

ST5015kWh-2500kW-MV-2h - Turnkey C&I Energy Storage Solution Brief:

Deploying Tier-1 LFP Hardware

PRODUCT OVERVIEW & OFFICIAL DATA SHEET: ST5015kWh-2500kW-MV-2h

## EXECUTIVE SUMMARY

The ST5015kWh-2500kW-MV-2h is a fully integrated, medium-voltage (MV) utility and large-scale commercial energy storage platform engineered for 2-hour discharge duration applications. Combining a 5.015 MWh nominal LFP battery capacity with a 2.5 MW bi-directional power conversion system (PCS) in a single, pre-fabricated skid, this system delivers turnkey grid interconnection, peak shaving, load shifting, and renewable firming. The containerized assembly includes all auxiliary power, fire suppression, liquid thermal management, and MV step-up transformer, drastically reducing site engineering costs and commissioning timelines.



## SYSTEM ARCHITECTURE & SAFETY

The ST5015kWh-2500kW-MV-2h is built around a high-voltage DC bus architecture with distributed battery racks aggregated to a central 2.5 MW bi-directional inverter. The PCS operates at 1500 V DC nominal, optimized for containerized high power density. A dedicated 3.3 MVA liquid-immersed transformer steps up the output to MV levels (6 kV / 10 kV / 35 kV selectable), enabling direct connection to industrial distribution grids without additional switchgear. The steel weatherproof enclosure is rated IP55, and internal compartments segregate battery packs, power electronics, and HVAC to prevent cross-contamination and thermal propagation. Active and passive safety layers include per-rack fusing, contactor-based isolation, aerosol fire suppression (NFPA 855 compliant), and gas venting pathways.

## KEY FEATURES

- Feature 1: 5.015 MWh usable capacity (nominal) with Tier-1 prismatic LFP cells, over 6,000 cycles at 80% DoD, 25°C.
- Feature 2: Integrated 2.5 MW PCS with MV step-up transformer, requiring only external MV grid connection.
- Feature 3: Smart liquid cooling system maintains cell temperature variance <3°C, maximizing cycle life and safety.
- Feature 4: Pre-engineered for N+1 redundancy on auxiliary systems (pumps, fans, BMS power).
- Feature 5: Factory pre-commissioned with integrated EMS gateway for Modbus TCP, IEC 61850, or DNP3.
- Feature 6: UL 9540A tested thermal runaway propagation resistance at cell and module level.

## COMPLIANCE & STANDARDS

The ST5015kWh-2500kW-MV-2h complies with global regulatory frameworks for grid-connected storage systems: UL 9540 (Energy Storage Systems), UL 1973 (Batteries), UL 1741 SA (Grid Support with IEEE 1547), IEC 62619 (Secondary Cells), IEC 62477 (PCS Safety), CE, and UN 38.3 for transport. Additionally, the system meets NFPA 855 installation limits, and the BMS is certified to ISO 13849 for functional safety. Cyber-security provisions align with

IEC 62443-3-3 for remote monitoring interfaces.

## TECHNICAL SPECIFICATIONS

Parameter	Specification
Nominal Energy (C/2)	5,015 kWh (DC, at BOL)
Usable Energy (80% DoD)	4,012 kWh (DC)
AC Power (Grid-Connected)	2,500 kW @ 0.9 PF (lag/lead)
Max AC Apparent Power	2,777 kVA
System Voltage Architecture	1500 V DC nominal
Cell Chemistry	Tier-1 Prismatic LFP (LiFePO4)
Cycle Life (80% DoD, 25°C)	≥6,000 cycles to 70% SOH
Round-Trip Efficiency (DC)	94.5% @ rated power
Cooling Method	Active liquid cooling (glycol-water)
Operating Temperature Range	-20°C to +50°C (derated >45°C)
Ingress Protection (Chassis)	IP55 (NEMA 3R equivalent)
Fire Suppression	Aerosol + gas detection per NFPA 855
MV Transformer	3.3 MVA, dry-type or liquid-immersed, 6/10/35 kV
Communication Protocols	Modbus TCP, IEC 61850, DNP3, CAN
Dimensions (L x W x H)	12,192 x 2,438 x 2,896 mm (40 ft skid)
Weight (Total)	~45 tons (including transformer)

## INDUSTRIAL DEPLOYMENT & OPERATIONAL LOGIC

The system supports four primary operational modes: (1) Peak shaving for large industrial facilities (automotive, semiconductor, data centers), (2) Renewable time-shifting for solar/wind farms, (3) Grid frequency regulation (droop control, <1 sec response), and (4) Islanded micro-grid support with black-start capability. A typical deployment occupies a 20 ft x 40 ft concrete pad with front-end MV switchgear and optional grid metering. The integrated EMS provides historical trend analysis, predictive cell balancing, and remote firmware updates over secure TLS. Round-trip DC efficiency is rated at 94.5% at nominal power, and auxiliary load averages 15 kW during operation, dropping to 0.5 kW in standby.

