

Commercial Systems Engineering Reference Manual: EMS3000CP

COMMERCIAL SYSTEMS ENGINEERING REFERENCE MANUAL: EMS3000CP

1. PRODUCT IDENTIFICATION

The EMS3000CP is a utility-grade, modular Commercial & Industrial (C&I) Energy Storage System engineered for high-cycle arbitrage, peak shaving, and backup power in demanding grid-tied and micro-grid environments. Designed for system integrators and facility engineers, this platform delivers Tier-1 LFP safety, liquid cooling precision, and a compact, outdoor-ready form factor.



2. INTERNAL BESS TOPOLOGY

The EMS3000CP utilizes a three-layer hierarchical architecture:

- DC Side: High-voltage battery rack with integrated Tier-1 LFP cells (up to 4000 cycles @ 90% DoD).
- Power Conversion: Bi-directional modular PCS (up to 100 kW per chassis) with seamless grid-forming capability.
- Control Layer: Embedded EMS with active cell balancing, SoC/SoH algorithms, and cloud-ready communications (Modbus TCP, CAN, IEC 61850).

3. THERMAL PROTECTION MECHANISMS

The integrated liquid cooling system maintains cell $\Delta T \leq 3^\circ\text{C}$ across all modules, enabling stable operation from -30°C to $+55^\circ\text{C}$ ambient. A multi-level thermal runaway suppression circuit (aerosol + gas detection) provides proactive fail-safe protection, compliant with NFPA 855.

4. OPERATIONAL ADVANTAGES

- Round-trip efficiency: $\geq 92\%$ (DC/AC, at 0.5C).
- Response time: < 20 ms for islanding detection and seamless switchover.
- Parallel scalability: up to 10 cabinets (3.72 MWh) via shared DC busbar.

SPECIFICATION MATRIX

Parameter	Specification
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Nominal Capacity	215 kWh / 372 kWh per cabinet (LFP)
Cooling Method	Smart Liquid Cooling ($\Delta T \leq 3^{\circ}\text{C}$)
Cell Chemistry	Tier-1 LFP (LiFePO ₄)
Max System Voltage	1500 V DC
Round-trip Efficiency	$\geq 92\%$ (0.5C)
Operating Temp. Range	-30°C to +55°C (derated above 50°C)
Protection Rating	IP55 (cabinet), IP20 (internal racks)
Safety Certifications	UL 9540, IEC 62619, UN 38.3

5. REGULATORY COMPLIANCE

Fully certified to UL 9540, UL 1973, IEC 62619, IEC 62477, and CE / UN 38.3 for transport. The EMS3000CP includes cyber-secure remote monitoring via encrypted cloud gateway (GDPR & NERC CIP ready).



DEPLOYMENT & COMMISSIONING NOTES

- Outdoor IP55 / NEMA 3R enclosure.
- On-board surge protection (Type I & II).
- Recommended 1m front clearance for service access.
- Standard 3-year full warranty, extendable to 10 years on throughput (up to 8 MWh per rack).