Synchronous motor & drive package
Low Voltage motors and drives
Two new high-performance motor and drive packages
For industrial applications

The High Output package
- Power range from 1 to 315 kW
- Powerful, yet highly compact motor with up to two frame sizes smaller than conventional motor
- Enables cost effective machine designs

The IE4 Super Premium Efficiency package
- Power range from 11 to 200 kW
- Energy losses reduced by up to 40%
- Compliant to the upcoming efficiency class IE4
- Payback time less than two years – from energy savings alone

Both packages are based on perfectly controlled synchronous motor technology without permanent magnets materials. Optimized for VSD operation, they combine motor, drive and advanced software into complete solutions.
New revolutionary motor and drive package
For industrial applications

- Similar functionality compared to traditional induction motor and drive package
- Suitable for general purpose industrial applications such as pumps, fans and compressors
- Same stator technology with induction motor combined with novel synchronous reluctance rotor
- Performance comparable to permanent magnet motors, but without magnets
- Optimized for VSD operation – not suitable for direct-on-line fixed speed operation
Synchronous reluctance motor
Technology review
Synchronous reluctance technology
History - key technology steps

|------|------|--------|------|------|------|------|

(a) Simple salient pole (SP) rotor
(b) Axially laminated anisotropy (ALA) rotor
(c) Transversally laminated anisotropy (TLA) rotor
(d) J. K. Kostko 1923 (original patent)
(e) Vagati and Fratta 1980s & 1990s
Key to success
Elimination of rotor losses

Traditional induction motor

IE4 SynRM motor

High Output SynRM motor

100%  
I²R Rotor

I²R Stator

Other

60%

80 - 90%

I²R Stator

Other

Losses
Product offer
LV motor and drive package
Trademark and name
Special VSD motors

- High output synchronous motor and drive package
  - M3AL for aluminium motor frame 90-132 & ACS850
  - M3BL for cast iron motor frame 160-315 & ACS850
- IE4 Super premium efficiency synchronous motor and drive package
  - M3BL for cast iron motor frame 160-315 & ACS850

New ABB Drives product ranges support the synchronous reluctance control software. The first family with the revolutionary software is ACS850.
Standard ACS850 drive with new software
New motor control SynRM

- Supply voltage
  - 3-phase 380 V to 500 V
- Supply frequency
  - 50 Hz to 60 Hz
- Motor control:
  - ABB’s Direct torque control (IM or PM or SynRM)
- Output power
  - Up to 500 kW
- New variant code for synchronous reluctance motors
  - +N7004 option ”SynRM”
High output
LV motor and drive package
High output motor range
’Small and powerful’

- 90 to 132 aluminium frame, 1 to 55 kW
- 160 to 315 cast iron frame, up to 315 kW
- Up to two frame sizes smaller compared to induction motors
- Competitive product offering compared to traditional or other new technologies
- Minimum IE2 efficiency
- Optimized for VSD operation up to 6000 r/min
- Simplicity – no permanent magnets
- Extended bearing service intervals
- Advanced ABB open loop control software
- Global ABB support
Super premium efficiency LV motor and drive package
IE4 Super premium efficiency motor range
’Simply efficient’

- 160 to 315 cast iron frame, 11 to 200 kW
- Energy saver – IE4 efficiency
- Replaceable with induction motors – same size and output
- Reliable – cooler bearings and windings
- Service friendly – no permanent magnets
- Optimized for VSD operation
- Advanced ABB open loop control software
- Global ABB support
Draft of the efficiency IE4 with VSD supply

<table>
<thead>
<tr>
<th>Supply</th>
<th>Motor</th>
<th>Efficiency level on motor</th>
<th>Example Efficiency level IE4 15 kW</th>
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</thead>
<tbody>
<tr>
<td>DOL</td>
<td>SPE 160-315</td>
<td>Efficiency correspond to new IE4 levels</td>
<td>IEC IE4 level 94,0%</td>
</tr>
<tr>
<td>VSD</td>
<td>SPE 160-315</td>
<td>Efficiency correspond to new IE4 levels with sinusoidal voltage supply</td>
<td>IEC IE4 level 94,0%</td>
</tr>
</tbody>
</table>
Losses and efficiency in electrical motors

Energy facts - 37kW 1500rpm

Losses at 92.7% (IE2)

- Loss: 2.9 kW

Losses at 95.3% (IE4)

- Loss: 1.8 kW
- Reduced losses: 1.1 kW

Benefits

- 1.1 kW x 0.1 EUR/kWh x 8760 hrs = 964 EUR/year

If the efficiency level increases by 2.6 %-unit, the reduction of losses is 38%

Savings 964 EUR per year = 4.8 tons CO₂ (0.5 kg/kWh)
LV motor and drive package
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Need more information?
http://www.abb.com
Power and productivity for a better world™