Three-Phase-Synchronous-Motor with Permanent-Magnet

Operating and Installation Data:

Rated-
- power $P_N$: 500 kW
- voltage $U_N$: 690 V
- frequency $f_N$: 86.7 Hz
- current $I_N$: 480 A
- speed $n_N$: 650 1/min
- torque $M_N$: 7350 Nm

Connection: Y
Class of rating: S1
Absolute altitude: <1000 m ab.s.l.
Coolant temperature: 38 °C
Water (l/min): 30

Power factor $\cos \phi$: 0.95
Therm. class (design/util.): 155 (F) / 130 (B)

Standard: IEC/EN 60034-1
Tolerances: IEC/EN 60034-1

Calculated partial load data (sinusoidal supply):

<table>
<thead>
<tr>
<th>Speed $n / n_N$</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Torque $M / Nm$</td>
<td>11550</td>
<td>7350</td>
<td>6125</td>
<td>14700</td>
</tr>
<tr>
<td>Speed $n / min^{-1}$</td>
<td>0</td>
<td>650</td>
<td>780</td>
<td>650</td>
</tr>
<tr>
<td>Power $P / kW$</td>
<td>0</td>
<td>500</td>
<td>500</td>
<td>1000</td>
</tr>
<tr>
<td>Voltage $U / V$</td>
<td>8</td>
<td>649</td>
<td>690</td>
<td>690</td>
</tr>
<tr>
<td>Current $I / A$</td>
<td>745</td>
<td>480</td>
<td>431</td>
<td>980</td>
</tr>
<tr>
<td>Efficiency $\eta / %$</td>
<td>97.2</td>
<td>97.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power factor $\cos \phi / -$</td>
<td>0.95</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Additional technical ratings and information:

Operation with converter: Puls-frequency $f_p = 2.5$ kHz

Utilization acc. thermal class 155(F): 670V, 650rpm, 670kW; $I = 640A$

Efficiency $\eta > 97.0\%$ for rated torque within speed range 350 - 750rpm
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- frequency $f_N$: 86.7 Hz
- current $I_N$: 480 A
- speed $n_N$: 650 1/min
- torque $M_N$: 7350 Nm
- Power factor $\cos \varphi$: 0.95

Connection: Y
Class of rating: S1
Absolute altitude: <1000 m ab.s.l.
Coolant temperature: 38 °C
Water (l/min): 30
Therm. class (design/util.): 155 (F) / 130 (B)

Standard: IEC/EN 60034-1
Tolerances: IEC/EN 60034-1

Calculated Partial Load Data:

<table>
<thead>
<tr>
<th>$P/P_N$</th>
<th>1.00</th>
<th>0.75</th>
<th>0.50</th>
<th>0.25</th>
<th>0.10</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\cos \varphi$</td>
<td>0.95</td>
<td>0.97</td>
<td>0.98</td>
<td>0.99</td>
<td>~1.00</td>
</tr>
<tr>
<td>$\eta$ [%]</td>
<td>97.2</td>
<td>97.0</td>
<td>96.4</td>
<td>94.0</td>
<td>86.5</td>
</tr>
</tbody>
</table>

Physical data

Torque constant: 15.4 Nm/A
Voltage constant: 1067 V/min

Electrical time constant: 90.28 ms
Mechanical time constant: 2.31 ms
Thermal time constant: 42.06 min

Winding resistance (cold) / phase: 4.609 mΩ
Phase sequence inductance: 0.590 mH

Steady-state short-circuit current: 1245 A
Max. short-circuit current: 2403 A

Max. speed: 780 min\(^{-1}\)