ENERGY STORAGE SYSTEMS 7.0/9.0/X

PREFACE

ESS 7.0/9.0/X is a new modular lithium-ion based energy storage system, which stores the surplus of the collected solar energy for later use. Energy can either be directed into the storage system or be fed into the public grid via an inverter. Energy is available as required: in the evening, at night, or on a cloudy day.

With the ESS 7.0/9.0/X System, consumers of solar power become more independent from electricity prices and use their home-made eco-electricity when they need it.

ADVANTAGES

- Technical service online and by telephone
- Store during the day; use day and night
- Independent from daylight and public grid
- Economic, cost-cutting and ecofriendly
- Robust, safe and space saving
- Modular installation: the storage capacity can be adapted to your needs
- Subsidized by the Federal Government of Germany: KfW-Program 275

TECHNICAL PROPERTIES

- Powerful energy storage system
- New lithium-ion technology: a 10 year warranty covering the system’s current value (not in all countries)
- High efficiency: 95 %
- High discharge depth: 80 % DOD (Depth of Discharge)
- Durable: 5,000 full cycles
- Parallel installation of max. 12 modules possible
- High operational safety

SAFETY MEASURES

- Direct current relay and 2nd protection (chemical fuse) for a redundant battery cut-off
- Overvoltage and low voltage monitoring for each cell string with redundant battery cut-off
- Temperature monitoring for each cell string
- Current interrupt device (CID) in each cell
- Protection against a reboot after deep discharge or any other serious error
- Active current control as a function of cell voltage and temperature (derating)
- Closed metal, double housing

TECHNICAL PROPERTIES OF A SINGLE MODULE

<table>
<thead>
<tr>
<th>GENERAL PROPERTIES</th>
<th>ESS 7.0</th>
<th>ESS 9.0</th>
<th>ESS X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy (nom./usable)</td>
<td>6.74 kWh/5.39 kWh</td>
<td>8.5 kWh/6.8 kWh</td>
<td>10.06 kWh/8.05 kWh</td>
</tr>
<tr>
<td>Nominal voltage</td>
<td>55.5 V</td>
<td>54.0 V</td>
<td>54.0 V</td>
</tr>
<tr>
<td>Charge end voltage</td>
<td>61.5 V</td>
<td>61.5 V</td>
<td>61.5 V</td>
</tr>
<tr>
<td>Discharge end voltage</td>
<td>45.0 V</td>
<td>45.0 V</td>
<td>45.0 V</td>
</tr>
<tr>
<td>Capacity (nom./usable)</td>
<td>121.5 Ah/ 97.2 Ah</td>
<td>156.6 Ah/125.3 Ah</td>
<td>186.3 Ah/149.1 Ah</td>
</tr>
<tr>
<td>Max. charge</td>
<td>90 A</td>
<td>90 A</td>
<td>90 A</td>
</tr>
<tr>
<td>Max. discharge current</td>
<td>300 A (3 sec)</td>
<td>300 A (3 sec)</td>
<td>300 A (3 sec)</td>
</tr>
<tr>
<td>Max. discharge power</td>
<td>18 kW*</td>
<td>18 kW*</td>
<td>18 kW*</td>
</tr>
<tr>
<td>Weight</td>
<td>95 kg</td>
<td>97 kg</td>
<td>99 kg</td>
</tr>
<tr>
<td>Dimensions (W x H x D)</td>
<td>638 x 421 x 487 mm</td>
<td>638 x 421 x 487 mm</td>
<td>638 x 421 x 487 mm</td>
</tr>
<tr>
<td>Communication</td>
<td>CAN – SMA ready</td>
<td>CAN – SMA ready</td>
<td>CAN – SMA ready</td>
</tr>
<tr>
<td>Battery chemistry</td>
<td>Li-Ion NMC</td>
<td>Li-Ion NCA</td>
<td>Li-Ion NCA</td>
</tr>
<tr>
<td>Discharge depth</td>
<td>80% DOD</td>
<td>80% DOD</td>
<td>80% DOD</td>
</tr>
<tr>
<td>Full cycles</td>
<td>5,000</td>
<td>5,000</td>
<td>5,000</td>
</tr>
<tr>
<td>Battery Management System</td>
<td>Monitoring of cell voltage, cell temperature, current, derating and passive balancing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PERFORMANCE DATA

| Energy density (weight) | 71 Wh/kg | 87.6 Wh/kg | 101.6 Wh/kg |

DEVELOPED ACCORDING TO THE STANDARDS AND USER GUIDELINES FOR STATIONARY ENERGY STORAGE SYSTEMS

- VDE-AR-E 2510-50
- VDE-AR-E 2510-2
- DIN EN 62619 (draft)
- FNN note (04/2016 version)

USER INFORMATION

- Discharge temperature (cells): -2 °C to +45 °C
- Charge temperature (cells): -2 °C to +45 °C
- Recommended storage temperature: 10 °C to 25 °C
- Self discharge (cells): ca. 2 % per year
- Stand-by consumption: Active mode 5 W / Sleep mode 0.126 W
- Max. parallel connection (of batteries): 12 (additional hardware required)
- Protection class: IP 21
- European Conformity (CE): yes
- UN-test 38.3: yes
- Warranty: 10 year warranty covering the system’s current value (not in all countries)

*depends on the respective inverter