

Containerized Micro-Grid Solutions - Official Commercial BESS Technical Overview & Datasheet

EXECUTIVE SUMMARY

The Containerized Micro-Grid Solutions portfolio represents a fully integrated, turnkey energy storage platform engineered for commercial and industrial (C&I) applications. Designed to address the escalating demand for grid resilience, peak shaving, and renewable energy arbitrage, this portfolio delivers a scalable, high-density, and inherently safe solution. Each containerized unit acts as a self-contained power block, seamlessly integrating Tier-1 LFP battery racks, a bi-directional Power Conversion System (PCS), intelligent Battery Management System (BMS), and advanced thermal management into a standardized, ruggedized enclosure. This datasheet provides a comprehensive technical overview of the platform's architecture, performance capabilities, safety mechanisms, and compliance credentials, establishing it as a cornerstone for modern micro-grid infrastructure.



SYSTEM ARCHITECTURE & SAFETY

The core of the Containerized Micro-Grid Solution is a modular, parallel-expandable architecture. At its heart lies a high-voltage DC bus that interconnects multiple battery clusters with a central PCS. This design allows for independent cluster management, ensuring that a single point of failure does not compromise the entire system's operation. Safety is engineered in multiple layers, starting from the cell level with Tier-1 LFP chemistry, known for its superior thermal stability. The system is governed by a three-level BMS (BMU, BCU, and EMS) that provides real-time monitoring, active cell balancing, and precise state-of-charge (SOC) and state-of-health (SOH) estimation. The enclosure itself is a robust, C5-rated anti-corrosion steel structure, equipped with a multi-stage fire suppression system (aerosol and water-based options) and a dedicated HVAC or liquid cooling system to maintain optimal operating

temperatures, even under extreme ambient conditions.

KEY FEATURES

- Turnkey Containerized Design: Factory-integrated and pre-tested for rapid deployment, significantly reducing on-site installation time and cost.
- Scalable MWh Capacity: Modular design allows for seamless parallel expansion from hundreds of kWh to multi-MWh utility-scale projects.
- Advanced Liquid Cooling: Smart liquid cooling technology ensures uniform temperature distribution across cells, extending lifespan and maintaining performance.
- Bi-directional Grid Interfacing: Fully integrated PCS provides four-quadrant operation, enabling active and reactive power support, voltage and frequency regulation, and seamless grid-to-island transitions.
- Multi-Level Safety Architecture: Includes cell-level monitoring, pack-level suppression, and container-level fire detection and extinguishing systems, compliant with UL 9540A.
- Intelligent EMS: Cloud-connected Energy Management System for remote monitoring, diagnostics, and optimized dispatch based on dynamic tariff structures and load profiles.

COMPLIANCE & STANDARDS

The Containerized Micro-Grid Solutions portfolio is engineered to meet the most stringent international standards for safety, performance, and grid interconnection. Key certifications include:

- UL 9540: Standard for Energy Storage Systems and Equipment.
- UL 9540A: Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems.
- IEC 62619: Safety requirements for secondary lithium cells and batteries for industrial applications.
- IEC 62933: Electrical Energy Storage (EES) Systems.
- UN 38.3: Transportation testing for lithium batteries.
- IEEE 1547: Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces.

TECHNICAL SPECIFICATIONS

The following table outlines the core technical parameters of a standard 20-foot containerized unit. Custom configurations are available upon request.

Parameter	Specification
Nominal Capacity	215 kWh / 372 kWh / 500 kWh per container (configurable)
DC Voltage Range	600 Vdc to 1500 Vdc

Cooling Method	Smart Liquid Cooling (HVAC optional)
Cell Chemistry	Tier-1 LFP (Lithium Iron Phosphate)
Cycle Life	≥ 8000 cycles @ 25°C, 0.5C, 80% DOD
Round-Trip Efficiency	≥ 95% (DC-DC)
Operating Temperature	-30°C to +55°C (derating above +45°C)
Enclosure Protection	IP54 / IP55 (C5 anti-corrosion)
Communication	Modbus TCP/IP, IEC 61850, CAN 2.0
Certifications	UL 9540, UL 9540A, IEC 62619, CE, UN 38.3

INDUSTRIAL DEPLOYMENT

This solution is ideally suited for a wide range of C&I applications, including manufacturing facilities, data centers, commercial buildings, and remote micro-grids. Its containerized nature allows for deployment in space-constrained environments, while its robust construction ensures reliable operation in harsh climates. The system can be configured for various operational modes, such as peak shaving, demand response, backup power, and participation in ancillary services markets. The accompanying figure illustrates a typical micro-grid layout integrating the BESS with local renewable

generation and critical loads.

