Intensium® Max+ 20M
Medium power lithium-ion container 1.1 MWh – 2.5 MW

Intensium® Max is Saft’s ready to install containerized Energy Storage System (ESS) designed for grid applications requiring both energy and power combined with high efficiency and long life.

Built with latest generation of NMC/NCA Li-ion technology, Intensium® Max+ 20M is a fully integrated storage system, combining high operational reliability, high energy density and excellent power capability. It enables dynamic cycling at variable depths of discharge, with energy throughputs equalling several full cycles per day.

Its modular design based on up to 18 parallel strings of 30 Synerion 24M modules allows a power rating of 2.5 MW.

Applications

■ Integration of variable renewables: smoothing, shaping and shaving
■ Ancillary services: frequency regulation, spinning reserves, voltage regulation, black-start
■ Microgrids: diesel bridging & spinning reserve

Features

■ Latest generation NMC/NCA Li-ion technology
■ Advanced industrial design offering highest safety and robustness
■ 20 years design life
■ Proven architecture for high availability
  • Modularity with one Battery Management Module (BMM) per string
  • Master Battery Management Module (MBMM) for global management
  • One PLC for external communication and remote monitoring
■ Sophisticated battery management for enhanced operability in grid applications
  • Monitoring and control of voltage and temperature at cell level
  • Real time supervision of charge and discharge current limits
  • Real time indication of State of Charge (SOC)
  • Balancing of State of Charge (SOC) between cells and strings
  • Alarms and faults management (contactor opening rules)
  • Indication of State of Health (SOH) integrating cycling and calendar aging
  • Black box registering alarms and number of cycles
■ Advanced thermal management system based on air conditioning unit and controllable fans

Nominal characteristics at + 25°C/+ 77°F

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage (V)</td>
<td>771</td>
</tr>
<tr>
<td>Capacity (C/5) (Ah)</td>
<td>1414</td>
</tr>
<tr>
<td>Rated energy (C/5) (kWh)</td>
<td>1090</td>
</tr>
<tr>
<td>Continuous discharge power (kW)</td>
<td>2500</td>
</tr>
<tr>
<td>Continuous charge power (kW)</td>
<td>2200</td>
</tr>
</tbody>
</table>

Mechanical characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length (mm)</td>
<td>6058</td>
</tr>
<tr>
<td>Width (mm)</td>
<td>2438</td>
</tr>
<tr>
<td>Height w/o HVAC (mm)</td>
<td>2896</td>
</tr>
<tr>
<td>Height incl HVAC (mm)</td>
<td>3820</td>
</tr>
<tr>
<td>Weight (tonnes)</td>
<td>19.5</td>
</tr>
</tbody>
</table>

Electrical characteristics at + 25°C/+ 77°F

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Voltage (V)</td>
<td>630</td>
</tr>
<tr>
<td>Maximum Voltage (V)</td>
<td>867</td>
</tr>
<tr>
<td>Maximum continuous discharge current (A)</td>
<td>3240</td>
</tr>
<tr>
<td>Maximum continuous recharge current (A)</td>
<td>2775</td>
</tr>
<tr>
<td>Discharge time at nominal power (h)</td>
<td>0.5</td>
</tr>
<tr>
<td>Time to full recharge (h)</td>
<td>0.5</td>
</tr>
<tr>
<td>Insulation resistance (1kVdc - OC)</td>
<td>&gt; 10mΩ</td>
</tr>
<tr>
<td>Dielectric</td>
<td>2.5kVdc</td>
</tr>
</tbody>
</table>

Operating conditions

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature</td>
<td>– 20°C/+ 55°C</td>
</tr>
<tr>
<td>Cycle efficiency (roundtrip, 1C)</td>
<td>96%</td>
</tr>
<tr>
<td>Self-discharge</td>
<td>&lt;5% / month</td>
</tr>
<tr>
<td>Calendar life at 25°C/+ 77°F</td>
<td>&gt; 25 years</td>
</tr>
<tr>
<td>Cycle life at 25°C/+ 77°F, 1C/1C, 80% DOD (*)</td>
<td>3500</td>
</tr>
<tr>
<td>Cycle life at 25°C/+ 77°F, 0.5C/0.5C, 80% DOD (*)</td>
<td>4400</td>
</tr>
</tbody>
</table>

(*) 20% capacity loss
• High cooling efficiency
• Temperature homogeneity

Safety management system with smoke detection, fire suppression system and alarms

Benefits
• Flexibility to provide both power and energy functions
• Low Total Cost of Ownership in complex applications
• optimum power to energy ratio enabling application stacking
• high energy throughput with minimum auxiliary consumption
• long cycle life and calendar life despite increased temperatures
• Quick and cost effective installation, with containers delivered « plug and play » ex factories due to ready to deploy solution fully assembled ex factory, plug and play
• Easy system integration: compatible with most power conversion systems in the market
• Excellent flexibility: scalable configuration of strings and containers
• High availability and serviceability due to parallel connection of strings
• Low maintenance - diagnostic interface available
• Remote supervision capability

Safety
• Safety driven design guarantees safe behavior in case of abuse usage or cell thermal runaway.
  • cell level: mechanical venting to release gases, materials selected for high temperature resistance
  • module level: electronic board for cell monitoring and balancing; structural protection to avoid thermal runaway propagation
  • string level: BMM to manage short-circuits, over-currents, overtemperature and over-voltages
  • container level: emergency push buttons, DC disconnect switch to perform maintenance, ground fault detection and fire suppression system

Fire suppression system performs the following action in case of smoke detection:
  • Release of inert gases (nitrogen or argon) to stop combustion
  • Contactor opening
  • Information on external displays and with audible alarms
  • Stop of air conditioning unit and fans
  • Sending alarm to control system

Storage conditions
Storage temperature       – 20°C/+ 55°C (– 4°F to + 131°F)
Storage time             6 months
Maximum altitude         3000 m above sea level
Maximum relative humidity 100% (controlled inside at 60%)

Compliance to standards
Cell safety               UL 1642, IEC 62619
Module safety             EN 50178 / IEC 60950
Container safety          IEC 61508 (SIL1)
EMC                      IEC 62 040-2 Cat C1 and C3
Container protection class (operation) IP 33
Container dimension and transport IS0668
Container corrosion protection ISO 12944 Level C5I
Seismic                   Eurocode zone 5 / IEEE 693 high level
Environment              IEC 60721 (dust, chemical / biological pollution, wind, precipitation, fire exposure)
Transport classification  UN 3480 - Class 9
Transport regulation compliance UN 3480 - ST/SG/AC.10/11 Rev 5 § 38.3
Marking                   CE
Directives               ROHS, REACH, WEEE
Manufacturing plants     ISO 9001, QS 9000, ISO 14000
Noise                     56 dB at 2 m

Battery System Architecture
18 Energy Storage System Units (ESSU)
  • 30 Synerion modules in series
  • One Battery Management Module (BMM)
Distribution cabinet for 2.5 MW DC power output
  • Communication interface via MODBUS TCP (other protocols are optional)
  • Disconnect switch

• Master Battery Management Module (MBMM)
• Programmable Logic Controller (PLC)
• Two auxiliary power supplies
  • 400V AC for HVAC, FSS, lighting
  • 24V DC for electronics and fans, internal DC self-supply available
• Ground fault detection function (optional)
• External emergency stop