



PRODUCT DATASHEET

ESC-R100-211

All-in-One BESS

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ABBREVIATIONS COMPARISON TABLE

BMU	Battery management unit
BMS	Battery management system
PCS	Bidirectional power conversion system
EMS	Energy management system
CAN	Controller LAN
CSC	Cell monitoring circuit
CSU	Current sampling unit
DCAN	CAN for calibration
ETH	Ethernet module
MSD	Manual disconnecter
SBMU	Sub-system battery management unit
SCAN	CAN between BMU and CSU
SOC	State of charge
SOE	State of energy
SOH	State of health
SOP	State of power

1 PRODUCT OVERVIEW

1.1 General description

The product includes battery packs, an HV control box (with integrated secondary BMS and EMS), a liquid cooling system, a PCS unit and a fire protection system. The modularized system structure can flexibly match various industrial and commercial scenarios, and can realize peak-shaving, energy-shifting, backup power, and alleviate the pressure of the grid during peak times.

1.2 Major components

- 1 An LFP BESS with two-stage BMS battery management system, supporting comprehensive digital LCD display;
- 2 100kW PCS with wide DC input voltage range, supporting grid-side functions including voltage regulation, three-phase unbalance control, harmonic control and other functions;
- 3 An IP55 enclosure equipped with thermal insulation design to meet the needs of most outdoor use scenarios.
- 4 The EMS includes a clouding service platform, plus a local device to perform data collection of PCS and other related equipment.

1.3 Main features

1 Safety and reliability

- Patented liquid-cooling battery pack technology, longevity LFP battery cells specialized for ESS applications;
- IP67 battery packs, IP55 outdoor cabinet, omni-directional protection design;
- Multi-level electrical protection and fire protection systems;

2 Flexibility

- Suits a complex of different application scenarios and power demands;
- Supporting both top-hoisting and bottom-lifting operations for swift transportation and installation works;
- Self-owned EMS, customizable to meet customer needs;

3 User friendly

- All in one design for space-saving & cost-saving;
- Modular design for O&M convenience;
- Supporting parallel connection for up-scaling and system expansion;

4 Intelligence

- Real-time monitoring and management of operation status to ensure safety at system level;
- Intelligent dispatching and management of energy usage to reduce energy costs.

1.4 Product Structure Illustration

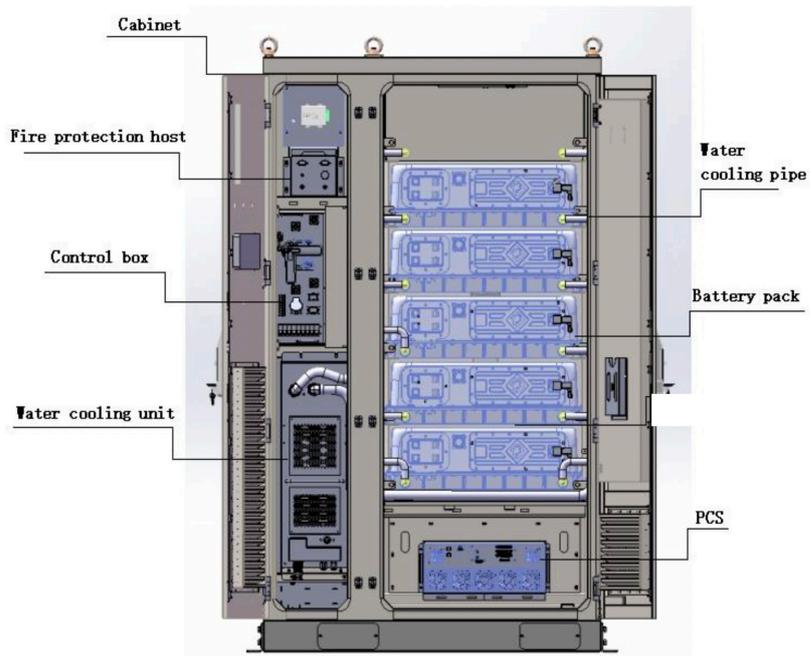


chart 1-1 product structure illustration

2 SYSTEM PARAMETERS ALL-IN-ONE BESS (ESC-R100-211)

System parameters:	
DC side voltage range	600~803Vdc
Output voltage	400V@AC
System configuration	1P220S
Rated power	100kW
PCS power	100kW
Nominal Energy Capacity	211kWh
Dimensions (L*W*H)	1340*1295*2260mm
Weight	2600KG
Ingress Protection	IP55
Operating Temperature	-20°C~50°C
Operating Humidity	≤95% (non-condensing)
Operating Altitude	≤2000m (derating required at above 2000m)
Cooling method	PCS air cooling + battery pack liquid cooling
Fire protection system	Aerosol FSS, Gas FSS at pack level (optional)
System communication prot	4G, RS485, Ethernet
System communication protocol	MODBUS/MQTT (supporting protocol customization)
Battery cell parameters:	
Rated capacity	300Ah
Rated energy	960Wh
Dimensions	81.2x175.4x202.6mm
Battery pack parameters:	
Grouping Method	1P44S
Nominal voltage	140.8V
Nominal energy	42kWh
Dimensions	787×1085×235mm
Weight	Approx 313kg

All-in-One System components

LFP Battery Pack	5 units
BMS	1 set
Fire protection system	1 set
Thermal Management System (Liquid-cooling)	1 set, 5kW
Enclosure	1 set
PCS	1 set, 100kW
HVDC Control Box	1 set
EMS	1 set

3 SPECIFICATIONS OF CONTROL BOX

The control box supplies power to BMS, liquid cooling unit, fire protection system, LCD display, indicators, etc. It is equipped with DC circuit breaker, air switch, AC/DC power supply, DC/DC wide voltage power supply, DC/DC isolation power supply, EMS module, 4G communication module and other devices. It has the functions of fault alarm, fault protection, safety protection, emergency stop, and step-by-step disconnection of the system during maintenance to ensure the operation safety. The structure illustration is shown as below, and the dimension is 550*600*250mm.

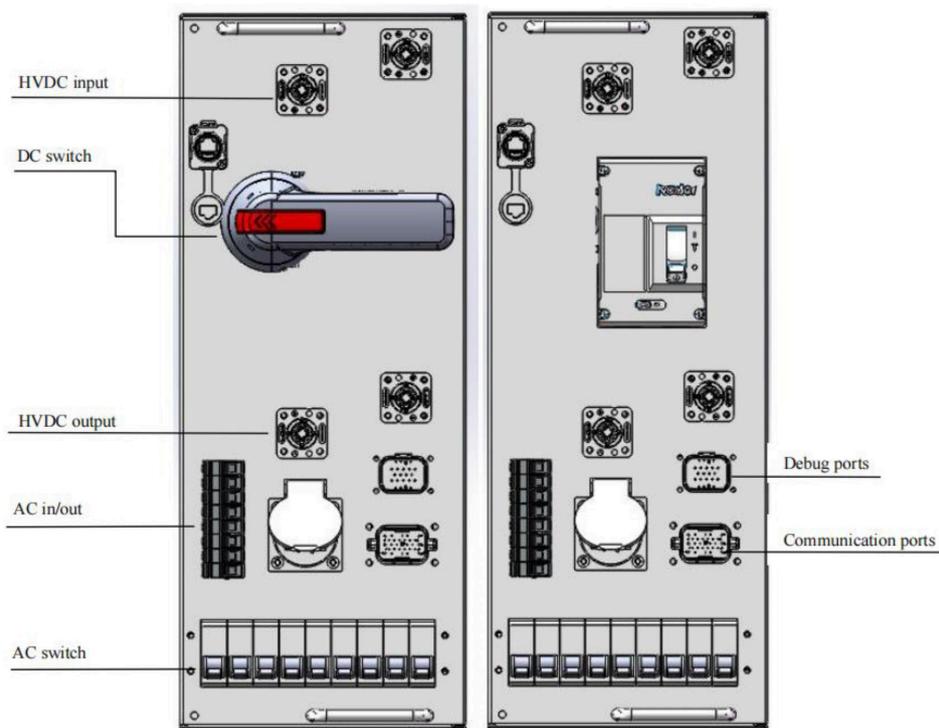


chart 3-1 Interface of the control box (The left image is the CE version, and the right image is the PRC version)

4 SPECIFICATIONS OF PCS

The power conversion system (PCS) is composed of a DC/AC bidirectional converter and a control unit, which is used to control the charging and discharging process of the battery as well as the power conversion between AC and DC. The DC current of battery system is converted to AC current through the PCS to power the load or supply to the grid, and the AC current from the grid is converted into DC through the PCS to charge the battery.

PCS Technical Parameters:

DC side parameters	
Operating voltage range	600~900V
Rated charge and discharge power	100kW
Maximum charge/discharge power	120kW (1 minute)
Maximum operating current	192A
AC side parameters (grid-connected).	
Rated output power	100kW
Current rating	145A
Rated grid voltage	400V (3-phase 4-wire)
Output voltage frequency	50/60±2.5Hz
Power factor range	-0.99~+0.99
Grid-tied current Total Harmonic Distortion (iTHD)	≤3% (rated power)
AC Side Parameters (Off-Grid)	
Rated output power	100kW
Rated off-grid voltage	400V
Output voltage frequency	50/60Hz
Basic parameters	
Maximum conversion efficiency	≥98%
Operating temperature range	-20°C ~+50°C (>45°C derating operation)
Relative humidity range	5%~95%, no condensation
Perating altitude	≤2000m (> 2000m to reduce power)
Noises	≤75dB

Structural parameters

Dimensions (W*H*D).	480×186×620mm (excluding partial protrusions)
Cooling method	Forced air cooling
Housing material	Metal case
Installation	Rack/subrack
Enclosure rating	IP20

Interface

Light	LED
Communication interface	Ethernet port (RS485)
Communication protocols	ModBus communication protocol

5 SPECIFICATIONS OF TMS (LIQUID-COOLING UNIT)

The temperature of the battery system is controlled by the TMS. The liquid coolant flows into the liquid-cooling plate at the bottom of the battery pack through the liquid cooling pipe (outgoing direction), and the heat of the battery cell is exchanged with the coolant and returns to the liquid-cooling unit through the coolant pipes (returning direction) for circulation, so as to control the temperature and temperature difference of battery cells to maintain the battery within the optimal temperature range and extend battery's life expectation.

Technical parameters of liquid-cooling unit:

Rated voltage	220Vac (±15%)
Rated frequency	50/60Hz (±2%)
Cooling capacity	5kW
Heat production	2kW
Rated power	2.4kW
Current rating	11A
Operating ambient temperature	-30~55°C
Refrigerants	R134a
Compressor type	Variable-frequency compressor
Fan type	AC fan x 2pcs
Condensing air volume	2000m ³ /hr
Circulating water volume	50L/min
Coolant	50% ethylene glycol in water
Pipe diameter	20mm
Evaporator form	Bridge heat exchanger
Inlet and outlet Position	Side In/Out
Installation	Plug-in mounting
Weight	92kg
Dimensions (W*D*H)	1145*266*840mm

6 SPECIFICATIONS OF EMS

6.1 EMS controller overview:

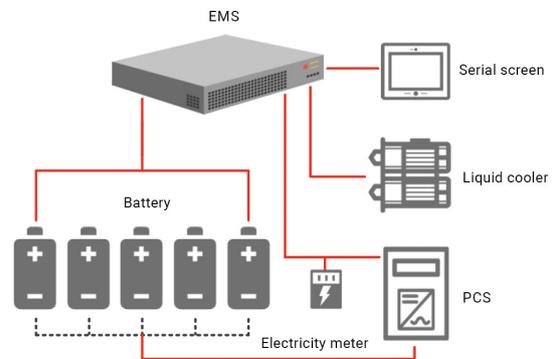
EMS-M4 is an integrated software & hardware device which can be applied to a variety of different energy storage systems, through real-time monitoring and control to achieve efficient utilization and operation optimization of energy storage equipment.

The hardware includes: display screen and motherboard, display screen and topological diagram is shown in the figure below.

chart 6-1 Display screen and topological diagram



(a) Display screen



(b) Topological diagram

6.2 EMS technical parameters

Mainboard size (L*W*H)	196*150*30 mm
Display size	7 inches
Resolution	1024*600
Display type	Touch screen
Supply voltage	6-33V, 5W
Maximum power consumption	10W
Operating temperature	-40°C~85°C
Installation	Screw mounting, the motherboard is fixed with M3 screws
Communication protocols	MQTT/Modbus, etc
Motherboard interface	3 x RS485 isolated interfaces, 3 x RS232 interfaces, 1 x 10/100M Ethernet interface, 6 x DI input and 6 x DO output

6.3 Features:

- 1 Expandable 2G/4G/LAN to the cloud;
- 2 Support remote monitoring and remote control;
- 3 Support edge computing;
- 4 Support remote upgrade;
- 5 Support SMS alarm;
- 6 Support protocol conversion;
- 7 Support data recording and export;
- 8 Support alarm recording and export;
- 9 Support ESS peak shaving mode, backup power mode, battery protection strategy, system protection strategy, etc.;
- 10 Support customized application profiles (such as profiles for solar plus storage & charger, microgrid profiles, etc.)

7 INSTALLATION REFERENCES:

7.1 Base mounting dimensions

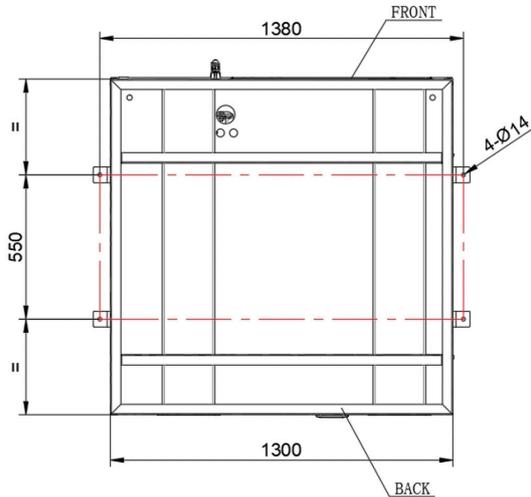


chart 7-1 Base (bottom view)

7.2 Installation Layout

a) Face-to-face layout: The cabinets can be deployed in face-to-face positions, and the distance between the two cabinets shall not be less than 1750mm, so as to ensure that the cabinet doors on both sides can be opened at the same time, which is convenient for maintenance.

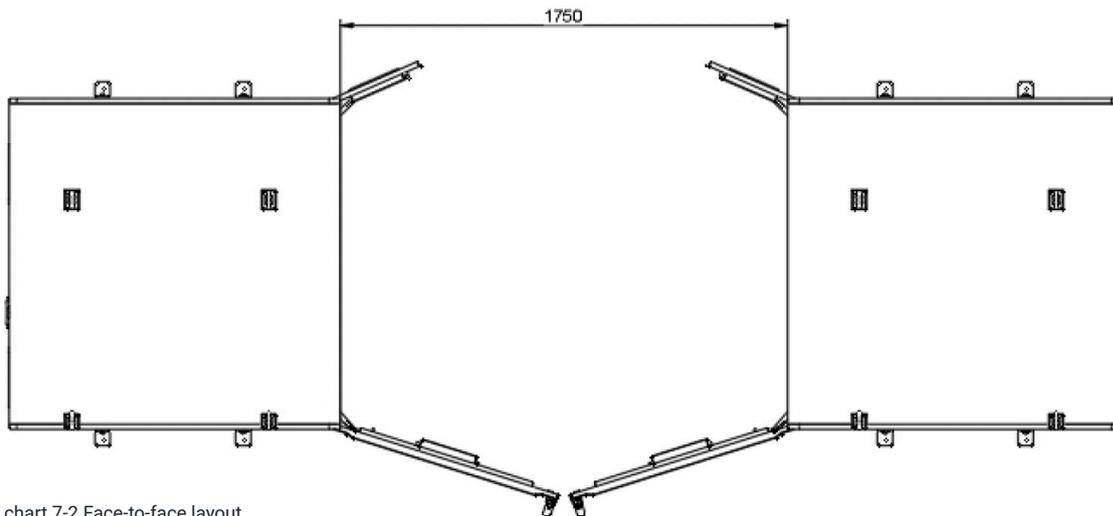


chart 7-2 Face-to-face layout

b) Side by side: the distance from the back of the cabinet to the enclosure is not less than 500mm, which can allow one person to pass through, and the recommended distance between the front of the battery cabinet and the enclosure shall not be less than 1500mm (for installation and maintenance operations). The recommended reserved space between the battery cabinets is 10mm - 20mm.

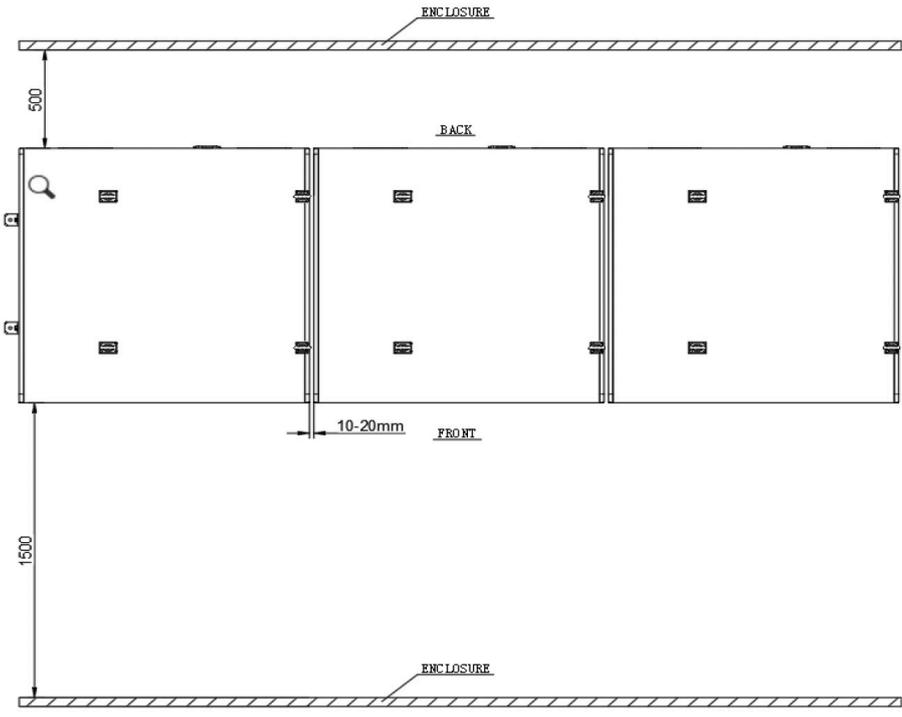


chart 7-3 Face-to-face layout

Other important dimensional details are shown in the attached drawing

