Energy Storage System Unit (ESSU)

Medium power lithium-ion (M-Type)

Saft's M-type ESSU is a storage system in a 19" cabinet designed for community energy storage and smart-building applications requiring medium power capability from any state of charge, high efficiency and long lifetime.

Built with proven Saft NCA Li-ion technology, Saft ESSUs is a fully integrated storage system, providing high operational reliability over thousands of cycles with excellent energy efficiency. Its modular design based on 29 Synerion® 24M modules in series allows a power rating above 100kW and an energy rating above 50kWh, which is a typical sizing for smart-buildings and community energy storage.

Applications

- Community energy storage: Load peak shaving, management of feeder congestion, voltage regulation, black-out management, islanding
- Smart-buildings: self-consumption (PV, CHP), energy shifting, price arbitrage

Features

- Field-proven NCA Li-ion technology (15 years' experience)
- Advanced industrial design offering highest safety and robustness
- 20 years design life with daily cycles at 60% depth of discharge
- Sophisticated battery management system composed of one Battery Management Module (BMM)
  - Monitoring and control of voltage at temperature at cell level
  - Real time calculation of charge and discharge current limits
  - Real time calculation of SOC using temperature, aging, voltage and currents
  - Balancing of State of Charge (SOC) between strings
  - Alarms and faults management (contactor opening rules)
  - Indication of State of Health (SOH) of the system integrating cycling and calendar aging
  - Black box registering alarms and number of cycles

Nominal characteristics at + 25°C/+ 77°F	
Voltage (V)	730
Capacity (C/3) (Ah)	80
Rated energy (C/3) (kWh)	58
Continuous charge power (kW)	60
Continuous discharge power (kW)	110
Mechanical characteristics	
Width (mm)	1200
Height (mm)	1450
Length (mm)	850
Weight (kg)	820
Electrical characteristics at + 25°C/+ 77°F	
Minimum Voltage (V)	609
Maximum Voltage (V)	812
Maximum continuous discharge current (A)	200 (180 if several ESSU in parallel)
Maximum continuous recharge current (A)	82
Discharge time at nominal power (h)	0.5
Recharge time at nominal power (h)	1
Insulation resistance (1000 V – OC)	>100 MΩ
Dielectric	3 kV rms
Operating conditions	
Operating temperature	– 20°C/+ 55°C (– 4°F to + 131°F)
Cycle efficiency (one way)	>95%
Self-discharge	≤5% per month
Calendar lifetime at + 25°C/+ 77°F	>20 years

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Benefits

- Flexibility to provide both power and energy functions
- Best energy efficiency of all electrochemical technologies (better than 95%)
- Easy system integration: compatible with most power conversion systems in the market
- Excellent flexibility: possible to reduce number of modules inside the cabinet and to upscale energy and power by paralleling multiple ESSUs
- Low maintenance
- Diagnostic interface available

Functional characteristics

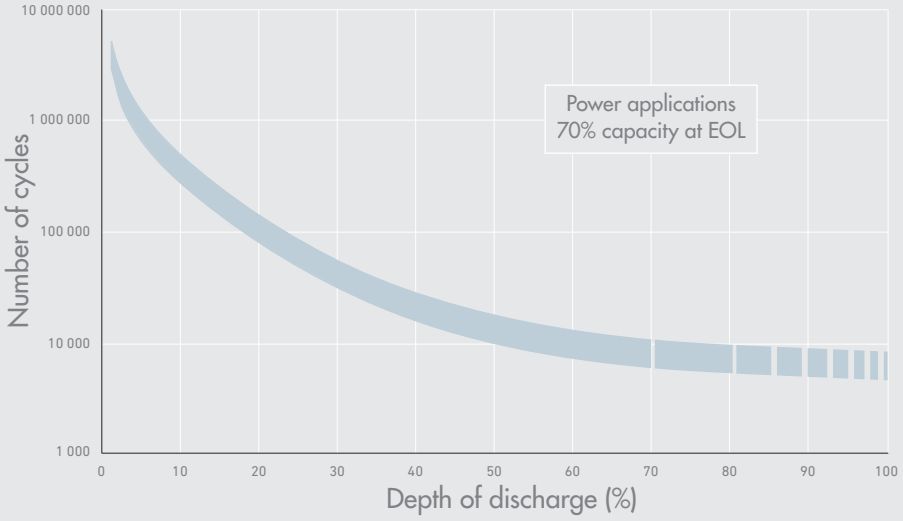
- High power capability
- Well suited for highly dynamic charge/discharge profiles from any state of charge
- Outstanding calendar and cycle life
- Stable internal resistance
- High energy density cells
- High charge retention

Safety

- Safety driven design guarantees safe behavior in case of abuse usage or cell thermal runaway.
  - cell level : shutdown effect separator, mechanical venting to release gases, materials selected to resist high temperatures and remain stable during gas release
  - module level : electronic board for voltage and temperature monitoring and cells balancing and structural protection to avoid thermal runaway propagation
  - string level : BMM with both circuit breaker and contactor to manage short-circuits, over-currents, over-temperature and over-voltages
- Stringent qualification processes (see compliance to standards)
- Safe handling of battery modules during maintenance because of low voltage modules (24V)

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	95% (non-condensing)
Compliance to standards	
Cell safety	UL 1642
Module safety	EN 50178 / IEC 60950
EMC	IEC 62 040-2 Cat C1 and C3
Cabinet protection class	IP 20
Vibrations and shocks	IEC 60721-3-3 (class 3M4 and 3M2 respectively)
Seismic	IEEE 693 high level
Environment	IEC 62093 (indoor conditioned)
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 and ISO 14000

Energy storage module
Cycle life at + 25°C/+ 77°F



Cycle life depends on both depth of discharge (DOD) and charging rates. The above results are based on testing at a fixed DOD and varying charging rates. The end of life (EOL) is reached when the remaining capacity is 70% of the initial capacity.

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