

# Key equipment of the three electric systems

## Marine containerized mobile power supply

### Product overview

The marine containerized mobile power supply is a modular, mobile, plug-and-play marine energy storage device that integrates a high-capacity lithium iron phosphate battery system into a standard container. It is specifically designed to meet the power needs of ships, enabling zero emissions, low noise, high energy efficiency, and high comfort for ships. It is an important technical equipment for the shipping industry to transform towards green, low-carbon, and intelligent development.

The product meets the requirements of classification society specifications such as "E-25 Marine Containerized Mobile Power Supply" and "Battery Power Specification for Marine Applications".

### Product composition

The containerized mobile power supply consists of battery system, busbar distribution system, temperature control system, fire protection system, combustible gas detection system, ventilation system, lighting system, video surveillance system, integrated alarm display and control system, and battery swapping interface, etc.

### Product features

(1)Excellent energy efficiency: The first large battery pack design in China, featuring high energy density, low self-depletion rate, high charge-discharge rate, and long cycle life.

(2)High efficiency and flexibility: Universal, modular, and standardized design, adopting quick-connect interfaces with anti-misplug connectors for plug-and-play functionality.

(3)Safety and reliability: The battery compartment, electrical room, fire protection room, and water-cooled unit room are safely isolated in different zones. The battery compartment meets the A60 fire rating, and employs active and passive integrated fire protection technology (heptafluoropropane), providing multi-level safety protection.

(4)Intelligent identification of power sockets:

The power socket supports multi-plug connection, automatically adjusting protection parameters based on the number of plug-socket connections, without being limited by the number of charging couplers of onshore charging piles;

The power socket can prevent live plugging;

The two battery pack power sockets are able to prevent incorrect connection.



(5)Strong adaptability to high-temperature environments: The electronic control part and the unit of the water cooling system are arranged separately, which are applicable to the high-temperature environment of the ship's deck.

(6)Convenient maintenance operation: The operation surfaces are centrally arranged, allowing easy access for maintenance in both the electrical room and the electrical cabin.

(7)Intelligent interconnection: the product features Beidou high-precision positioning, the working status and alarm information of the containerized mobile power supply are transmitted to the cloud via a 4G antenna.

## Marine containerized mobile power supply

### Main functions

As an energy storage device, containerized mobile power supply provide energy for ships and conduct safety management during the battery charging and discharging process.

### Battery management function

#### ※ Battery monitoring

(1)Automatically or manually enable and disable high voltage for the battery pack, and start and stop external output;

(2)Isolate the faulty battery cluster in case of a single-cluster failure, and execute emergency control of the battery pack to enable/disable high voltage and start/stop external output;

(3)Manually perform balanced charging of battery clusters during maintenance;

(4)Execute fault reset;

(5)Control the maximum allowable charge/discharge power, current, and voltage of the battery pack;

(6)Monitor and display the voltage data of individual battery cells;

(7)Monitor and display the high-voltage enabling/disabling status of the battery cluster;

(8)Monitor and display the voltage, current, and charging/discharging status of the battery cluster;

(9)Monitor and display the insulation resistance, SOC, and SOH data of the battery cluster/pack;

(10)Monitor and display the voltage, current, and charging/discharging status of the battery pack;

(11)Monitor and display data of battery cell temperature, busbar temperature inside the high-voltage box, and ambient temperature of the battery compartment;

(12)Monitor and display the highest battery cell voltage and serial number;

(13)Monitor and display the lowest battery cell voltage and serial number;

(14)Monitor and display the highest battery cell temperature and serial number;

(15)Monitor and display the lowest battery cell temperature and serial number;

(16)Monitor and display the environmental temperature, pole terminal temperature, and MSD temperature in the battery pack.

#### ※ Alarm functions

(1)Alarm for overvoltage, undervoltage, and large voltage difference of battery cells;

(2)Alarm for over-temperature, under-temperature, large temperature difference, and rapid temperature rise of battery cells;

(3)Alarm for overvoltage, undervoltage, overcurrent, insulation, and low SOC of battery clusters/packs;

(4)Alarm for large voltage difference and large circulation current in battery clusters;

(5)Alarm for abnormal actuation of battery cluster relays and fuse faults;

(6)Alarm for voltage and temperature acquisition faults;

(7)Alarm for high temperature of copper bars in the high-voltage box, and excessively high or low ambient temperature;

(8)Alarm for communication faults.

#### ※ Protection functions

(1)Protection against overvoltage, undervoltage, and large voltage difference of battery cells;

(2)Protection against over-temperature, under-temperature, large temperature difference, rapid temperature rise, and thermal runaway of battery cells;

(3)Protection against overvoltage, undervoltage, overcurrent, and insulation fault of battery clusters/packs;

(4)Protection against large voltage difference and high circulating current in battery clusters;

(5)Protection against abnormal actuation of battery cluster relays;

(6)Protection against voltage and temperature acquisition faults;

(7)Protection against high temperature of high-voltage box copper bars and over-temperature/under-temperature of the environment;

(8)Protection against communication faults;

(9)Protection against protection function faults;

(10)Protection against emergency stop and abnormal DC24V voltage.

#### ※ Parameter settings

(1)Three-level alarm parameter setting for overvoltage, undervoltage, and large voltage difference of battery cells;

(2)Three-level alarm parameter setting for over-temperature, under-temperature, and large temperature difference of battery cells;

(3)Three-level alarm parameter setting for overvoltage, undervoltage, overcurrent, insulation, and SOC of battery clusters/packs;

(4)Three-level alarm parameter setting for large circulation current of battery clusters;

(5)Three-level alarm parameter setting for high temperature of high-voltage box copper bars and over-temperature/under-temperature of the environment.

# Marine containerized mobile power supply

## ► Power distribution management function

- ✖. DC main circuit control and protection function
- ✖. Power distribution and protection function
- ✖. Power supply management and data transmission
- ✖. UPS backup power supply

## ► Temperature control function

Based on the different working environments and protection level requirements of various equipment, water cooling and air conditioning cooling are adopted for heat dissipation of battery packs and electrical equipment respectively.

## ► Fire detection and extinguishing functions

The battery compartment is equipped with temperature and smoke detectors as well as combustible gas detectors, which can predict the risk of thermal runaway in advance through multi-sensor analysis.

Fire extinguishing devices and alarm devices are arranged in separate compartments, with one set of fire extinguishers in operation and one standby. The release methods of fire extinguishing agents include automatic release, local release, remote control release, and mechanical emergency release.

## ► Emergency exhaust function

The emergency exhaust fan is interlocked with the combustible gas detection system. The combustible gas detector monitors the combustible gas concentration in real time. When the combustible gas concentration in the battery compartment is detected to be greater than 20% of its lower explosive limit (volume fraction), the power supply to the battery system and all non-explosion-proof electrical equipment in the battery compartment is automatically cut off, the air inlet and outlet fire dampers are opened, and the emergency exhaust fan is started after both dampers are opened to discharge the combustible gas out of the container.

## ► Video surveillance function

The product monitors the situation inside the battery compartment in real time, with the video connected to the ship's CCTV system via a network cable.

## ► Comprehensive alarm display and control function

The product monitors the working status of the battery system and various equipment inside the container in a centralized manner, and provides alarms and emergency protection measures for any malfunctions that occur.

A good human-machine interface assists operators in observation and operation.

## ► System specifications

| Name                                     | Value   |
|--|---|
| Rated DC voltage                         | DC614.4V  |
| Nominal energy of battery                | 1929.216kWh   |
| Maximum continuous charge-discharge rate | 0.5C  |
| Battery cycle life                       | ≥6000次, @15~35°C, 0.8DOD  |
| Cooling method                           | Liquid cooling (battery compartment) + air conditioning cooling (electrical room) |
| Protection level                         | Weather-tight   |
| Container size                           | 20-foot high cube container (length 6058×width 2438×height 2896mm)                |
| Total weight                             | ≤25.7t  |