification scheme is a global certification frame work which,

- Has a wide international acceptance
- Is harmonized to international standards
- Provides users confidence that products meet critical safety standards

### PAINTING

A typical customer modification is an enhanced painting system, whether the specification requires environmentally friendly low VOC, isocyanate free, superior corrosive protection, improved aesthetics, and extended durability, we offer different systems to meet your requirements.

Performance of a paint coating is influenced by a number of variables including atmospheric aggressiveness, surface preparation and the type and thickness of paint.



TIC is capable of offering three paint systems dependant on your requirements:

- Acrylic high gloss finish, isocyanate free, weather resistant finish.
- Epoxy, semi gloss, low VOC, high solids paint, providing an excellent anti-corrosive barrier protection.
- TIC actively promotes the use of environmentally sensitive products and also offer Polysiloxane, a premium high performance, high solid, very low VOC, superior gloss, anti corrosive painting product.

The minimum dry film thickness is clearly a function of the required duration and life cycle, but only to a certain practical point, a maximum of 210 microns for the harshest of conditions is recommended. Contact your local Toshiba International Corporation office for further information.

The most common requested colours:



**RAL 7003**  
Moss Grey



**Y14**  
Golden Yellow



**B24**  
Harbour Blue



**R64**  
Deep Indian Red



**X15**  
Orange



**G22**  
Serpentine

## ADDITIONAL PRODUCTS

(Detailed catalogues available)



Variable Speed Drives  
(0.4kW – 630kW)



Electronic Soft Starters  
(7.5kW – 3MW)



Large Drives/Drive Systems

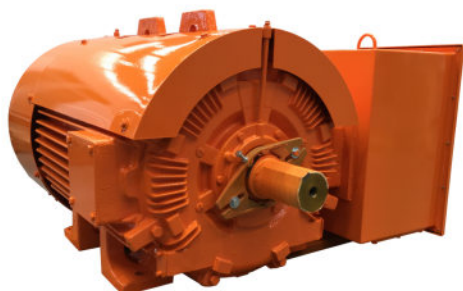


Protection Relay

**After Sales Service**  
**Plant Maintenance & Monitoring**  
**Asset Management**  
**Plant Alliance Management**



Microwave Density Meter



Heavy Duty Motor



Explosion Protected Motor



High Voltage AC Motor

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