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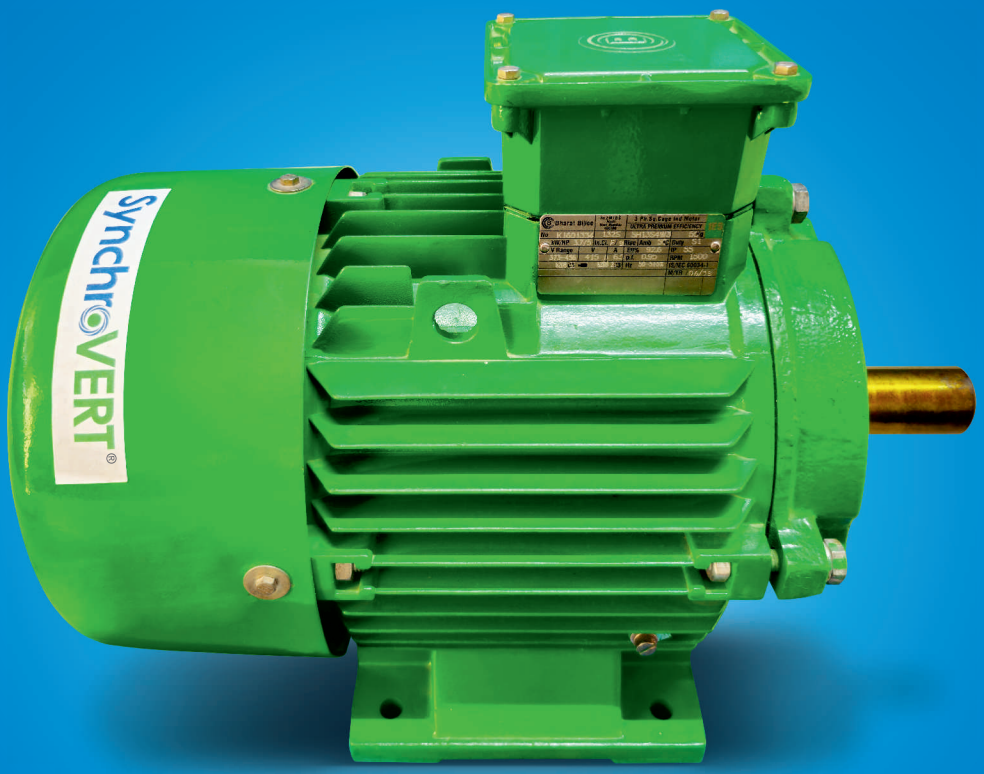
Bharat Bijlee

SynchroVERT®

IE4 & IE5 Motors



Super Premium and Ultra Premium Energy Efficient Motors

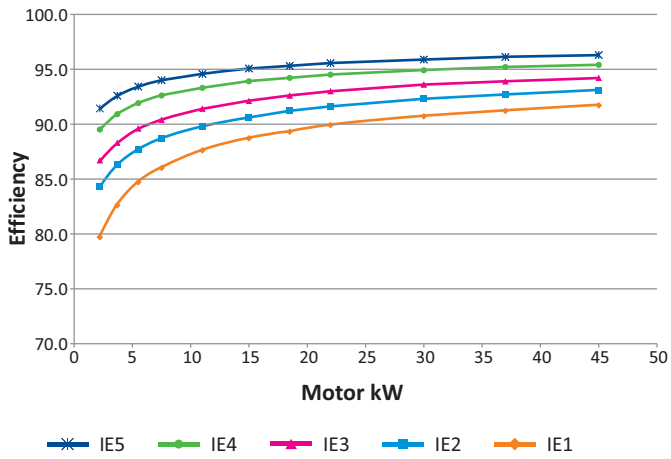
Bharat Bijlee's SynchroVERT IE4 & IE5 Line Start Permanent Magnet Synchronous Motors (LS PMSM) deliver upto 55% lower energy losses than IE2 motors. Our patented LS PMSM technology enables the motor to operate with both Direct On Line (DOL) and Variable Frequency Drive (VFD) systems.

Typically, induction motors are chosen to operate at 70-80% of their rated capacity. In contrast, our SynchroVERT motors are designed to run at 100% of their rated capacity, enabling the selection of one size lower motor rating and its corresponding VFD. This innovation not only reduces CapEx but also shortens the payback period and achieves significant energy savings year-on-year.

- Super Premium IE4 & IE5 class of efficiency as per IEC 60034-30-1
- Operates without a VFD
- Line Start Permanent Magnet Synchronous Motor (LSPMSM) technology*
- Remarkably short payback periods
- Patented Product

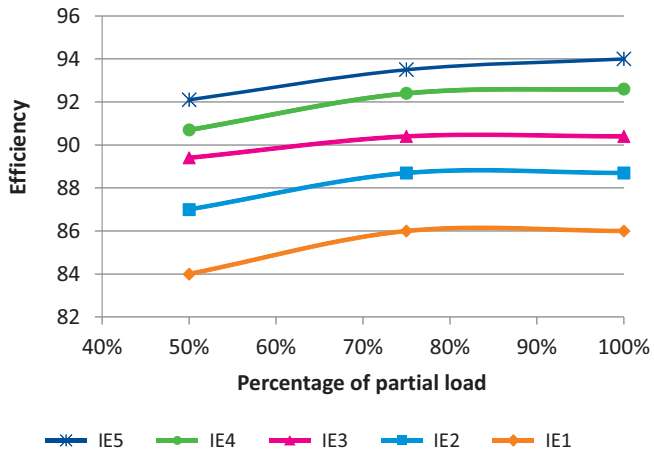
Advantages of SynchroVERT® Motors

Efficiency as per IEC 60034-30-1
IE5 Efficiency higher than other classes



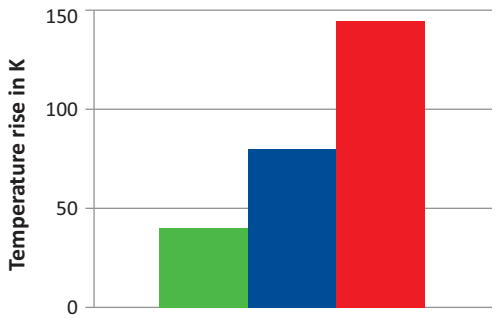
Efficiencies of IE4 & IE5 are 5 to 12% higher than IE1.

7.5kW, 4P, 132M frame efficiency comparision on partial load



Efficiencies of IE4 & IE5 at partial load are much higher than IE2 e.g. for a 3.7 kW motor from 5% at full load to 7% higher at half load.

Low temperature rise



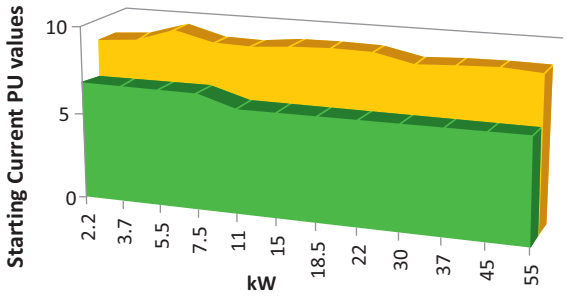
Temperature rise classes and SynchroVERT® temperature rise

IE4 & IE5 motor: 40K Class B: 80K Class F: 145K

Low temperature reduces thermal load on AHUs (in airconditioning units), and improves overall efficiency.

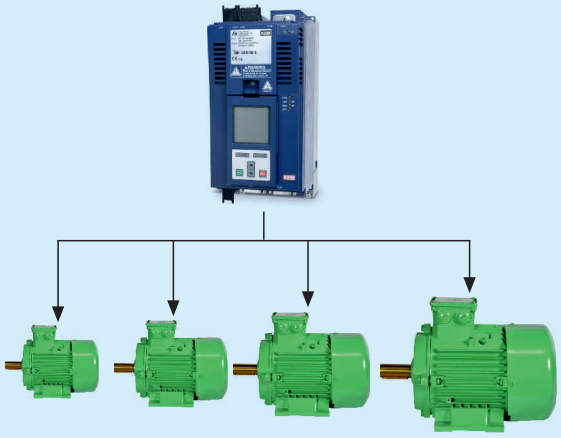
* Temperature rise for 40°C ambient.

Low starting current

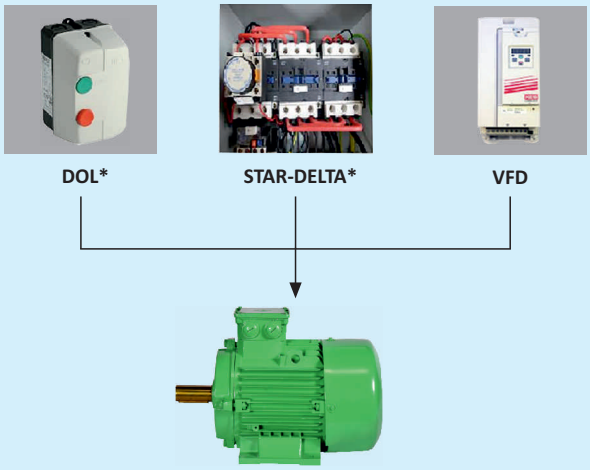


SynchroVERT® IE4 & IE5 motor Standard motor

Low starting currents compared to IE2/IE3 eliminates need of switchgear and/or cable replacement.



- VFD operation suitable from 5Hz to 100Hz.
- Multiple motors synchronized with one common VFD instead of individual VFDs with encoder feedback.
- VFD is recommended for smooth starting to overcome cogging torque due to PM.



*LSPMSM motors has cogging torque due to strong PM during starting in DOL, Star-Delta.

Product Range

	IE4: Super Premium Efficiency				IE5: Ultra Premium Efficiency
Type	**Safe Area**			**Flame proof: ATEX certified**	
Frame Size	112 - 250M	132	200L - 250M	F112 - F180L	132M - 225M
kW Range	1.5 - 55	3.7 - 7.5	18.5 - 37	1.5 - 18.5	3.7 - 45
Pole	4	2	6	4	4
Voltage	415V + /-10%	415V + /-10%	415V + /-10%	415V + /-10%	415V + /-10%
Frequency	50Hz + /-5%	50Hz + /-5%	50Hz + /-5%	50Hz + /-5%	50Hz + /-5%

Energy Savings in IE4 Motors

kW	Pole	Frame	% Efficiency		Savings	
			IE4	IE2	kWh/ annum	Rs/ annum
2.2	4	112M	89.5	84.3	910	8188
3	4	112M	90.4	85.5	1141	10270
3.7	4	112M	90.9	86.3	1302	11716
3.7	4	132S	90.9	86.3	1302	11716
5.5	4	132S	91.9	87.7	1720	15477
7.5	4	132M	92.6	88.7	2137	19230
11	4	160M	93.3	89.8	2757	24814
15	4	160L	93.9	90.6	3491	31420
18.5	4	180M	94.2	91.2	3876	34885
22	4	180L	94.5	91.6	4422	39800
30	4	200L	94.9	92.3	5343	48086
37	4	225S	95.2	92.7	6289	56600
45	4	225M	95.4	93.1	6992	62927
55	4	250M	95.7	93.5	8114	73022
3.7	2	132S	89.7	85.5	1216	10942
5.5	2	132S	90.9	87	1627	14647
7.5	2	132S	91.7	88.1	2005	18047
18.5	6	200L	94.2	90.4	4953	44579
22	6	200L	93.7	90.9	4339	39054
30	6	200L	94.2	91.7	5209	46885
37	6	225M	94.5	92.2	5860	52742

Energy Savings in IE5 Motors

kW	Pole	Frame	% Efficiency		Savings	
			IE5	IE2	kWh/ annum	Rs/ annum
3.7	4	132S	92.6	86.3	1750	15751
5.5	4	132S	93.4	87.7	2296	20667
7.5	4	132M	94	88.7	2860	25744
11	4	160ML	94.6	89.8	3729	33563
15	4	160L	95.1	90.6	4701	42305
18.5	4	180M	95.3	91.2	5236	47126
22	4	180L	95.6	91.6	6029	54265
30	4	200L	95.9	92.3	7321	65887
37	4	225S	96.1	92.7	8473	76256
45	4	225M	96.3	93.1	9637	86732

Motor Type	Frame Range	kW Range	Polarity
IE4 Safe area	112 to 250	1.5 to 55	4P
IE4 Safe area	132	3.7 to 7.5	2P
IE4 Safe area	200L to 225	18.5 to 30	6P
IE4 Hazardious area	112 to 180	1.5 to 18.5	4P
IE5 Safe Area	132 to 225	3.7 to 45	4P

Energy saving/annum based on 6000 hrs running.

Rs saving/annum based on energy rate of Rs.9/kWH.

SUPER PREMIUM (IE4) & Ultra-Premium (IE5) EFFICIENCY

The Case for Energy Efficient Motors and Motor-driven Systems

Global warming and its impact on the environment is an ever-growing concern. Governments and companies across the world are actively seeking solutions to a problem that has the potential to profoundly alter the future of our planet. The ever increasing cost of fuel and electricity adds to the complexity, and directly affects not just industries but entire economies. Renewable energy is only part of the solution. Electric motors are estimated to consume about 65% of the electrical energy consumed by industry. Moreover, energy costs over the typical life cycle of a motor can be as high as twenty times the original capital cost of the motor. Energy efficient motors thus offer an opportunity to significantly reduce energy costs and their collateral environmental effects. Increasingly, there is a strong economic-and environmental-case for choosing high efficiency motors over conventional ones. Instead of repairing or rewinding a failed motor, organizations may profitably consider replacing them with energy efficient motors or motor driven systems that can bring about significant reduction in energy consumption.

Bharat Bijlee's Patented Super Premium IE4 & Ultra Premium IE5 Motors - Elevating Efficiency & Sustainability

Experience the next generation of electric motors with Bharat Bijlee's SynchroVERT series of Line Start Permanent Magnet Synchronous Motors (LS PMSM). Designed for zero slip and delivering a precise rated speed of 1500 RPM for 4 pole, these advanced synchronous motors redefine performance and reliability.

With cutting-edge technology, Bharat Bijlee's IE4 & IE5 motors provide: **exceptional efficiency,** reducing energy consumption; **lower temperature rise,** enhancing durability and operational stability; **higher power factor** ensuring optimized power utilization; **Lower Full Load Current (FLC) & starting current,** minimizing stress on electrical systems.

Committed to sustainability, these motors help reduce carbon emissions. Bharat Bijlee's innovation is powering the future–efficient, reliable, and environmentally responsible.

Enhanced Performance and Versatile Applications

With an LS PMSM motor, pumps and fans operate 3% to 5% faster, ensuring higher discharge and air delivery. However, if an existing motor is already at full capacity, modifications such as impeller redesign or Variable Frequency Drive (VFD) integration are necessary for optimal performance.

For various applications–including spinning frames and textile machines, the increased speed directly translates to improved output. When replacing induction motors, ensuring the LS PMSM motor's RPM matches the existing motor shaft speed via VFD adjustment, pulley selection, or impeller trimming enhances energy efficiency beyond conventional motors.

Unmatched AHU (HVAC) Efficiency with LS PMSM Motors

Elevate your Air Handling Unit (AHU) performance with our SynchroVERT series IE4 and IE5 motors, designed for maximum efficiency. These advanced motors achieve significantly higher energy savings, designed to run at 100% of its rated capacity reducing CapEx, operating with 50% lower temperature rise compared to traditional induction motors. The lower motor surface temperature near 50% level optimizes AHU cooling performance, ensuring long-term operational excellence.

Experience the power of cutting-edge efficiency with LS PMSM technology–where every watt counts!

<table>
<tr><th rowspan="2">Frame Size</th><th colspan="2">Bearing nos.
C3 Clearance</th><th rowspan="2">Terminal box location</th><th colspan="2">Terminals</th><th rowspan="2">No. & size of cable entries</th><th rowspan="2">Max. Cond. Cross Sec. area mm</th></tr>
<tr><th>DE</th><th>NDE</th><th>No.</th><th>Size</th></tr>
<tr><td>112M</td><td>6206 2Z</td><td>6205 2Z</td><td>TOP</td><td>6</td><td>M4</td><td rowspan="3">2 x 1"</td><td rowspan="2">10</td></tr>
<tr><td>132S, 132M</td><td>6208 2Z</td><td>6208 2Z</td><td rowspan="2">TOP</td><td rowspan="2">6</td><td rowspan="2">M5</td></tr>
<tr><td>160M, 160L</td><td>6309 2Z</td><td>6209 2Z</td><td>16</td></tr>
<tr><td>180M, 180L</td><td>6310 2Z</td><td>6309 2Z</td><td>TOP</td><td>6</td><td>M6</td><td>2x1-1/2"</td><td>35</td></tr>
<tr><td>200L</td><td>6312 2Z</td><td>6212 2Z</td><td>TOP</td><td>6</td><td rowspan="2">M8</td><td rowspan="3">2 x 2"</td><td>50</td></tr>
<tr><td>225S, 225M</td><td>6313</td><td>6213</td><td>TOP</td><td>6</td><td>50</td></tr>
<tr><td>250M</td><td>6315</td><td>6215</td><td>TOP</td><td>6</td><td>M10</td><td>70</td></tr>
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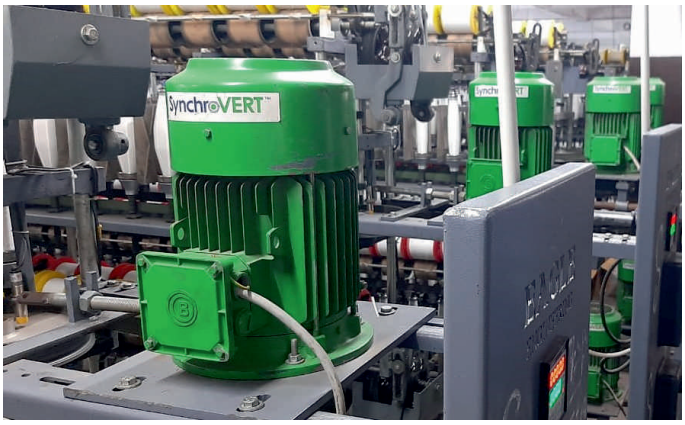
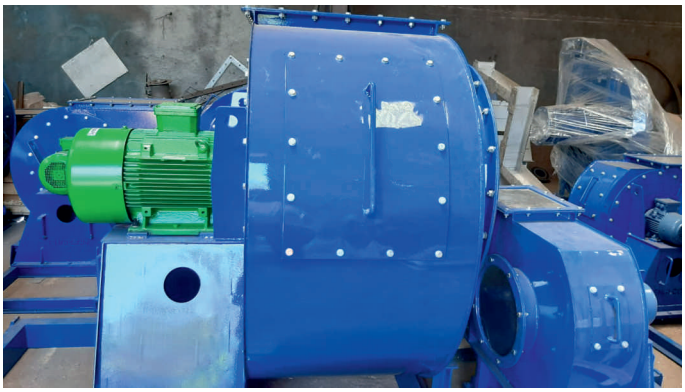
Note: L10 bearing life is 50,000 hours for directly coupled loads through flexible couplings only.

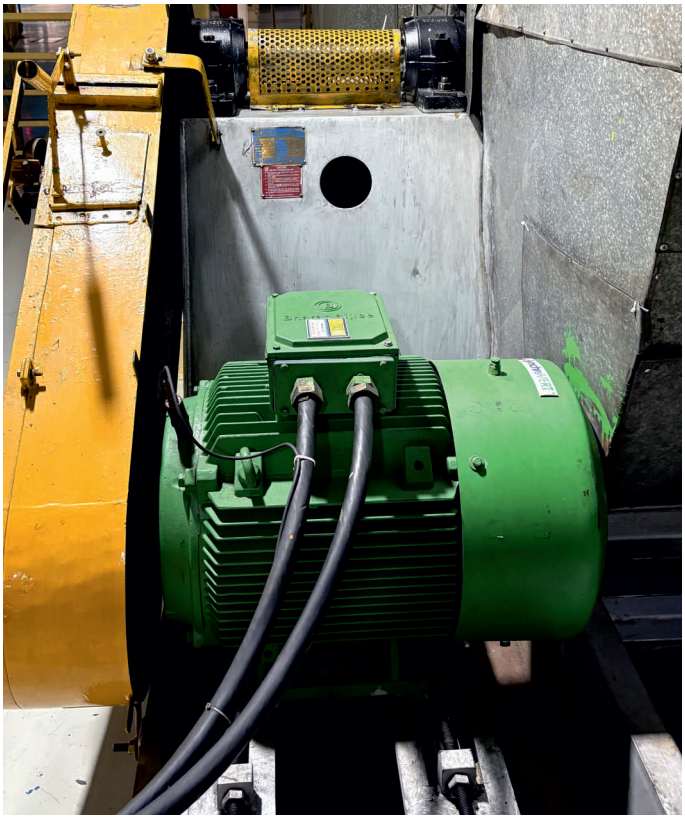
APPLICATIONS



3.7kW / 4P Motor for Textile TFO



7.5kW / 4P Motor for AHU



37kW / 4P Motor for Paint Booth Blower

37kW / 4P Motor for Agitator

15kW / 4P Motor for Humidifier Fan

ADDITIONAL FEATURES

- S1 duty (S2 to S9 available)
- Easily interchangeable with standard motor
- IP 55 (IP 56, IP66 available on request)
- Options of insulated bearing and/or roller bearing available on request
- Sealed bearings (2Z) with Unirex N3-ESSO grease
- On line re-greasing in 180M/180L frame and above
- C40 (EN8) steel shaft (EN24 or stainless steel shaft available on request)
- High endurable Class F insulation with low temperature rise
- VPI with Class H solvent-less resin, suitable of inverter duty
- Non-hygroscopic, tropicalized, suitable for high humidity environment

Patent for designs of IE4 and IE5 motors

Winner of CII's 'Most Innovative Energy Saving Product' 2016 and 2018

AHU of Edgetech Air System fitted with our SynchroVERT® IE4 motor won ACREX Award of Excellence 2017 for Technology Development & Energy Saving

Excellence in Innovation Award at the 12th Manufacturing Today Awards in 2024

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