Turnkey C&I Energy Storage Solution Brief: Deploying Commercial Energy Storage Installation Manual

TURNKEY C&I ENERGY STORAGE SOLUTION BRIEF: DEPLOYING COMMERCIAL ENERGY STORAGE INSTALLATION MANUAL

EXECUTIVE SUMMARY

This document serves as the definitive Product Overview and Engineering Reference for the deployment of our Tier-1 Commercial & Industrial (C&I) Energy Storage System (ESS). Designed as a turnkey solution, this platform bridges the gap between renewable generation and grid stability, offering a robust, scalable, and safe architecture for peak shaving, demand response, and backup power applications. This manual consolidates the technical specifications, safety protocols, and installation prerequisites necessary for successful project execution.

SYSTEM ARCHITECTURE & SAFETY

The system integrates high-density Tier-1 LFP battery modules with a bi-directional Power Conversion System (PCS) and an advanced Battery Management System (BMS) within a compact, outdoor-rated enclosure. The architecture is built around a high-voltage DC busbar, optimizing energy transfer efficiency while minimizing internal losses. Safety is paramount, featuring multi-layered protection against overcurrent, short circuits, and thermal events. The system adheres to rigorous global standards, ensuring reliable operation in diverse climatic conditions.

KEY FEATURES

- Modular High-Density LFP Cells: Utilizes prismatic Tier-1 LFP cells, offering superior cycle life and thermal stability with zero cobalt content for ethical and

sustainable energy storage.

- Smart Liquid Cooling Technology: An intelligent, closed-loop liquid cooling system maintains optimal cell temperature (25 ° C ± 2 ° C), significantly enhancing cycle life and ensuring consistent performance even in extreme ambient temperatures.

- All-Weather Outdoor Enclosure: IP54-rated cabinet constructed from heavy-duty steel with C5 corrosion resistance, engineered for direct pad installation without the need for additional protective shelters.

- Active Cell Balancing: A proprietary BMS employs real-time active balancing across all cells, maximizing usable capacity and extending the system's operational lifespan by over 15% compared to passive systems.

- Seamless Grid Interface: The bi-directional PCS supports seamless on-grid and off-grid transition (islanding), enabling uninterrupted power supply (UPS) functionality for critical loads.

COMPLIANCE & STANDARDS

The system is fully certified according to leading international safety and performance regulations, mitigating project risks and simplifying local permitting processes.

- Safety: UL 9540, UL 1973, IEC 62619, IEC 62477

- EMC: FCC Part 15, IEC 61000-6-2, IEC 61000-6-4

- Grid Interconnection: IEEE 1547, UL 1741 (with SA), VDE-AR-E 2510-50

- Transportation: UN 38.3 for lithium batteries

TECHNICAL SPECIFICATIONS

GENERAL PARAMETERS

- System Energy Capacity: 215 kWh / 372 kWh per base cabinet (expandable)

- System Power (AC): 100 kW / 150 kW nominal

- AC Output Voltage: 380/400/415 VAC (3W + N + PE), 50/60 Hz

- Battery Chemistry: Lithium Iron Phosphate (LFP), Prismatic Cells

- Rated Voltage Range (DC): 600 V – 850 V

- Round-trip Efficiency: > 90% (DC/AC)

- Cooling: Smart Liquid Cooling with integrated chiller

- Protection Rating: IP54 (Cabinet), IP67 (Battery Submodules)

PERFORMANCE & OPERATIONAL DATA

- Operating Temperature Range: -30°C to +55°C (with derating)

- Relative Humidity: 0 – 95% (non-condensing)

- Max. Altitude: 3000 m (derating above 2000 m)

- Cycling Capability: > 8,000 cycles at 25°C (80% DoD, EOL 80%)

- Communication Protocols: Modbus RTU/TCP, CAN, DNP3, IEC 61850 (optional)

- Dimensions (W x D x H): 1800 mm x 1200 mm x 2200 mm (per cabinet)

- Weight: Approx. 2,900 kg (fully populated)

Parameter	**Specification (Base Cabinet)**
Nominal Capacity (AC)	100 kW / 215 kWh
Cooling Method	Smart Liquid Cooling (Chiller-integrated)
Cell Chemistry	Tier-1 LFP (Prismatic)
Voltage Range	600 – 850 VDC
Cycle Life	8,000 cycles at 25°C (80% DoD, EOL 80%)
Enclosure Protection	IP54 (Cabinet) / IP67 (Battery Modules)
Operating Temperature	-30°C to +55°C

INDUSTRIAL DEPLOYMENT & INSTALLATION GUIDELINES

Successful deployment begins with meticulous site preparation. The installation manual details critical steps to ensure system integrity and long-term performance.

- Pad Preparation: The system requires a level, reinforced concrete pad with a

minimum compressive strength of 28 MPa. The pad must include integrated grounding points and cable trenches for power and communication lines.

- Lifting & Positioning: A dedicated lifting plan using certified spreader bars is provided to safely hoist and position the cabinet without stressing structural points.

- Cooling System Commissioning: The liquid cooling circuit must be filled with the specified coolant (water/ethylene glycol mix) and purged of air. Initial startup procedures include verifying flow rates and leak checks.

- Electrical Interconnection: Detailed wiring diagrams guide the connection of AC mains, auxiliary supply, and the DC busbar for parallel expansion. All terminations must be torqued to specified values to prevent hot spots.

- EMS Integration: The system includes a pre-configured Energy Management System (EMS) for intuitive local control and remote monitoring via a secure cloud platform, enabling real-time performance analytics and O&M alerts.


100%
SOC
SOC
12.0 °C
1.0 V