

# ELECTRIC MOTORS

Premium Series | High Efficiency | Low Voltage Motors

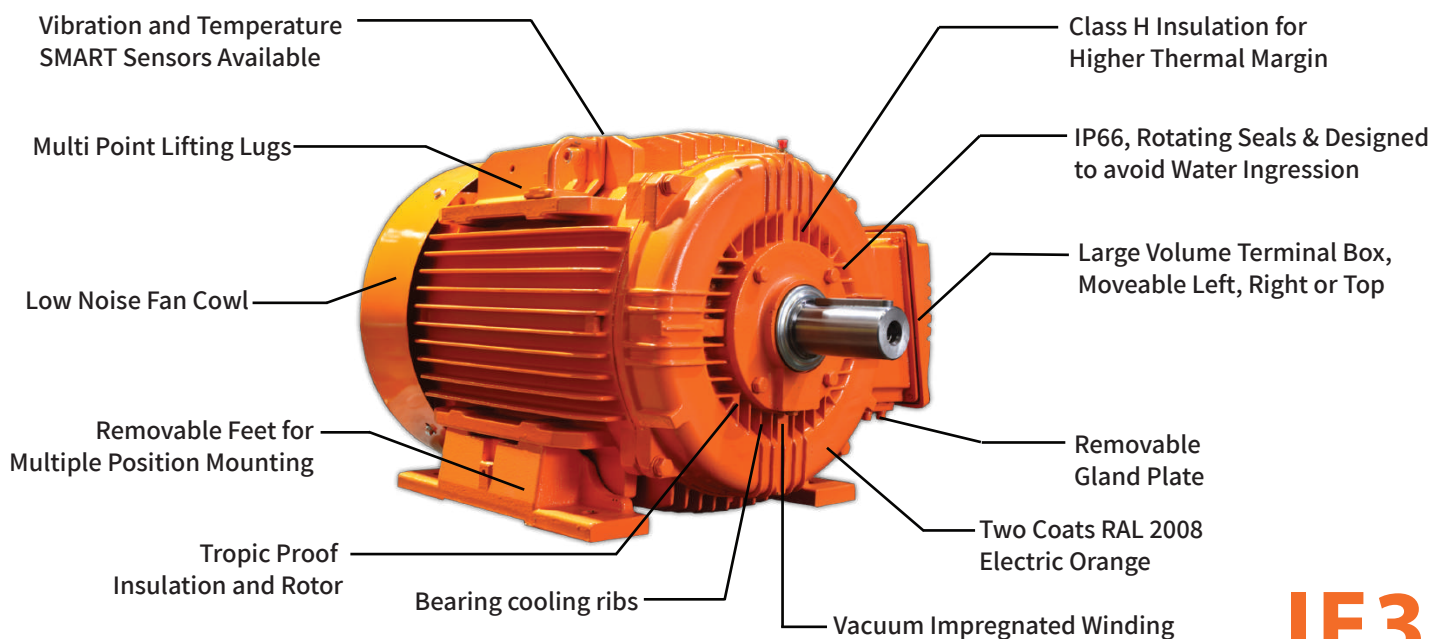
Technical Brochure

## EMT OMEC – A GLOBAL PLAYER

EMT is a global multinational group of companies linked together by common products and markets. EMT OMEC is the group's Electric Motor and Motor Service company located in Australia. Our Electric Motors are manufactured by our partner company OMEC another global player with manufacturing and distribution footprints stretching across Asia, Europe, Australia and Africa.

## EMT OMEC M3 PREMIUM SERIES ELECTRIC MOTOR

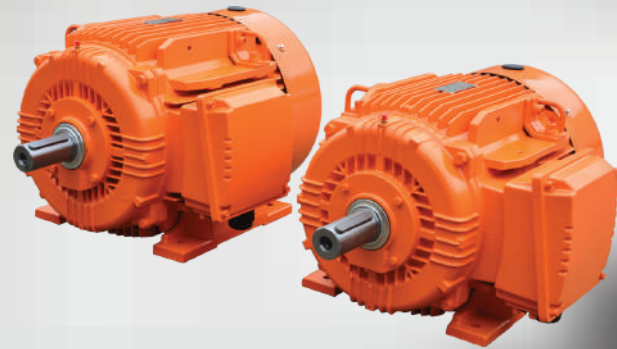
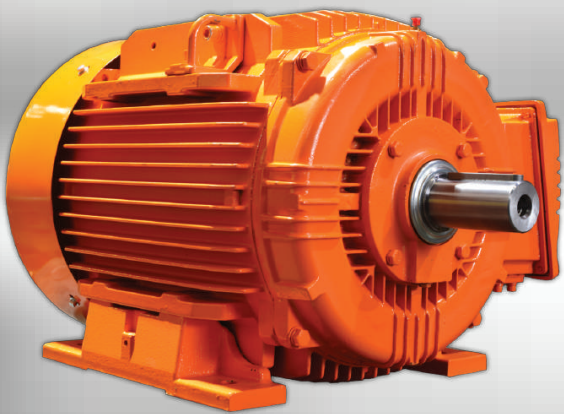
“Designed and Manufactured for Long Life & Lower Total Cost of Ownership.”



## PREMIUM SERIES MOTORS IE3 High Efficiency

### Technical characteristics

- ☑ IE3 high efficiency rated motor series
- ☑ Design & Performance proven to IEC 60034 standards
- ☑ IP 66 enclosure rating, fixed and rotating seals
- ☑ Class H insulation with maximum B rise.
- ☑ Vacuum impregnated winding for Durability, Long Life and Lower Cost of Ownership.
- ☑ S1 duty at 1000m AMSL and 40 °C ambient.
- ☑ No de-rating between -20 and +40 °C
- ☑ Dual voltages 415V / 690V, 50Hz / 60Hz
- ☑ Tested to 1.5 times FLC for 2 minutes
- ☑ Ratings upto 355kW and larger on request
- ☑ High quality cast iron TEFC frames to IEC dimensions
- ☑ Bearings are re-greasable, heavy duty 63 series C3 clearance
- ☑ Replaceable feet on M3 frames 160 to 280 frames
- ☑ M3 design allows for top or left hand conversions from standard RHS
- ☑ Terminal box rotatable in 90 ° intervals for left, right or top cable entry
- ☑ Diagonal terminal lid, easy access on installation
- ☑ Mounting options B3, V6, V5, B5, V3, V1, B35, B36 or V15
- ☑ Variable mount lifting lugs for easy handling
- ☑ IEC vibration Grade N as standard
- ☑ Two coat wet spray finish gloss RAL 2008 Tropic Proof design
- ☑ Steel Fan cowls – heavy duty versions on request
- ☑ Hi impact static resistant injection moulded fans
- ☑ Insulated bearings and earth brushes for VSD applications available
- ☑ 150 / 180 °C Thermistors standard in aux terminal box
- ☑ PT 100 thermal protection available
- ☑ Forced ventilation units available
- ☑ Anti condensation heaters available
- ☑ Tacho generator and encoders available
- ☑ Vibration and Temperature Smart sensors available
- ☑ 3 plus Warranty



## OUR PRODUCTS

EMT OMEC manufactures and distributes a wide range of high quality Electric Motors and related products to many global standards across most market segments throughout the Australian market. All products are manufactured to meet and exceed applicable international and local standards. In addition, they have many performance and construction features that are specifically designed to cope with Australia's unique local environmental and application requirements.

This product brochure describes EMT OMEC M3 Premium series cast iron motors and larger Y2 series cast iron IE3 motors. These motors have been developed to exceed the needs of our clients operating within an energy environment of increasing complexity where energy utilisation economics are driving technological advances and by default purchasing decisions relating to total cost of ownership. These high efficiency motors are designed to meet the requirements described in both the Australian minimum efficiency standards and international IEC 60034 (IE3) performance standards. These motors are increasingly the go to product for the discerning motor buyer when key application requirements requiring robust mechanical properties as well as high standards of electrical performance, ensuring the efficient use of energy and a low resultant low carbon footprint are important decision factors

## ENERGY EFFICIENCY

Energy and energy efficiency are terms we see everywhere across industry, however the concept is often over complicated and sometimes misunderstood. The simplest way of understanding energy utilisation in terms of an electrical motor is that its efficiency is just the ratio of mechanical output power to the electric input power.

The laws of nature predict that any piece of machinery will to some degree incur energy losses due to mechanical friction, heat loss and electrical losses. The higher the efficiency of the machines design, the lower the losses. This is important because you are paying for the energy you put into an electric motor not the mechanical power it puts out. Lower the input electrical power in billable Kilowatts and you directly reduce your electricity bill.

In recent years, advances in material science in combination with computer aided design technology has allowed engineers to optimise Electric Motor design and reduce these losses to as little as 4% in the best scenarios. It was not uncommon in years past to see larger motors losing over 20% of their input power to poor design.

To put this into perspective an IE1 efficiency 75kW motor at full load has an efficiency around 92,7% need input power of almost 81kW. You're paying for 81kW. By comparison an EMT OMEC IE3 motor has an efficiency exceeding 95% need input power of only 79kW. This may seem to be an inconsequential improvement, however you save over 2kW an hour for 10 hours a day for 20 days a month that's  $2 \times 10 \times 20 = 400\text{kWh}$  a month you're not paying for. Actually, it is a staggering 4,8MWh a year saving. Eyes wide open now? In reality the 2,4% loss saving between new technology and old technology represents an impressive 31% reduction in energy wastage on one such motor alone. How many old motors do you have on your works site? Now this concept starts to make practical sense.





## EFFICIENCY REGULATION

To ensure these energy efficiency savings are maximised by industry, and in doing so inversely reducing generation demand needs, our government has implemented minimum energy efficiency standards for electric motors. The older IE1 efficiency motors used in the above example were commonly sold well into the mid 2000's until legislation prevented further import or manufacture after 2006. Many thousands of these inefficient motors remain installed throughout industry. Revised national standards have now raised the minimum efficiency across a wide range of industrial electric motors to a level generally termed as IE2. Above this level is a far higher specification of motor with an IE3 level of efficiency. These are now termed high efficiency motors. EMT OMECs Premium series of cast iron electric motors as described within this brochure either meet or exceed the requirements of the higher IE3 efficiency standards.

## NATIONAL ELECTRIC MOTOR STANDARDS

Our Premium series EMT OMEC IE3 high efficiency electric motors are manufactured and perform in accordance with the below mentioned national and International standards.

AS 60034.1	Rotating electrical machines - Rating and Performance
IEC 60034-2-1	Rotating electrical machines - Standard methods for determining losses and efficiency
AS 60034.5	Rotating electrical machines - Degrees of protection provided - IP code
IEC 60034-6	Rotating electrical machines - Methods of cooling - IC code
AS 60034.7	Rotating electrical machines - Construction, mounting and terminal box positions - IM code

AS 60034.8	Rotating electrical machines - Terminal markings and direction of rotation
AS 60034.9	Rotating electrical machines - Noise limits
AS 60034.11	Rotating electrical machines - Thermal protection
AS 60034.12	Rotating electrical machines - Starting performance of single-speed induction motors
IEC 60034-14	Rotating electrical machines - Mechanical vibration limits
IEC 60034-30	Rotating electrical machines - Efficiency classes for single speed three-phase cage induction motors
IEC 60072-1	Dimensions and output series for rotating electrical machines - Frame numbers 56 to 400 and flange numbers 55 to 1080

## TYPE DESIGNATION

EMT OMEC M3 and Y2 series IE3 motors are identified by standard part codes as detailed below.

Example an IE3 Premium series 75kW 4P motor would be termed PHE 250M4 B3 where the data indicates

P	Premium IE3 series
HE	High Efficiency
250M	Motor Frame size
4	Poles - Speed 2, 4, 6 or 8
B3	Mount type B3, B35 or B5

Each designation is unique to individual rating. The Motor rating plate designates the kW rating particular to the indicated Type Designation

## PRODUCT IDENTIFICATION NAMEPLATES

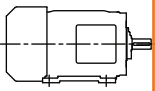
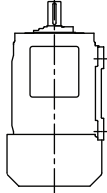
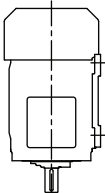
All EMT OMEC Premium series cast iron high efficiency motors are equipped with stainless steel rating plates riveted to the main motor casing on which all relevant ratings, performance and supply connection related identification data is permanently engraved.



EMTOME C		Three Phase Motor		IE3	
Type	IE3-315M4	Ins. CL H	Duty S1	IP 66	
V Δ/Y	Hz	KW	RPM	A Δ/Y	Pf
380 / 660	50	132	1485	238 / 137	0.88
415 / 720	50	132	1485	223 / 129	0.86
440 / 760	60	158	1785	252 / 143	0.88
500 / 865	60	158	1785	227 / 131	0.86
Weight	1053 kg	Brg DE	6319C3	PTC 150°C	
Alt 1000mt	AMB. 40°C	Brg NDE	6319C3	PTC 180°C	
Serial No	xxxxxxxxxxxxxx	Δt 80K	IEC 60034	ASNZ1359.5	
EMTOME C 1300 139 181		www.emtomec.com.au			

## MOUNTING ARRANGEMENTS

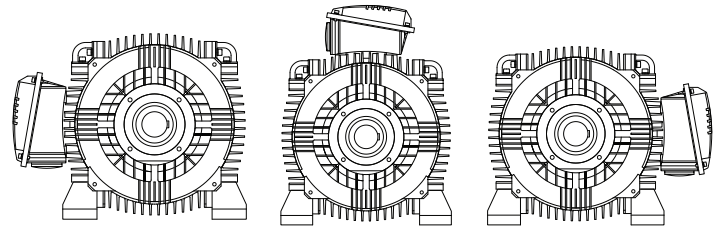
The EMT OMEC Premium series cast iron high efficiency motors are designed so that they can be operated in all horizontal and vertical mounting positions, providing consideration is given to the location of drain holes and bearing types specified for application loads. The M3 design also incorporates removable mounting feet across frames 160mm to 280mm allowing for B3, B35 and B5 only frame configurations.

MOTOR MOUNTING STANDARDS			
Mount Orientation			
Mount	Horizontal	Shaft Up	Shaft Down
Foot Mount	B3 - IM1001	V6 - IM1031	V5 - IM1011
Foot & Flange Mount	B35 - IM2001	V36 - IM2031	V15 - IM2011
Flange Mount	B5 - IM3001	V3 - IM3031	V1 - IM3011

## TERMINAL BOX

These Premium series motors have cast iron IP66 terminal boxes with gaskets. The angled profile of the box section allows for easy access to the terminal studs and facilitates easier tightening. The dome profile lids also allow additional internal clearances. The gland plates on all frames are removable greatly cutting installation time. Each terminal box is rotatable in 90° intervals allowing for any cable entry direction.

The removable mounting feet across the M3 series 160 to 280 frames allows the standard right hand terminal box to be converted to a top or left hand terminal box location with relative ease. The terminal blocks are centrally located above the cable seal that separates the internal motor body space from the terminal box interior. The motor main leads are marked in accordance with the requirements of IEC60034-8.



TERMINAL BOX GLAND ARRANGEMENT			
Motor Frame	Design Type	Gland Qty	Size
160	M3 - Removable	2	M32x1.5
180	M3 - Removable	2	M32x1.5
200	M3 - Removable	2	M50x1.5
225	M3 - Removable	2	M50x1.5
250	M3 - Removable	2	M63x1.5
280	M3 - Removable	2	M63x1.5
315	Y2 - Removable	2	M63x1.5
355	Y2 - Removable	4	M63x1.5

## DUTY RATINGS

All EMT OMEC Premium series cast iron high efficiency motors are rated for continuous duty S1. Where motors are required to meet the needs of S2 to S9 duty applications please contact our offices for assistance.

## AMBIENT x ALTITUDE APPLICATION

In accordance with the requirements of IEC 60034-1, this Premium series of electric Motor is listed in its standard format based upon an ambient temperature range of -20°C to 40°C ambient and altitudes up to and including 1000mts.



Although our class H insulation systems provide more thermal margin protection than can be found in many standard industrial motors. It is however still good practice to assume that when motors are intentionally used outside of these standard installation parameters some de-rating may be sensible. This de-rating scenario can be applied using the table below.

ALTITUDE (m)									
T (°C)	1000	1500	2000	2500	3000	3500	4000	4500	5000
10							0.97	0.92	0.88
15						0.98	0.94	0.90	0.86
20					1.00	0.95	0.91	0.87	0.83
25				1.00	0.95	0.93	0.89	0.85	0.81
30			1.00	0.96	0.92	0.90	0.86	0.82	0.78
35		1.00	0.95	0.93	0.90	0.88	0.84	0.80	0.75
40	1.00	0.97	0.94	0.90	0.86	0.82	0.80	0.76	0.71
45	0.95	0.92	0.90	0.88	0.85	0.80	0.78	0.74	0.69
50	0.92	0.90	0.87	0.85	0.82	0.80	0.77	0.72	0.67
55	0.88	0.85	0.83	0.81	0.78	0.76	0.73	0.70	0.65
60	0.83	0.82	0.80	0.77	0.75	0.73	0.70	0.67	0.62
65	0.79	0.76	0.74	0.72	0.70	0.68	0.66	0.62	0.58
70	0.74	0.71	0.69	0.67	0.66	0.64	0.62	0.58	0.53
75	0.70	0.68	0.66	0.64	0.62	0.60	0.58	0.53	0.49
80	0.65	0.64	0.62	0.60	0.58	0.56	0.55	0.48	0.44

## DEGREE OF PROTECTION

The EMT OMEC Premium motor series is designed with an IP66 enclosure rating according to the requirements of IEC60034.5. This is accomplished via the use of a dual fixed and rotating seal design at both the drive and non-drive end of the motor frame. The outer seal provides a rotating labyrinth and lip seal whilst the inner seal acts as a mechanical oil seal. The motors terminal box is also rated IP66 with a closed cell gasket between all joint surfaces.

IP	6	6	Dust and Water protection standards
Numeral 1	1	2	
2: Motors protected against solid objects greater than 12 mm			
4: Motors protected against solid objects greater than 1 mm			
5: Dust-protected motors			
6: Dust-tight motors			
Numerals 2			
3: Motors protected against spraying water			
4: Motors protected against splashing water			
5: Motors protected against water jets			
6: Motors protected against heavy seas			

## COOLING

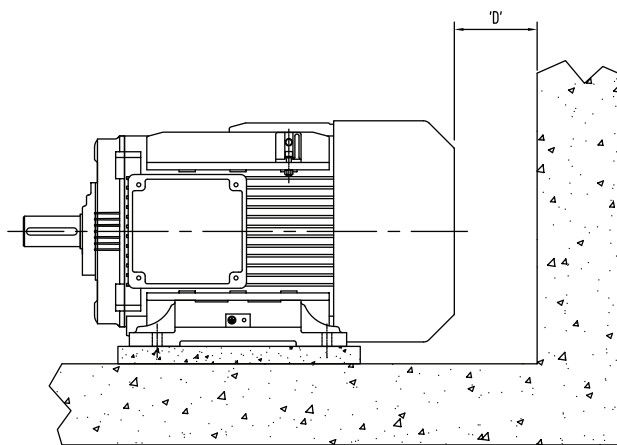
All EMT OMEC Premium series high efficiency motors are totally enclosed fan cooled (TEFC) IC411 designs to IEC60034-6. Standard cooling fans are injection moulded reinforced polypropylene. All motors can be equipped with alloy or steel fans on request when required. All fans are bi-directional in design allowing all motors to be run either clock-wise or anti-clockwise without modification. Fan covers are all steel construction.

Certain applications require special cooling arrangements. For eg. forced ventilation cooling units to provide constant air cooling at lower operating speeds. EMT OMEC Premium series motors can be upgraded to include these modifications and other special cooling upgrades.

Specific attention needs to be taken to the air space behind and installed electric motor when designing an installation. Restriction of the air inflow space may affect motor cooling and ultimately result in a premature insulation system failure scenario. Note that motors used in enclosed or confined spaces may also need a general de-rating factor.



Minimum rear space behind fan cowl	
Motor Frame	Minimum mm
160	40
180	50
200	60
225	80
250	110
280	150
315 / 355	200

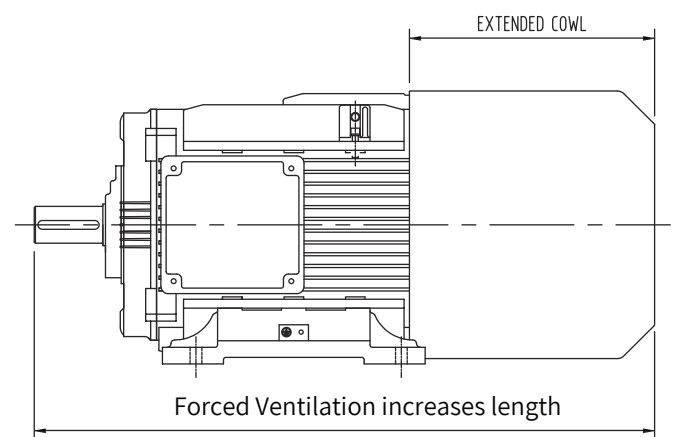


## VSD APPLICATIONS & FORCED VENTILATION

All EMT OMEC Premium series high efficiency electric motors are suitable for use with electronic soft starter and inverter based Variable Speed Drives (VSDs).

As a general rule of thumb an S1 rated motor may be used in a constant torque application at speeds between 25Hz and 60Hz (415V) without specific modifications. Speeds over 60Hz will result in an available torque drop off and a rated kW upgrade may be required to cope with the load demand. At speeds below 25Hz the integral cooling fan efficiency drops to the point that an additional fixed speed forced ventilation cooling fan may be required to ensure adequate cooling airflow is maintained. In these instances above, where an application approaches these characteristics we recommend that you contact our engineers for specific application advice.

Further to the cooling requirements of electronically speed adjusted motors it may be required to include insulated bearings, bearing housings, earth brushes or a combination of the above to limit the potential bearing damage due to the presence of circulating eddy current spikes created by PWM inverter based controllers. All VSD drives have differing characteristics as do site specific supplies. As a broad rule of thumb we would suggest the inclusion of this type of protection for motors 75kw and above, again feel free to contact our Engineers for application specific advice.



## ROTOR DESIGN

All EMT OMEC Premium series electric motors have rotors constructed from high quality carbon steel. The resin coated lamination steel is carefully selected taking into account its mineral composition, electrical and mechanical properties to ensure that the rotating core is electrically efficient and reduces eddy current core losses to a minimum. The end ring design includes integral cooling fins which completes the internal air circuit. This helps the motor to effectively distribute the internal heat generated to the outer casing where heat loss is most effective. This reduces overall heat build up and lengthens the expected life of the motors resin impregnated insulation systems.



## INSULATION SYSTEM

All EMT OMEC Premium series high efficiency motors are constructed using a vacuum impregnated class H insulation. The vacuum impregnated windings provides benefits such as

- Greater strength and rigidity
- Improved protection against moisture and foreign contamination
- Improved dielectrics
- Higher resistance to ground
- Lower maintenance
- Longer life
- Lower Total Cost of Ownership

All electrical designs are optimised to guarantee a Class B, 80° C working temperature rise above ambient at full load under normal operating conditions. Our class H insulation system has a working thermal limit of 125° C above the base 40° C ambient. This is an additional 20° C over the protection provided by the class F insulation systems found in other industrial motors. Further to this the class H insulation has a short term duration withstand rating of a further 15° C. This creates an insulation system with a maximum duty temperature of 165° C with transient peaks up to 180° C.

Hot spot margin	10		15
Permissible maximum winding temperature rise above base without derating	80	105	125
Rated Ambient temperature base	40	40	40
<b>Maximum winding temperature limits</b>			
Insulation Class	B - 130 ° C	F - 155 ° C	H - 180 ° C

This huge thermal safety margin for a motor with a design temperature rise of just 80° C maximum provides ultimate levels of protection for tough motor applications where unusually high ambient temperatures are common,

multiple start cycles are present, or heavily fluctuating loads create elevated temperature cycles. With heat related degradation being the key enemy of motor insulation integrity our Class H system ensures that our EMT OMEC Premium series motors will outlast most.

## BEARINGS SIZE & REGREASING

All EMT OMEC motors are fitted with high quality branded bearings across the series. Frames 160 and up are regreasable at both the drive and non-drive ends. See the below tables for standard recommended regreasing intervals. Users should be aware that non standard duty applications in vertical installations, high ambient temperature, higher speed and high load applications may need reduced grease intervals.

The motors are supplied as standard with C3 clearance ball bearings in motors up to and including a 280 frame size with larger frames most commonly used on heavy duty applications using pulleys and belts have a ball / roller arrangement as standard. All frame sizes are designed in a manner that allows standard bearing selections to be changed to customise the motor to its specific duty. This includes the ability to interchange ball and roller bearings as well as angular contact bearings without modification to any motor component parts. Care should taken selecting bearings, it should be noted that roller bearings require a radial load to ensure correct operation and are in general not suitable for direct coupling arrangements as well as most 2 pole speed applications.

## BALANCING & VIBRATION

Rotors are dynamically balanced using a half key in accordance with IEC 60034-14 standards. Motor frames 160 to 280mm are supplied balanced to grade normal. Larger motors frames are supplied balanced to grade reduced as standard. This high level of balance ensures low levels of vibration once installed ensuring longer bearing life and enhanced mechanical durability.

## Typical Bearing sizes and Regrease Intervals - Premium Series IE3 range

STANDARD HORIZONTAL MOUNT ( IM1001 )									
Frame Size	Motor Poles	Motor Type	Bearing size		Regrease qty (g)	Regrease Intervals- hours			
			ND	NDE		2P	4P	6P	8P
160	2 - 8	M3	6309 C3	6309 C3	20	7500	15000	22500	29000
180	2 - 8	M3	6311 C3	6311 C3	30	6000	13000	19500	26500
200	2 - 8	M3	6312 C3	6312 C3	40	5700	11500	17000	23000
225	2	M3	6313 C3	6313 C3	40	5700			
	4 - 8		6313 C3	6313 C3	40		10000	16000	21000
250	2	M3	6314 C3	6314 C3	40	5000			
	4 - 8		6314 C3	6314 C3	50		9000	13500	18000
280	2	M3	6314 C3	6314 C3	60	3000			
	4 - 8		6317 C3	6317 C3	60		8000	12000	16000
315	2	Y2	6317 C3	6317C3	60	3000			
	4 - 8		6319 C3	3619 C3	70		7000	10000	14500
			NU 319						
355	2	Y2	6317 C3	3617 C3	70	3000			
	4 - 8		6322 C3	6320 C3	80		7000	10000	14500
			NU 322						

### Vibration Grades

Rated Motor Speed rpm	Vibration Grade to IEC 60034-14	Maximum RMS value of vibration velocity mm/s	
		160 to 225	250 to 355
600-3600	Normal	2.8 mm/s	3.5 mm/s
600-1800	Reduced	1.12 mm/s	1.8 mm/s
1800-3600		1.8 mm/s	2.8 mm/s

### PAINT & CORROSION PROTECTION

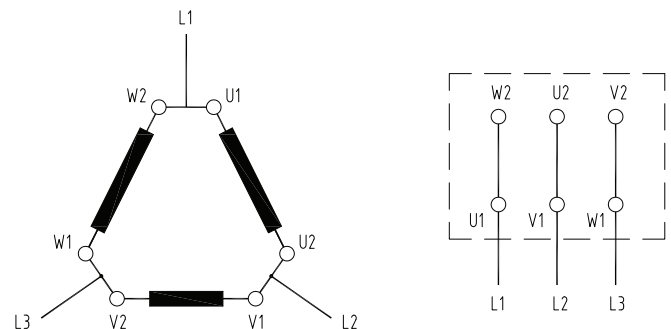
EMT OMEC Premium series high efficiency motors are differentiated from our other general motor product ranges by being finished in gloss electrical bright red orange RAL 2008 to a minimum DFT of 50 Microns. The paint process is a two coat based wet spray system as standard.

Special paint colours and processes may be requested to client or site specific specifications as and when required. This will need to be specified at the time of enquiry.

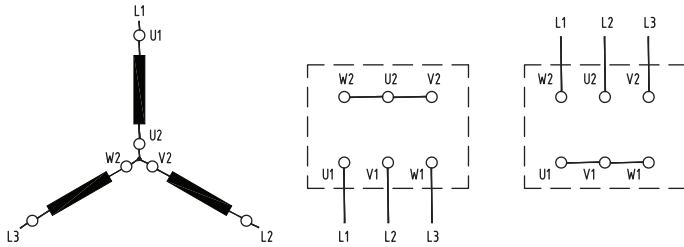
All of our Premium series motors are supplied with tropical protection of internal exposed bare metal surfaces. This ensures the durability of the motors when installed in both tropical and excessively humid industrial environments.

### TERMINATIONS

Terminal voltages and connections are marked on each motor's stainless steel rating plate. These detail 50Hz and 60Hz ratings in for Star and Delta connection configurations. All motors are designed to have connection six terminals with interconnecting link bridge connectors allowing users to choose connection logic at the time of installation. Note current motor design standards require all motors above 112 frame to be delta connected for direct on line or VSD starting at standard 415V, 50Hz or 440V, 60Hz Australian voltages. Star configuration allows for 690V voltage applications.



Delta Connected Winding 400 / 415V



Star Connected Winding 690V

Motor Frame Size	Winding Heater wattage
160	40 W
180	40 W
200	40 W
225	54 W
250	54 W
280	54 W
315	99 W
355	99 W

Heater Terminals in main or Separate Auxiliary Box

## OVER TEMPERATURE PROTECTION

EMT OMEC Premium series high efficiency motors all are supplied with PTC thermistors already installed and terminated to an auxiliary terminal box. These motors have both an alarm 150°C and a 180°C trip thermistor as standard.

All motors can be upgraded to include additional thermistors, klixon type bi-metal thermal overloads or PT100 thermocouples on request.

## HEATERS

All EMT OMEC premium series high efficiency motors can be equipped with strip heaters used to keep motors above ambient temperature when switched off. This helps prevent the build up of condensation within motor frames. These heaters are typically wound on to the winding overhang at one end of the motors stator winding. The leads are terminated into an auxiliary terminal box. Although mainly used in larger MV motors, larger frame LV motors can be equipped with 240V space heaters as an alternative, these are thermostatically controlled incaloy heaters preferred in some applications where a more robust heat source is required.

## MODIFICATIONS & UPGRADES

EMT OMEC has its own engineering workshop. This facility allows us to perform modifications and upgrade works under the control of our ISO 9001:2015 accredited quality management systems.

Accordingly a wide range of modifications can be undertaken to create special purpose motors, make adaptor frames to facilitate the replacement of old Imperial frame motors. Additionally we customize motors with various optional features such as

- Addition of brakes and clutches
- Insulated bearings and earth brushes for VSD applications
- 150 / 180 °C Thermistors standard in aux' terminal box PT 100 thermal protection
- Forced ventilation units
- Anti condensation heaters
- Tacho generator and encoders
- Vibration and Temperature Smart sensors
- Customised colours
- Extended shafts



# EMT OMEC Premium Series CAST IRON FRAME IE3 GENERAL PERFORMANCE DATA 50Hz 400V

- > Ratings 11kW to 315kW
- > IE3 efficiency at 75% and 100%
- > Multi-Voltage / Multi-Frequency Ratings
- > Right Hand side Terminal Box standard
- > Multi-Mount Terminal Box M3 series allows repositioning
- > Thermistors 1x 150 °C and 1x 180 °C as standard

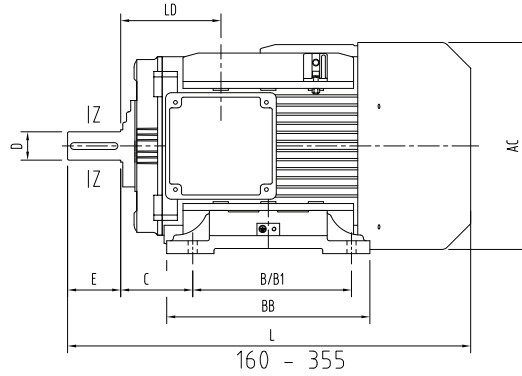
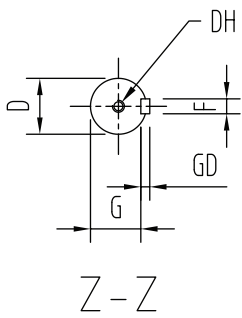
- > Cast Iron Robust frames
- > TEFC IP66 standard
- > Class H Insulation
- > VI resin Impregnation and Tropicalisation
- > Regreasable bearing design 160 - 355 frame
- > B3, B5 and B35 Mounts

Motor Part Code	Frame Design	Rated Output		IE3 National Standard Efficiency	EMT OMEC Motor Performance		Power Factor		Full Load Amps 400V	Full Load Torque	Locked Current / Rated Current	Locked Torque / Rated Torque	Max Torque / Rated Torque	Moment of inertia(J)	Net weight
					75% load	100% Load	75% load	100% Load							
		KW	RPM	%	%	%	cosØ	cosØ	Amps	Nm	% of FLC	% FLT	%Tmax	Kg-m <sup>2</sup>	Kg
PHE 160M2	M3	11	2958	91.2%	93.2%	93.1%	0.887	0.907	18.8	35.5	8.03	3.05	3.71	0.0549	110
PHE 160M4	M3	11	1476	91.4%	91.9%	91.7%	0.722	0.786	22.0	71.2	7.93	2.50	3.02	0.0724	120
PHE 160L6	M3	11	976	90.3%	91.5%	91.1%	0.675	0.742	23.5	107.7	6.94	2.04	2.78	0.1452	135
PHE 160MX2	M3	15	2941	91.9%	93.6%	92.9%	0.850	0.876	26.6	48.7	7.84	2.61	2.89	0.0635	125
PHE 160L4	M3	15	1476	92.1%	92.9%	92.7%	0.713	0.780	29.9	97.1	7.99	2.87	3.38	0.0929	140
PHE 180L6	M3	15	982	91.2%	92.1%	92.0%	0.700	0.762	30.9	145.7	6.45	2.07	3.10	0.2285	175
PHE 160L2	M3	18.5	2941	92.4%	93.6%	93.1%	0.858	0.880	35.6	60.1	7.67	2.25	3.14	0.0725	140
PHE 180M4	M3	18.5	1477	92.6%	93.4%	93.3%	0.741	0.798	35.9	119.6	7.89	2.50	3.69	0.1350	175
PHE 200L6	M3	18.5	984	91.7%	92.3%	92.3%	0.712	0.774	37.4	179.5	7.47	2.42	3.14	0.3420	220
PHE 180M2	M3	22	2953	92.7%	93.4%	93.2%	0.849	0.875	39.0	71.1	7.80	2.72	3.58	0.1025	175
PHE 180L4	M3	22	1478	93.0%	93.4%	93.5%	0.719	0.789	43.0	142.1	7.99	2.47	3.80	0.1360	185
PHE 200LX6	M3	22	982	92.2%	92.6%	92.5%	0.725	0.784	43.8	213.7	7.64	2.37	3.14	0.3860	230
PHE 200L2	M3	30	2963	93.3%	93.7%	93.3%	0.831	0.861	53.9	96.6	7.60	2.41	3.47	0.1730	223
PHE 200L4	M3	30	1478	93.6%	93.9%	93.7%	0.758	0.813	56.8	193.8	8.80	2.60	3.56	0.2450	240
PHE 225M6	M3	30	984	92.9%	93.1%	92.9%	0.773	0.809	57.6	291.0	6.88	2.58	3.10	0.6250	300
PHE 200LX2	M3	37	2961	93.7%	94.0%	93.7%	0.843	0.872	65.4	119.3	7.69	2.35	3.40	0.1950	245
PHE 225S4	M3	37	1483	93.9%	94.1%	93.9%	0.787	0.835	68.1	238.4	8.18	3.16	3.90	0.3900	300
PHE 250M6	M3	37	987	93.3%	93.7%	93.5%	0.795	0.835	68.4	358.0	7.38	2.33	3.40	0.9850	425
PHE 225M2	M3	45	2959	94.0%	94.3%	94.1%	0.825	0.862	80.1	145.2	7.70	2.30	3.51	0.3250	310
PHE 225M4	M3	45	1484	94.2%	94.3%	94.2%	0.803	0.833	82.8	289.5	7.98	3.14	3.90	0.4500	330
PHE 250M6	M3	45	985	93.7%	93.9%	93.7%	0.794	0.840	82.0	421.0	7.40	2.70	2.50	1.7320	450
PHE 250M2	M3	55	2969	94.3%	94.5%	94.3%	0.879	0.891	94.5	176.9	7.13	2.03	3.30	0.3950	385
PHE 250M4	M3	55	1484	94.6%	94.8%	94.6%	0.814	0.856	98.0	354.1	7.87	2.53	3.60	0.6400	400
PHE 280S6	M3	55	986	94.1%	94.3%	94.1%	0.787	0.840	100.0	520.0	7.50	3.20	2.50	1.9650	475
PHE 250M2	M3	75	2968	94.7%	94.9%	94.8%	0.867	0.884	124.6	241.3	8.10	2.39	3.15	0.6830	415
PHE 250M4	M3	75	1480	95.0%	95.5%	95.0%	0.829	0.851	129.0	484.0	6.31	1.98	2.72	1.0450	425
PHE 280M6	M3	75	990	94.6%	94.8%	94.6%	0.775	0.826	138.0	706.0	7.40	2.00	3.15	3.7230	580
PHE 280S2	M3	90	2978	95.0%	95.5%	95.5%	0.858	0.880	155.0	288.5	7.85	2.44	3.75	0.7650	545
PHE 280S4	M3	90	1491	95.2%	96.0%	95.9%	0.821	0.859	157.7	576.4	6.31	1.98	2.72	1.3960	600
PHE 315S6	Y2	90	990	94.9%	95.3%	95.1%	0.784	0.830	164.5	853.0	7.60	2.00	3.12	4.5260	920
PHE 280M2	M3	110	2977	95.2%	95.9%	96.1%	0.844	0.866	183.9	352.9	8.56	3.02	3.54	1.5580	600
PHE 280M4	M3	110	1488	95.4%	95.8%	95.4%	0.834	0.859	186.5	705.8	7.50	2.24	3.05	1.5750	650
PHE 315ML6	Y2	110	990	95.1%	95.3%	95.2%	0.786	0.830	198.8	1039.9	7.85	2.00	3.05	5.1570	1120
PHE 315S2	Y2	132	2973	95.4%	95.4%	95.4%	0.894	0.906	220.5	424.2	7.04	1.81	3.18	1.7260	980
PHE 315S4	Y2	132	1486	95.6%	96.3%	95.9%	0.879	0.890	278.7	1060.9	7.93	2.92	3.22	3.6780	1017
PHE 315ML6	Y2	132	991	95.4%	96.3%	96.0%	0.794	0.837	237.1	1271.5	7.90	2.76	3.65	5.6850	1185
PHE 315ML2	Y2	160	2970	95.6%	95.9%	95.6%	0.888	0.897	269.2	514.8	6.68	1.78	2.98	1.9410	1090
PHE 315ML4	Y2	160	1489	95.8%	96.2%	96.1%	0.826	0.864	278.0	1026.8	8.00	2.95	4.14	4.4720	1085
PHE 355ML6	Y2	160	992	95.6%	96.0%	95.8%	0.814	0.847	284.6	1540.5	7.12	1.87	3.25	9.5700	1705
PHE 315ML2	Y2	200	2966	95.8%	96.3%	96.0%	0.902	0.906	331.7	644.2	6.41	1.87	3.01	2.2120	1190
PHE 315ML4	Y2	200	1487	96.0%	96.5%	96.3%	0.863	0.885	338.9	1258.2	6.12	2.64	3.34	4.8560	1200
PHE 355ML6	Y2	200	991	95.8%	96.2%	96.0%	0.816	0.849	354.0	1926.8	7.13	1.94	3.32	9.8900	1890
PHE 355ML2	Y2	250	2979	95.8%	96.2%	96.2%	0.888	0.903	415.6	801.3	7.77	1.95	3.54	3.8490	1710
PHE 355ML4	Y2	250	1489	96.0%	96.5%	96.3%	0.870	0.888	421.7	1603.3	7.40	2.29	3.48	7.3640	1740
PHE 355ML6	Y2	250	991	95.8%	96.3%	96.0%	0.847	0.868	433.1	2410.6	6.74	1.76	2.97	11.1000	2000
PHE 355ML2	Y2	280	2973	95.8%	96.2%	96.0%	0.897	0.909	462.9	899.3	6.93	1.68	3.11	3.9490	1870
PHE 355ML4	Y2	280	1487	96.0%	96.8%	96.5%	0.880	0.893	468.9	1798.2	6.50	2.03	3.11	8.0140	1870
PHE 355ML6	Y2	280	990	95.8%	95.8%	95.4%	0.827	0.858	494.0	2701.9	7.23	1.92	3.13	11.3000	2080
PHE 355ML2	Y2	315	2979	95.8%	96.6%	96.5%	0.899	0.920	512.1	1009.5	8.12	2.09	3.78	3.9950	1870
PHE 355ML4	Y2	315	1487	96.0%	96.5%	96.5%	0.860	0.882	534.2	2023.0	7.15	2.25	3.36	9.1000	1870

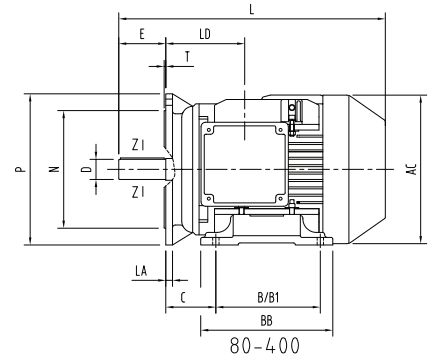




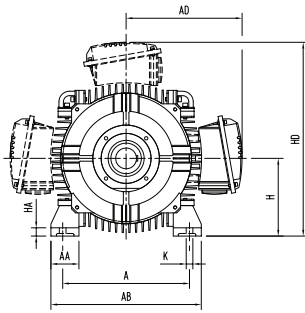
# EMT OMEC Premium Series CAST IRON FRAME IE3 GENERAL PERFORMANCE DATA 50Hz 400V



B3-Foot mount

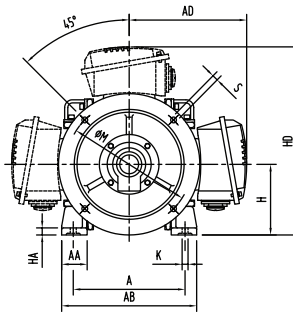


B5 / B35 Foot / Flange

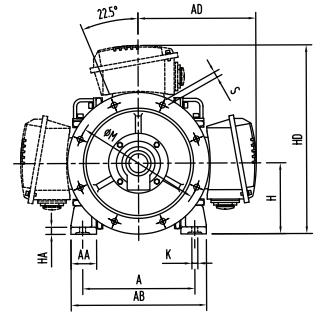


160 - 355

B3 Foot mount end view



160-200



225-355

B5 Flange mount dimensions end view

Frame Size	Pole	Frame H	Shaft Extension					Foot Centres			General Dimensions										B5 Flange Dimensions						
			D	E	F	G	DH	A	B	B1	C	K	AA	AB	AC	BB	HA	HD	AD	LD	L	P	N	M	S	LA	T
160M	2-8	160	42	110	12	37	M16	254	210	-	108	15	55	304	315	300	14	430	270	146	665	350	250	300	4 x 19	15	5
160L	2-8	160	42	110	12	37	M16	254	254	-	108	15	55	304	315	300	14	430	270	146	665	350	250	300	4 x 19	15	5
180M	2-4	180	48	110	14	42.5	M16	279	241	-	121	15	71	350	360	299	22	465	285	161	690	350	250	300	4 x 19	15	5
180L	2-8	180	48	110	14	42.5	M16	279	279	-	121	15	71	350	360	337	22	465	285	161	730	350	250	300	4 x 19	15	5
200L	2-8	200	55	110	16	49	M20	318	305	-	133	19	76	388	400	368	22	535	335	186	780	400	300	350	4 x 19	17	5
225S	4-8	225	60	140	18	53	M20	356	286	-	149	19	81	430	450	368	22	580	355	189	810	450	350	400	8 x 19	20	5
225M	2	225	55	110	16	49	M20	356	311	-	149	19	81	430	450	393	22	580	355	189	820	450	350	400	8 x 19	20	5
225M	4-8	225	60	140	18	53	M20	356	311	-	149	19	81	430	450	393	22	580	355	189	850	450	350	400	8 x 19	20	5
250M	2	250	60	140	18	53	M20	406	349	-	168	24	94	484	485	445	30	645	395	207	911	550	450	500	8 x 19	22	5
250M	4-8	250	70	140	18	58	M20	406	349	-	168	24	94	484	485	445	30	645	395	207	911	550	450	500	8 x 19	22	5
280S	2	280	65	140	18	58	M20	457	368	-	190	24	101	542	550	485	30	705	425	215	940	550	450	500	8 x 19	22	5
280S	4-8	280	80	140	20	67.5	M20	457	368	-	190	24	101	542	550	485	30	705	425	215	1015	550	450	500	8 x 19	22	5
280M	2	280	65	140	18	58	M20	457	419	-	190	24	101	542	550	536	30	705	425	215	990	550	450	500	8 x 19	22	5
280M	4-8	280	80	140	20	67.5	M20	457	419	-	190	24	101	542	550	536	30	705	425	215	1065	550	450	500	8 x 19	22	5
315S	2	315	65	140	18	58	M20	508	406	-	216	28	120	630	625	570	45	845	530	257	1170	660	550	600	8 x 24	22	5
315S	4-8	315	85	170	22	71	M20	508	406	-	216	28	120	630	625	570	45	845	530	257	1200	660	550	600	8 x 24	22	5
315M	2	315	65	140	18	58	M20	508	457	508	216	28	120	630	625	680	45	845	530	257	1290	660	550	600	8 x 24	22	5
315M	4-8	315	85	170	22	71	M20	508	457	508	216	28	120	630	625	680	45	845	530	257	1320	660	550	600	8 x 24	22	5
315L	2	315	65	140	18	58	M20	508	457	508	216	28	120	630	625	680	45	845	530	257	1290	660	550	600	8 x 24	22	5
315L	4-8	315	85	170	22	71	M20	508	457	508	216	28	120	630	625	680	45	845	530	257	1320	660	550	600	8 x 24	22	5
355M	2	355	75	140	20	67.5	M24	610	500	560	254	28	120	730	700	750	52	970	615	284	1526	800	680	740	8 x 24	22	5
355M	4-8	355	100	170	25	86	M24	610	500	560	254	28	120	730	700	750	52	970	615	284	1556	800	680	740	8 x 24	22	5
355L	2	355	75	140	20	67.5	M24	610	500	560	254	28	120	730	700	750	52	970	615	284	1526	800	680	740	8 x 24	22	5
355L	4-8	355	100	170	25	86	M24	610	500	560	254	28	120	730	700	750	52	970	615	284	1556	800	680	740	8 x 24	22	5



### High Voltage Motors

- o High voltage motors at 3,3kV, 6,6kV and 11kV.
- o kW ratings from 400kW to 10,000kW
- o Cast Iron motors to 500mm frame approximately 1000kW
- o Fabricated frame motors to 1000mm and 10,000kW
- o Motors designed to suit application
- o All mounting arrangements B3 B5 B35 and Vertical
- o Slipring motors available in all mount variations
- o We manufacture bespoke new for old replacements

### Standard IE2 Low Voltage Motors

- o Single phase CRCS and CR motors to 2,2kW
  - o 0.18kW to 2,2kW, 2 and 4 Pole Speeds
  - o Class F with B rise
  - o B3, B5, B35, B14A and B14B mounts available
  - o IP 55 Multi Mount design
- o Three Phase IE2 Aluminium Frame Motors 0,09kW to 15kW
  - o 0,09 to 315kW ratings, 2, 4 and 6 Pole Speeds
  - o Class F with B rise
  - o IP 55 / 56 Design
  - o B3, B5, B35, B14A and B14B mounts available
  - o IP 55 Multi Mount design
- o Three Phase IE2 Cast Iron Frame Motors 2,2kW to 315kW
  - o 2,2 to 315kW ratings, 2, 4 and 6 Pole Speeds
  - o Class F with B rise
  - o B3 and B35 mounts available
  - o IP 55 / 56 Design
- o Nema Frame 56C frame motors
  - o Available in single and three phase
  - o Various common speeds and kW

## Variable Speed Drives

- o Full range to suit all EMT OMEC motors
- o Single phase VSDs 240V to three phase 240V
- o Three phase drives all voltages
- o Various IP ratings available as well as full cabinets

## Motor repair services

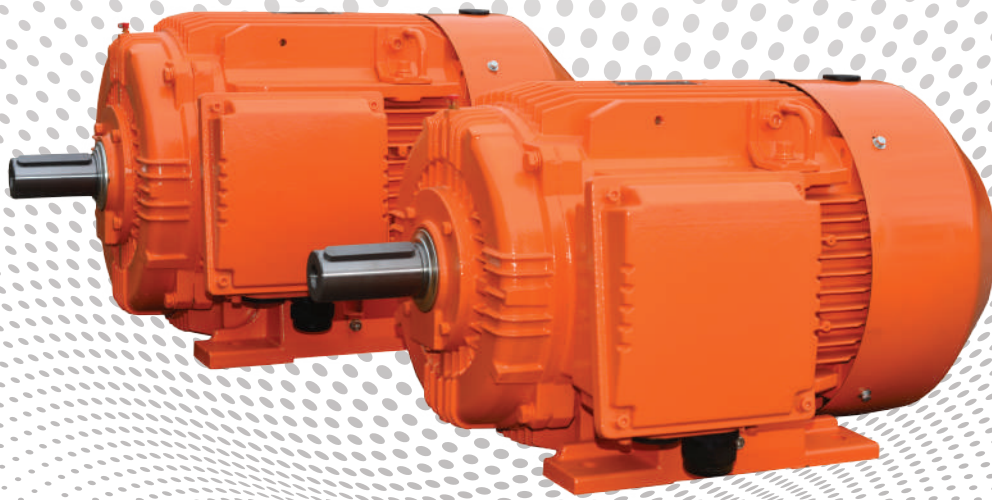
- o Full Motor rewind and repair facility within our own works
- o Motor service contracts undertaken
- o Installation and alignment services
- o Fabrication of special mounting bases adaptors

## Engineering Services

- o General Mechanical and Electrical engineering services
- o Machining of special components
- o Maintenance Services and Contracts
- o Asset Management

## EMT Projects

- o EMT's project division undertakes complete plant upgrade projects.
- o The team has many years of experience in the maintenance and upgrade of Plant and Equipment and can also undertake longer term project based work.



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