



鸥瑞智诺能源科技（北京）有限公司

Original Energy Technology (Beijing) Inc.

File No: SPEC-TC2-008

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# 0.5MWh Lithium Battery Storage System Product Specification

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**Product Name:** 0.5MWh Power Station

**Product Type:** OE-216F800

**Product No :** 691V800Ah

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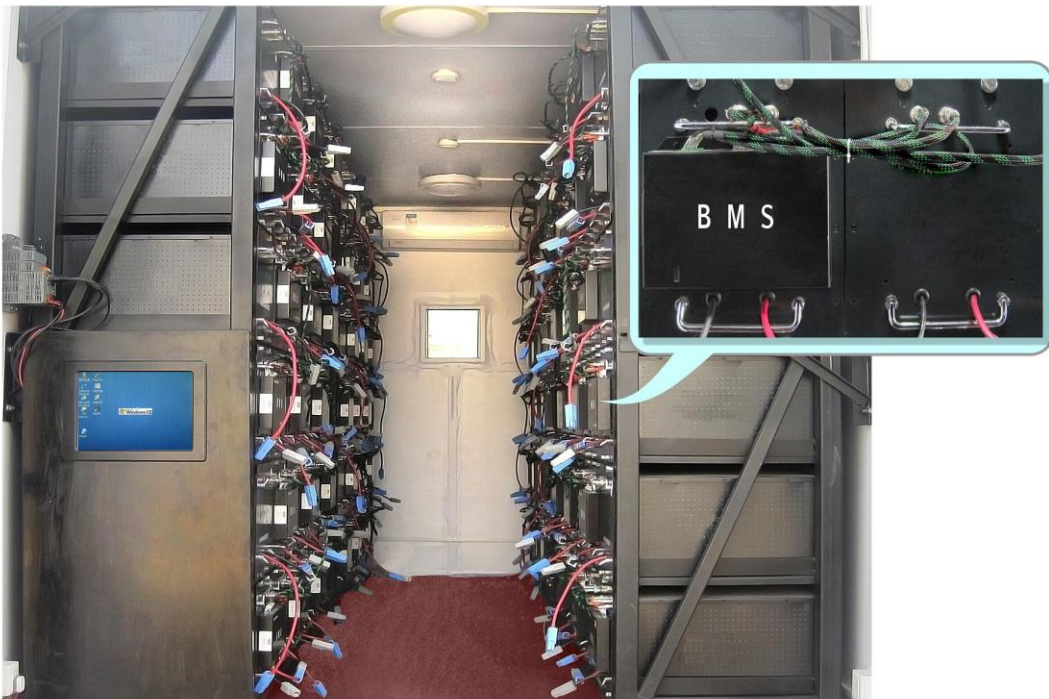
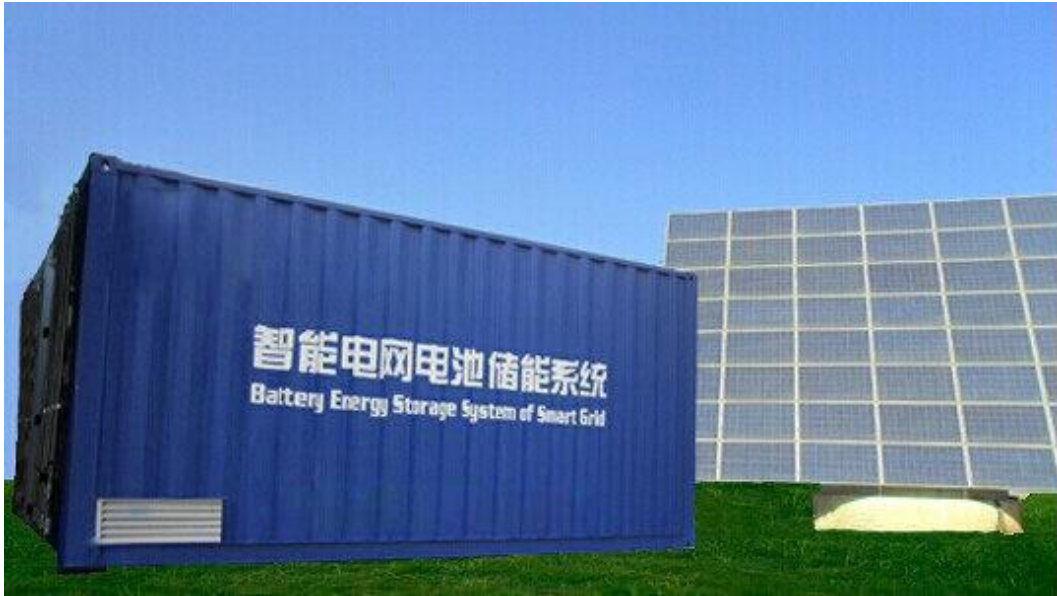


## 1. System Overview

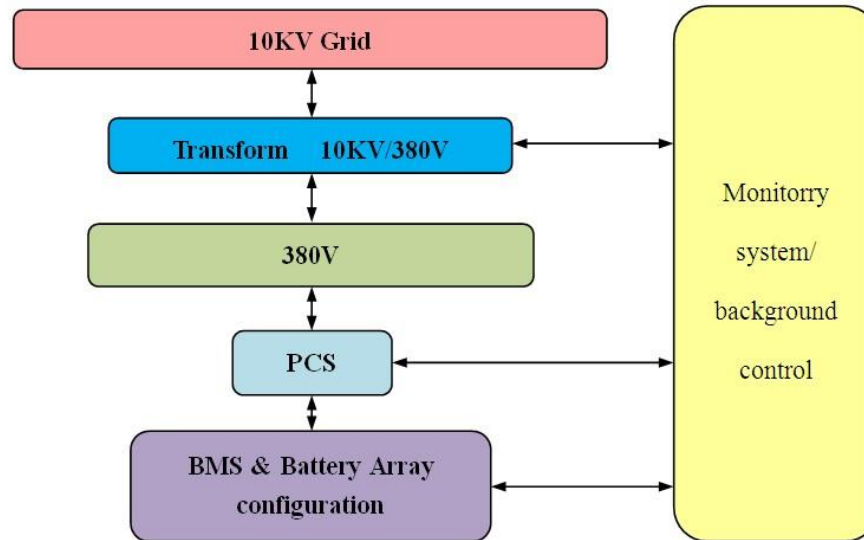
0.5MWH power station storage system is one energy storage subsystem of 500kWh, this subsystem consists of one 100kW energy storage bidirectional converter and power control system(PCS)、battery manage system(BMS)、background monitoring and management system and Lithium Iron Phosphate battery modules. The entire energy storage system consists of a monitoring and management system to control and coordinate the work of the various components of the network. Lithium iron phosphate module is composed of a cluster by 216 F100 battery module through a series-parallel, then combined together by eight clusters in parallel. Power station energy storage system using scientific internal structure design, advanced battery production technology, and configure more advanced battery management systems and energy conversion systems with high energy and long life, safe and reliable, wide temperature range and other characteristics, is wind, photovoltaic energy storage, smart grid energy storage and other industries ideal green power products。

## 2. System Appearance





### 3. System Schematic Diagram



### 4. Specifications of Energy Storage System

Items	Standard Parameters	Remark
Nominal Voltage (V)	691	
Nominal Capacity (Ah)	800.0	Standard Charge & Discharge
Nominal Power (MWh)	0.5	
Total Charge Cutoff Voltage (V)	756±5	Adjustable
Total Discharge Cutoff Voltage (V)	626.4±5	Adjustable
Charge Cutoff Cell Voltage (V)	3.65	Adjustable
Discharge Cutoff Cell Voltage (V)	2.5	Adjustable
Standard Charge & Discharge Currents(A)	160.0±5	
Charge Cutoff Current (A)	2.0	Adjustable
Maximum Charge Discharge Currents (A)	240±10	Adjustable
Maximum Pulse Charge & Discharge Currents (A)	320±10	30S
Efficiency	> 95%	
Assembly method	216 series 8 parallel	F100 module
Dimension (mm)	(6058 *2458 *2591)±10	(L*W*H) one 20-foot



		heighten container
Weight(ton)	16	Approximately
Waterproof Grade	IP55	
Operating Temperature Range (°C)	-20~50	
Storage Temperature Range (°C)	-40~50	
Storage Humidity (RH)	5%~95%	
Operating Humidity (RH)	≤85%	

### 5. Energy Storage System Applications

The energy storage system in the power range of applications which can be summarized as follows: When the storage system in network operation, you can achieve "load shifting" peaking applications, intermittent access complementary new energy grid, primary and secondary frequency, static and dynamic reactive power control, such as a hot standby system; energy storage systems, respectively following several major advanced applications in grid. It is worth noting that these discussions are qualitatively analyze the relationship between the storage grid from the principle aspect, to achieve these functions, consider whether MW energy storage system and the load level, the capacity of the power grid matches.

#### 1) System peak adjustment

Trough in the event of load power; in order to improve the distribution network equipment asset utilization, energy storage could be applied as a means of "load shifting", and in a short time peak appears, release the power of the energy storage system to the grid; when the load valley appears, this energy storage system absorbs energy from the grid. To some extent, the energy storage system can "flatten" the difference between peak and valley of the system load, when there are two electricity price of peak and valley, storage and even achieve energy "buy low, sell high", ie, when the valley charging load, peak load discharge, reduced end-user electricity cost to some extent.

Peaking control needs match monitoring or scheduling system, due to the input of information there are two different implementations: Based on historical load curve energy





storage system developed to optimize scheduling curves, real-time load information to calculate the energy storage system based on output. In addition, the energy storage system based on active power output of the way and can be divided into two categories: one is the energy storage system is always involved in the valley adjusted to full-fat or full-absorbing form; another section of the energy storage system in real-time active power output, ensuring grid payload at a preset level.

### 2) Intermittent complementary application of new energy

In photovoltaic, wind energy represented by the new energy, the output power is not controllable, intermittent, volatile characteristics, is contrary to the basic requirements of the grid peak adjustment , there is a certain threat to the safe and stable operation of the grid. When this new energy storage and complementary "bundling" is running, you can change the output power characteristics of a certain degree of new energy sources to meet the expectations of the target grid, was "constant power characteristics" or "controlled power characteristics." conducive to the unified grid and safe and economic operation.

### 3) Primary and secondary frequency modulation (FM)

Power system load changes are the main cause of the power system frequency fluctuations due to the energy storage system can change very quickly in response to the power grid, and therefore have the ability to control the frequency of changes in different time scales. If energy storage system and monitoring system or scheduling system is compatible, FM function can be achieved.

Specifically, the first FM focused on change cycle within 10 seconds, to less extent changes in load weight, small-scale system frequency deviation for rapid adjustment to stabilize the instantaneous difference between the power output and the load. Compared to conventional generator speed achieved by a frequency modulation, the energy storage system is more suitable. Firstly, energy storage system operates in a non-rated conditions and also have a higher efficiency; Secondly, because the energy can be two-way mobility, energy storage systems can provide twice the rated capacity of the regulation; Thirdly, the energy storage system has the ability to regulate faster, usually operates from standby to full power within seconds. Primary Frequency designed primarily for local frequency of using negative feedback, with taking into account the other unit between FM (Droop coefficient, adjust the speed, etc.), battery charge and



discharge status, etc.

For battery energy storage systems, as opposed to the grid of large power capacity installed, its capacity is very small, the FM role is not yet clear, does not currently have an impact on other generators, but with the increasing storage system capacity in the future, and more energy storage system device put into operation, also need to have a stable load distribution function, to avoid conflict with other FM equipment.

The second FM is mainly for load classification of change cycle from 10 seconds to a few minutes and slowly varying component of ongoing changes in load control, the need to increase the AGC control functions on the basis of the primary FM, energy storage systems that receive AGC instructions, associated upload information: information actuator conditions, such as participation in AGC energy storage system running actual power generation, power generation constraints adjustment (adjustment range, adjustable rate), the control system operating status. AGC control commands issued, such as adjusting the power output of the power setpoint or lift command, control command change energy storage system operation or control system operating state.

#### 4) Static and dynamic reactive power control

Energy storage system and monitoring system or dispatch system cooperates each other; AVC system can accept reactive instructions participation of the whole network reactive power and voltage optimization control.

Under an emergency situation, the load side voltage drop severely, in order to reduce the load of low pressure trip, avoid voltage collapse, the energy storage system can be switched quickly to support emergency voltage mode, which does not need to cooperate with the monitoring system

#### 5) Standby heat System

Energy storage systems are used as a backup system to prevent accidents when the frequency load shedding, emergency reserve requirements can be a gap in the main power system, it could provide effective output within 3 to 5 seconds, which has a faster response than conventional spinning reserve requirements. Battery energy storage system can provide such



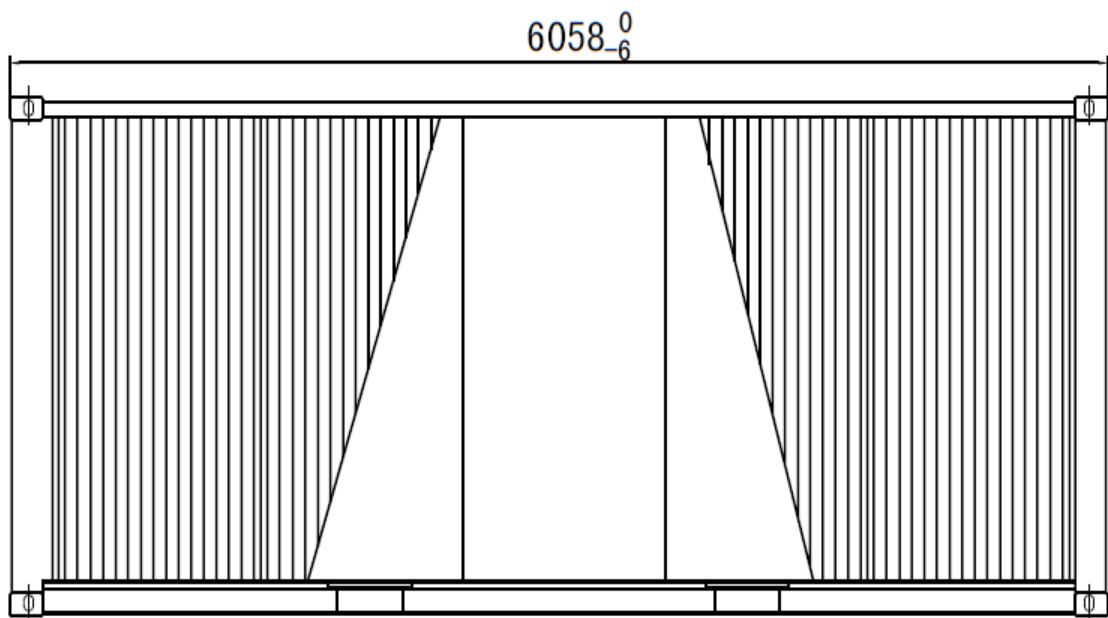
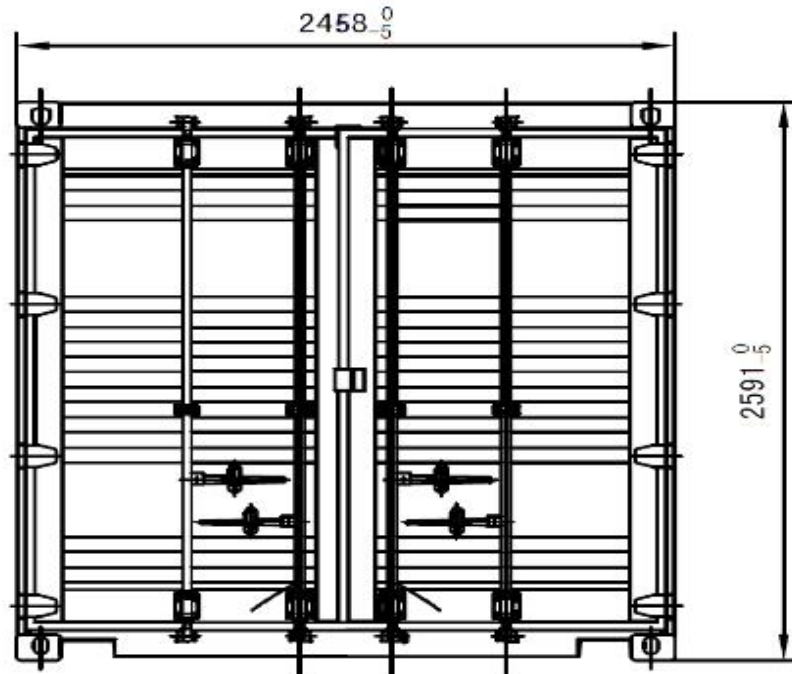


emergency reserve, reducing the load loss of the main unit failure. As a quick backup energy storage systems in the provision of output, requires the ability to maintain at least 15 minutes of full capacity output, ensuring complete backup unit can start synchronizing, synchronization, complete the process of load recovery. After 15 minutes, the energy storage system may gradually reduce to zero output. As quick standby, startup state needs SOC of the battery not less than 70%. After each backup run as fast, energy storage system will complete charge up to 100% of the SOC at night or load valley electricity.

## 6. Operating Parameters of Energy Storage System

Items		Specification	Remarks
AC Phase		3-Phase 3-wire	
Rated Power (KW)		100	
Grid Discharge Mode	Rated Voltage (V)	380	Effective Value
	Voltage Range (V)	340~410, AC	
	Rated Frequency (Hz)	50	
	Frequency Range (Hz)	47.5~51.5	
	Total Current Waveform Distortion Rate (THD) (%)	< 5%	When 30% to 100% of rated power, the background grid voltage of harmonic distortion is less than 2%
	Output Reactive Power (KVar)	-100~+100	The total reactive power range
Grid Charge Mode	Rated voltage (V)	380	
	AC Voltage Range (V)	350~420, AC	
	Frequency Range (Hz)	47.5~51.5	
	Maximum Power (KW)	100	
	Power Factor	0.97	Under Rated Power
AC Overload		110% 10 mins	
		120% 1 min	
Maximum Efficiency		> 92%	
Max.Short Circuit Current Peak		<2 times of Rated Current	
Common Mode Current		< 50mA	

## 7. Container Dimension of Energy Storage System (Unit: mm)



## 8. Installation & Debugging Notes

- During the installation process, system must be operated by qualified personnel and



- must comply with local regulations of the power industry or related conduct;
- Note the positive and negative mark, do not reverse the positive and negative, to avoid short-circuiting;
  - The system is for high-voltage direct current, in addition to professionals, not allowing other people to touch or operate, should stay away from system;
  - The initial capacity of the battery pack is for half capacity, the first use of the battery, the battery should be fully charged before use;
  - If system is in use, should stay away from fire, heat and water, if the battery leaks or emits an odor, you should immediately discontinue use and notify the relevant personnel to deal with;
  - Do not pierce the battery casing with a nail or other sharp object, not hammering or foot battery pack;
  - Not in any way related to disassemble the system unit, battery pack and battery;
  - If the battery pack gives off an odor, heat, deformation, discoloration or any other abnormalities occur should stop using it; if the battery electrolyte leakage splashing into the eyes, do not wipe, wash with water immediately and seek medical assistance. If not promptly treated, the eyes will hurt!
  - During system operation, if there is the odor or abnormal phenomenon, please power off immediately and inform the relevant personnel to deal with;

## 9. Maintenance

- If energy storage systems is in storage, the battery should be 40% to 60% of capacity;
- If the battery is stored for a long time, it should be charged every 3 months, The charge time is about 2.5 hours if the charge current is 160.0A;
- When the system is in operation, not allow to plug the plug-in, otherwise easily lead to security risks;
- When system is in operation, not allow to modify the important parameters on the control panel, otherwise affect the normal operation of the system;
- When system is in operation or maintenance, it must be performed by professionals.



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- During maintenance, please do not loading or handle battery, otherwise easily lead to degradation of system performance and security risks;
- If there is abnomal phenomenon in system operation, should contact us as soon as possible, is strictly prohibited without permission to disassemble related devices or remove any battery.

## 10. Product Responsibility

- Before installation, please read carefully the product specifications;
- The company assume no responsibility if there is any violation of the provisions of the relevant requirements of the product resulting from the operation of the accident;
- The company will inform you if the product specification content changes due to improving product quality or upgrades related technical parameters, for the latest product information, please contact our company;

If you have any questions, please contact the following address:

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